BAUMÜLLER

be in motion be in motion

# Converter

## BKD 6 / ... 7000
## BKF 12 / ... 7000

**Manual**

| | |
|---|---|
| **E** | 5.98066.07 |

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| | |
|---|---|
| Title | Manual |
| Product | Converter, BKD 6 / ... 7000 BKF 12 / ... 7000 |
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# 1

# CONVERTER DESCRIPTION

## 1.1 General

Baumüller 7000-series converters are mains-commutated converters for variable-speed microprocessor-controlled DC drives and available in single and four-quadrant versions. Both versions differ merely in the design of the armature control power unit.

The power unit of the single-quadrant converter BKD 6/…/…-7000 is designed as a fully controlled three-phase bridge connection (B6C), and in the case of the four-quadrant converter BKF12/../..-7000 as a circulating-current-free anti-parallel connection (B6C)2I.

A half-controlled double-pulse bridge B2HKF generally serves as field supply, and field current control is via the microprocessor.

The single-quadrant converters are designed with rated currents from 30 A to 2050 A, and the four-quadrant converters are available for rated currents from 30 A to 1650 A, allowing DC drives to be operated within an output range from approx. 5 kW to up to 800 kW at an armature voltage of 520 V in the case of the four-quadrant converter, and up to approx. 1100 kW at an armature voltage of 600 V in the case of the single-quadrant converter (operation on 500 V, 3~ industrial mains).

The converter series consists of a total of 4 power levels referred to as sizes I .. IV and differing in design and size of the power unit and control module arrangement.

In this type series, drive control, communication and general signal processing is handled by a powerful 16-bit microprocessor system located on the microprocessor board. Board and remaining electronic components such as power supply and field devices are identical for all converter sizes. The microprocessor board is a top print, allowing all relevant components to be accessible easily and from the front.

The converter operating software and the EEPROM with the machine-specific data records are located on a plug-in module designed to allow simple exchange.

Designed with the relevant analog setpoint and additional inputs and digital control inputs, the range of applications includes the replacement of existing analog converter series such as BKF 12/../2000, BKF 12/../3000, BKD 6/../2000 or BKD/BKF../6000.

The converters can also be combined with PCs, PLCs, NCs or CNCs. Adaptation to different bus systems may be via additional modules (option boards), for example, that may be optionally fitted to the microprocessor board.

## 1.2 Features

- Signal processing controlled by a powerful 16-bit microprocessor system

- Operation
  - Via integrated keypad, LED and 7-segment displays
  - Via RS232 PC interface, optionally menu-assisted via the
    - WINBASS operating program
  - Via RS 485 field bus interface, optionally via
    - USS protocol connection
    - One of the optionally available interface cards for BM CAN interface, PROFIBUS-DP, CANopen (in preparation)

- Modular software structure with freely interconnectable function blocks (e.g. adders, multipliers, dividers, …)

- Controller structures
  - Speed control via tachogenerator with/without field weakening
  - Speed control via incremental encoder with/without field weakening
  - Constant-field armature voltage control
  - Current control with/without field weakening
  - Freely configurable adaptive PI controller for higher-level control tasks

- 6 data records
  - Freely programmable for adaptation to different applications
  - Online change-over via serial interface or terminals even during operation

- Setpoint sources
  - 4 analog setpoint inputs
    - Differential inputs, ±10V, resolution 11 bit
    - Scaling, offset and polarity can be parameterised
    - 2 inputs variable from ±10 V to 0…20 mA or 4…20 mA
  - 6 internally fixed-programmable setpoints
  - Internal setpoint generator
  - Internal motorised potentiometer
  - RS 485 field bus interface at basic unit or optional plug-in interface cards

- 2 ramp generators
  - Ramp generator A with separately adjustable ramp-up and ramp-down times. Additionally with separately adjustable roundings and 2 selectable parameter sets.
  - Ramp generator B with separately adjustable ramp-up and ramp-down times.

- Adaptive speed controller with P/PI characteristic and D component for actual-value input.

- Microprocessor-controlled field supply, with or without field weakening as well as standstill field.

- 6 analog outputs.
  - 4 programmable analog outputs, ±10 V, 10 mV resolution.
  - 2 fixed analog outputs, direct analog signal, for actual speed (tachogenerator only) and armature current.

- Mains and connection monitoring at the AC and DC side (also for tachogenerator connection).

- Control via decoupled, partially programmable switching inputs.
  - 4 fixed digital inputs for converter enables (quick stop, main contactor ON/OFF, controller enable, pulse enable)
  - 8 freely programmable digital inputs.

- 6 freely programmable digital outputs.

- 2 fixed relay outputs for ready to operate (terminal strip X2) and main contactor ON (terminal strip X5).

- Connections
  - RS485 interface at the basic unit for USS protocol connection, optional plug-in interface cards for BM-CAN interface, PROFIBUS-DP, CANopen (in preparation).
  - RS232 interface for drive parameterisation (PC).
  - Incremental encoder input for:
    - 5 V differential signal/ RS422
    - 24 V single-ended
  - Decoupled incremental encoder output / RS422 signal
  - Tachogenerator input up to max. 240 $V_{DC}$
  - Adapter board for control connections
  - Custom-tailored if required (e.g. plugs instead of print terminals)

- Converters BKD and BKF completely identical except for the power unit.

## 1.3 Options

- Operating and service software
- Option boards
  - Field bus interface for BM-CAN interface, PROFIBUS-DP, CANopen

## 1.4 UL listed converters

- Up to now the following converters are UL listed
  - BK.../0030/...
  - BK.../0050/...
  - BK.../0080/...
  - BK.../0100/...
  - BK.../0140/...
  - BK.../0200/...
  - BK.../0240/...
  - BK.../0340/...
  - BK.../0450/...
  - BK.../0550/...
  - BK.../0650/...

Supplementary notes complying with UL508C:

- Connection cables:
  Use only 600C/750C copper cables
- Torques for power connections of current bars:
  Connection screw M8: 10 Nm
  Connection screw M10: 20 Nm
- Maximum short circuit current of the feeding mains:

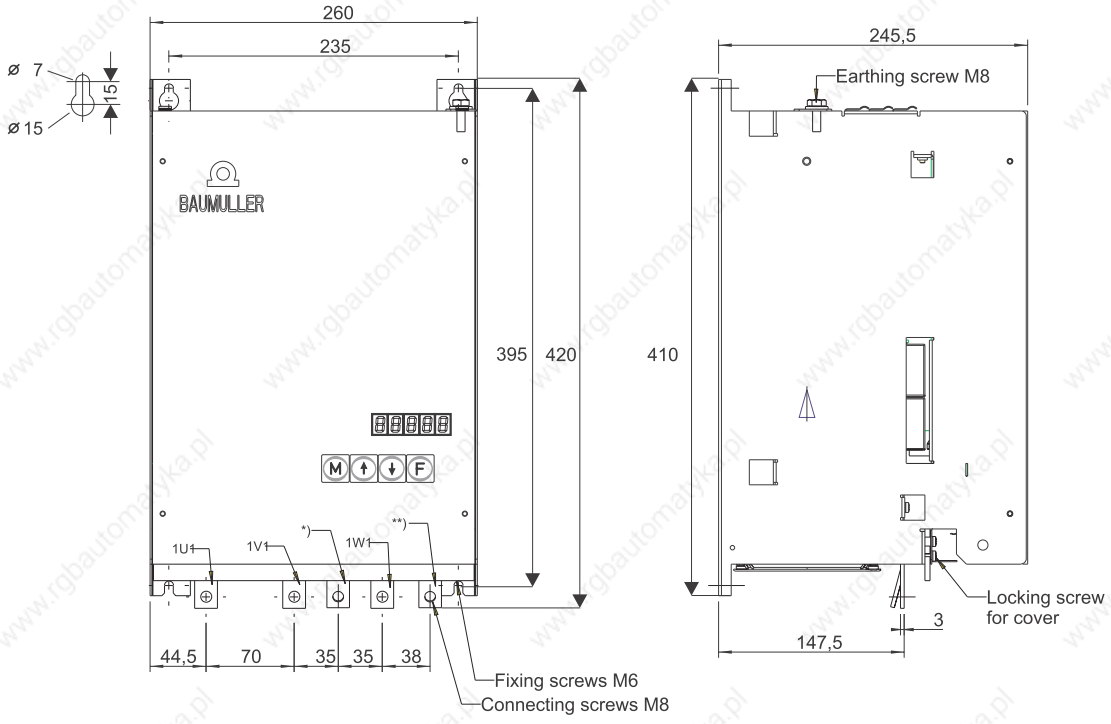
| Unit | Short circuit current in A |
|---|---|
| BK.../0030/... | 5 kA |
| BK.../0050/... | 5 kA |
| BK.../0080/... | 5 kA |
| BK.../0100/... | 10 kA |
| BK.../0140/... | 10 kA |
| BK.../0200/... | 10 kA |
| BK.../0240/... | 10 kA |
| BK.../0340/... | 18 kA |
| BK.../0450/... | 18 kA |
| BK.../0550/... | 30 kA |
| BK.../0650/... | 30 kA |

# ASSEMBLY

## 2.1 Dimensions

BKD6 and BKF12 / ... 7000, size I (30 A to 200 A)

When mounting, leave 150 mm free space for air circulation at the top and bottom of the converter




*) BKF 1C1(1D1)
BKD 1C1

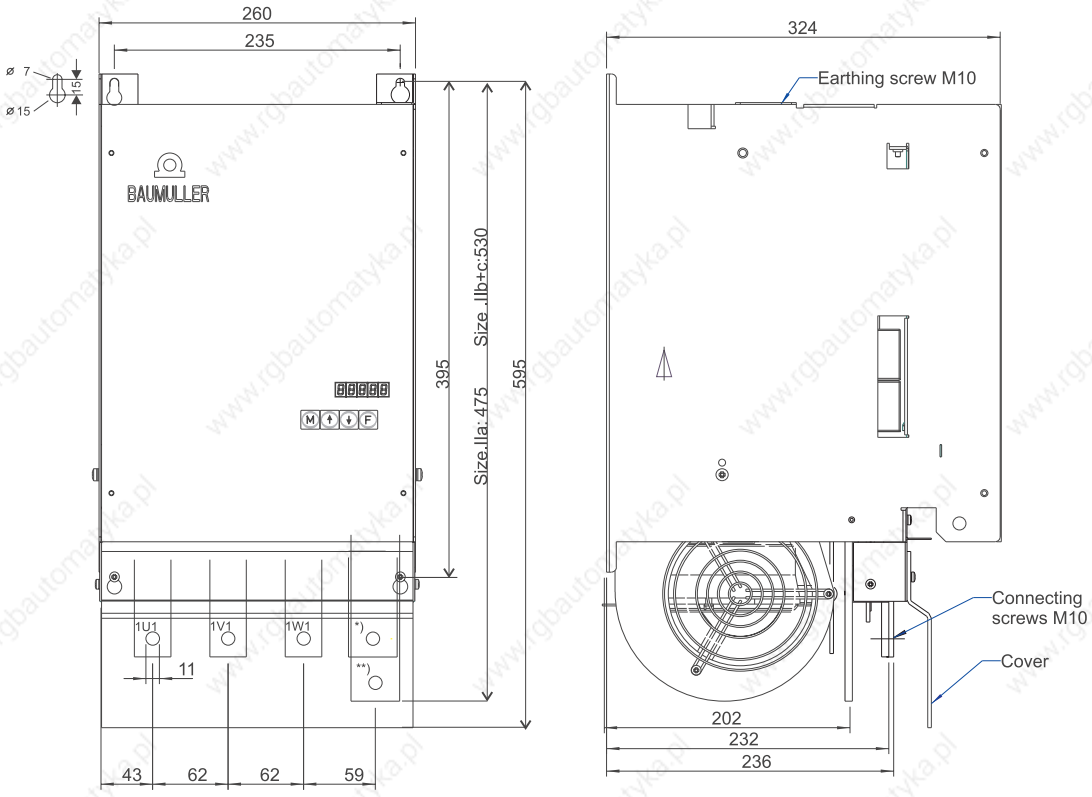
**) BKF 1D1(1C1)
BKD 1D1

Alterations reserved!

Illustration 1: Dimensions, size 1

BKD6 und BKF12 / ... 7000, Größe II (240 A to 700 A)

BKD6 und BKF12 / ... 7000, Größe II c (800 A + 950 A)




*) BKF: 1D1(1C1)
BKD: 1C1

**)BKF: 1C1(1D1)
BKD: 1D1

Alterations reserved!

Illustration 2: Dimensions, size 2

## Controller and field supply, sizes III, IV (750 A to 2050 A)

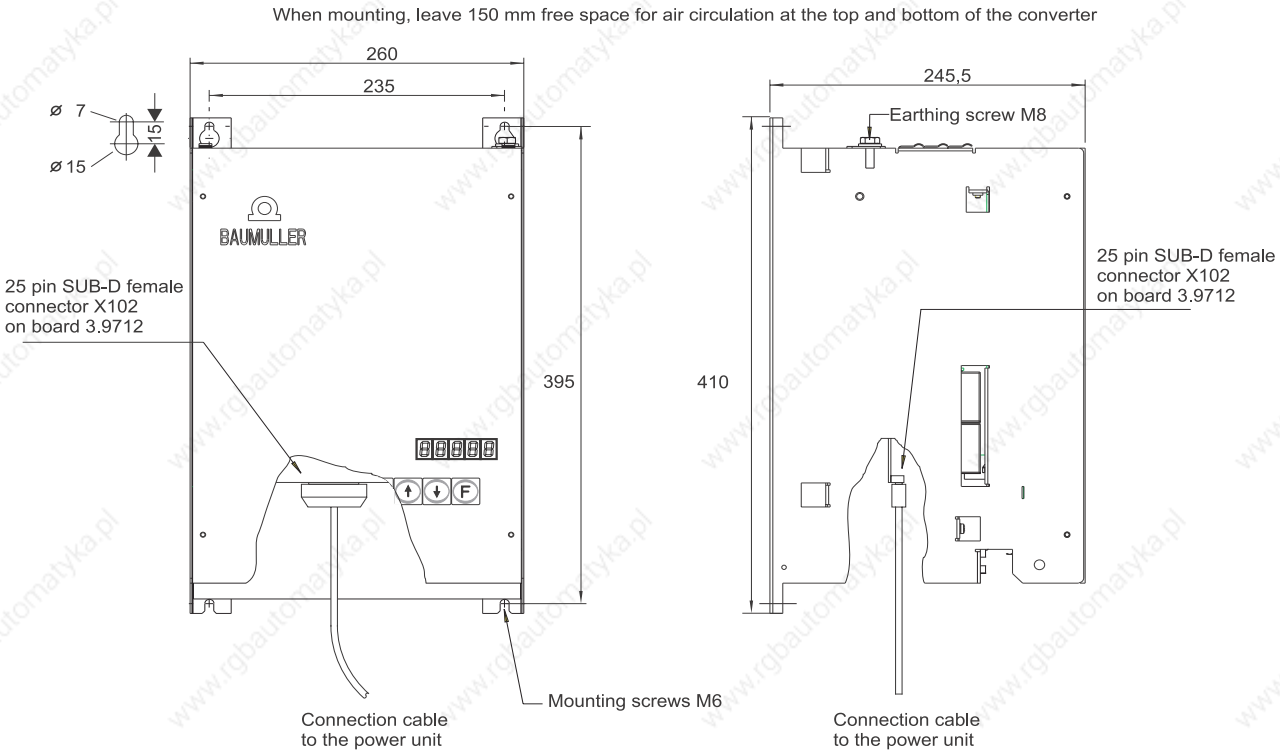



Illustration 3: Dimensions controller and field supply, sizes III, IV

Power unit BKD6 ... 7000, size III (750 A and 920 A)

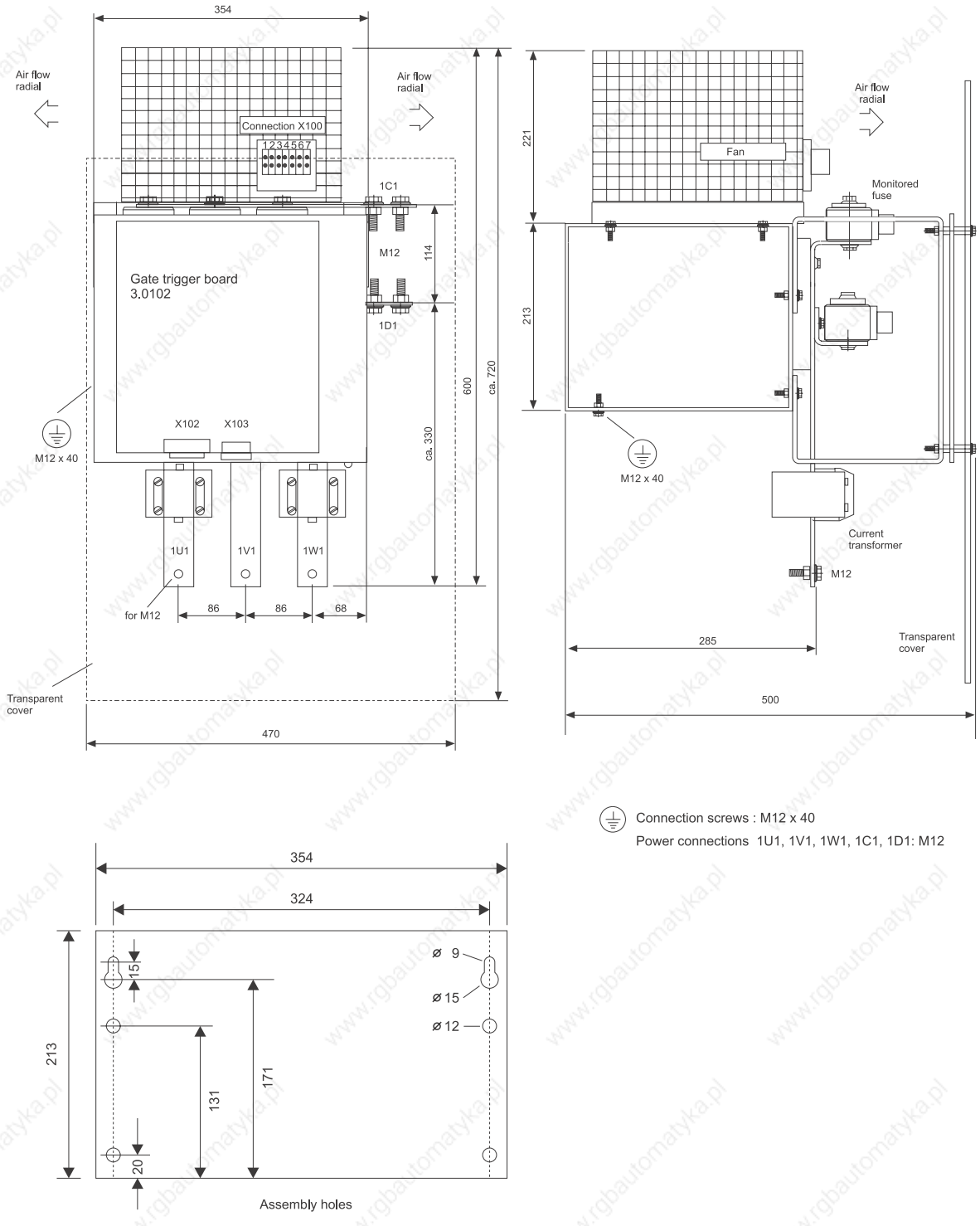



Abbildung 4: Dimensions power supply BKD 6, size III (750 A, 920 A)

Power unit BKD 6 / ... 7000, size III (1100 A)

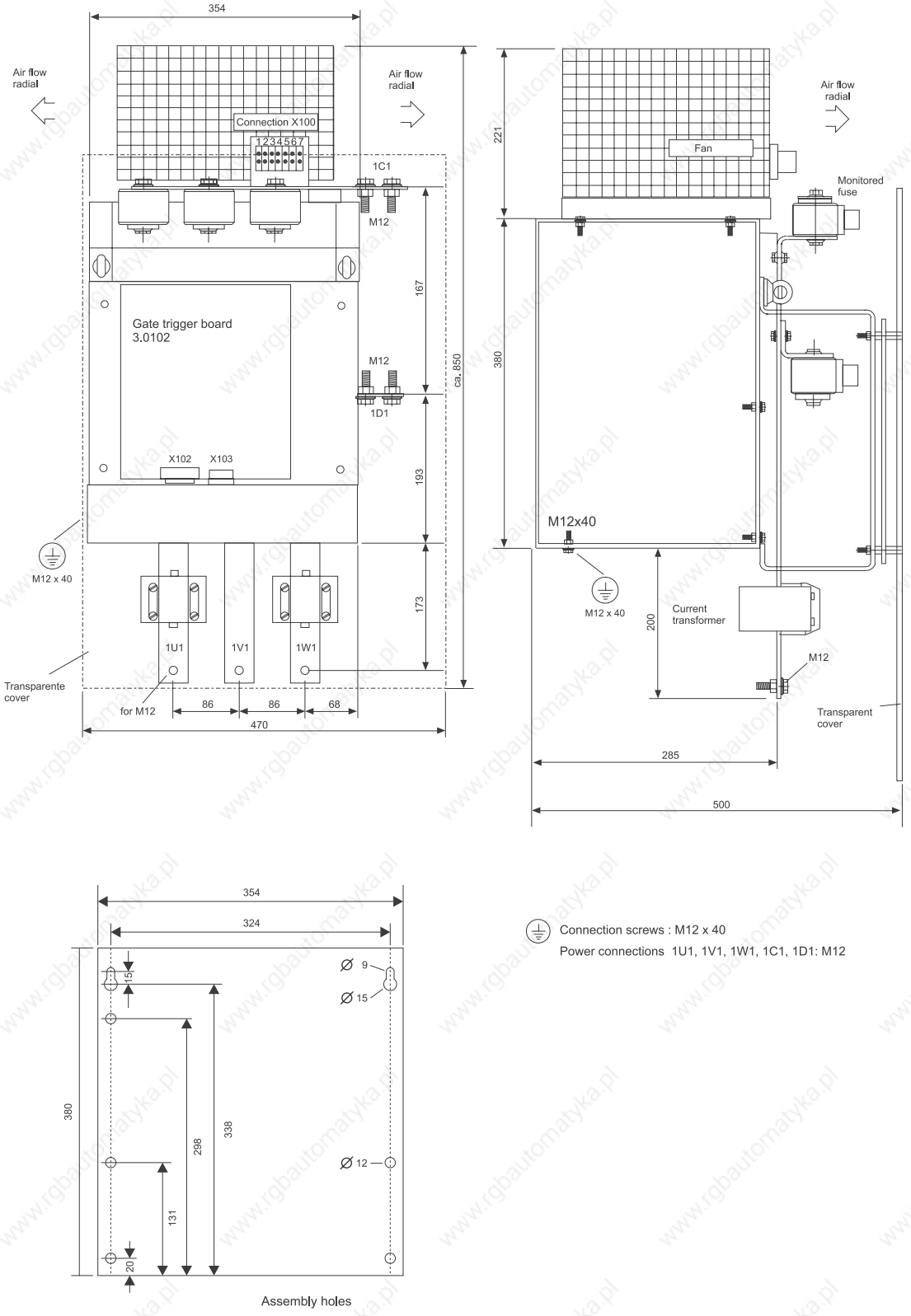
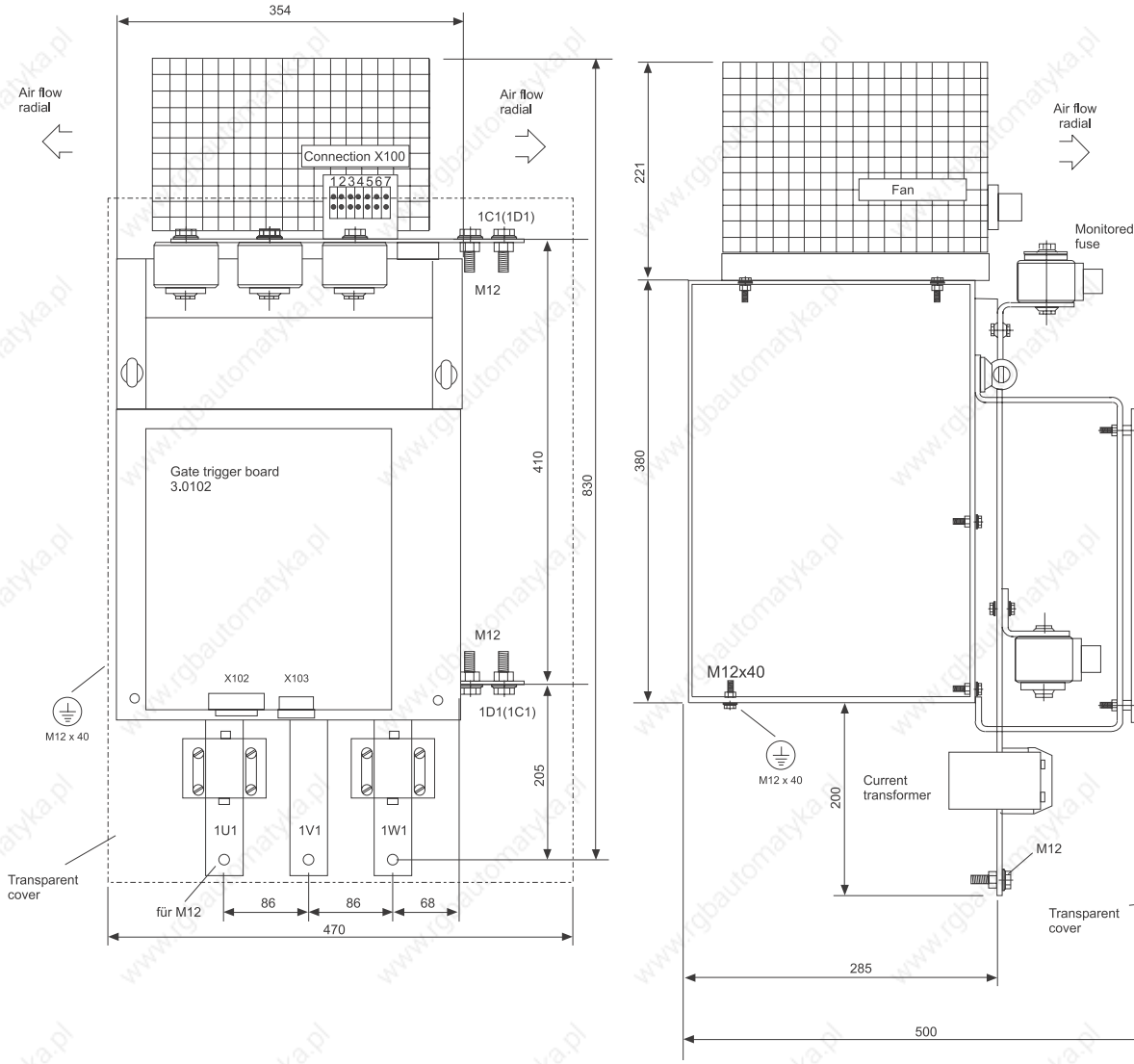
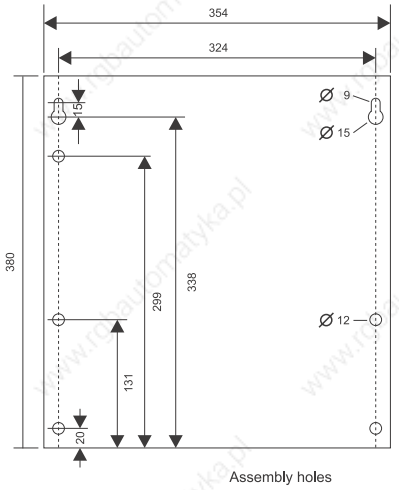



Illustration 5: Dimensions power unit BKD 6, size III (1100 A)

Power unit BKF 12, size III (850 A)




Connecting screws M12 x 40
Power connections 1U1, 1V1, 1W1, 1C1(1D1), 1D1(1C1) : M12

Abbildung 6: Dimensions power unit BKF 12, size III (850 A)

Power unit, size IV

| | |
|---|---|
| BKD 6 / ... / 7000 | 1550 A, 1750 A, 2050 A |
| BKF 12 / ... / 7000 | 1250 A, 1400 A, 1650 A |

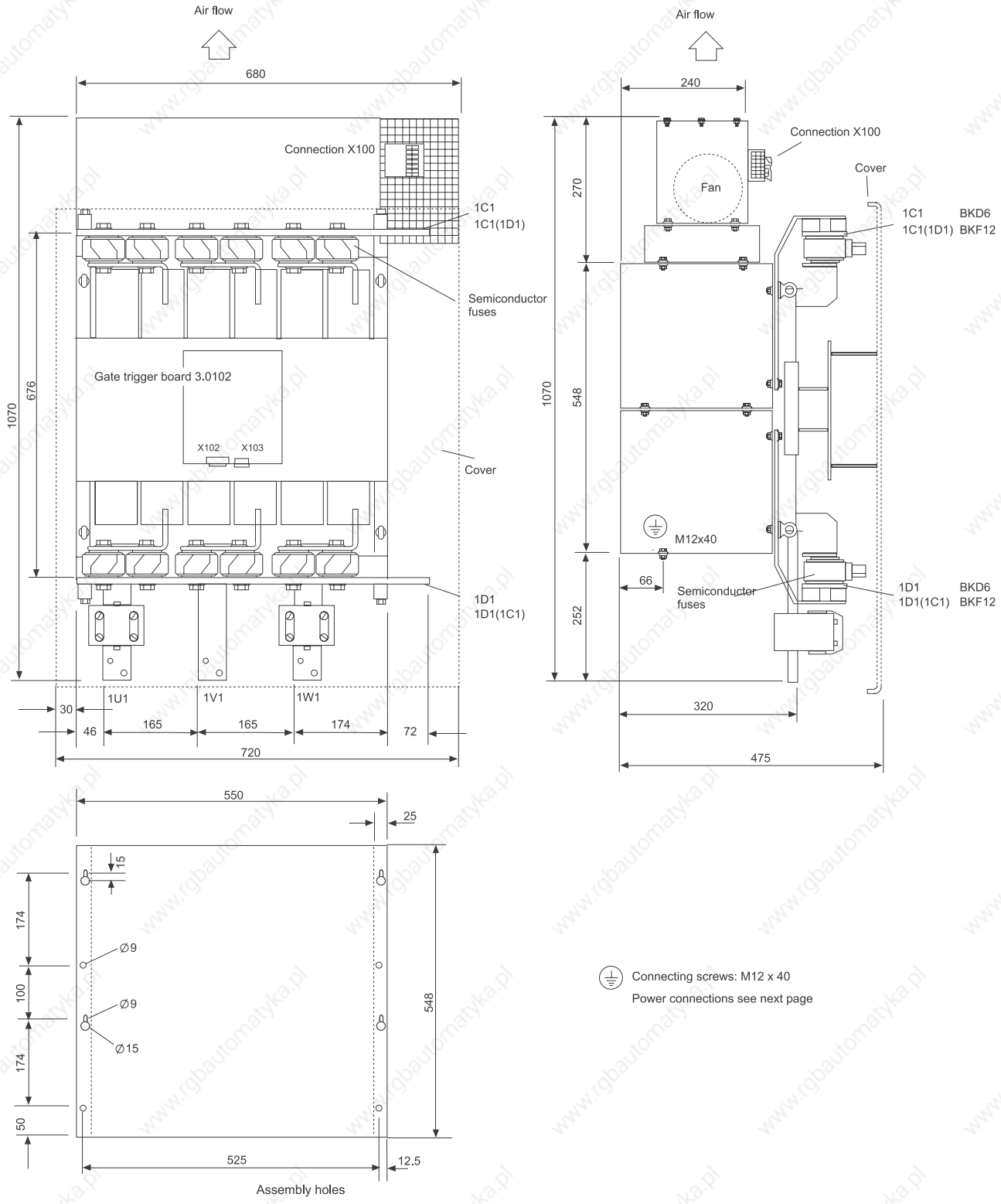



Abbildung 7: Dimensions power unit, size IV

## 2.2 Power connections

Power connections, size IV

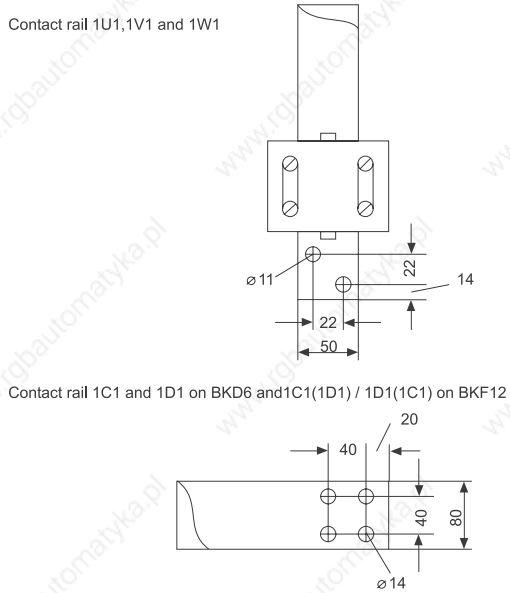



Illustration 8: Dimensions power connections, size IV

Optionally following angle bars are available connecting the DC contact rails 1C1 and 1D1:
Article no.: 1231965

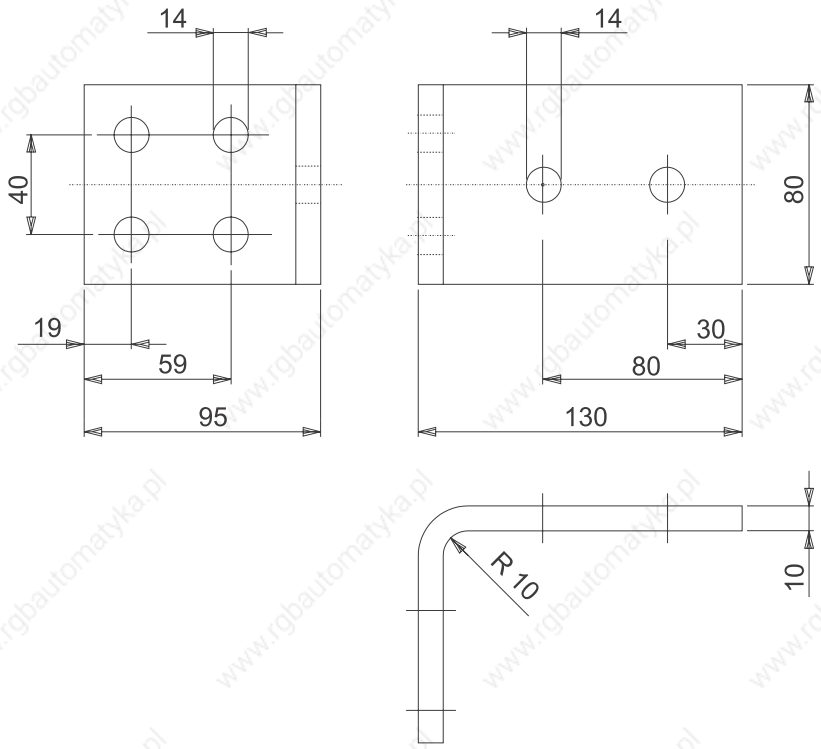



Illustration 9: Dimensions connection angle bar, size IV

Using the angle bars is independent of the kind of electrical terminal at the DC current bars:

When using a crimp connection the distance of the mounting holes at the bars 1C1 and 1D1 could be too small for the assembly.

## 2.3 Weights

- Size I

  17 kg

- Size II

  28 kg ... 32 kg

- Power unit, sizes III and IV:

| | | |
|---|---|---|
| Size III: | BKD | 43 kg ... 54 kg |
| | BKF | 55 kg |
| Size IV: | BKD | 124 kg ... 128 kg |
| | BKF | 124 kg ... 130 kg |

- Control board, sizes III and IV:

| | |
|---|---|
| Sizes III, IV: | 13 kg |

## 2.3 Weights

# 3

# INSTALLATION

## 3.1 Connection instructions

**Plug-in jumpers W500 and W501**

**W501**: Reference point for control inputs X2: 15…26

is fitted if the +24 V for the converter enables are drawn from the converter (X1: 25, 26); do not fit if the controller is directly enabled by the PLC or the control !
Reference potential in this case are terminals X2: 13, 14 (Bse); the jumper is fitted in the factory.

**W500**: Defining the reference point for control input X2: 18 (pulse enable).

Jumper A-B selects the reference point input with W501 for the other control inputs.

Jumper B-C fixes the reference point to the internal reference ground (M24V), allowing pulse enable connection to the 24 V of the converter even if the other enables are supplied by the higher-level control.

This approach ensures that voltage failures in the external control, which would otherwise lead to a pulse inhibit, have no adverse effect on the converter.

Uncontrolled converter disable may lead to converter damage.

The pulse enable is a pure hardware function that acts directly upon the power stage (pulse generation) independent of the converter operating state. Suppressing the firing pulses during drive deceleration may lead to fuses blowing in the mains supply line. In extreme cases, the thyristors may be damaged (shoot-through)!

**Terminal strip X1**: Print terminals

Conductor cross-sectional area 0.14 ... 1.5 $mm^2$

| | | |
|---|---|---|
| X1: 1 | Setpoint supply | Speed setpoint voltage stabilised, -10 V / 10 mA |
| X1: 2 | Setpoint supply | Speed setpoint voltage stabilised, +10 V / 10 mA |
| X1: 3 | Actual speed | Polarity negative in clockwise motor rotation (A-side), available for tachogenerator connection only, max. 4 mA |
| X1: 4 | Reference potential | Bsa for actual speed |
| X1: 5 | Actual armature current | 0 ... +10 V, max. 4 mA; 10 V corresponding to 200 % of the rated converter current (unsmoothed $I_{actual}$, observe current ripple) |
| X1: 6 | Reference potential | Bsa for actual armature current |
| X1: 7 | Analog output 1 | programmable via parameters P 461...P 465<br>0 … +/-10 V, max 4 mA; resolution 10 mV |
| X1: 8 | Reference potential | Bsa for analog output 1 |
| X1: 9 | Analog output 2 | programmable via parameters P 466...P 470<br>0 … +/-10 V, max 4 mA; resolution 10 mV |
| X1: 10 | Reference potential | Bsa for analog output 2 |
| X1: 11 | Analog output 3 | programmable via parameters P 471...P 475<br>0 … +/-10V, max 4 mA; resolution 10 mV |
| X1: 12 | Reference potential | Bsa for analog output 3 |
| X1: 13 | Analog output 4 | programmable via parameters P 476...P 480<br>0 … +/-10 V, max 4 mA; resolution 10 mV |
| X1: 14 | Reference potential | Bsa for analog output 4 |
| X1: 15 | Reference potential | Bsa |
| X1: 16 | Reference potential | Bsa |
| X1: 17 | Analog input 1 | Difference amplifier input - |
| X1: 18 | | Difference amplifier input +<br>with S800 it can be changed over<br>from +/-10 V<br>to 0 … 20 mA<br>or 4 … 20mA |
| X1: 19 | Analog input 2 | Difference amplifier input - |
| X1: 20 | | Difference amplifier input +<br>with S800 it can be changed over<br>from +/-10 V<br>to 0 … 20 mA<br>or 4 … 20 mA |
| X1: 21 | Analog input 3 | Difference amplifier input - |
| X1: 22 | | Difference amplifier input +<br>+/-10 V |
| X1: 23 | Analog input 4 | Difference amplifier input - |
| X1: 24 | | Difference amplifier input +<br>+/-10 V |
| X1: 25 | +24 V | Use for digital input control only !<br>Current limitation starts at 300 mA |
| X1: 26 | +24 V | |

**Terminal strip X2:** Print terminals

Conductor cross-sectional area 0.14 ... 1.5 $mm^2$

| | | |
|---|---|---|
| X2: 1 | Ready | NO contact |
| X2: 2 | | NC contact |
| X2: 3 | | Common |

Relay picks up when ready
Relay contacts can be loaded with 24 V/1 A

| | | |
|---|---|---|
| X2: 4 | +24 V ext. | for external digital output supply<br>insert jumper W600 to B-C |

Programmable digital outputs (P 421...P 444)

| | |
|---|---|
| X2: 5 | Dig. output 1 |
| X2: 6 | Dig. output 2 |
| X2: 7 | Dig. output 3 |
| X2: 8 | Dig. output 4 |
| X2: 9 | Dig. output 5 |
| X2: 10 | Dig. output 6 |

Load of digital outputs:
for internal supply: max. 20 mA per output
for external supply: max. 100 mA per output
Signal level:
H signal: 15 V…30 V
L signal: 0 V…3 V

| | | |
|---|---|---|
| X2: 11 | Reference potential | Bsd for digital outputs |
| X2: 12 | Reference potential | Bsd for digital outputs |
| X2: 13 | Reference potential | Bse for digital inputs |
| X2: 14 | Reference potential | Bse for digital inputs |

Jumper W501 on jumper A-B must be fitted if the internal 24 V of X1: 25, 26 is used.
If the control's 24 V is used, W501 must be fitted on jumper B-C so that the control is isolated from the electronics ground (optocoupler inputs). A 50 V potential difference with regard to the electronics ground is permissible for isolation.

| | |
|---|---|
| X2: 15 | Main contactor ON |
| X2: 16 | Controller enable |
| X2: 17 | Deactivate<br>Quick stop |
| X2: 18 | Pulse enable |

Enable commands:
Input signal level:
H signal: 13 V … 30 V
L signal: 0 V … 7.5 V

| | |
|---|---|
| X2: 19 | Dig. input 1 |
| X2: 20 | Dig. input 2 |
| X2: 21 | Dig. input 3 |
| X2: 22 | Dig. input 4 |
| X2: 23 | Dig. input 5 |
| X2: 24 | Dig. input 6 |
| X2: 25 | Dig. input 7 |
| X2: 26 | Dig. input 8 |

Programmable digital inputs
(Parameters P 401...P 408)
Signal level:
H signal: 13 V … 30 V
L signal: 0 V … 7.5 V

**Terminal strip X3:**Plug-in terminal
Conductor cross-sectional area 0.2 … 2.5 $mm^2$

| | | | |
|---|---|---|---|
| X3: | 1 | tachogenerator connection | $U_{Tacho}$ 60 V ... 240 V |
| X3: | 2 | tachogenerator connection | $U_{Tacho}$ 15 V ... 75 V |
| X3: | 3 | tachogenerator connection | $U_{Tacho}$ 4 V ... 20 V |
| X3: | 4 | Reference potential | Bsa for tachogenerator connection |

**RS 232 interface**

**SUB-D plug X23**: Female connector, 9pole

Supply voltage on controller potential !

Interface cable PC power unit 3 m article no. 213846
other lengths on demand

| Pin no. | Assignment |
|---|---|
| 1 | Not assigned |
| 2 | TxD RS232 |
| 3 | RxD RS232 |
| 4 | Not assigned |
| 5 | Bsd |
| 6 | +5 V |
| 7 | Not assigned |
| 8 | Not assigned |
| 9 | Not assigned |

**RS485 interfaces for USS protocol connection**

**SUB-D plug X29A**: female connector, 9pole

**SUB-D plug X29B**: male connector, 9pole

Supply voltage isolated

(50V to controller electronics)

| Pin no. | Assignment |
|---|---|
| 1 | -TxD RS485 |
| 2 | +5 V RS485 |
| 3 | Ground RS485 |
| 4 | Ground RS485 |
| 5 | -RxD RS485 |
| 6 | +RxD RS485 |
| 7 | Ground RS485 |
| 8 | Ground RS485 |
| 9 | +TxD RS485 |

**Incremental encoder input**

RS422 interface for incremental encoder with rectangular pulses

**SUB-D plug X24**: female connector, 15-pole
Supply voltage on controller potential !

| Pin no. | Assignment |
|---|---|
| 1 | Ground |
| 2 | +5 V encoder supply |
| 3 | RS422 incremental encoder +U0 |
| 4 | RS422 incremental encoder -U0 |
| 5 | RS422 incremental encoder +U2 |
| 6 | Not assigned |
| 7 | RS422 incremental encoder -U1 |
| 8 | RS422 incremental encoder +U1 |
| 9 | RS422 incremental encoder -U2 |
| 10 | Not assigned |
| 11 | Not assigned |
| 12 | +5 Sensor |
| 13 | 0V Sensor |
| 14 | Not assigned |
| 15 | Not assigned |

**Incremental encoder output**

**SUB-D plug X27**: male connector, 15-pole
Supply voltage on controller potential !

| Pin no. | Assignment |
|---|---|
| 1 | Ground |
| 2 | Not assigned |
| 3 | Incremental encoder +U0 |
| 4 | Incremental encoder -U0 |
| 5 | Incremental encoder +U2 |
| 6 | Not assigned |
| 7 | Incremental encoder -U1 |
| 8 | Incremental encoder +U1 |
| 9 | Incremental encoder -U2 |
| 10 | Not assigned |
| 11 | Not assigned |
| 12 | Not assigned |
| 13 | Not assigned |
| 14 | Not assigned |
| 15 | Not assigned |

**Terminal strip X4:** Print terminal
Conductor cross-section 0.2 … 4.0 $mm^2$

| | | |
|---|---|---|
| X4: 1 | 2U1 | Mains connection L1 |
| X4: 2 | 2W1 | Mains connection L3 |
| X4: 3 | 2C1 | + connection of field winding (F1) |
| X4: 4 | 2D1 | - connection of field winding (F2) |

**Terminal strip X5:** Plug-in terminal

Conductor cross-section 0.2 … 2.5 $mm^2$

| | | |
|---|---|---|
| X5: 1 | 4U1 | Fan connection L |
| X5: 2 | N | Fan connection N |

for externally ventilated units (from 140A)

| Converters | power consumption |
|---|---|
| 140 A, 200 A | 230 V / 0.40 A |
| 240 A, 340 A | 230 V / 0.50 A |
| 450 A, 550 A, 650 A, 700 A | 230 V / 0.85 A |

| | | | |
|---|---|---|---|
| X5: 3 | Not assigned | | |
| X5: 4 | Main contactor | NO contact | Main contactor K1 control |
| X5: 5 | ON | NC contact | Relay contacts can withstand $230V_{AC}$ / $1A_{AC}$ |
| X5: 6 | Relay | Common | or $24V_{DC}$ / $1A_{DC}$ (non-inductive load); The relay is activated by the control command 'Main contactor ON' at terminal X2: 15 |

**Power supply unit X6**:

| | | |
|---|---|---|
| X6: 1 | 3U1 | Power supply unit connection L1 |
| X6: 2 | Not assigned | |
| X6: 3 | 3W1 | Power supply unit connection at L3 |

Connect L1 and L3 in phase with field and armature supply
(refer to ▹3.3 Connection diagrams◃ from page 33)

**External +24V X7**: (optional for electronics supply)

| | | | |
|---|---|---|---|
| X7: 1 | +24 V ext. add. | | Required for converters with field bus connection |
| X7: 2 | Reference voltage | Bsd | if, while the power section supply is switched off, communication must be maintained at X6: 1,3. |

### Armature and field connections

| | | |
|---|---|---|
| 1U1<br>1V1<br>1W1 | Connections of the thyristor set | Connect via choke D1, fuses F1 and main contactor K1 to the three-phase mains L1, L2, L3.<br>Observe clockwise rotating field and in-phase condition with power supply unit and field supply! Terminal screws refer to ▹2.1 Dimensions◃ from page 11 |
| 1C1, 1D1 / 1C1(1D1), 1D1(1C1) | Motor connections | 1C1 / 1C1(1D1) is positive during clockwise rotation |
| F1 | Phase fuses | refer to ▹3.5 Semiconductor protection fuses◃ from page 49. |
| F2 | Armature circuit fuses | For recommendations refer to ▹3.5 Semiconductor protection fuses◃ from page 49. The BKD converter has no armature circuit fuses F2 |
| K1 | Main contactor | is operated in current-free condition, isolates the power unit |
| D1 | Three-phase current mains choke | For recommendations refer to ▹3.6 Mains chokes◃ from page 52, reduces converter disturbances of the supplying mains and protects the thyristors from impermissible rates of current rise. The specified rated currents refer to the DC side. |
| L1, L2, L3 | Cable conductors | Cross-section as per DIN EN 60204 part 1 / VDE 0113 part 1 / 06.93, sections 14 and 15, appendix C, and VDE 0298 / part 4 |
| 1B1, 2B2 | Motor connections | Cross-section as per DIN EN 60204 part 1 / VDE 0113 part 1 / 06.93, sections 14 and 15, appendix C, and VDE 0298 / part 4;<br>connection 1B1 positive for clockwise shaft rotation |
| PE | PE conductor connection | Cross-section as per DIN EN 60204 part 1 / VDE 0113 part 1 / 06.93, section 8.2.2, observing pr EN 50178 / VDE 0160 / 11.94, sections 5.3.2.1 and 8.3.4.4; terminal screw refer to ▹2.1 Dimensions◃ from page 11 |
| F3 | Semiconductor fuse in field connection | 2 x screw-in fuses 5SD4.. 16 A … 30 A / 500 V~, dependent on field converter rated current, refer to ▹3.5 Semiconductor protection fuses◃ from page 49. |
| F4 | Line protection | Fuse 0.4 A mtr / 500 V or motor protection switch 0.4 A … 0.63 A |
| F5 | Backup fuse | for fan |

| Converters | Fuse |
|---|---|
| 140 A, 200 A | 230 V / 0.40 A or motor protection switch |
| 240 A, 340 A | 230 V / 0.50 A or motor protection switch |
| 450 A, 550 A, 650 A, 700 A | 230 V / 0.85 A or motor protection switch |

| | | |
|---|---|---|
| F1, F2 | Connection Field winding | Cross section as per DIN EN 60204 part 1 / VDE 0113 part 1 / 06.93, sections 14 and 15, appendix C, and VDE 0298 / part 4. Connection F1 positive for clockwise shaft rotation. |
| D2 | Field mains choke | one choke in one supply line, designed in accordance with the field unit rated current, refer to section on mains chokes. |

## 3.2 Location diagrams

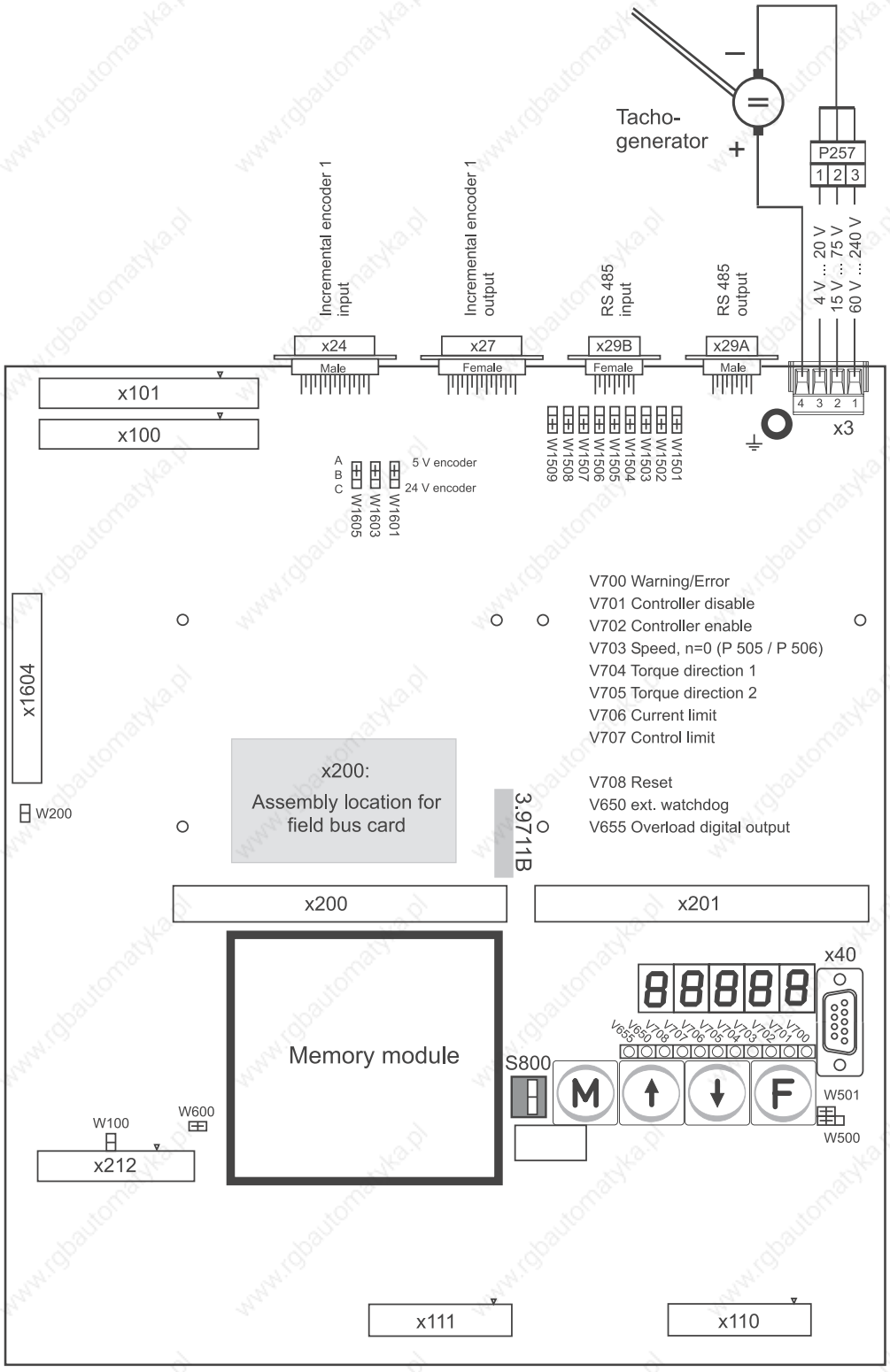
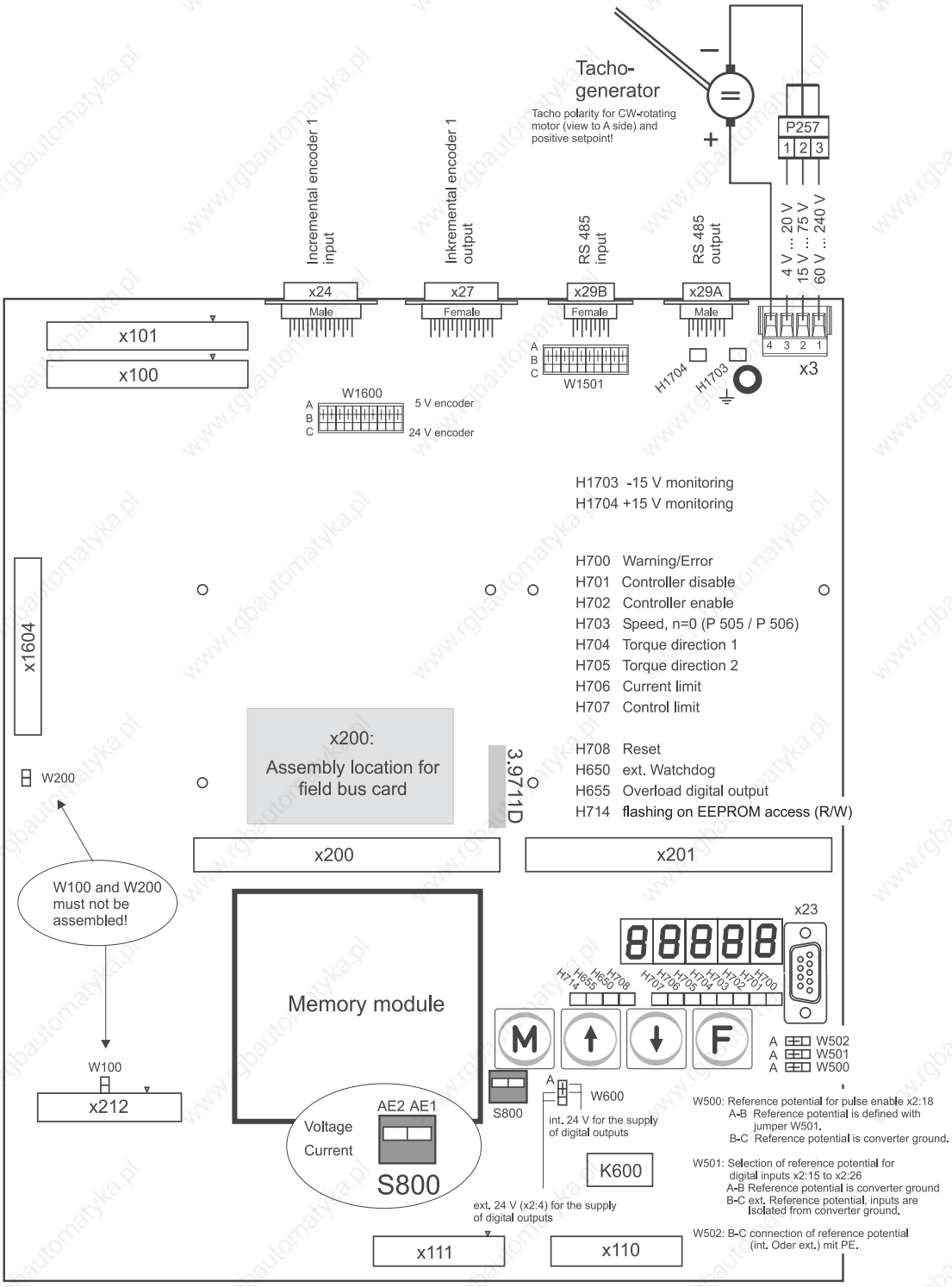



Illustration 10: Location diagram, board 3.9711B




PC cable (at X23): 3 m article-no. 213846

Illustration 11: Location diagram, board 3.9711D

**Plug-in jumpers board 3.9711:**

W100 Not allowed to be fitted!

W200 For operation of the power unit the jumper must not be fitted!
For a software update of the power unit the plug-in jumper must be fitted before the switch-on of the power supply. Remove the plug-in jumper after software update. Fit and remove plug-in jumper only in voltage free state.

W500 Reference point for pulse enable of input X2: 18

- A-B The reference point is determined by plug-in jumper W501
- B-C The reference point is identical with the unit reference point, indepentent of W501

W501 Reference point for digital inputs X2: 15 bis X2: 26

- A-B The reference point is identical with the unit reference point
- B-C External reference point (X2: 13 und X2: 14), the inputs are not related to the reference point of the unit (electrically insulated, max. 50 V potential difference are permitted)

W502 Connection of X2: 13 und X2: 14 with PE

- A-B No connection with PE
- B-C Terminals are connected with PE

W600 Supply digital outputs X2: 5 up to X2: 10

- A-B Unit internal supply of digital outputs, max. 20 mA per output
- B-C External supply of digital outputs, may. 100 mA per output

  When using external supply of the digital outputs the reference of the external voltage must be connected with the unit reference (X2: 11 up to X2: 14). The outputs cannot be electrically insulated from the unit reference.

W1501 not fitted

W1600 Selection of levels of incremental encoder 1 (at X24)

- A-B Encoder signal 5 V (differential signal)
- B-C Encoder signal 24 V (single ended)

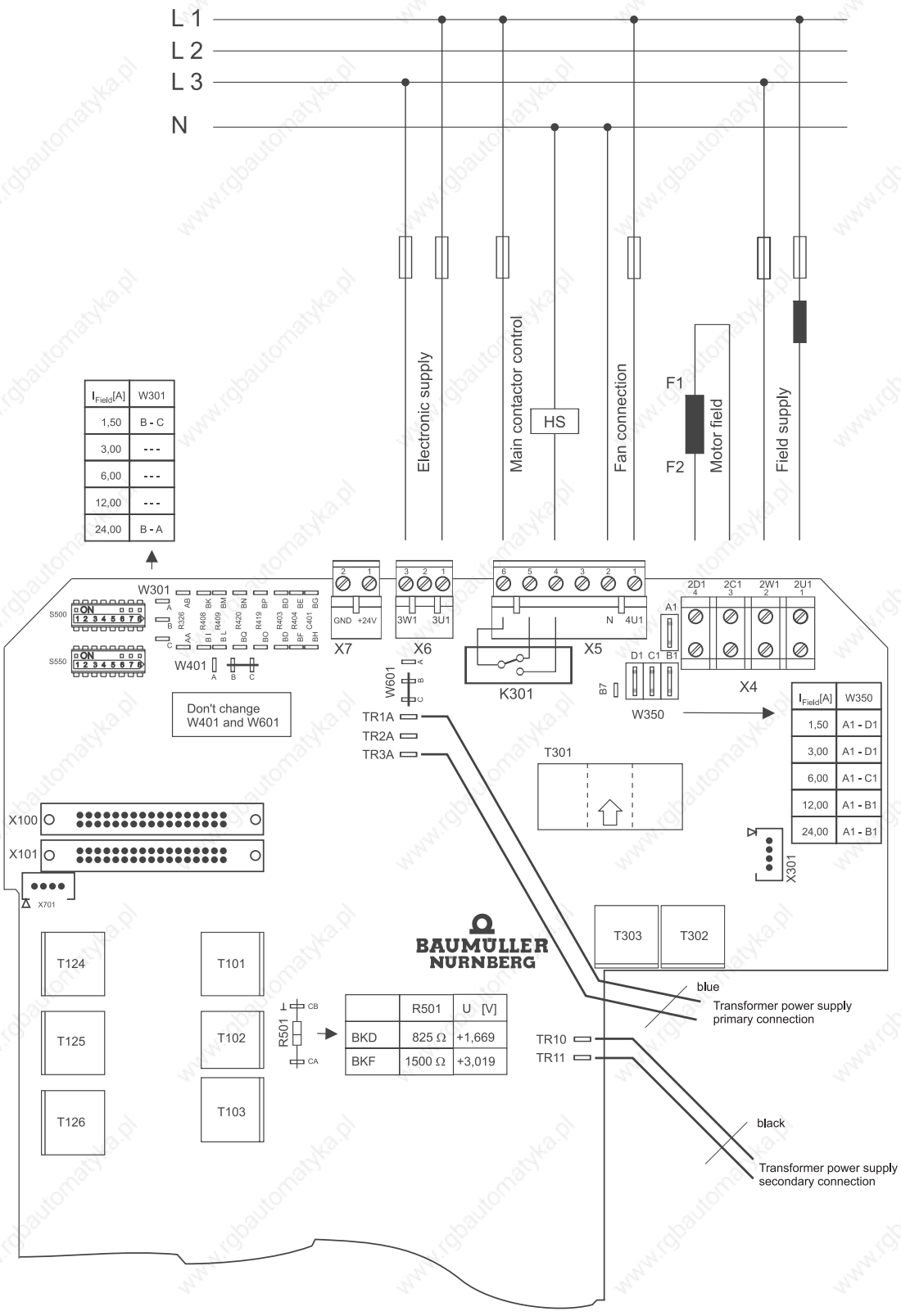



Illustration 12: Location diagram, board 3.9712B

## 3.3 Connection diagrams

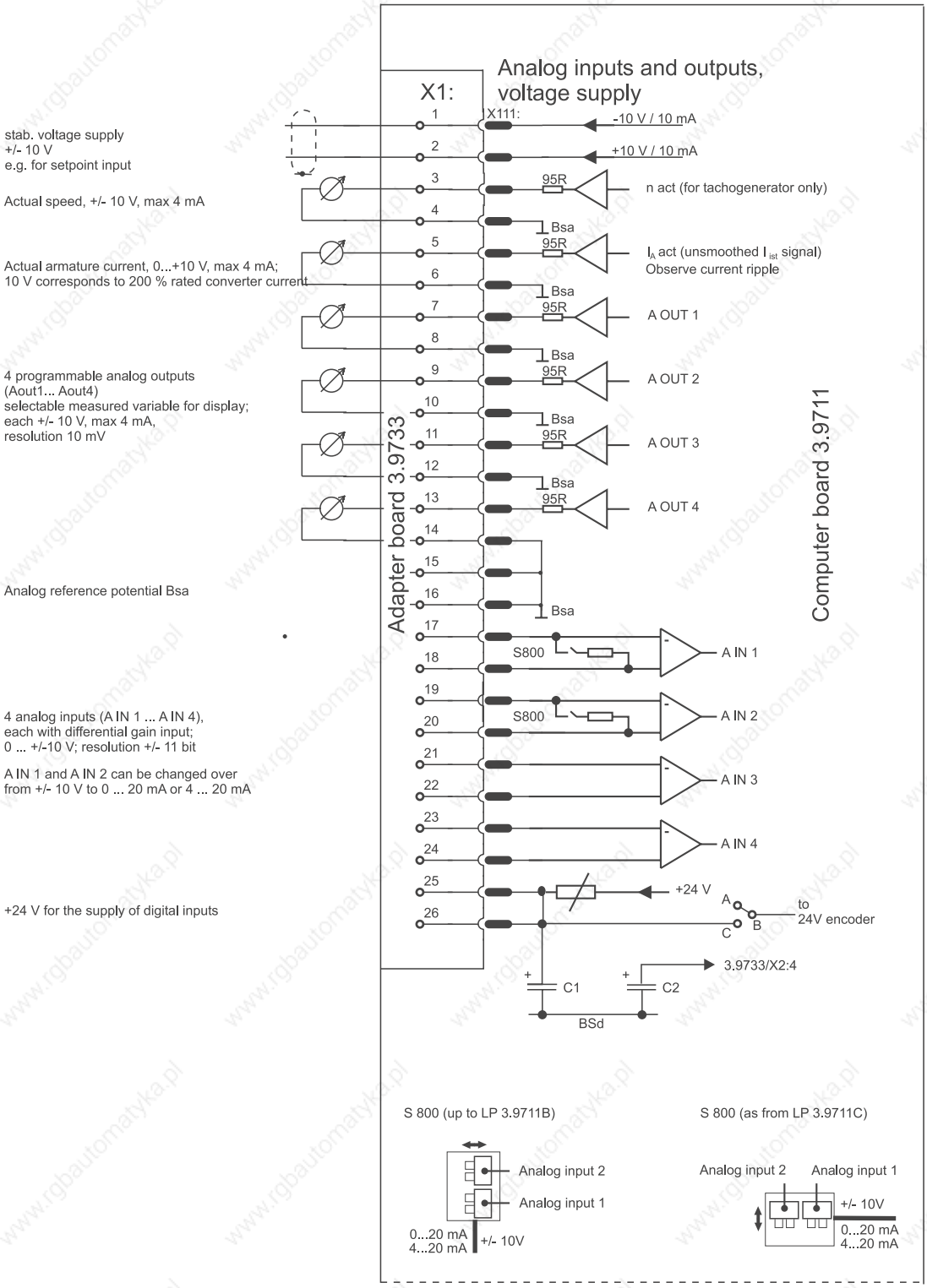



Illustration 13: Connection diagram, analog inputs and outputs

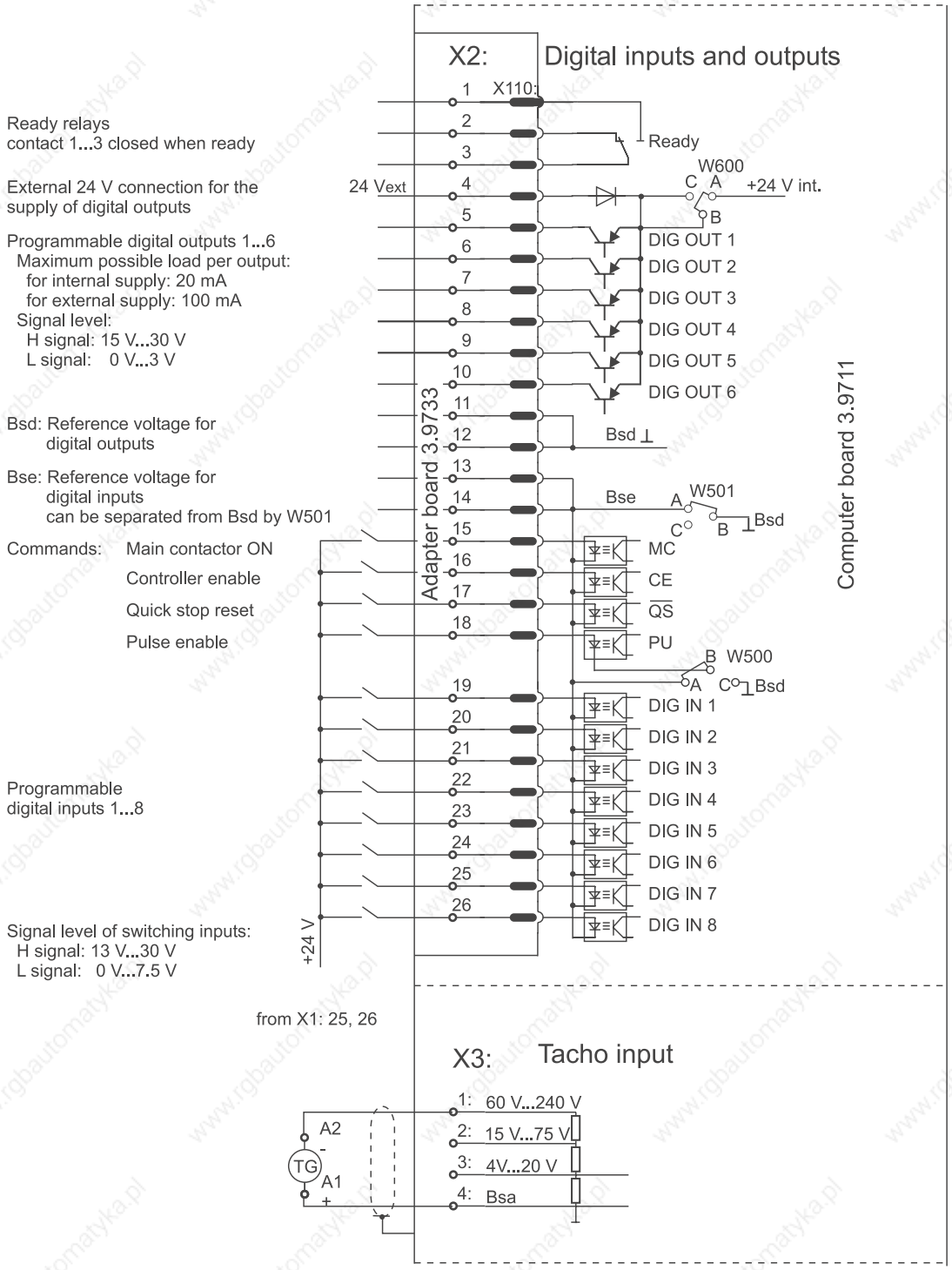



Illustration 14: Connection diagram, digital inputs and outputs

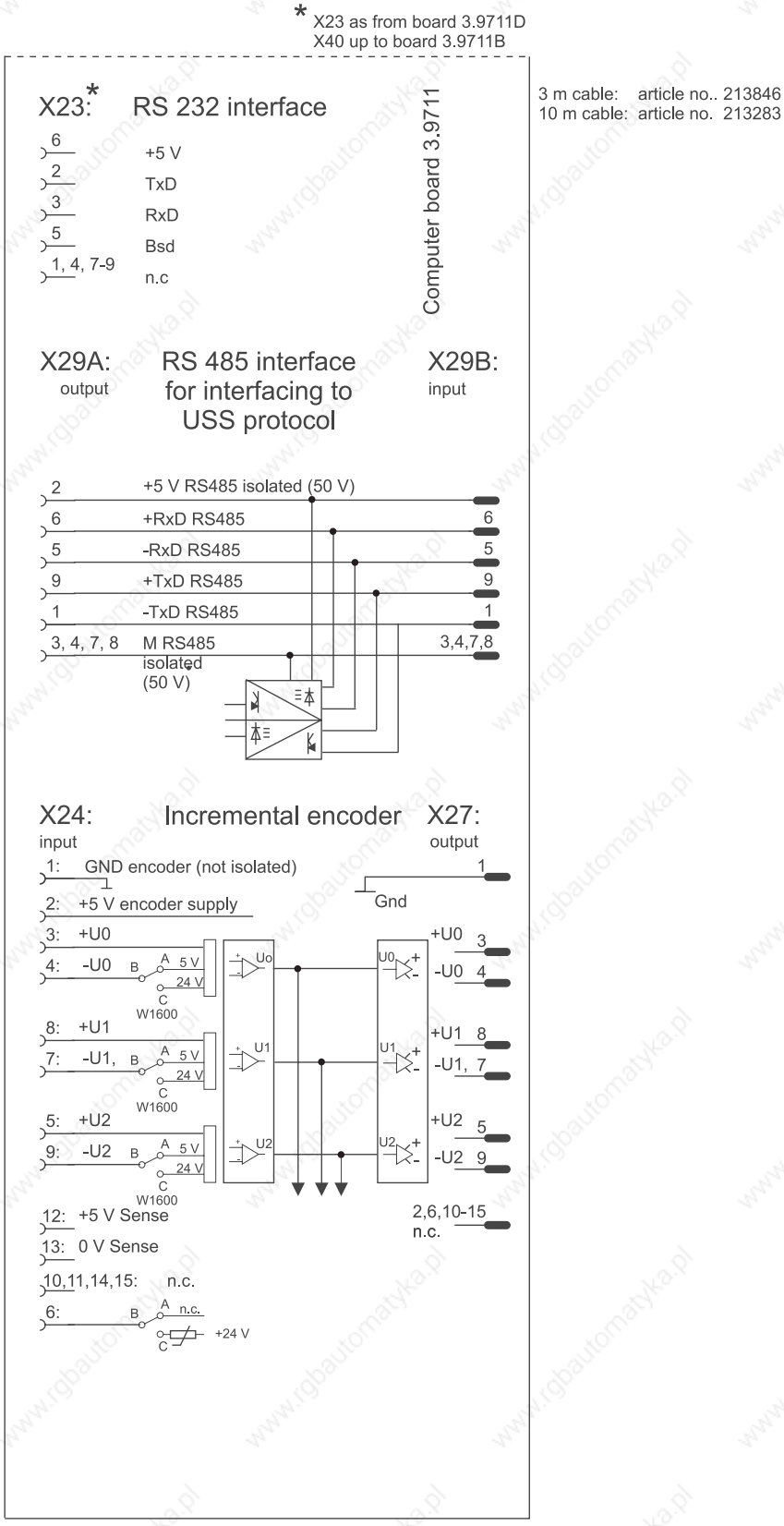



Illustration 15: Connection diagram, RS 232 - RS 485 - incremental encoder

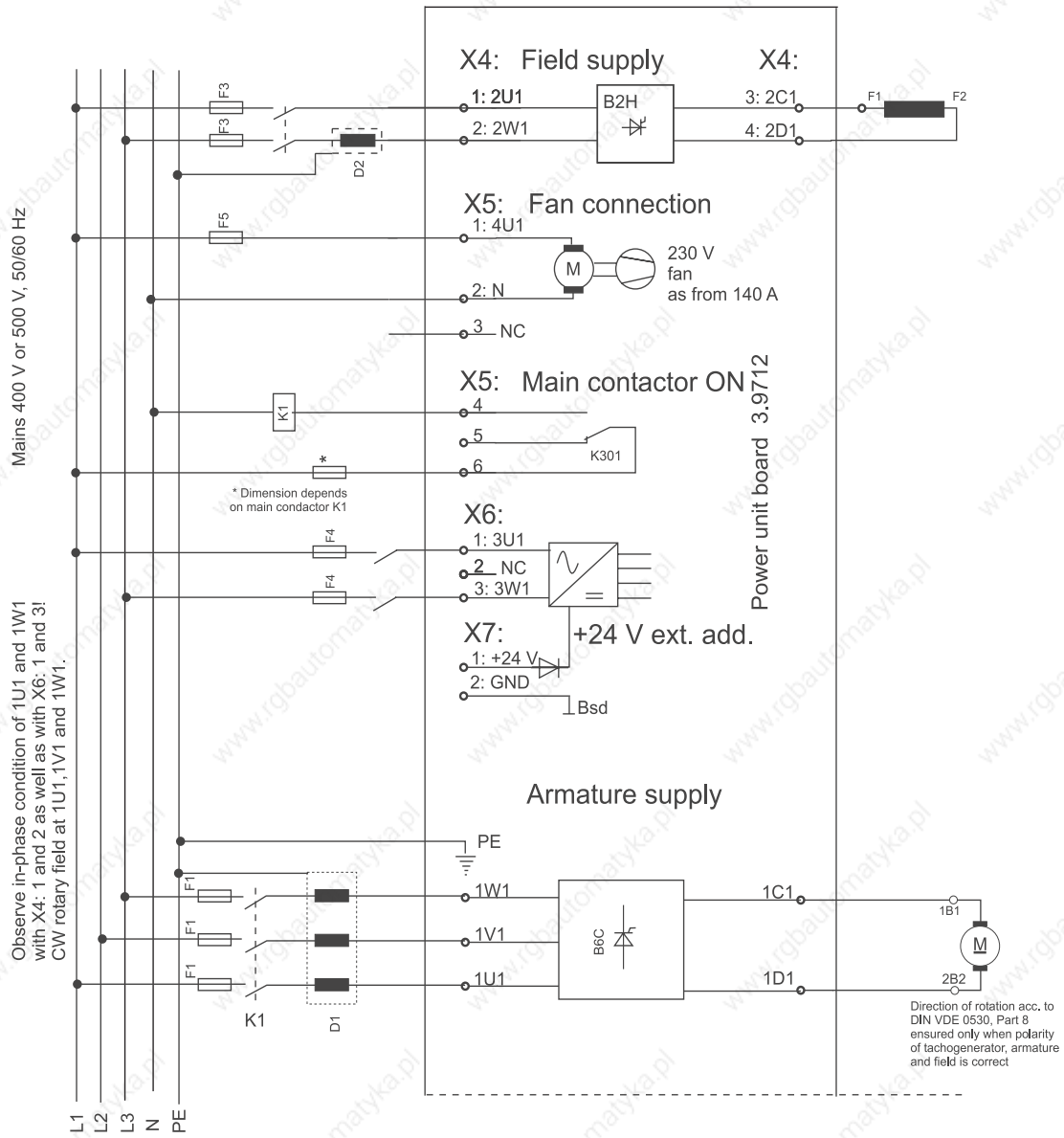



Illustration 16: Connection, power unit BKD 6/ 7000, sizes I and II

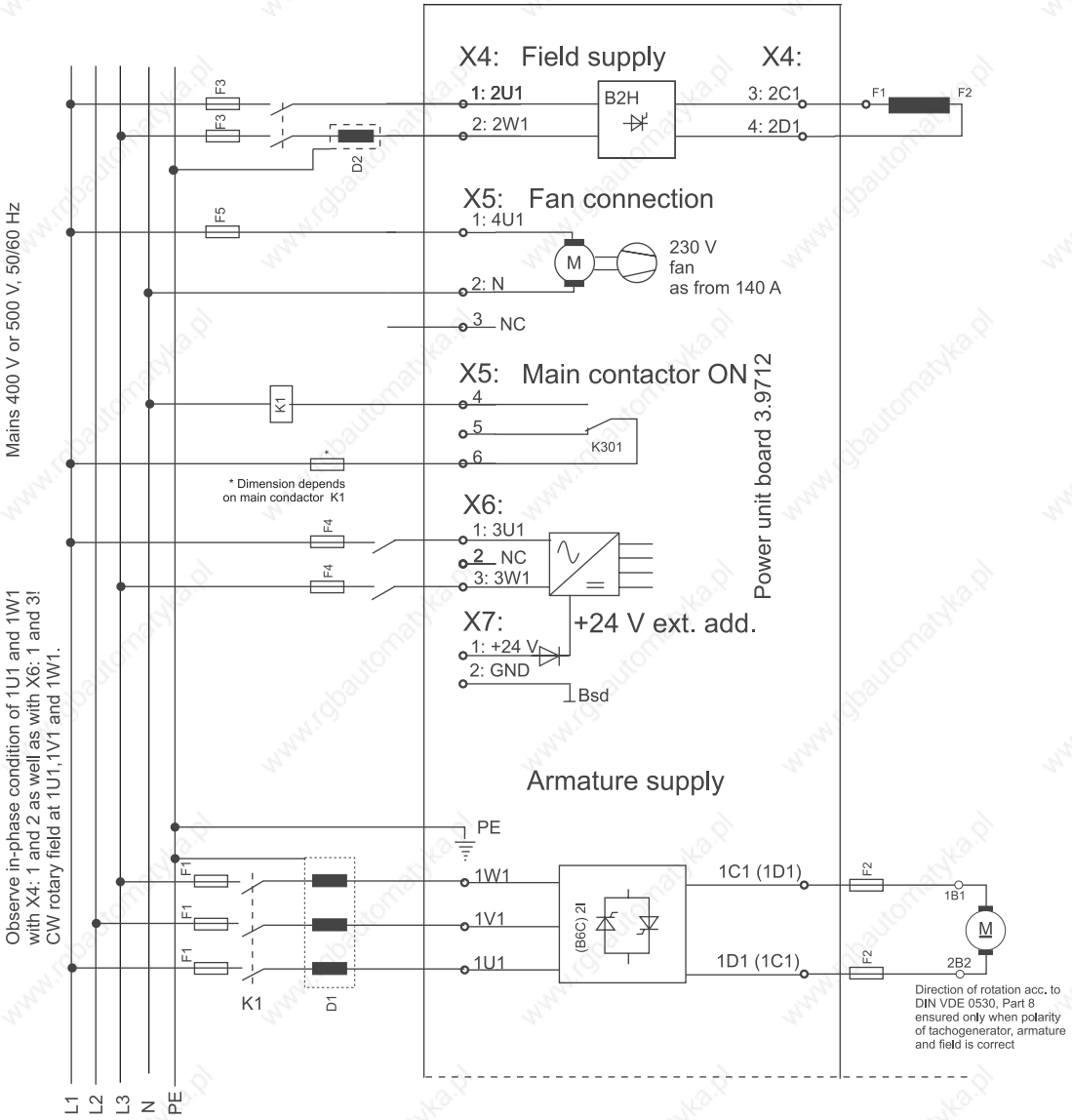



Illustration 17: Connection power unit BKF 12/ 7000, sizes I and II

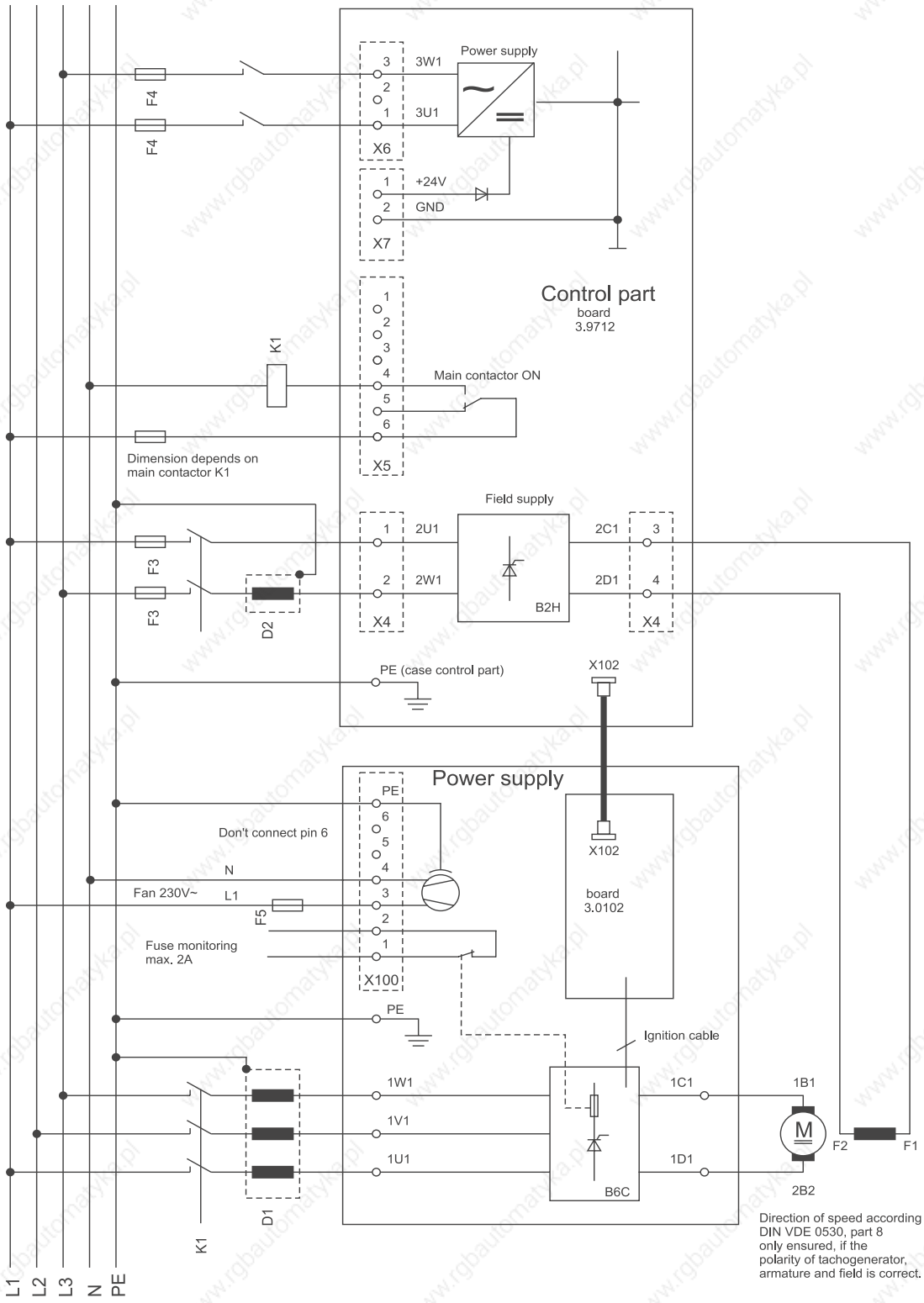



Illustration 18: Connection BKD 6 / 7000, size III (750 A, 920 A, 1100 A)

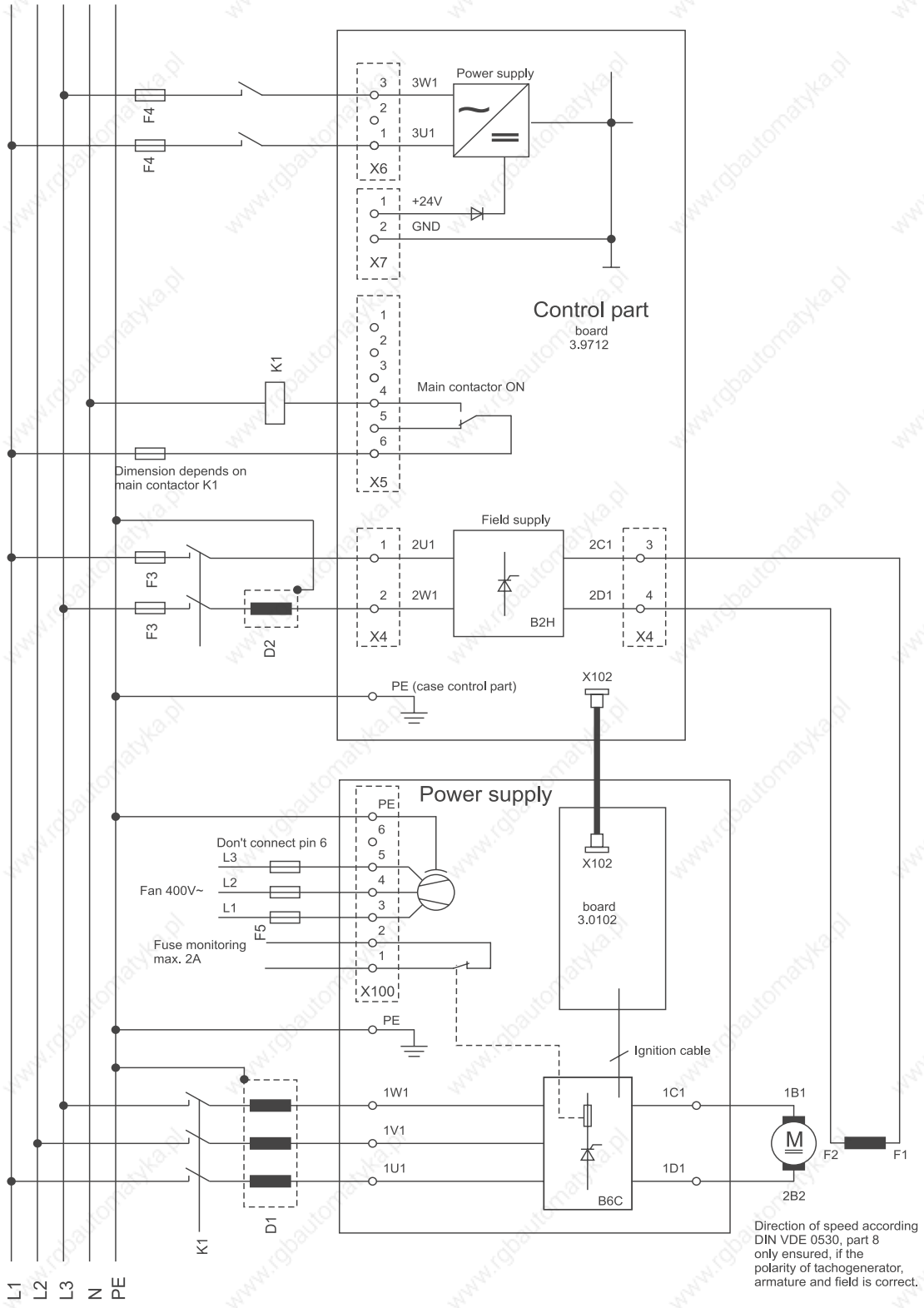



Illustration 19: Connection BKD 6 / 7000, size IV (1550 A, 1750 A, 2050 A)

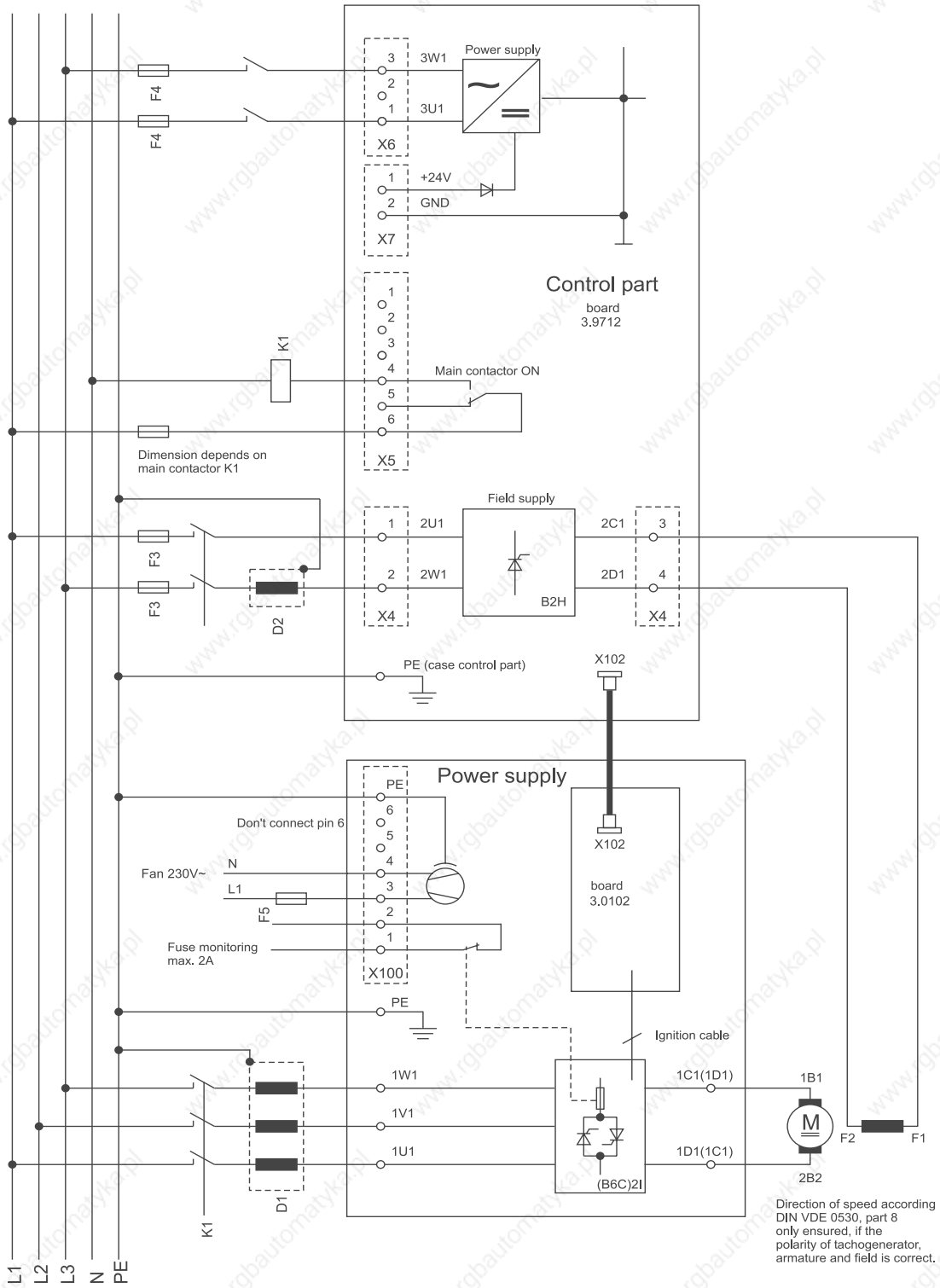



Illustration 20: Connection BKF 12/ 7000, size III (850 A)

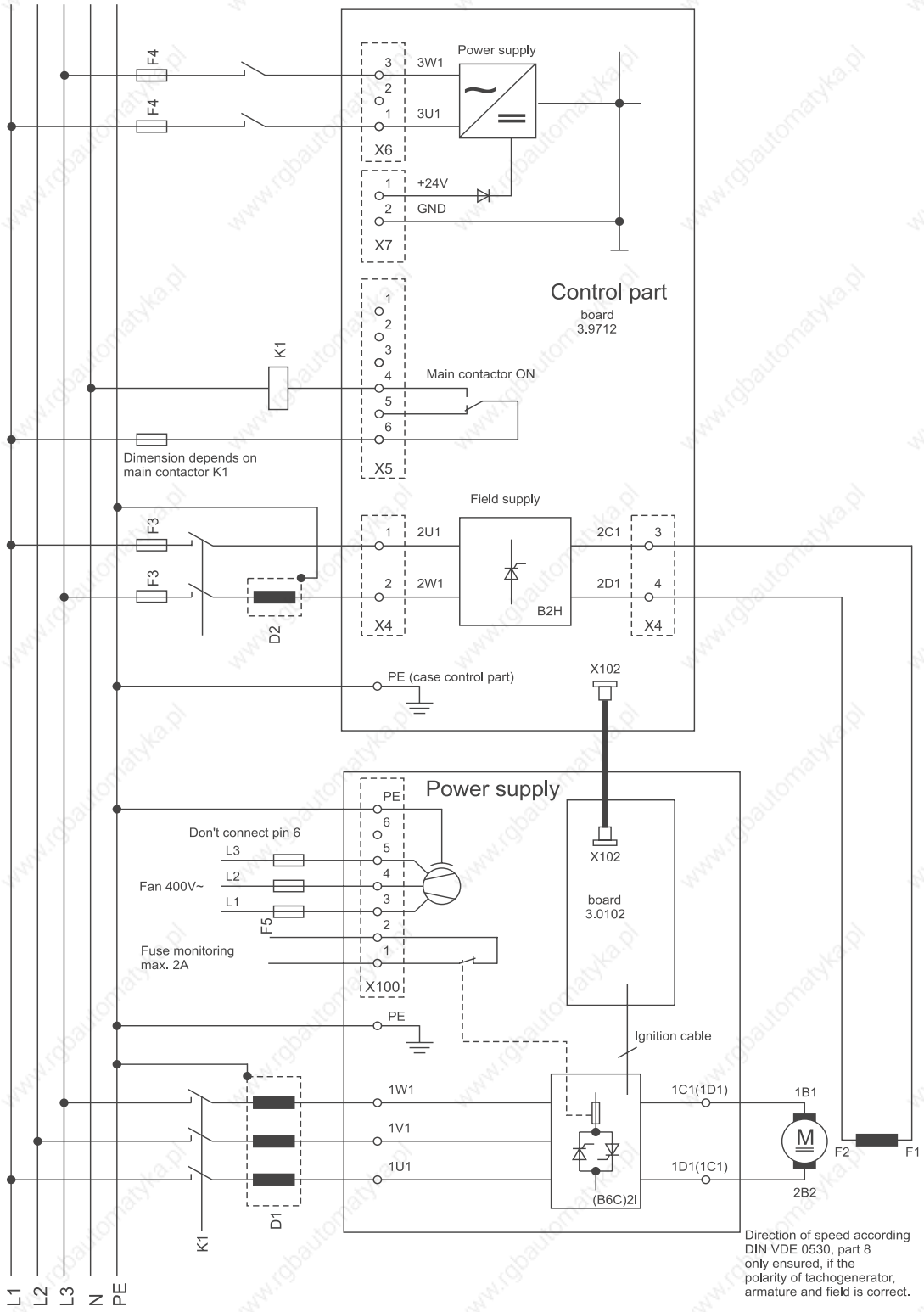
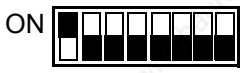
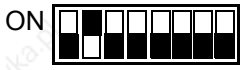
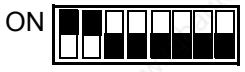
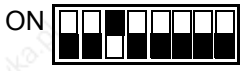
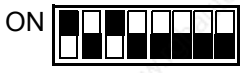
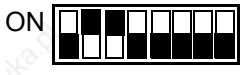
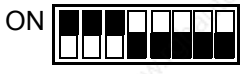
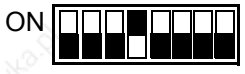



Illustration 21: Connection BKF 12 / 7000, size IV (1250 A, 1400 A, 1650 A)

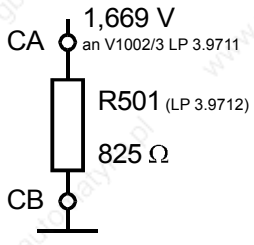
## 3.4 Setting the power unit identification

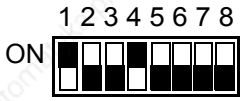
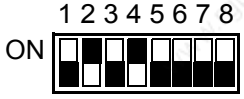
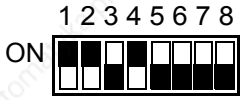
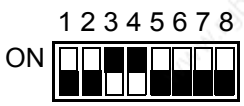
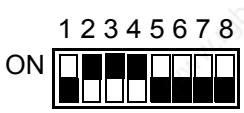
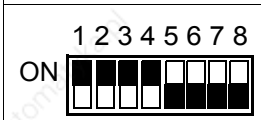
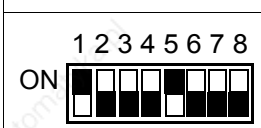
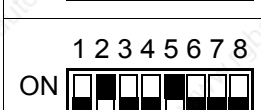
### 3.4.1 BKD 7000 (armature power unit)

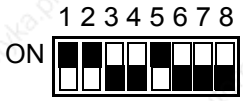
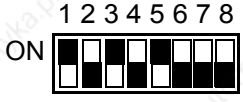
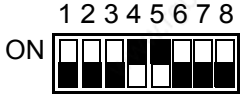
| DIP switch S500 | P002 (BKD/BKF) | P003 Power unit nominal current | P005 Power unit peak current | AL 227 Overload time in s | AL 221 Temperature threshold power unit in °C |
|---|---|---|---|---|---|
| | 1 | 0 A | 0 A | 0 s | 99 °C |
|   | 1 | 30 A | 36 A | 30 s | 80 °C |
|   | 1 | 50 A | 60 A | 30 s | 95 °C |
|   | 1 | 80 A | 96 A | 30 s | 100 °C |
|   | 1 | 100 A | 120 A | 30 s | 110 °C |
|   | 1 | 140 A | 168 A | 30 s | 75 °C |
|   | 1 | 200 A | 240 A | 30 s | 80 °C |
|   | 1 | 220 A | 240 A | 30 s | 80 °C |
|   | 1 | 0 A | 0 A | 0 s | 99 °C |

AL 221
Warning threshold for power unit temperature in °C
(warning W3)

Analog identification BKD



| DIP switch S500 | P002 (BKD/BKF) | P003 Power unit nominal current | P005 Power unit peak current | AL 227 Overload time in s | AL 221 Temperature threshold power unit in °C |
|---|---|---|---|---|---|
|   | 1 | 0 A | 0 A | 0 s | 99 °C |
|   | 1 | 340 A | 408 A | 30 s | 75 °C |
|   | 1 | 450 A | 540 A | 30 s | 70 °C |
|   | 1 | 650 A | 780 A | 30 s | 75 °C |
| | 1 | 550 A | 660 A | 30 s | 75 °C |
|   | 1 | 700 A | 840 A | 30 s | 75 °C |
|   | 1 | 750 A | 750 A | 0 s | 85 °C |
| | 1 | 800 A | 960 A | 30 s | 85 °C |
|   | 1 | 920 A | 920 A | 0 s | 85 °C |
|   | 1 | 1100 A | 1100 A | 0 s | 85 °C |

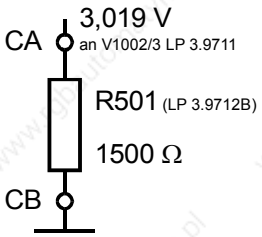
| DIP switch S500 | P002 (BKD/BKF) | P003 Power unit nominal current | P005 Power unit peak current | AL 227 Overload time in s | AL 221 Temperature threshold power unit in °C |
|---|---|---|---|---|---|
|  | 1 | 950 A | 1140 A | 30 s | 90 °C |
| | 1 | 0 A | 0 A | 0 s | 99 °C |
|  | 1 | 1550 A | 1550 A | 0 s | 85 °C |
| | 1 | 0 A | 0 A | 0 s | 99 °C |
| | 1 | 1750 A | 1750 A | 0 s | 85 °C |
|  | 1 | 2050 A | 2050 A | 0 s | 85 °C |

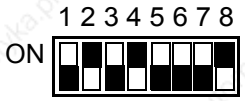
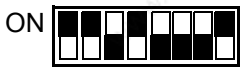
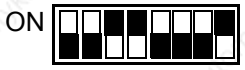
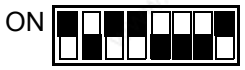
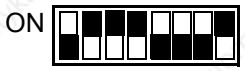
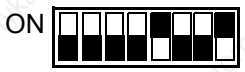
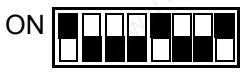
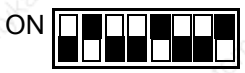
### 3.4.2 BKF 7000 (armature power unit)

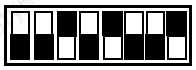
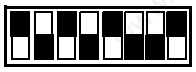
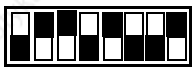
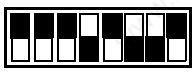
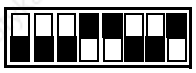
| DIP switch S500 | P002 (BKD/BKF) | P003 Power unit nominal current | P005 Power unit peak current | AL 227 Overload time in s | AL 221 Temperature threshold power unit in °C |
|---|---|---|---|---|---|
| 1 2 3 4 5 6 7 8 ON | 4 | 0 A | 0 A | 0 s | 99 °C |
| 1 2 3 4 5 6 7 8 ON | 4 | 30 A | 36 A | 30 s | 80 °C |
| 1 2 3 4 5 6 7 8 ON | 4 | 50 A | 60 A | 30 s | 95 °C |
| 1 2 3 4 5 6 7 8 ON | 4 | 80 A | 96 A | 30 s | 100 °C |
| 1 2 3 4 5 6 7 8 ON | 4 | 100 A | 120 A | 30 s | 110 °C |
| 1 2 3 4 5 6 7 8 ON | 4 | 140 A | 168 A | 30 s | 70 °C |
| 1 2 3 4 5 6 7 8 ON | 4 | 200 A | 240 A | 30 s | 75 °C |
| 1 2 3 4 5 6 7 8 ON | 4 | 0 A | 0 A | 0 s | 99 °C |
| 1 2 3 4 5 6 7 8 ON | 4 | 0 A | 0 A | 0 s | 99 °C |
| 1 2 3 4 5 6 7 8 ON | 4 | 240 A | 288 A | 30 s | 70 °C |

AL 221
Warning threshold for power unit temperature in °C
(warning W3)

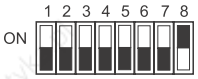
Analog identification BKF



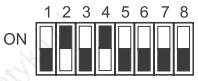
| DIP switch S500 | P002 (BKD/BKF) | P003 Power unit nominal current | P005 Power unit peak current | AL 227 Overload time in s | AL 221 Temperature threshold power unit in °C |
|---|---|---|---|---|---|
|   | 4 | 340 A | 408 A | 30 s | 80 °C |
|   | 4 | 450 A | 540 A | 30 s | 65 °C |
|   | 4 | 650 A | 780 A | 30 s | 70 °C |
|   | 4 | 550 A | 660 A | 30 s | 70 °C |
|   | 4 | 700 A | 840 A | 30 s | 75 °C |
| | 4 | 0 A | 0 A | 0 s | 99 °C |
|   | 4 | 850 A | 850 A | 0 s | 85 °C |
|   | 4 | 0 A | 0 A | 0 s | 99 °C |
|   | 4 | 0 A | 0 A | 0 s | 99 °C |
| | 2 | 1250 A | 1250 A | 0 s | 85 °C |

| DIP switch S500 | P002 (BKD/BKF) | P003 Power unit nominal current | P005 Power unit peak current | AL 227 Overload time in s | AL 221 Temperature threshold power unit in °C |
|---|---|---|---|---|---|
| 1 2 3 4 5 6 7 8 ON  | 4 | 1400 A | 1400 A | 0 s | 85 °C |
| 1 2 3 4 5 6 7 8 ON  | 4 | 0 A | 0 A | 0 s | 99 °C |
| 1 2 3 4 5 6 7 8 ON  | 4 | 1650 A | 1650 A | 0 s | 85 °C |
| 1 2 3 4 5 6 7 8 ON  | 4 | 0 A | 0 A | 0 s | 99 °C |
| 1 2 3 4 5 6 7 8 ON  | 4 | 0 A | 0 A | 0 s | 99 °C |

### 3.4.3 Field power unit

| S 550 | P 006 | $U_{identification}$ (at V1001/3 LP 3.9711) | $I_{identification}$ (R550 - R557 LP 3.9712B) |
|---|---|---|---|
| | 0.00 A | | |
| | 1.50 A | 0.557 V | 2.033 mA |
| | 3.00 A | 1.111 V | 2.028 mA |
| | 6.00 A | 1.663 V | 2.023 mA |
| | 12.00 A | 2.213 V | 2.019 mA |
| | 24.00 A | 2.760 V | 2.015 mA |
| | 0.00 A | 3.305 V | 2.010 mA |
| | 0.00 A | 3.847 V | 2.006 mA |
|  | 0.00 A | 4.387 V | 2.001 mA |

CAUTION: the low-significant switch has priority

 = 3.00 A

| $I_{Field}$ [A] | W301 | W350 |
|---|---|---|
| 1.50 | B-C | A1-D1 |
| 3.00 | - | A1-D1 |
| 6.00 | - | A1-C1 |
| 12.00 | - | A1-B1 |
| 24.00 | B-A | A1-B1 |

Illustration 22: Field power unit BKx 7000 (board 3.9712)

## 3.5 Semiconductor protection fuses

**NOTE**

Safe protection of the power unit is no longer ensured if fuses other than those specified in the list are used !

Super-fast-action semiconductor protection fuses must be switched into the three-phase current supply line for thyristor protection.

For sizes I and II, the mains-end semiconductor protection fuses (phase fuses) must be arranged outside the converter in the switching cabinet.

For BKF converters, the armature circuit fuses must also be taken into consideration.

Converter sizes III and IV have branch fuses already included in the converter.

### 3.5.1 Converter size I

Connection voltage 3 x 400 V

Make: SIEMENS

| Converter type BKD or BKF | Phase current (eff) | Rated direct current | Phase fuse | Rated current/ rated voltage | Article no. | Armature circuit fuse (for BKF converters only) | Rated current/ rated voltage | Article no. |
|---|---|---|---|---|---|---|---|---|
| BK.../0030/...-...-7... | 24.6 A | 30 A | 3NE8 003<br>3NE4 101 | 35 A / 660 V<br>32 A / 1000 V | 113890<br>101940 | 3NE8 003<br>3NE4 101 | 35 A / 660 V<br>32 A / 1000 V | 113890<br>101940 |
| BK.../0050/...-...-7... | 41.0 A | 50 A | 3NE8 017<br>3NE4 117 | 50 A / 660 V<br>50 A / 1000 V | 101953<br>101941 | 3NE8 018<br>3NE4 118 | 63 A / 660 V<br>63 A / 1000 V | 101958<br>101942 |
| BK.../0080/...-...-7... | 65.6 A | 80 A | 3NE8 020<br>3NE4 120 | 80 A / 660 V<br>80 A / 1000 V | 110403<br>101943 | 3NE8 021<br>3NE4 121 | 100 A / 660 V<br>100 A / 1000 V | 101957<br>110396 |
| BK.../0100/...-...-7... | 82.0 A | 100 A | 3NE8 021<br>3NE4 121 | 100 A / 660 V<br>100 A / 1000 V | 101957<br>110396 | 3NE8 022<br>3NE4 122 | 125 A / 660 V<br>125 A / 1000 V | 101959<br>101944 |
| BK.../0140/...-...-7... | 114.8 A | 140 A | 3NE8 022<br>3NE4 122 | 125 A / 660 V<br>125 A / 1000 V | 101959<br>101944 | 3NE8 024<br>3NE4 124 | 160 A / 660 V<br>160 A / 1000 V | 302927<br>101950 |
| BK.../0200/...-...-7... | 164.0 A | 200 A | 3NE4 327-0B | 250 A / 800 V | 205065 | 3NE4 327-0B | 250 A / 800 V | 205065 |

Connection voltage 3 x 500 V

Make: SIEMENS

| Converter type BKD or BKF | Phase current (eff) | Rated direct current | Phase fuse | Rated current/ rated voltage | Article no. | Armature circuit fuse (for BKF converters only) | Rated current/ rated voltage | Article no. |
|---|---|---|---|---|---|---|---|---|
| BK.../0030/...-...-7... | 24.6 A | 30 A | 3NE4 101 | 32 A / 1000 V | 101940 | 3NE4 101 | 32 A / 1000 V | 101940 |
| BK.../0050/...-...-7... | 41.0 A | 50 A | 3NE4 117 | 50 A / 1000 V | 101941 | 3NE4 118 | 63 A / 1000 V | 101942 |
| BK.../0080/...-...-7... | 65.6 A | 80 A | 3NE4 120 | 80 A / 1000 V | 101943 | 3NE4 121 | 100 A / 1000 V | 110396 |
| BK.../0100/...-...-7... | 82.0 A | 100 A | 3NE4 121 | 100 A / 1000 V | 110396 | 3NE4 122 | 125 A / 1000 V | 101944 |
| BK.../0140/...-...-7... | 114.8 A | 140 A | 3NE4 122 | 125 A / 1000 V | 101944 | 3NE4 124 | 160 A / 1000 V | 101950 |
| BK.../0200/...-...-7... | 164.0 A | 200 A | 3NE4 327-0B | 250 A / 800 V | 205065 | 3NE4 327-0B | 250 A / 800 V | 205065 |

### 3.5.2 Converter size II

Connection voltage: 3 x 400 V / 3 x 500 V
Make: SIEMENS

| Converter type BKD or BKF | Phase current (eff) | Rated direct current | Phase fuse | Rated current/ rated voltage | Article no. | Armature circuit fuse (for BKF converters only) | Rated current/ rated voltage | Article no. |
|---|---|---|---|---|---|---|---|---|
| BK.../0240/...-...-7... | 196.8 A | 240 A | 3NE4 327-0B | 250 A / 800 V | 205065 | 3NE4 327-0B | 250 A / 800 V | 205065 |
| BK.../0340/...-...-7... | 278.8 A | 340 A | 3NE3 230-0B | 315 A / 1000 V | 205187 | 3NE3 232-0B | 400 A / 1000 V | 207004 |
| BK.../0450/...-...-7... | 369.0 A | 450 A | 3NE3 332-0B | 400 A / 1000 V | 207004 | 3NE3 334-0B | 500 A / 1000 V | 204481 |
| BK.../0550/...-...-7... | 451.0 A | 550 A | 3NE3 334-0B | 500 A / 1000 V | 204481 | 3NE3 336 | 630 A / 1000 V | 204483 |
| BK.../0650/...-...-7... | 533.0 A | 650 A | 3NE3 335 | 560 A / 1000 V | 204482 | 3NE3 337-8 | 710 A / 900 V | ---- |
| BK.../0700/...-...-7... | 574,0 A | 700 A | 3NE3 336 | 630 A / 1000 V | ---- | 3NE3 338-8 | 800 A / 800 V | ---- |
| BKD6/0800/470-600-7... | 656,0 A | 800 A | 3NE3 337-8 | 710 A / 900 V | ---- | ---- | ---- | ---- |
| BKD6/0950/470-600-7... | 779,0 A | 950 A | 3NE3 338-8 | 800 A / 800 V | ---- | ---- | ---- | ---- |

### 3.5.3 Converter size III

With size III phase fuses are used, included in the power unit of the converter.

Connection voltage: 3 x 400 V / 3 x 500 V
Make: Ferraz

| Converter type BKD or BKF | Phase current (eff) | Rated direct current | Phase fuse | Rated current/ rated voltage | Article no. |
|---|---|---|---|---|---|
| BKD6/0750/...-...-7... | 433 A | 750 A | 6,6 URD 32 TTF 0500 | 500 A/ 690 V | - |
| BKD6/0920/...-...-7... | 531 A | 920 A | 6,6 URD 32 TTF 0630 | 630 A/ 690 V | - |
| BKD6/1100/...-...-7... | 635 A | 1100 A | 6,6 URD 32 TTF 0700 | 700 A/ 690 V | - |
| BKF12/0850/...-...-7... | 491 A | 850 A | 6,6 URD 32 TTF 0630 | 630 A/ 690 V | - |

### 3.5.4 Converter size IV

With size IV phase fuses are used, included in the power unit of the converter.

Connection voltage: 3 x 400 V / 3 x 500 V
Fabrikat: Ferraz

| Converter type BKD or BKF | Phase current (eff) | Rated direct current | Phase fuse | Rated current/ rated voltage | Article no. |
|---|---|---|---|---|---|
| BKD6/1550/...-...-7... | 895 A | 1550 A | 6,6 URD 33 TTF 1000 | 1000 A/ 690 V | - |
| BKD6/1750/...-...-7... | 1010 A | 1750 A | 6,6 URD 33 TTF 1250 | 1250 A/ 660 V | - |
| BKD6/2050/...-...-7... | 1184 A | 2050 A | 6,6 URD 32 TTF 0700 2 parallel | 700 A/ 690 V | - |
| BKF12/1250/...-...-7... | 722 A | 1250 A | 6,6 URD 33 TTF1000 | 1000 A/ 690 V | - |
| BKF12/1400/...-...-7... | 808 A | 1400 A | 6,6 URD 33 TTF 1000 | 1000 A/ 690 V | - |
| BKF12/1650/...-...-7... | 953 A | 1650 A | 6,6 URD 33 TTF 1000 | 1100 A/ 690 V | - |

### 3.5.5 Fuse sizes

Make: SIEMENS

| | | | |
|---|---|---|---|
| 3NE8.. | Size | 00, | DIN 43620 |
| 3NE4 1.. | Size | 0, | DIN 43620 |
| 3NE4 3..-0B | Size | 2, | Gauge 110 mm |
| 3NE3 2.. | Size | 1, | Gauge 110 mm |
| 3NE3 3.. | Size | 2, | Gauge 110 mm |

### 3.5.6 Semiconductor fuse, field supply

Connection voltage: 2 x 400 V / 2 x 500 V

5 SD 420 16 A / 500 V size E27 (up to 12 $A_{DC}$)
5 SD 430 20 A / 500 V size E27
5 SD 440 25 A / 500 V size E27 (24 $A_{DC}$)

## 3.6 Mains chokes

A mains choke is required between converter and mains (VDE 0160) to protect the thyristors from impermissible rates of current rise and to reduce converter disturbances of the supplying mains.

### 3.6.1 Three-phase current mains chokes

$U_N$ = 400 V / 500 V 50/60 Hz, $U_K$ = 4 % / 4.8 % with flat termination, IP00

| Choke BK3- | Rated direct current $A_{DC}$ | Mains current $A_{eff}$ | a mm | b mm | c mm | d mm | e mm | f x g mm | Flat termination ∅ mm x mm | Weight kg | Losses W | $T_A$ °C | Article no. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0025/0030 | 30 | 25 | 155 | 130 | 132 | 130 | 72 | 8 x 12 | 20 x 2 / M6 | 6,0 | 65 | 45 | 368377 |
| 0040/0050 | 50 | 40 | 190 | 120 | 158 | 170 | 58 | 8 x 12 | 20 x 2 / M6 | 7,0 | 80 | 45 | 368378 |
| 0065/0080 | 80 | 65 | 190 | 140 | 158 | 170 | 78 | 8 x 12 | 20 x 2 / M6 | 10,0 | 97 | 45 | 368379 |
| 0080/0100 | 100 | 80 | 230 | 165 | 202 | 180 | 98 | 8 x 12 | 25 x 3 / M8 | 12,0 | 135 | 45 | 369380 |
| 0115/0140 | 140 | 115 | 230 | 190 | 202 | 180 | 122 | 8 x 12 | 25 x 3 / M10 | 18,0 | 160 | 40 | 368381 |
| 0165/0200 | 200 | 165 | 240 | 195 | 211 | 190 | 125 | 11 x 15 | 25 x 3 / M10 | 23,0 | 190 | 40 | 368382 |
| 0275/0340 | 340 | 275 | 300 | 225 | 271 | 240 | 145 | 5,8 x 11 | 30 x 5 / M10 | 38,0 | 300 | 40 | 368384 |
| 0365/0450 | 450 | 365 | 360 | 220 | 320 | 310 | 125 | 11 x 15 | 40 x 5 / M10 | 47,0 | 370 | 40 | 368385 |
| 0450/0550 | 550 | 450 | 360 | 260 | 320 | 310 | 140 | 11 x 15 | 50 x 5 / M12 | 58,0 | 460 | 40 | 368386 |
| 0530/0650 | 650 | 530 | 360 | 260 | 320 | 310 | 140 | 11 x 15 | 50 x 5 / M12 | 63,0 | 550 | 40 | 368387 |
| 0615/0750 | 750 | 615 | 420 | 285 | 375 | 370 | 151 | 11 x 15 | 60 x 5 / M12 | 68,0 | 630 | 40 | 368388 |
| 0750/0920 | 920 | 750 | 420 | 285 | 375 | 370 | 151 | 11 x 15 | 60 x 5 / M12 | 78,0 | 650 | 40 | 368389 |
| 0900/1100 | 1100 | 900 | 420 | 285 | 380 | 370 | 166 | 11 x 15 | 60 x 10 / M12 | 90,0 | 750 | 40 | 368390 |
| 1020/1250 | 1250 | 1020 | on request | | | | | | | | | | |
| 1150/1400 | 1400 | 1150 | on request | | | | | | | | | | |
| 1270/1550 | 1550 | 1270 | on request | | | | | | | | | | |
| 1350/1650 | 1650 | 1350 | on request | | | | | | | | | | |
| 1430/1750 | 1750 | 1430 | on request | | | | | | | | | | |
| 1680/2050 | 2050 | 1680 | on request | | | | | | | | | | |

**Dimension drawings**

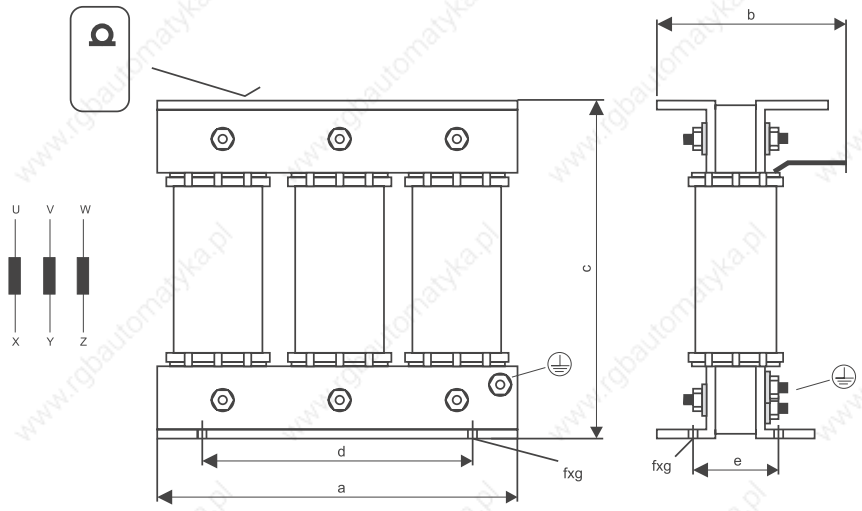



Illustration 23: Dimension drawing: Three-phase current mains chokes

### 3.6.2 Single-phase mains choke

$U_N$ = 230 V -10 % ... 500 V +10 % 50/60 Hz, $U_K$ = 4/4,8 %, IP00, one choke

| Choke BK1- | Rated direct current A | a mm | b mm | c mm | d mm | e mm | f x g mm | Weight kg | Loss W | $T_A$ °C | Article no. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/03-001 | 3 | 60 | 49 | 85 | 44 | 38 | 3,6 x 7 | 0,70 | 12 | 45 | 368391 |
| 06/06-001 | 6 | 66 | 62 | 90 | 50 | 49 | 4,9 X 9 | 1,0 | 15 | 45 | 368392 |
| 12/12-001 | 12 | 85 | 85 | 98 | 64 | 63 | 4,8 X 9 | 2,0 | 28 | 45 | 368393 |
| 24/24-001 | 24 | 96 | 88 | 112 | 84 | 72 | 5,8 X 11 | 2,8 | 32 | 40 | 368394 |

**Dimension drawing**

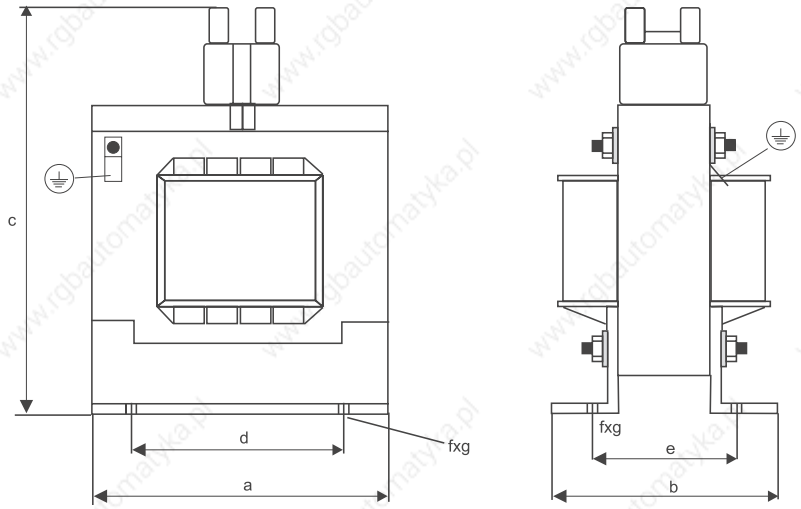



Illustration 24: Dimension drawing: Single-phase mains choke

## 3.7 Additional accessories

| | | |
|---|---|---|
| PC interface cable | 3 m | article-no. 213846 |
| PC interface cable | 5 m | article-no. 213283 |
| other lengths on demand | | |

# 4

# COMMISSIONING

## 4.1 Seven-segment display, keypad and LEDs

The seven-segment display consists of 5 positions for parameter values, errors, warnings and switching states at the digital switching inputs, for example.

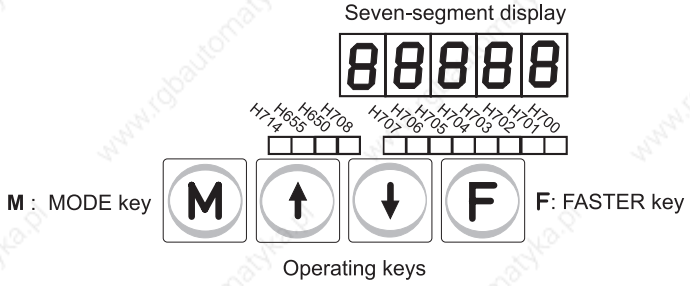
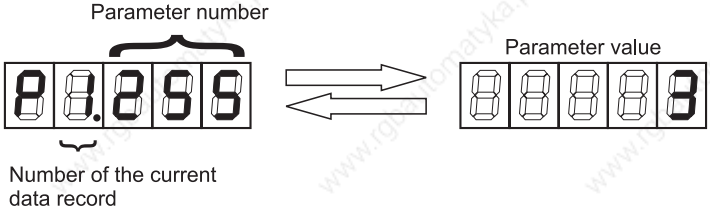



Illustration 25: Seven-segment display

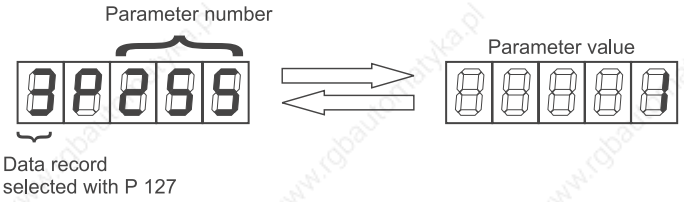
Switch on the display by pressing the MODE key Ⓜ below the display for about one second. This switches the display into alternating mode, displaying alternately the parameter number and the parameter value provided there are no errors and warnings.




P **1.**255 means that the value of parameter P 255 is displayed in the **current** data record. The current data record is data record 1. After a changeover to data record 3, for example, the parameter number is displayed as P 3.255.

You can display the values in a specific data record that is not the current data record. Select this data record with parameter P 127. In this mode, P 127 ≠ 0, the display is **fixed** to the selected data record. Even after a data record change, the display will still show the data record selected with P 127. In the display this state (P 127 ≠ 0) is represented as follows: The data record number is displayed **in front of** the P.

Where values from a selected data record are displayed, the data record number is shown in front of the parameter number: **3**P 255.




It is only after P 127 has been reset to '0' that the display follows the current data record.

Use **one** of the two arrow keys to move to the next higher or lower parameter number. Keep the key pressed until you have reached the required parameter number. Pressing the F key simultaneously, speeds up selection of a new parameter number.

Pressing the M key once fixes the display to the parameter value. The display shows, and continuously refreshes, the current parameter value. Press the M key again to return to the alternating display mode (parameter number / parameter value).

### 4.1.1 Changing parameter values via the keypad

Switch on the display first (press M key), and then enable the keypad for parameter value modification. For this purpose, enter the value '17' in parameter P 32:

- Select parameter P 032 with one of the arrow keys.
- Press the MODE key M to fix the display to the parameter value.
- Use the arrow key ↑ to set the value '17'.
- Press the MODE key M to transfer the value.
- ▸ The display alternates between parameter number and parameter value.

You may now modify parameters, following the same procedure you applied to enable the keypad.

**CAUTION**

It is strongly recommended to fix the data record to be edited by using parameter P 127 prior to commencing any modifications. This action prevents a data record change from leading to unintentional modification of the selected parameter in a different data record. Modifications may be performed in any data record that has already been programmed.

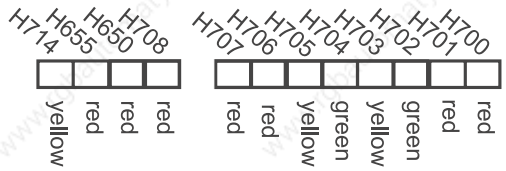
The display must be in alternating mode (alternating between parameter number and parameter value).

- Use one of the arrow keys ↑ or ↓ to display the required parameter number.
  **Tip**: Simultaneous operation of the F key speeds up parameter selection.
- Press the MODE key M once the parameter has been selected. The display merely shows the associated parameter value.
- Use one of the arrow keys ↑ or ↓ to set the value in the display.
  **Tip**: Simultaneous operation of the F key speeds up value setting.
- Press the MODE key to transfer the value into the associated **RAM** data record.
- ▸ The display again alternates between parameter number and parameter value.

**NOTE**

Note that a new parameter value is transferred only when pressing the MODE key and not as early as during arrow key adjustment. The value is then transferred into the RAM data record (not to the EEPROM data record). If the modified parameter belongs to the primary data group, it is automatically stored also in the EEPROM. If the parameter belongs to a data record, it can only be transferred into the EEPROM by subsequently storing the data record.

### 4.1.2 LEDs




H700: Warning or error present

H701: Disable controller

H702: Enable controller

H703: $n > n_{min}$ (parameters P 505 and P 506);
illuminated if the speed has fallen below the value (P 505) - (P 506).

H704: illuminated if torque direction 1 is activated

H705: illuminated if torque direction 2 is activated

H706: Current limit reached - speed controller output at the limit and armature current above 93 % of the current limit (ALink 68)

H707: Control limit ($\alpha_G$ - P 360 or $\alpha_W$ - P 361 reached)

H708: RESET

H650: External watchdog tripped (error no. 30)

H655: Shortcircuit or overload at a digital output (X2: 5 to X2: 10, error no. 43)

H714: flashing on EEPROM access (from board 3.9711D and software release 03.10)

## 4.2 Data records

The EEPROM for data storage is divided into two sections. One stores up to 6 data records, the other contains primary data that are exempt from modification through a data record change; they exist only once. These data include the definitions (allocation) of input functions (DEF) for the programmable switching inputs (X2: 19 to X2: 26), for example.

The EPROM contains a non-variable data record 7 with preset values. There is no memory area for this in the EEPROM. The EPROM also contains preset values for the primary data.

As soon as the electronics supply is switched on, the data records programmed into the EEPROM are copied into the relevant RAM area. The primary data are also copied into the relevant RAM areas. Where not all six data records in the EEPROM are assigned, the values of data record 7 are taken from the EPROM into the associated RAM areas. These data records are neither visible nor accessible and become available only through programming.

**NOTE**

Since the 7000-series converters are supplied without programmed data records, the error messages '58' and '6' appear in parameter P 037 when the electronics supply is applied, and the ready relay remains dropped.

Error number 58: EEPROM empty

Error number 6: Invalid boot source entry

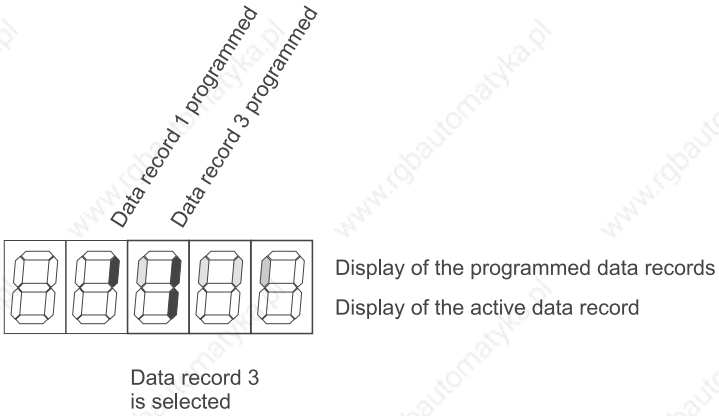
As no data have yet been stored in the EEPROM, the values of the EPROM data record (= data record 7) are transferred into the six existing RAM data records. The RAM also holds a copy of the EPROM data record which the user can merely use as an 'editor' for initial data record generation. In this case it is active for entry of the parameter values required for machine functioning. The settings of this data record can be written into data records 1 to 6 (see parameter P 153). In this process, the data are copied into the RAM area associated with the data record and permanently stored in the associated EEPROM area at the same time. Where the generated data record is to be stored in data records 1 and 3, for example, enter

P 153 = **7.1** to copy the edited RAM data record 7 into RAM data record 1 and permanently store it in EEPROM data record 1.

Then enter P 153 = **7.3** to copy the edited RAM data record 7 into RAM data record 3 and permanently store it in EEPROM data record 3.

The two data records 1 and 3 now contain the same values for the parameters. Now change the value of a parameter in data record 3. For this purpose, select data record 3 with P 127 = 3, change the required parameter and store the data of the edited RAM data record 3 in the EEPROM data record 3 with **P 153 = 3.3** .

Parameter P 45 shows the programmed data records in the top row of the seven-segment display, and in the bottom row the current (active) data record:




Once the required data records have been programmed, enter the number of an already programmed data record in parameter P 151 (Boot source).

Errors '58' and '6' can now be acknowledged by switching the electronics supply off and on again. The active data record then is the one whose number was entered in parameter P 151 (Boot source).

Data record 7 is no longer accessible directly if more than one data record was programmed. The following three approaches are possible:

**Case 1:**

Select an already programmed data record with parameter P 127 as the basis for the generation of further data records. Modify as necessary, and store the modified data record with parameter P 153.

Example:
Data record 3 is edited, and the data are to be stored in data record 4. Enter P 153 = 3.4 in parameter P 153.

**NOTE**

Since this case requires changing the values of an existing data record, the RAM now contains invalid values for the set. Once the new data record has been programmed, make sure in every case to switch the electronics supply off and on again to restore the original state.

**Case 2:**

Copy an already programmed data record to the data record to be created as a basis for the generation of further data records.

Modify as necessary, and store the modified data record on to itself with parameter P 153. Now all data records are valid since no 'non'-RAM data record was modified in this case.

Example:

Data record 3 is copied into data record 4 with P 153 = 3.4. Then use parameter P 127 = 4 to select data record 4 for editing, and modify as necessary. Store the modified data record 4 with P 153 = 4.4.

**NOTE**

Although this process has already generated a valid data record, the set is not suitable for machine operation !

**Case 3:**

Although data record 7 is no longer accessible for editing, it can be copied at any time into any data record x with parameter P 153 = 7.x and thus be stored in the associated EEPROM area at the same time.

Once the new data record has been modified, store it on to itself. Now all data records are valid since no 'non'-RAM data record was modified in this case.

**NOTE**

Although this process has already generated a valid data record, the set is not suitable for machine operation !

Make sure therefore to adapt the data in the newly generated data record to the individual requirements !

**Example**:

Use P 153 = 7.5 to transfer and store the preset values from the EPROM into data record 5. Then use P 127 = 5 to select data record 5 for the necessary settings. Use P 153 = 5.5 to store the final values in data record 5.

If the setting of a primary-data parameter (that is not contained in a data record) is changed, the new value is stored immediately in the EEPROM upon input.

### Undoing modifications

The data records stored in the EEPROM are copied into the associated RAM areas after the electronics supply has been switched on. Where data were changed in the RAM area and not yet stored, the modification can be undone either through switching the electronics supply on and off or by overwriting the RAM data record with the values of the **associated** EEPROM data record. Source and target data record are **identical** in this case ! Proceed as follows to overwrite RAM data record 2 (for example) with its EEPROM values:

- P 157 = 0 (reset data record manager)
- P 158 = 2 (data record number)
- P 157 = **6** (Read data record from EEPROM)

It is also possible to erase a data record in the **EEPROM**. Note that the currently selected data record can not be erased. Any attempt to do so will result in warning 4. The boot data record entered in parameter P 151 cannot be erased either. Warning 9 is displayed in this case. Where the current boot data record is to be erased, enter the number of a different programmed data record in P 151. The original boot data record can then be erased. This requires the following inputs:

- P 157 = 0 (Reset data record manager)
- P 158 = DRno (Data record number)
- P 157 = **7** (Erase data record from EEPROM)

## 4.3 Basic settings

**Input via converter keypad**: Set P 032 to 17 (refer ▹Changing parameter values via the keypad◃ on page 56), the keypad is enabled for input.

**Input via PC**: Start WINBASS, set parameter P 125 to 1 (refer WINBASS description).

**P 003** Rated current of power unit

**P 006** Rated current of field power unit

**P 070** Electronics supply (mains voltage) in $V_{eff}$

Preset value: 400 $V_{eff}$

**P 071** Power unit supply (mains voltage) in $V_{eff}$

Preset value: 400 $V_{eff}$

**P 072** Maximum converter current in $A_{DC}$

Preset value: 50 % of the value displayed in parameter P 003.

**P 073** Motor armature voltage in $V_{DC}$

Preset value: 400 $V_{DC}$ for BKF, 470 $V_{DC}$ for BKD.

**Setting parameters P 074 and P 078 is relevant only if $i^2t$ monitoring is required for the motor.**

**P 074** Rated motor current in $A_{DC}$

Preset value: 50 % of the value displayed in parameter P 072.

**P 078** Thermal time constant of the motor in minutes

Preset value: 0 min.

UL 508C: If you install an UL-conform machine, you must activate the $i^2t$ monitoring of the motor by setting the parameter P 074 and P 078. The unit calculates the warming of the motor in percent and generates when reaching 100 % a warning (DLink 19), which must result in a deactivation of the drive.

**P 079** Rated field current in $A_{DC}$

Preset value: 100 % of the value displayed in parameter P 006.

**Setting P 080 is relevant only if the drive is field-weakened.**

**P 080** Minimum field current of the motor (in field weakening mode - P 255 = 5/6) in percent of the entered rated field current (P 079)

Preset value: 100 %

**P 081** Field weakening range (required exclusively for actual speed monitoring / tachogenerator connection)

Preset value: 1.0 (no field weakening).

**P 107** Stop mode

**0**: Coast drive.

**1**: Decelerate along the set deceleration ramp (P 109) and coast at $n < n_{min}$ (P 505 / P 506)

Preset value: 0

**P 108** Disable mode

**0**: Coast drive.

**1**:Decelerate along the set deceleration ramp (P 109) and coast with main contactor OFF at n < n < min (P 505 / P 506)

Preset value: 0

**P 109** Ramp-down time, disable/stop

Preset value: 0.00 s (decelerate at current limit if P 107 and / or P 108 set to '1').

**P 110** Ramp-down time, quick stop

Drive starts to coast once the speed has fallen below the value set with parameters P 505 and P 506.

Preset value: 0.00 s (decelerate at current limit)

**P 111** General signal limit

The input and output signals of various function groups are limited to this value. Refer to sequential function charts for the areas where this limit is effective.

Preset value: 100.00 %.

**P 255** Selection of actual value and field unit setting

Dependent on this are the settings of parameters P 256 to P 258 and/or P 261 to P 263.

Preset value: 1 (Armature voltage and constant field)

**P 501** Threshold, overspeed monitoring

Preset value: 115.00 %

**P 082** Optimisation (motor)

Once the converter has been set, store the values, and optimise at P 082 = 1. Store the data record again after optimisation.

**NOTE**

One of the error messages 44, 45, 46 or 47 may be displayed during optimisation if the motor has a high armature resistance. In that case, raise the thresholds for the associated monitoring functions for optimisation, and reset as required after optimisation and **before** storing the data.

# 5

# OPERATION

## 5.1 Software-Update

Before updating the software with an incompatible software, read out and print the data records via a PC and erase the EEPROM. For additional information, see (▹Error description◃ from page 428, error description F5)

## 5.2 Converter control

Depending on the configuration, converter control may be via hardware enables at terminal strip X2 and using control commands via a communication interface (field bus system, for example).

Only the hardware enables are effective if the converter is controlled without control commands while control via a communication interface requires a control command in addition to the hardware enables.

Parameter P 121 Communication source is used to set whether the converter is controlled exclusively via hardware enables or via a control command from a communication interface.

### 5.2.1 Hardware enable signals

There are 4 switching inputs available for converter control at terminal strip X2 of the terminal print (X2: 15...18).

These terminals enable and disable the controller and defined drive stop and deactivation.

- Main contactor ON (MC) / Main contactor OFF X2: 15
- Controller enable (CE) / Controller disable X2: 16
- Deactivate quick stop / Quick stop ($\overline{\text{QS}}$) X2: 17
- Pulse enable (PU) / Pulse inhibit X2: 18

| | | |
|---|---|---|
| Signal level: | ON | +24 V (+13 V...+30 V) |
| | OFF | 0 V (0 V...+7.5 V) |
| Input resistance: | $R_i$ = 4 kΩ | |

The controller enables can be displayed at the converter display with parameter P 042 (see also description P042).

For control without communication interface, the converter is enabled if X2: 16,17,18 are connected to +24 V and in addition, at X2: 15 a switching operation 0 V ▸ +24 V is performed. Input X2: 15 is edge-triggered.
The converter is disabled as soon as one connection is supplied 0 V or is open.

The diagram below shows the basic converter control along with the effects of the enable signals.

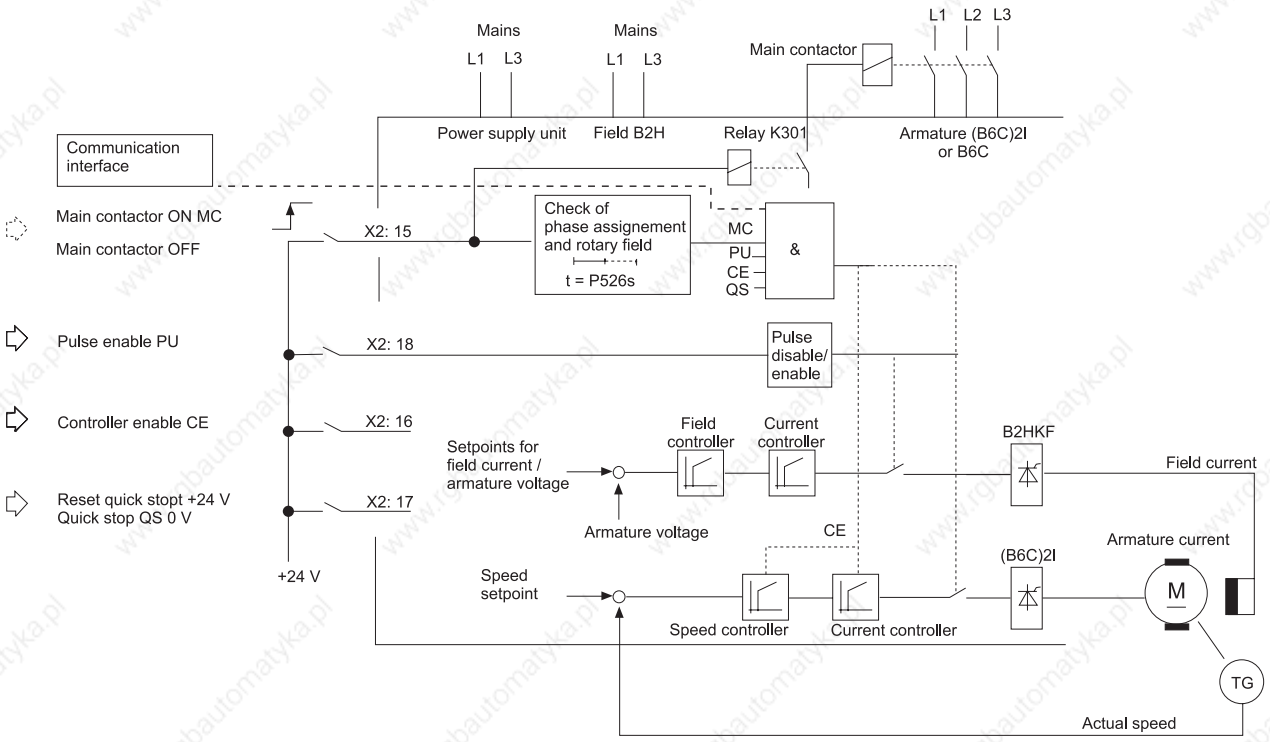



Illustration 26: Basic converter control; effects of enable signals

### 5.2.2 Converter control without field bus connection

In this operating mode, control is exclusively via the hardware enable signals, i. e., without control commands from a communication interface, and requires the following setting in parameter P 121 Communication source (see also description P 121):

**P 121 = 0000$_{hex}$** Standard setting, operation without communication interface.

**P 121 = 0010$_{hex}$** Operation with communication interface, converter control is exclusively via the hardware enables; only setpoint input and parameter accesses are via the field bus connection.

The individual hardware enables and their respective effects on converter control are described as follows.

#### 5.2.2.1 Main contactor ON

**Switching input**: X2: 15

**Enable**: Edge triggering 0 V ⇒ +24 V

**Disable**: 0 V or open contact

**Function**

**Enable:** Relay K301 on power unit board 3.9712 picks up and connects the power unit to the mains via the main contactor, provided there are no error conditions.

To enable the converter, enter the operating command 'Deactivate quick stop' (QS) before 'Main contactor ON' (MC).

Once the command 'Main contactor ON' (MC) has been entered, the phase assignment of power unit connection, field connection and power supply unit (electronics supply) is checked. Phase failure and rotating field monitoring are also active.

One measuring cycle for data acquisition takes about 100 ms.

Due to various different pickup times of the contactors used for converter mains supply (switching capacity etc.), the measuring cycles are repeated several times until an error message is generated.

Parameter P 526 can be used to set the maximum measuring time during which the error messages are suppressed.

Any error messages reporting connection errors will be generated only after the set time has elapsed.

**NOTE**

If the contact 'Main contactor ON' is switched last to enable the drive, it **may** take max. the time set with P 526 until the drive is enabled and the motor starts rotating !

The input 'Main contactor ON' (MC) is edge-triggered and thus connection to +24 V cannot be fixed. This input **always** requires a switching operation to be performed to enable the converter.

**Disable**: The functionality is provided by parameter P 107:

**P 107 = 0**

**Undecelerated Off:** The drive starts to coast, and once the armature current has reached zero, the power unit is isolated from the mains via main contactor relay K301 and the external mains contactor.

The enable commands 'Quick stop' at terminal X2: 17 and 'Controller disable' at terminal X2: 16 have no further effect on the converter once the 'Main contactor OFF' command has been entered.

The function 'Main contactor OFF' can be interrupted: On re-enable, the previous speed is approached along the ramp of the ramp generator as long as that is switched on.

**P 107 = 1**

Decelerates the drive along the deceleration ramp for 'Main contactor OFF' and 'Controller disable' (P 109). Once the speed falls below the threshold set with P 505 and P 506, the drive starts to coast, and the main contactor relay K301 and the external mains contactor isolate the power unit from the mains.

The enable command 'Quick stop' at terminal X2: 17 affects the function of the deceleration process in this case: If the command 'Quick stop' is activated as well during the deceleration process, the system switches from the deceleration ramp for 'Main contactor OFF' and 'Controller disable' (P 109) to the deceleration ramp for 'Quick stop' (P 110).

The enable command 'Controller disable' at X2: 16 has no influence on the drive in this case.

The function 'Main contactor OFF' can be interrupted: On re-enable, the previous speed is approached along the ramp of the ramp generator as long as that is switched on.

**NOTE**

After the 'Main contactor ON' contact has opened, it must be closed at the earliest after the time set with P 518 plus 150 ms to ensure the controller is enabled. The converter remains disabled if the safety period is not observed !

This period must be observed also for an armature circuit changeover where 2 motors are serviced alternately by one converter.

Non-observance leads to the error message 'Tacho failure'.

#### 5.2.2.2 Controller enable

**Switching input**: X2: 16

**Enable**: +24 V

**Disable**: 0 V or open contact

**Function**

**Enable**: Instantaneous enable of firing pulses and controller if the other enables are present.

**Disable**: The function is entered by parameter P 108:

**P 108 = 0**

**Undecelerated Off:** The drive starts to coast, the main contactor remains picked-up.

The enable commands 'Quick stop' at terminal X2: 17 and 'Main contactor OFF' at terminal X2: 15 have no further effect on the converter once the 'Controller disable' command has been entered.

The function 'Controller disable' can be interrupted: On re-enable, the previous speed is approached along the ramp of the ramp generator as long as that is switched on.

**P 108 = 1**

Decelerates the drive along the deceleration ramp for 'Main contactor OFF' and 'Controller disable' (P 109). The drive starts to coast once the speed falls below the threshold set with P 505 and P 506. The main contactor remains picked-up.

The enable commands 'Quick stop' at terminal X2: 17 and 'Main contactor OFF' at terminal X2: 15 affect the deceleration process function in this case:

If one of the two commands is entered additionally during deceleration, the drive switches to the respective function immediately:

**On 'Quick stop'**: Switches to deceleration ramp for 'Quick stop', decelerates to speed = 0, drive coasts, main contactor relay K301 drops, thus isolating the power unit from the mains.

**On 'Main contactor OFF'**: Function is dependent on parameter P 107:

P 107 = 0: Drive starts to coast immediately, followed by main contactor relay K301 dropping, thus isolating the power unit from the mains.

P 107 = 1: Deceleration along the deceleration ramp for 'Main contactor OFF' and 'Controller disable' continues, the drive starts to coast at zero speed. Then the main contactor relay K301 drops, thus isolating the power unit from the mains.

The function 'Controller disable' can be interrupted: On re-enable, the previous speed is approached along the ramp of the ramp generator as long as that is switched on.

#### 5.2.2.3 Quick stop

**Switching input**: X2: 17

**Enable**: +24 V

**Disable**: 0V or open contact

**Function**

**Enable**: 'Deactivate quick stop'

To enable the converter, input the operating command 'Deactivate quick stop' (QS) before 'Main contactor ON' (MC).

**Disable:** Decelerates the drive along the deceleration ramp for 'Quick stop' (P 110). Once the speed falls below the threshold set with P 505 and P 506, the drive starts to coast, and the main contactor relay K301 and the external mains contactor isolate the power unit from the mains.

The commands 'Main contactor OFF' at terminal X2: 15 and 'Controller disable' at terminal X2: 16 have no further effect on the drive once the 'Quick stop' command has been input.

'Quick stop' can not be interrupted.

#### 5.2.2.4 Pulse inhibit

**CAUTION**

Use the enable signal 'Pulse inhibit' in emergency cases only.

**Switching input**: X2: 18

**Enable**: +24 V

**Disable**: 0 V or open contact

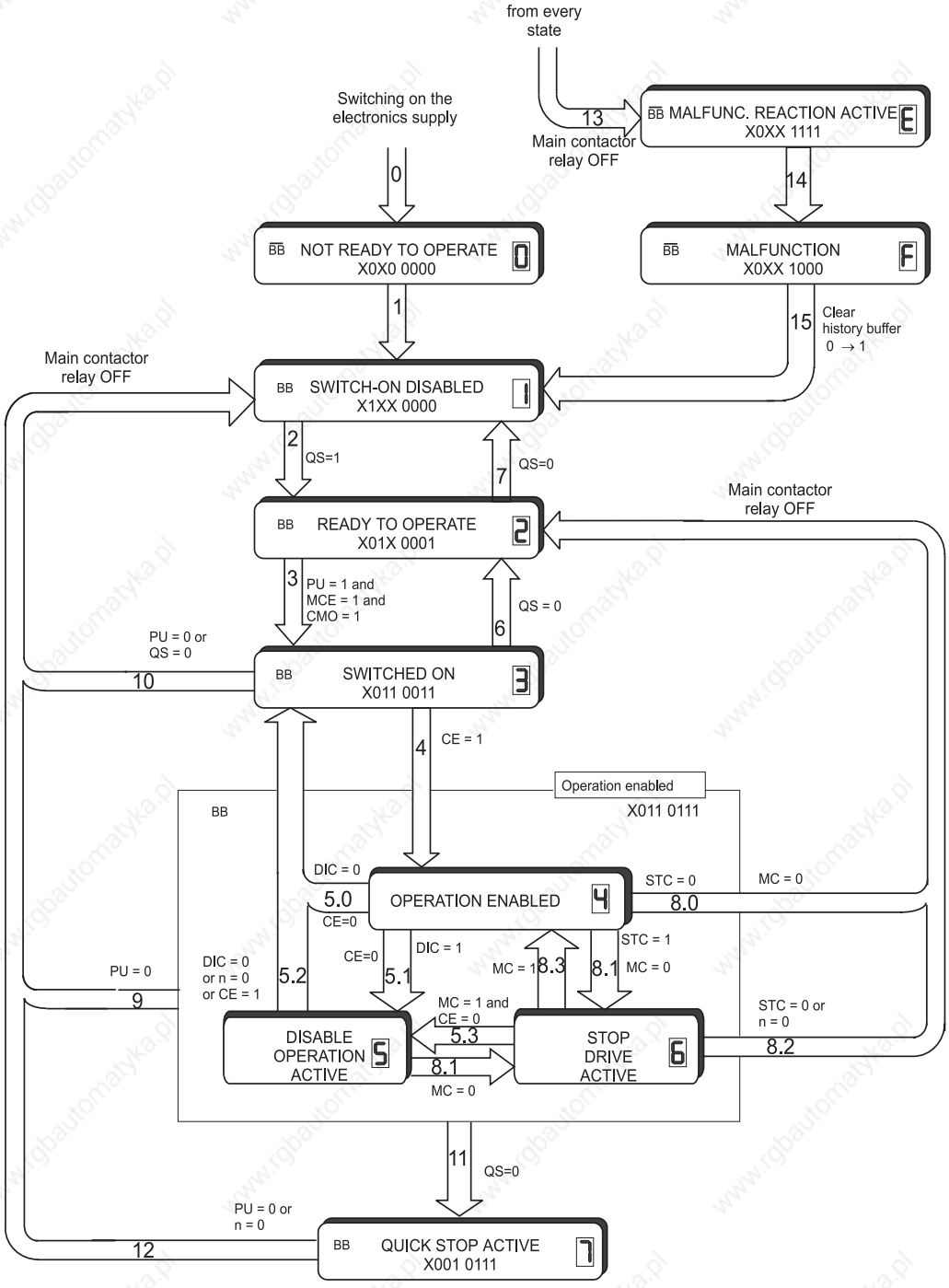
**Enable**: Instantaneous enable of firing pulses and controller if the other enables are present.

**Disable**: The pulses controlling the armature and field power units are switched off after 15 ms independent of the operating state.

The pulse enable/pulse inhibit is a pure hardware function acting directly upon the power unit (pulse generation). Pulse inhibit may therefore lead to fuses blowing. In extreme cases (shoot-through), the thyristors may be damaged! Therefore, use this function as a higher-level switch-off mechanism only !

#### 5.2.2.5 State machine for converter control for operation without field bus connection

The various converter states and the control sequence as a function of the hardware enables are described below on the basis of the state machine in accordance with DRIVECOM Profile-Power Transmission.




X2: 18 : PU = 1: Pulse enable to 1 level
X2: 18 : PU = 0: Pulse enable to 0 level

X2: 17 : QS = 1: Quick stop to 1 level (inactive)
X2: 17 : QS = 0: Quick stop to 0 level (active)

X2: 16 : CE = 1: Controller enable to 1 level
X2: 16 : CE = 0: Controller enable to 0 level

X2: 15 : MC = 1: Main contactor enable to 1 level
X2: 15 : MC = 0: Main contactor enable to 0 levell

MCE = 1: positive main contactor edge applied
MCE = 0: negative main contactor edge applied
CMO = 1: Connection monitoring o.k.
CMO = 0: Connection monitoring not o.k.

STC = 1: Stop mode (P 107) = 1 (braking at QS ramp)
STC = 0: Stop mode (P 107) = 0 (drive coasting)

DIC = 1: Disable mode (P 108) = 1 (braking at QS ramp)
DIC = 0: Disable mode (P 108) = 0 (drive coasting)

Illustration 27: Converter control state diagram - without field bus connection

### 5.2.3 Converter control via communication interface

In this operating mode, the converter is controlled via control commands from a communication interface. For this purpose, the communication interface must be selected accordingly with the help of parameter P 121 Communication source (see ▹Parameter description - Converter data◃ from page 181).

The various converter states and the control sequence are represented in the form of a state diagram (see ▹State machine of the converter control◃ on page 72) in accordance with the DRIVECOM profile Power Transmission.

Converter control via a communication interface requires the 4 hardware enables in addition to the control commands (see ▹Main contactor ON◃ on page 67 to ▹Pulse inhibit◃ on page 69).

Where the converter is to be controlled solely via control commands, the 3 hardware enables 'Controller enable' (CE) at X2: 15, 'Deactivate quick stop' (QS) at X2: 17 and 'Pulse enable' at X2: 18 (PU) may be fixed-linked to 24 V (X1: 25, 26).

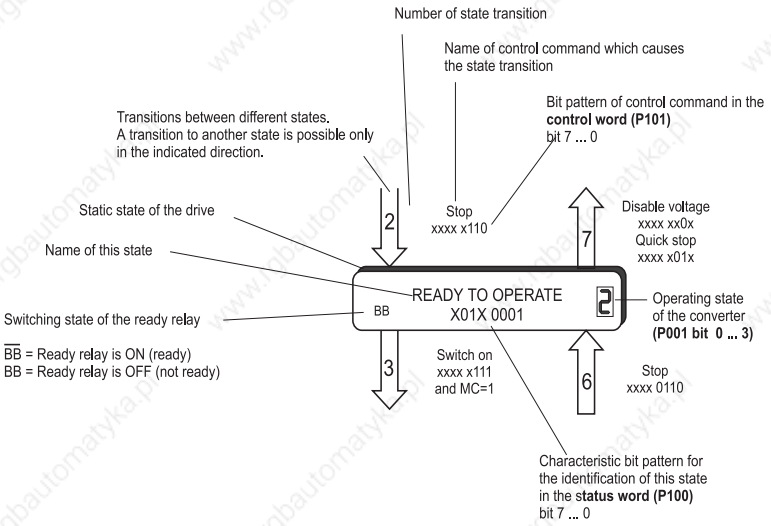
One exception is the hardware enable 'Main contactor ON' at X2:15: This input is edge-triggered and can therefore not be fixed-linked to +24V.

Transition from operating state READY TO OPERATE (2) to SWITCHED ON (3) is possible only if, in addition to the control command 'Switch on', a switching operation from OFF to ON is performed at the hardware switching input 'Main contactor ON' (X12: 15).

#### 5.2.3.1 State machine of the converter control

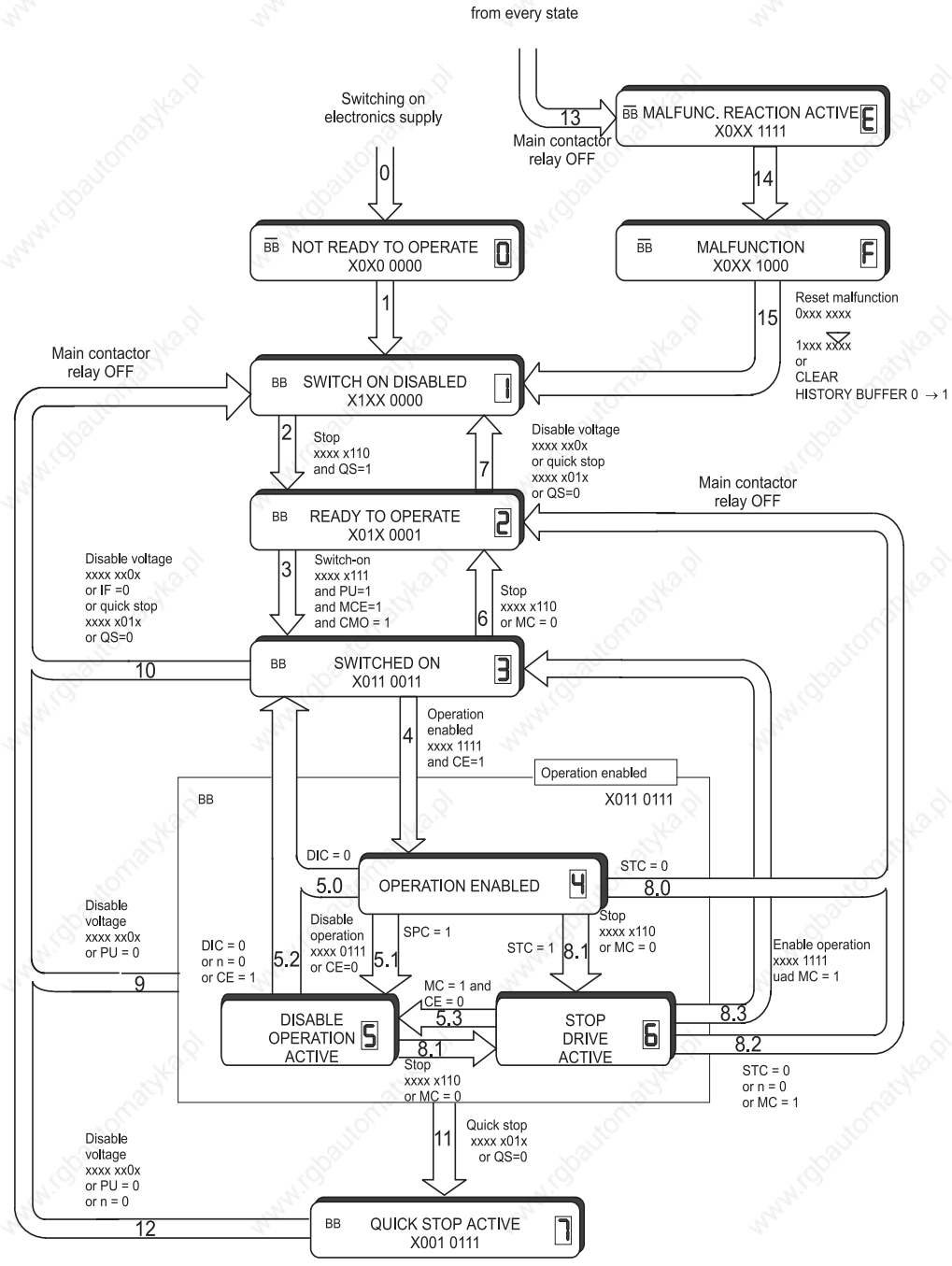
The various operating states of the converter define the converter behaviour (for example, operation enabled or disabled). These states as well as the conditions required to reach the respective states, are shown in ▹Illustration 28◃ on page 73.

The individual states are shown with the respective identification in the status word, and the conditions and control word commands that must be met to achieve transition from one state to the next, are also described.




Within the states, bits 7…0 of the status word (P 100) are displayed in binary form XXXX XXXX. At the state transitions, bits 7…0 of the status word (P 101) are displayed in binary form xxxx xxxx.

Any positions identified X or x have no effect on state machine control and current state display.




X2: 18 : PU = 1: Pulse enable to 1 level
X2: 18 : PU = 0: Pulse enable to 0 level

X2: 17 : QS = 1: Quick stop to 1 level (inactive)
X2: 17 : QS = 0: Quick stop to 0 level (active)

X2: 16 : CE = 1: Controller enable to 1 level
X2: 16 : CE = 0: Controller enable to 0 level

X2: 15 : MC = 1: Main contactor enable to 1 level
X2: 15 : MC = 0: Main contactor enable to 0 level

MCE = 1: positive main contactor edge applied
MCE = 0: negative main contactor edge applied

CMO = 1: Connection monitoring o.k.
CMO = 0: Connection monitoring not o.k.

STC = 1: Stop mode (P 107) = 1 (braking at MC ramp)
STC = 0: Stop mode (P 107) = 0 (drive coasting)

DIC = 1: Disable mode (P 108) = 1 (braking at MC ramp)
DIC = 0: Disable mode (P 108) = 0 (drive coasting)

Illustration 28: Converter control state diagram

#### 5.2.3.2 Converter control states

0 **NOT READY TO OPERATE**
- Voltage is supplied to the electronics
- Self-test running
- Initialisation running
- Drive function disabled
- Ready-to-operate relay is OFF (drive not ready for operation)

1 **SWITCH-ON DISABLED**
- Software/hardware initialisation complete
- Parameterisation complete
- Application can be reparameterised
- Drive function disabled
- Ready-to-operate relay is ON (drive ready for operation)

2 **READY TO OPERATE**
- Application can be reparameterised
- Drive function disabled
- Ready-to-operate relay is ON (drive ready for operation)

3 **SWITCHED ON**
- Application can be reparameterised
- Drive function disabled
- Power unit ready to operate (connections checked)
- Ready-to-operate relay is ON (drive ready for operation)

4 **OPERATION ENABLED**
- Application can be reparameterised (except parameters that can only be modified offline)
- Drive function enabled
- Ready-to-operate relay is ON (drive ready for operation)

5 **DISABLE OPERATION ACTIVE**
- Application can be reparameterised (except parameters that can only be modified offline)
- Drive function enabled
- Command 'Disable operation' is executed (parameterisable via P 108 / P 109)
- Ready-to-operate relay is ON (drive ready for operation)

6 **STOP DRIVE ACTIVE**
- Application can be reparameterised (except parameters that can only be modified offline)
- Drive function enabled
- Command 'Stop' is executed (parameterisable via P 107 / P 109)
- Ready-to-operate relay is ON (drive ready for operation)

7 **QUICK STOP ACTIVE**

- Application can be reparameterised (except parameters that can only be modified offline)
- Quick stop active (via adjustable ramp P 110)
- Drive function enabled
- Ready-to-operate relay is ON (drive ready for operation)

E **MALFUNCTION REACTION ACTIVE**

- Application can be reparameterised
- Error present
- Ready-to-operate relay is OFF (drive not ready for operation)

F **MALFUNCTION**

- Application can be reparameterised
- Drive function disabled
- Ready-to-operate relay is OFF (drive not ready for operation)

#### 5.2.3.3 Description of control word commands

The commands passed on to the converter via the control word (P 101) are described below. As specified in the controller control state diagram, drive control also requires the associated hardware enables to be set.

**Stop** (required bit combination in the control word xxxx x110)

This command is required for the transition from state 'SWITCH-ON DISABLED' to state 'READY TO OPERATE' (for example, directly after the converter has been switched on, after an error was acknowledged or after a quick stop).

The command is also required to stop the drive. Stopping may be as follows:

- The drive starts to coast immediately (P 107 stop mode (Main contactor = 0)
- The drive is decelerated along the deceleration ramp (P 107 stop mode (Main contactor)) = 1)

The stopping of the drive may be interrupted (command 'Enable operation') as long as the drive is still decelerated along the ramp.

After the stopping process, the main contactor is switched off, so that the hardware contact for main contactor ON must be operated again to re-enable the drive (edge for main contactor ON).

**Disable voltage** (required bit combination in the control word xxxx xx0x)

The command 'Disable voltage' always causes transition into the state 'SWITCH-ON DISABLED'. The drive function is disabled immediately, and the drive starts to coast. The main contactor is also switched off. The command thus corresponds largely to deactivating the hardware signal 'Pulse enable'.

**Switch on** (required bit combination in the control word xxxx 0111)

The command 'Switch on' is required to change from state 'READY TO OPERATE' to state 'SWITCHED ON'. The power unit connections are checked in the 'SWITCHED ON' state, and the drive can be enabled directly.

The command 'SWITCH ON' is included in the commands 'Enable operation' and 'Disable operation'.

**Disable operation** (required bit combination in the control word xxxx x111)

The command 'Disable operation' inhibits the drive function. Depending on the parameterisation, the drive is decelerated along the set deceleration ramp to standstill, or starts to coast directly.

The deceleration process initiated via the command 'Disable operation' can be interrupted. The command 'Enable operation' can be used to re-enable the controller. The deceleration process is terminated via commands 'Disable voltage', 'Stop' or 'Quick stop' and the associated reaction initiated.

'Disable operation' is possible only while the drive function is enabled and corresponds to deactivating the hardware signal 'Controller enable'.

**Enable operation** (required bit combination in the control word xxxx 1111)

The command 'Enable operation' enables the drive function if the controller is already in 'SWITCHED ON' state. This command corresponds to the hardware signal 'Controller enable'.

**Quick stop** (required bit combination in the control word xxxx x01x)

The command 'Quick stop' corresponds to deactivating the hardware signal 'Deactivate quick stop', always causes transition to the state 'SWITCH-ON DISABLED' and interrupts the deceleration processes due to the commands 'Disable operation' and/or 'Stop'.

The drive is decelerated along the set quick stop ramp and then disabled. The quick stop process can only be interrupted with the command 'Disable voltage'.

**Reset malfunction** (required bit combination in the control word 0xxx xxxx ▸ 1xxx xxxx)

This command acknowledges and deletes error messages. Any error messages must be acknowledged with this command before the converter may be re-enabled.

Parameter P 106 can be used to set whether this command acknowledges the errors individually or as a group. Once all errors have been acknowledged, the command 'Reset malfunction' causes a change to the 'Switch-on disabled' state.

After an unacknowledgeable error, the converter can only be reset by means of a restart. From software release S03.10, this restart can be performed automatically by means of a reset with command 'Reset malfunction'. This behaviour can also be set in parameter P 106.

#### 5.2.3.4 Converter control in detail

For reasons of simplicity, it is assumed below that all hardware enables are present. Only the main contactor enable signal will receive special mentioning as it is edge-triggered. It is for this reason that a switching operation must be performed at this hardware contact even if control is via a field bus.

**Process sequence of controller enable**
Once switched on, the converter automatically assumes 'SWITCH-ON DISABLED' state (see also ▹Illustration 28◃ on page 73). The following actions must be performed one after the other to move from this state to the 'OPERATION ENABLED' state.

- Command 'Stop': Switches to 'READY TO OPERATE' state (2)
- Command 'Switch on': Required to change to 'SWITCHED ON' state (3) The hardware contact for main contactor ON must be operated in addition to the command (switching operation from OFF to ON)
- Command 'Enable operation': This command enables the controller, the converter assumes 'OPERATION ENABLED' state (4).

Since the command 'Switch on' is included in the command 'Enable operation', it is also possible to issue the command 'Enable operation' directly from the 'READY TO OPERATE' (2) state.

**Process sequence of controller disable**
Disabling the drive function from the 'Operation enabled' state requires the command 'Disable operation'. Depending on the parameterisation (P 108), the drive starts to coast immediately or is decelerated along the set deceleration ramp.

Deceleration along the deceleration ramp moves the drive into 'DISABLE OPERATION ACTIVE' state (5). The deceleration process can be interrupted by a re-enable (command 'Enable operation'). The deceleration process is also terminated via commands 'Stop', 'Disable voltage' and 'Quick stop'.

**Process sequence of stop**
Depending on the setting of parameter P 107, the command 'Stop' results in immediate drive coasting or in decelerating along the set deceleration ramp (P 109). Then the drive function is disabled and the main contactor contact isolated.

The controller assumes 'STOP DRIVE ACTIVE' state (6) if the 'Decelerate along deceleration ramp' mode has been set for stop purposes. During deceleration, the drive function can be re-enabled via the command 'Enable operation'. The deceleration process during stop can also be interrupted via the commands 'Quick stop' and 'Disable voltage'.

The command 'Stop' interrupts the command 'Disable operation' as long as the drive is in 'DISABLE OPERATION ACTIVE' state, in other words, is decelerated due to the command 'Disable operation'.

**Process sequence of quick stop**
If the ’Quick stop’ command is entered with the controller enabled, the command 'Quick stop' initiates a deceleration process at the set quick stop ramp-down time, and the controller changes to 'QUICK STOP ACTIVE' state (7). As soon as the drive has reached standstill, the drive function is disabled, the main contactor de-energised, and the controller switches to 'SWITCH-ON DISABLED' state.

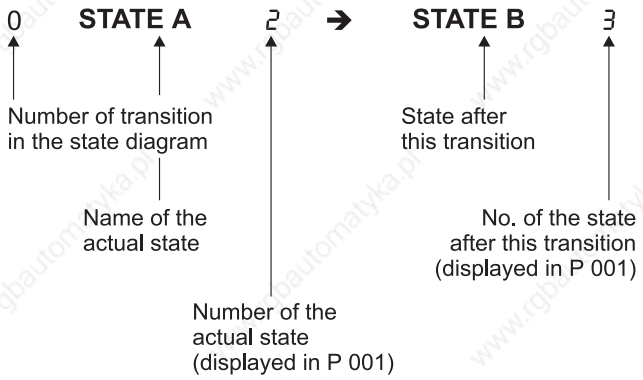
The command Quick stop also interrupts the deceleration process initiated by the commands 'Disable operation' or 'Stop'.

The quick stop function can only be terminated with the command 'Disable voltage'.

**Process sequence of disable voltage**
The command 'Disable voltage' causes the drive to coast immediately, regardless of the state. This command interrupts any other operating states and terminates even the quick stop function.

### 5.2.3.5 Converter control state transitions

This section describes the state changes ('state transitions') between the different converter control states, illustrating the conditions required for each state change and briefly describing which actions are performed in the converter during the state change.




| | |
|---|---|
| Event: | Event, e.g. control command or condition |
| Condition: | which must be fulfilled for this condition |
| Action: | Actions which the converter executes with this state change |

**0** **State machine input** ➔ **NOT READY TO OPERATE 0**

Event: - Hardware reset
or - Software reset
or - Switch on electronics voltage
Action: - Ready-to-operate relay is switched off
- Initialisation and self-test are started

**1** **NOT READY TO OPERATE** *0* ➔ **SWITCH-ON DISABLED** *1*

Event: - Initialisation and self-test completed without errors
Action: - Communication monitoring and process data monitoring are activated
- Ready-to-operate relay is switched on

**2** **SWITCH-ON DISABLED** *1* ➔ **READY TO OPERATE** *2*

Event: - Command 'Stop'
Condition: - Quick stop input X2: 17 = HIGH
Action: - None

| | | | | |
|---|---|---|---|---|
| **3** | **READY TO OPERATE** | 2 | ➔ **SWITCHED ON** | 3 |
| | Event: | | | - Command 'Switch on' |
| | Condition: | | | - Pulse enable X2: 18 = HIGH |
| | | and | | - Positive edge at main contactor enable x2: 15 |
| | Action: | | | - Main contactor relay K301 is switched on |
| | | | | - Power unit connections (armature and field) are checked |
| | | | | - Power connections monitoring is activated |
| **4** | **SWITCHED ON** | 3 | ➔ **OPERATION ENABLED** | 4 |
| | Event: | | | - Command 'Enable operation' |
| | Condition: | | | - Controller enable X2: 16 = HIGH |
| | Action: | | | - Drive function is enabled |
| **5.0** | **OPERATION ENABLED** | 4 | ➔ **SWITCHED ON** | 3 |
| | Event: | | | - Command 'Disable operation' |
| | | or | | - Controller enable X2: 16 = LOW |
| | Condition: | | | - P 108 (Stop mode drive inhibit) = 0 |
| | Action: | | | - Drive function is disabled |
| **5.1** | **OPERATION ENABLED** | 4 | ➔ **DISABLE OPERATION ACTIVE** | 5 |
| | Event: | | | - Command 'Disable operation' |
| | | or | | - Controller enable X2: 16 = LOW |
| | Condition: | | | - P 108 (Disable mode) = 1 |
| | Action: | | | - Drive is decelerated along the MC/CE ramp (P 109). |
| **5.2** | **DISABLE OPERATION ACTIVE** | 5 | ➔ **SWITCHED ON** | 3 |
| | Event: | | | - Zero speed reached |
| | | or | | - P 108 (Disable mode) = 0 |
| | | or | | - Controller enable X2: 16 = HIGH |
| | Action: | | | - Drive function is disabled |
| **5.3** | **STOP DRIVE ACTIVE** | 6 | ➔ **DISABLE OPERATION ACTIVE** | 5 |
| | Event: | | | - Command 'Disable operation' |
| | Condition: | | | - Main contactor enable X2: 15 = HIGH |
| | | and | | - Controller enable X2: 16 = LOW |
| | Action: | | | - None |
| **6** | **SWITCHED ON** | 3 | ➔ **READY TO OPERATE** | 2 |
| | Event: | | | - Command 'Stop' |
| | | or | | - Main contactor enable X2: 15 = LOW |
| | Action: | | | - Power connections monitoring is switched off |
| | | | | - Main contactor relay K301 is switched off |

**7** **READY TO OPERATE** 2 ➔ **SWITCH-ON DISABLED** 1

Event:
- Command 'Quick stop'

or
- Quick stop input X2: 17 = LOW

or
- Command 'Disable voltage'

Action:
- None

**8.0** **OPERATION ENABLED** 4 ➔ **READY TO OPERATE** 2

Event:
- Command 'Stop'

or
- main contactor enable X2: 15 = LOW

Condition:
- P 107 (Stop mode (main contactor)) = 0

Action:
- Drive function is disabled
- Power connections monitoring is switched off
- Main contactor relay K301 is switched off

**8.1** **OPERATION ENABLED** 4/ ➔ **STOP DRIVE ACTIVE** 6
**DISABLE OPERATION ACTIVE** 5

Event:
- Command 'Stop'

or
- main contactor enable X2: 15 = LOW

Condition:
- P 107 (Stop mode (main contactor)) = 1

Action:
- Drive is decelerated along the MC/CE ramp (P 109).

**8.2** **STOP DRIVE ACTIVE** 6 ➔ **READY TO OPERATE** 2

Event:
- Zero speed reached

or
- P 107 (Stop mode (main contactor)) = 0

or
- Main contactor enable X2: 15 = HIGH

Action:
- Main contactor relay K301 is switched off
- Power connection monitoring is switched off

**8.3** **STOP DRIVE ACTIVE** 6 ➔ **SWITCHED ON** 3

Event:
- Command 'Enable operation'

Condition:
- Main contactor enable X2: 15 = HIGH

Action:
- Drive deceleration is terminated

**9** **OPERATION ENABLED** 4/ ➔ **SWITCH-ON DISABLED** 1
**DISABLE OPERATION ACTIVE** 5/
**STOP DRIVE ACTIVE** 6

Event:
- Command 'Disable voltage'

or
- Pulse enable X2: 18 = LOW

Action:
- Drive function is disabled
- Power connections monitoring is switched off
- Main contactor relay (K301) is switched off

**10** **SWITCHED ON** 3 ➔ **SWITCH-ON DISABLED** 1

Event:
- Command 'Disable voltage'

or
- Command 'Quick stop'

or
- Quick stop input = LOW

Action:
- Drive function is disabled
- Power connections monitoring is switched off
- Main contactor relay (K301) is switched off

**11** **OPERATION ENABLED** 4/ ➔ **QUICK STOP ACTIVE** 7
**DISABLE OPERATION ACTIVE** 5/
**STOP DRIVE ACTIVE** 6

Event:
- Command 'Quick stop'

or
- Quick stop input X2: 17 = LOW

Action:
- Quick stop function is tripped
- Drive is decelerated along the quick stop ramp (P 110).

**12** **QUICK STOP ACTIVE** 7 ➔ **SWITCH-ON DISABLED** 1

Event:
- Command 'Disable voltage'

or
- Quick stop completed (zero speed reached)

or
- Pulse enable X2: 18 = LOW

Action:
- Drive function is disabled
- Power connections monitoring is switched off
- Main contactor relay (K301) is switched off

**13** **All states** ➔ **MALFUNCTION REACTION ACTIVE** E

Event:
Action:
- Drive malfunction is detected
- Ready-to-operate relay is switched off
- Error present

**14** **MALFUNCTION REACTION ACTIVE** E ➔ **MALFUNCTION** F

Event:
Action:
- Malfunction reaction complete
- Drive function is disabled
- Power connections monitoring is switched off
- Main contactor relay (K301) is switched off

**15** **MALFUNCTION** F ➔ **SWITCH-ON DISABLED** 1

Event:
- Command 'Reset malfunction'

or
- Digital input function 7 is executed

Condition:
- Malfunction no longer exists

Action:
- Malfunction reset is performed
- Ready-to-operate relay is switched on

The state change is effected only after the actions have been fully executed. The sequence of the actions is in accordance with their processing upon state change. After the actions have been fully processed, the next state has been reached, and new commands are accepted.

### 5.2.4 Switch ON and OFF sequence

Mains voltage supply to and disconnection from power supply unit (X6: 1,3), field supply (X4: 1,2) and power unit (1U1, 1V1, 1W1) must follow the subsequent guidelines, taking into account the enable criteria (see ▹Main contactor ON◃ on page 67 and ▹Controller enable◃ on page 68):

See also ▹Connection instructions◃ from page 21.

Observe in-phase condition of the three connection voltages, otherwise error messages P 37: For example, 21 (CCW rotating field at armature power unit), 19 (Field connection error (AC)), 20 (Armature power unit connection error (AC)).

#### 5.2.4.1 Switch-on sequence

It is recommended to proceed as follows:

- Connect power supply unit and field supply to the mains simultaneously, input pulse enable at X2: 18 at this point at the latest.

**NOTE**

'Pulse enable' causes the hardware to enable the firing pulses for armature and field. The field current is tested directly after switch-on (power supply unit to mains), so that a delayed pulse enable therefore brings up error message 40 (Field current monitoring).

It may happen that motors with a very high field time constant produce error message 40 (Field current monitoring) despite correct procedure.
Remedy: Extend P 385 (Delay for field current monitoring).

- 'Deactivate quick stop' (QS = 1) at terminal X2: 17. For control via communication interface: Also control word P 101 ('Stop', xxxx x110)
- 'Main contactor ON' (MCE = 1) at terminal X2: 15:
  Controls the mains contactor for the power unit via relay K301 on the converter power unit board 3.9712 (terminals X5: 4...6). For control via communication interface: Also control word P 101 ('Switch on, xxxx x111)
- Observe waiting period input by parameter P 526 (Maximum line stabilisation time). Standard setting: 0.5 s.
  Non-observance may lead to delayed startup during subsequent 'Controller enable'.
- Finally, input 'Controller enable' (CE = 1) at terminal X2: 16 for defined and instantaneous startup. For control via communication interface: Also control word P 101 ('Enable operation', xxxx 1111)

**NOTE**

'Deactivate quick stop' must be provided before 'Main contactor ON' to enable the converter.

Example for drive control without field bus connection:
Starting point: The drive was stopped via 'Quick stop' (QS = 0) at terminal X2: 17,
the remaining 3 enable commands 'Main contactor ON' at X2: 15, 'Controller enable' at X2: 16 and 'Pulse enable' at X2: 18 are still present.

There are two restarting options,
requiring the following inputs at the converter:

- Startup is to be instantaneous:
  - 'Main contactor OFF' at terminal X2: 15, 'Controller disable' at terminal X2: 16
  - 'Deactivate quick stop' at terminal X2: 17
  - 'Main contactor ON' at terminal X2: 15
  - Observe waiting period input by parameter P 526 (Maximum line stabilisation time). Standard setting: 0.5 s, range: 0.1 s...5.0 s.
  - 'Controller enable' at X2: 16 results in instantaneous startup
- A short delay is permissible between enable command and drive start (duration: max. the time specified with P 526).
  - 'Main contactor OFF' at terminal X2: 15,
  - 'Deactivate quick stop' at terminal X2: 17
  - 'Main contactor ON' at terminal X2: 15 results in a delayed start.

The following options are also possible:

- Field supply
  - may be connected to mains prior to the power supply unit without additional measures.
  - It is possible at P 386 = 0 (Field monitoring ON/OFF) to connect the field to mains after the power supply section.
    Mains connection must be effected at the latest upon input of the enable command 'Main contactor ON' as this is when the field connection is checked and field monitoring is activated.
- Mains contactor for the power unit
  - Mains connection is possible also without the assistance of relay K301 at the converter.
  - The power unit may be connected to mains before the power supply unit.

#### 5.2.4.2 Switch-off sequence

**NOTE**

It is vital to observe that the power unit must only be isolated from the mains when the firing pulses are at the inverter firing angle limit and the armature current has fallen to zero.

Non-observance of this procedure may lead to fuses blowing. In extreme cases the thyristors may be damaged.

Therefore always make sure to deactivate one of the enable conditions first, except pulse enable !

The choice of how to stop the drive is up to the operator:

- Deactivate command 'Main contactor ON' (MC = 0) at terminal X2: 15
- Deactivate 'Controller enable' (CE = 0) at terminal X2: 16
- 'Quick stop' (QS = 0) at X2: 17

The following control commands may be used in the control word P 101 where control is effected via a communication interface:

- 'Stop' xxxx x110
- 'Disable operation' xxxx x111
- 'Disable voltage' xxxx xx0x

Then first isolate the power unit from the mains (unless this has already been done via one of the controller disable commands), then power unit and field converter.

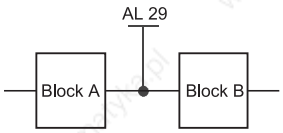
Error message 40 (Field current monitoring) is generated if the field converter is switched off prior to the power supply unit.

## 5.3 Converter structure

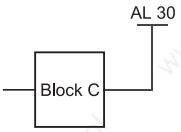
### 5.3.1 ALink

An ALink (Analog link = analog connection signal) is a 16-bit-wide memory cell written in every controller cycle, that can be used in several places throughout the program run. The ALink can be compared to a soldering terminal in a converter with an analog structure. In general, the ALink has a range of ± 16384, corresponding to a signal level of ± 100 %. The maximum values are at ± 32767, that is ± 200 %. A signal stored in an ALink corresponds to an analog signal of conventional converters.

Examples: Setpoint
Actual speed
Ramp generator output
Speed controller output etc.




The signal from Block A is stored as an intermediate result in ALink 29 and utilised further as input of Block B. It can also be used as input signal for further function blocks, however.




The signal from Block C is the end result and ends up in ALink 30. Further processing requires a link. See below.

#### 5.3.1.1 Selecting an ALink

Selecting an ALink as input signal for a function block (ramp generator, speed controller etc.) is by entering the number of the required ALink in the associated selection parameter.

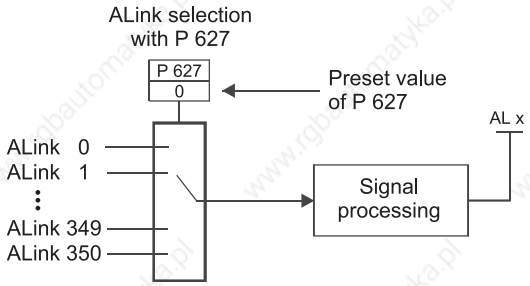
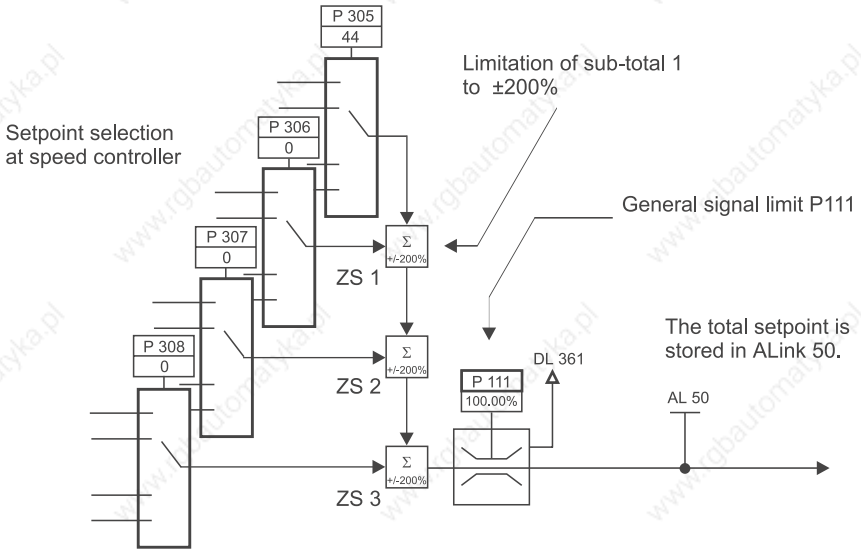


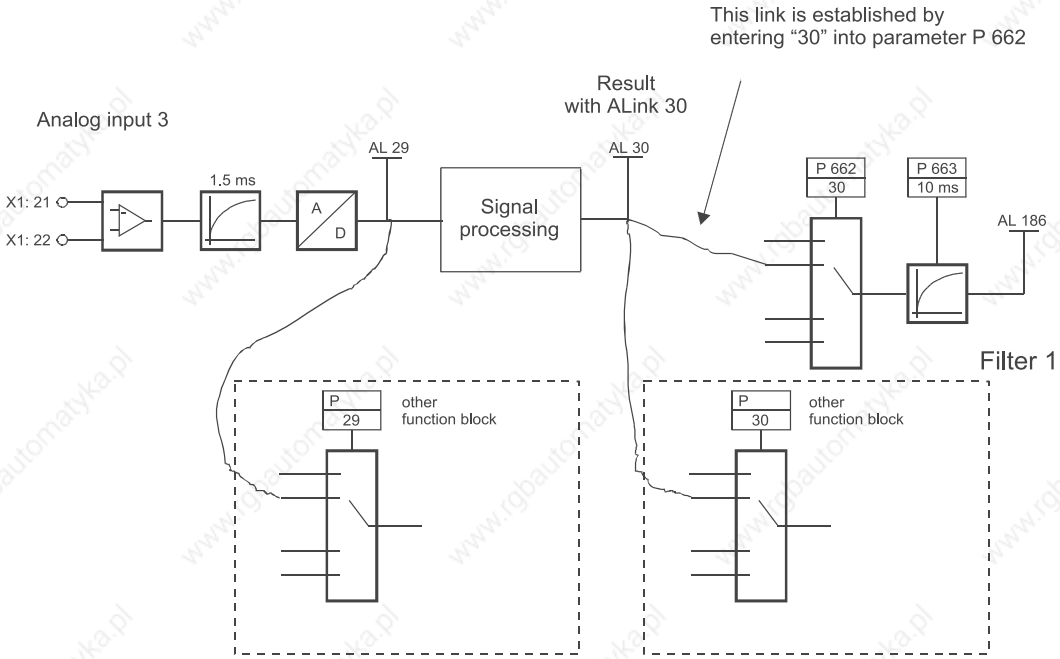

Illustration 29: Symbol for ALink selection

The selected input signals (ALinks) are always added for function blocks with several inputs (max. possible number: 4). Processing follows the sequence of rising selection parameter numbers. Each intermediate result is limited to ± 200 %. In the example, the end result is limited to the value of the general signal limit parameter P 111.




### 5.3.1.2 Interconnecting ALinks

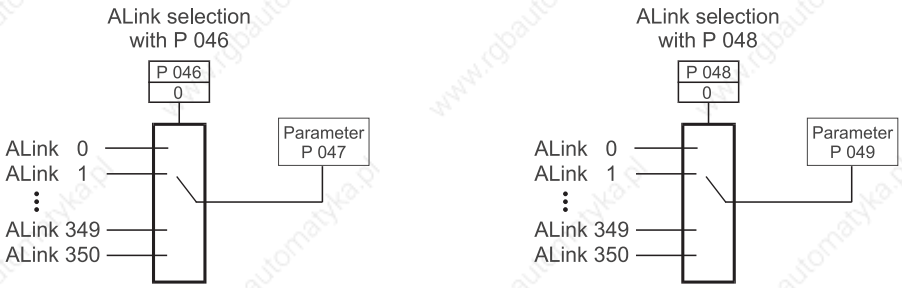
The diagram below illustrates that one ALink can be used by several function blocks.




In the above example, the value converted by analog input 3 is filtered with the help of the unassigned filter 1. The processed value of analog input 3 is stored in ALink 30 and is not further connected to any other function block for the time being. Entering the value '30' in the parameter that selects the input of the unassigned filter 1 (P 662 = 30) generates a connection between analog input 3 and the filter. The filtered value of analog input 3 is now in ALink 186. Since that is not connected to any other function block, it is necessary to generate a separate connection by entering '186' in a selection parameter of another function block to enable further utilisation of this value.

### 5.3.1.3 Displaying an ALink value

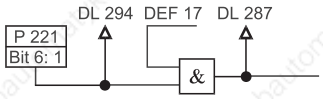
There are four parameters to show the contents of two ALinks in the display or on the PC. Parameters P 46 and P 48 select the ALinks whose value is then displayed in parameters P 47 and P 49.



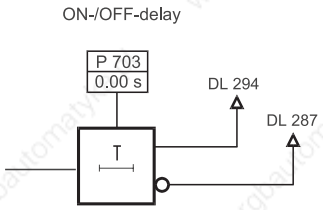

The values in parameters P 47 and P 49 are displayed as decimal figures in internal format. For signals with standard scaling (see ▹ALink list◃ from page 351) the signal range of ± 100 % is output as a figure within a range of ± 16384.

### 5.3.2 DLink

A DLink (Digital Link = digital link signal) is a 1-bit cell set by the program. This does not have to happen in the controller cycle, but may also occur in a background program during the rest time. DLink contents can be influenced only indirectly from outside, direct write access is not possible. A DLink is modified by writing a control word or by setting/resetting a digital input, for example. The switching input states (terminals X2: 15 to X2: 26) are mapped in DLinks 452 to 463. Even the bits of the state words in the system are assigned DLinks. Bits not yet assigned of control and state words have a fixed value of LOW (='0').




Bit states are temporarily stored in DLinks 294 and 278. They cause further internal reactions and may also be used for other connections.




The output of the digital block is written into DLinks 592 and 593. Further processing requires a connection.

#### 5.3.2.1 Selecting a DLink

Selecting a DLink as input signal for a function block (digital function block, digital inverter, digital outputs etc.) is by entering the number of the required DLink in the associated selection parameter.

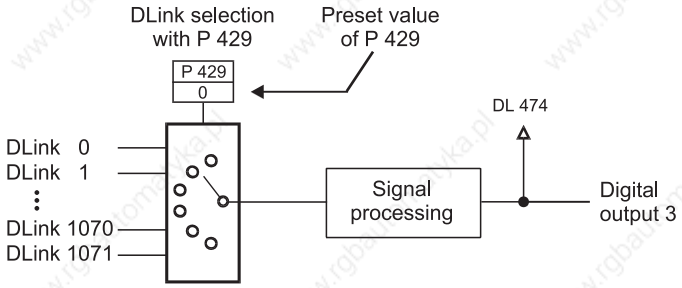
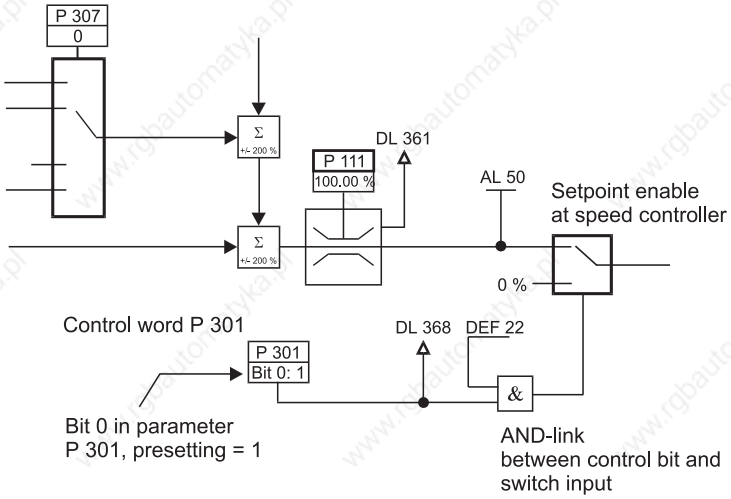



Illustration 30: Symbol for DLink selection

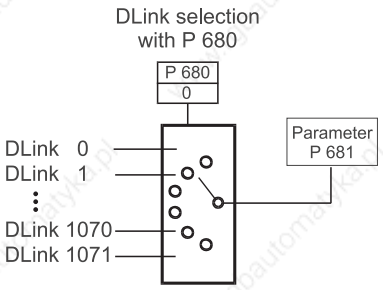
### 5.3.2.2 Influencing DLinks




Setpoint enable at the speed controller is via an external switch that has been assigned the digital input function 22 (DIF 22 - explanation further below), and via bit no. 0 of parameter P 301 (Control word (speed controller)). The control bit can now be modified via communication (field bus connection) by writing parameter P 301. The state of this control bit is mapped in DLink 368.

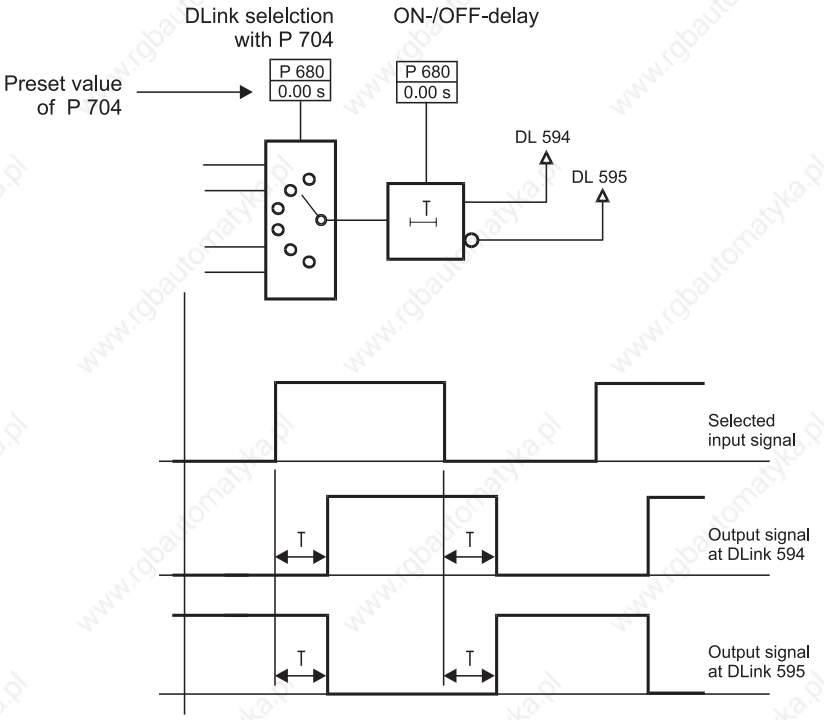
### 5.3.2.3 Displaying a DLink

There are two parameters to show the contents of a DLink in the display or on the PC. Parameter P 680 selects the DLink whose state is then shown in parameter P 681. The display is 1 bit wide and can adopt values 0 (= LOW) and 1 (= HIGH).



### 5.3.2.4 Digital basic functions

There are four digital inverters with one input each. The signal delay of each inverter can be parameterised. The specified time is valid for the LOW → HIGH as well as for the HIGH → LOW input signal transition.




Level changes at the input shorter than the set delay time do not appear at the digital inverter outputs !

The DLinks may be linked with the four existing digital function blocks via AND, OR and Exclusive OR. The result then becomes available in two further DLinks. The first DLink contains the operation result, the subsequent one the inverted result.

Each of the four digital function blocks is configured with a parameter (P 710 in the example):

**0**: Function block not active

**1**: Function block configured as AND gate with four inputs; assign (DLink 1) to unassigned inputs

**2**: Function block configured as OR gate with four inputs; assign (DLink 0) to unassigned inputs

**3**: Function block configured as Exclusive OR gate with two inputs

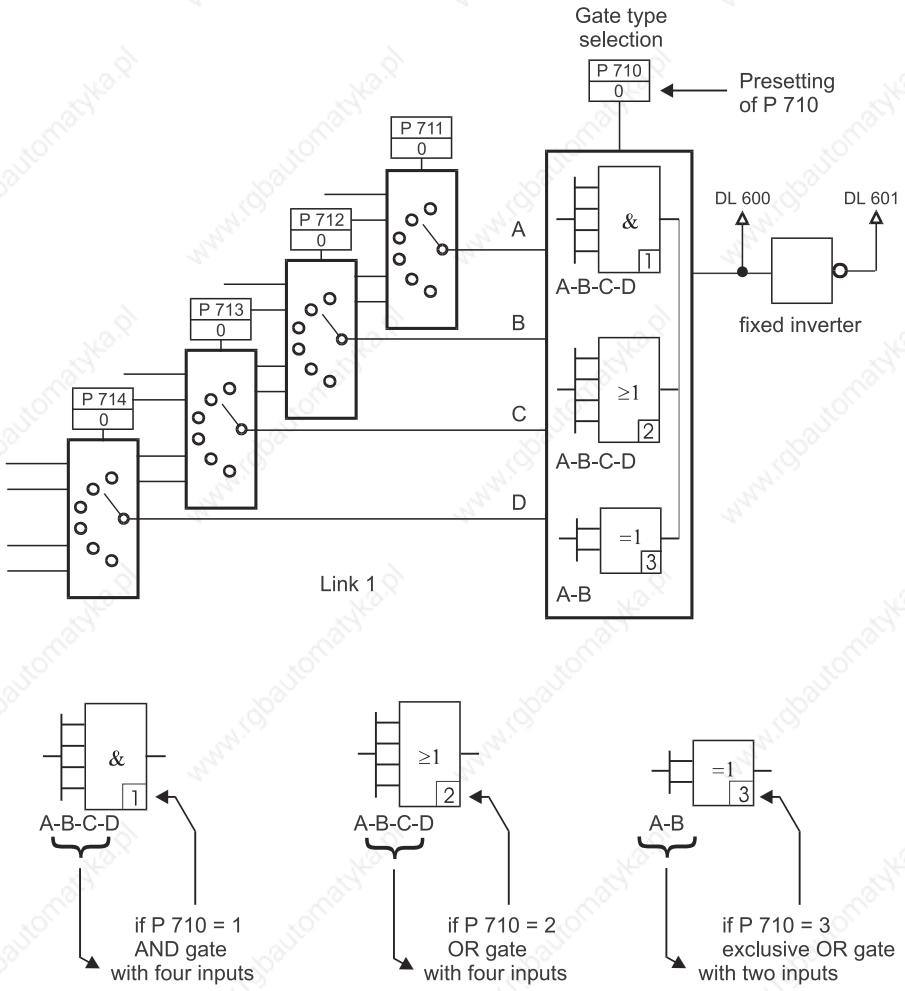



Illustration 31: Structure and parameterisation of an unassigned digital function block

### 5.3.3 Digital outputs

There are six programmable digital outputs. Each output has a free-wheeling diode. The outputs are protected against shortcircuits at the terminal. They are not isolated from the control !

Using the internal +24 V, each output can be loaded with max. 20 mA. Using external +24 V allows current loads of up to 100 mA per output.

The digital outputs have been assigned the following parameters and terminals:

| Digital output | Selection parameter | ON delay | OFF delay | Polarity reversal | Terminal |
|---|---|---|---|---|---|
| 1 | P 421 | P 422 | P 423 | P 424 | X2: 5 |
| 2 | P 425 | P 426 | P 427 | P 428 | X2: 6 |
| 3 | P 429 | P 430 | P 431 | P 432 | X2: 7 |
| 4 | P 433 | P 434 | P 435 | P 436 | X2: 8 |
| 5 | P 437 | P 438 | P 439 | P 440 | X2: 9 |
| 6 | P 441 | P 442 | P 443 | P 444 | X2: 10 |

The DLinks are available as output signals. DLinks may be combined with the help of the unassigned digital link elements and the result be connected to the output.

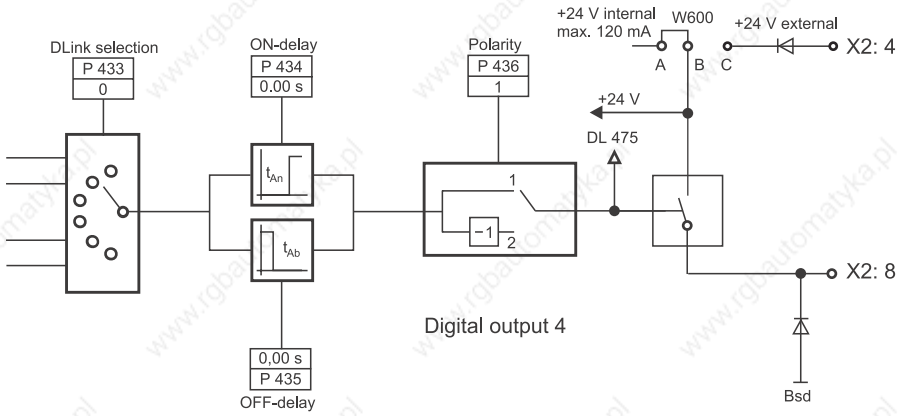



Illustration 32: Example of the basic digital output structure

The most common output functions are grouped together in DLinks 2 to 23.

| DLink no. | Description | State parameter | Bit no. | Also DLink |
|---|---|---|---|---|
| 0 | Fixed value 0 (LOW) | | | |
| 1 | Fixed value 1 (HIGH) | | | |
| 2 | State 'Enabled' | P 100 | 0 ... 2 | |
| 3 | State 'MALFUNCTION' | P 100 | 3 | 83 |
| 4 | State 'WARNING' | P 100 | 7 | 87 |
| 5 | Ramp generator setpoint reached | P 220 | 12 | 284 |
| 6 | $n > n_{max}$ (error 44, threshold P 501) | P 921 | 0 | 864 |
| 7 | $n > n_{min}$(P 505 and P 506) | P 250 | 10 | 314 |
| 8 | $n > n_{x1}$ (P 507 and P 508) | P 250 | 12 | 316 |
| 9 | $n > n_{x2}$ (P 509 and P 510) | P 250 | 13 | 317 |
| 10 | $n > n_{x3}$(P 511 and P 512) | P 250 | 14 | 318 |
| 11 | $n > n_{x4}$ (P 513 and P 514) | P 250 | 15 | 319 |
| 12 | Drift lock active (P 322 to P 324) | P 300 | 8 | 360 |
| 13 | $n_{actual} = n_{set}$ at the speed controller (P 515 to P 516) | P 300 | 12 | 364 |
| 14 | Unassigned comparator | | | |
| 15 | $I_A > Ix_1$ (P 521 and P 522) | P 350 | 8 | 392 |
| 16 | $I_A > Ix_2$ (P 523 and P 524) | P 350 | 9 | 393 |
| 17 | Current limit reached | P 300 | 14 | 366 |
| 18 | Speed controller output limit active | P 300 | 15 | 367 |
| 19 | Motor $i^2t$ monitoring | P 030 | 4 | 68 |
| 20 | Heat sink temperature limit monitoring | P 020 | 6 | 54 |
| 21 | Field current actual value < 50 % field current set-point | P 370 | 8 | 424 |
| 22 | State 'READY TO OPERATE' | P 100 | 0 | 80 |
| 23 | Drive disabled | P 100 | 0...2 | |

### 5.3.4 Digital input functions DIF

There are 33 predefined functions available for the eight switch inputs at terminals X2: 19 to X2: 26. The setting of the function assigned to the input is stored outside the data records in the EEPROM. A data record change therefore cannot assign a switching input a different function. Entry of the required function is possible only while the drive is disabled; the setting will be stored immediately in the EEPROM upon input.

Each input is assigned a DLink that maps the switch position (the signal level) at the associated input terminal, even if a switching input has been assigned DIF 0.

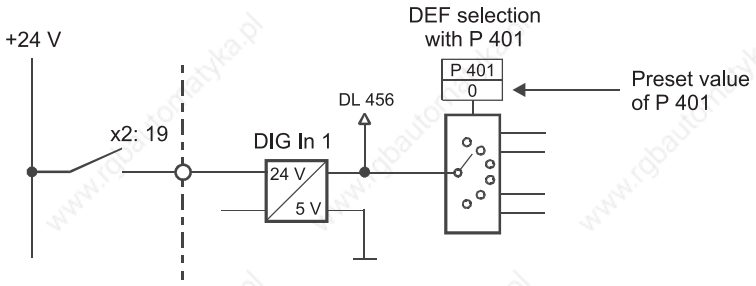
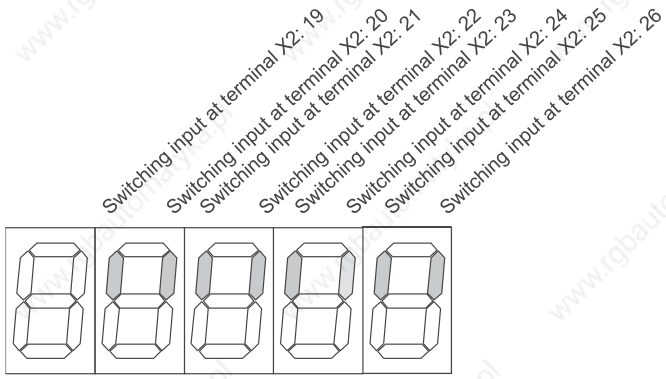



Illustration 33: Digital switching input 1

The DIF selection parameter defines the function of the switching input at the related terminal and is assigned to the sekected DLink.

| Parameter | Switching input | Terminal | DLink |
|---|---|---|---|
| P 401 | Function, digital input 1 | X2: 19 | DL 456 |
| P 402 | Function, digital input 2 | X2: 20 | DL 457 |
| P 403 | Function digital input 3 | X2: 21 | DL 458 |
| P 404 | Function, digital input 4 | X2: 22 | DL 459 |
| P 405 | Function, digital input 5 | X2: 23 | DL 460 |
| P 406 | Function, digital input 6 | X2: 24 | DL 461 |
| P 407 | Function, digital input 7 | X2: 25 | DL 462 |
| P 408 | Function, digital input 8 | X2: 26 | DL 463 |

The signal levels at the switching inputs are displayed as bar code in parameter P 43. The bar assigned to the switching input is illuminated as soon as a HIGH level is available at the respective terminal.




In addition to that, if there is a bus connection, some of the functions may be tripped by setting/ resetting the control word bits listed in the table below. The column Operation specifies the logic

function used to link control word bit and switch input. The specified operation applies also if several switching inputs are assigned the same function.

Example:

| | |
|---|---|
| DIF 7: Acknowledge error | **OR** operation between control word bit P 101/bit 7 and the switching input which the digital input function DIF 7 was assigned to. The OR operation can be used to acknowledge an error either via the switch **or** via the control bit. |
| DIF 9: Set analog input 1 to zero | **AND** operation between control word bit P 181/bit 1 and the switching input which the digital input function DIF 9 was assigned to. Due to the AND operation, the signal at analog input 1 can be isolated only if the control bit is set (HIGH) **and** the switching input is at HIGH level (+24 V). |

After voltage has been applied to the electronics supply, the control word bits for which an AND operation has been specified, are on HIGH level, and the control word bits for which an OR operation has been specified, on LOW level.

Any unused digital input functions for the switching inputs are set in accordance with the specified operation. At an AND operation to HIGH level, at an OR operation to LOW level.

The internal switch positions drawn in the function diagrams are drawn for unused digital input functions at terminals X2: 19 to X2: 26 and unaffected control word bits.

### 5.3.4.1 List of digital input functions DIF

| DIF no. | Operation | Control word Bit no. | Description |
|---|---|---|---|
| 0 | | | Digital input switched off, DLink active |
| 1 | | | 1: Load data record 1 |
| 2 | | | 1: Load data record 2 |
| 3 | | | 1: Load data record 3 |
| 4 | | | 1: Load data record 4 |
| 5 | | | 1: Load data record 5 |
| 6 | | | 1: Load data record 6 |
| 7 | OR | P 101 Bit 7 | 1: Acknowledge error |
| 8 | OR | P 181 Bit 0 | 1: Negate analog input 1 |
| 9 | AND | P 181 Bit 1 | 1: Enable analog input 1 |
| 10 | OR | P 181 Bit 2 | 1: Negate analog input 2 |
| 11 | AND | P 181 Bit 3 | 1: Enable analog input 2 |
| 12 | OR | P 181 Bit 4 | 1: Negate analog input 3 |
| 13 | AND | P 181 Bit 5 | 1: Enable analog input 3 |
| 14 | OR | P 181 Bit 6 | 1: Negate analog input 4 |
| 15 | AND | P 181 Bit 7 | 1: Enable analog input 4 |
| 16 | OR | P 221 Bit 0 | 0: Ramp generator A parameter set 1 active<br>1: Ramp generator A parameter set 2 active |
| 17 | AND | P 221 Bit 6 | 1: Enable ramp generator A input (setpoint) |
| 18 | OR | P 221 Bit 5 | 1: Stop ramp generator A |
| 19 | AND | P 221 Bit 4 | 1: Enable ramp generator A output |
| 20 | OR | P 211 Bit 0 | 1: Motor potentiometer up ( + ) |
| 21 | OR | P 211 Bit 1 | 1: Motor potentiometer down ( - ) |
| 22 | AND | P 301 Bit 0 | 1: Enable speed controller setpoint (after addition) |
| 23 | OR | P 601 Bit 0 | Unassigned change-over switch 1 |
| 24 | OR | P 601 Bit 1 | Unassigned change-over switch 2 |
| 25 | OR | P 601 Bit 2 | Unassigned change-over switch 3 |
| 26 | AND | P 601 Bit 3 | Unassigned change-over switch 4 |
| 27 | AND | P 561 Bit 0 | 1: Unassigned controller : Enable setpoint (after addition) |
| 28 | AND | P 561 Bit 1 | 1: Unassigned controller : Enable controller |
| 29 | AND | P 561 Bit 2 | 1: Unassigned controller : Enable I-component |
| 30 | OR | | Multiplier 1 |
| 31 | OR | | Multiplier 2 |
| 32 | AND | P 221 Bit 7 | 1: Enable ramp generator B input (setpoint) |
| 33 | AND | P 221 Bit 8 | 1: Enable ramp generator B output |

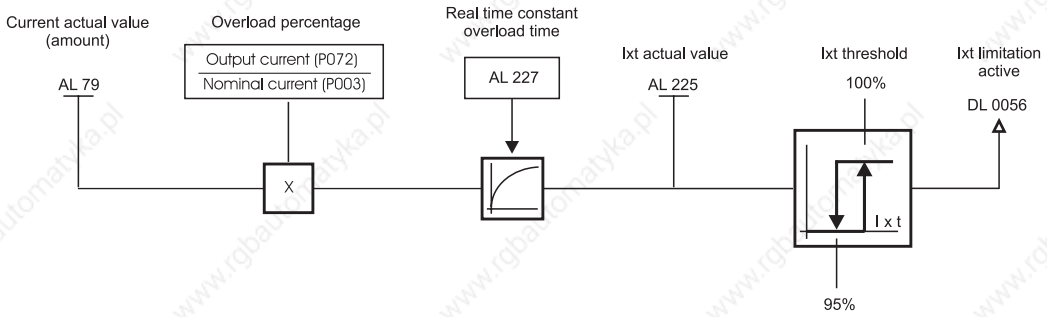
| DEF Nr. | Verknüpfung | Steuerwort Bit Nr. | Bedeutung |
|---|---|---|---|
| 0 | | | Digitaler Eingang abgeschaltet, DLink aktiv |
| 1 | | | 1: Datensatz 1 laden |

| | | | |
|---|---|---|---|
| 2 | | | 1: Datensatz 2 laden |
| 3 | | | 1: Datensatz 3 laden |
| 4 | | | 1: Datensatz 4 laden |
| 5 | | | 1: Datensatz 5 laden |
| 6 | | | 1: Datensatz 6 laden |
| 7 | ODER | P 101 Bit 7 | 1: Fehler quittieren |
| 8 | ODER | P 181 Bit 0 | 1: Analogeingang 1 negieren |
| 9 | UND | P 181 Bit 1 | 1: Analogeingang 1 freigeben |
| 10 | ODER | P 181 Bit 2 | 1: Analogeingang 2 negieren |
| 11 | UND | P 181 Bit 3 | 1: Analogeingang 2 freigeben |
| 12 | ODER | P 181 Bit 4 | 1: Analogeingang 3 negieren |
| 13 | UND | P 181 Bit 5 | 1: Analogeingang 3 freigeben |
| 14 | ODER | P 181 Bit 6 | 1: Analogeingang 4 negieren |
| 15 | UND | P 181 Bit 7 | 1: Analogeingang 4 freigeben |
| 16 | ODER | P 221 Bit 0 | 0: Hochlaufgeber A Beschaltung 1 aktiv<br>1: Hochlaufgeber A Beschaltung 2 aktiv |
| 17 | UND | P 221 Bit 6 | 1: Hochlaufgeber A Eingang (Sollwert) freigeben |
| 18 | ODER | P 221 Bit 5 | 1: Hochlaufgeber A stop |
| 19 | UND | P 221 Bit 4 | 1: Hochlaufgeber A Ausgang freigeben |
| 20 | ODER | P 211 Bit 0 | 1: Motorpoti hoch ( + ) |
| 21 | ODER | P 211 Bit 1 | 1: Motorpoti runter ( - ) |
| 22 | UND | P 301 Bit 0 | 1: Drehzahlregler Sollwert (nach Summenpunkt) freigeben |
| 23 | ODER | P 601 Bit 0 | Freier Umschalter 1 |
| 24 | ODER | P 601 Bit 1 | Freier Umschalter 2 |
| 25 | ODER | P 601 Bit 2 | Freier Umschalter 3 |
| 26 | UND | P 601 Bit 3 | Freier Umschalter 4 |
| 27 | UND | P 561 Bit 0 | 1: Freier Regler : Sollwert (nach Summenpunkt) freigeben |
| 28 | UND | P 561 Bit 1 | 1: Freier Regler : Regler freigeben |
| 29 | UND | P 561 Bit 2 | 1: Freier Regler : I-Anteil freigeben |
| 30 | ODER | | Vervielfacher 1 |
| 31 | ODER | | Vervielfacher 2 |
| 32 | UND | P 221 Bit 7 | 1: Hochlaufgeber B Eingang (Sollwert) freigeben |
| 33 | UND | P 221 Bit 8 | 1: Hochlaufgeber B Ausgang freigeben |

### 5.3.5 Overload function

An overload function is implemented in several power units. These power units can be run with a higher current as the power unit nominal current (P003) for a short time. The power unit's possible peak current is displayed in P005.

The overload period is limited by a Ixt monitoring.



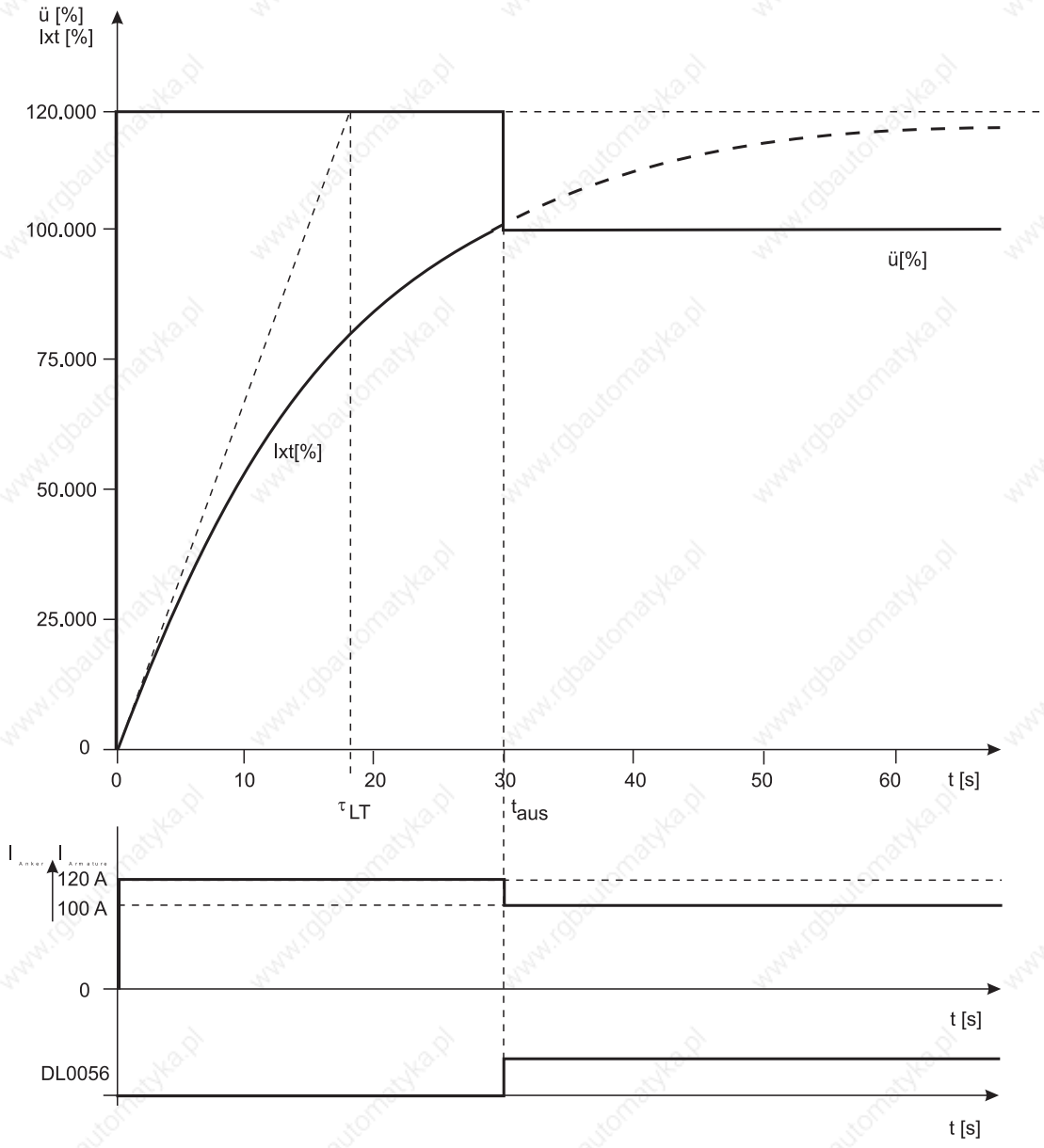

The possible overload period depends on the previous load. The overload period displayed in the power unit table is valid for a peak current load, if the device has not run before.

If the output current is lower than the peak current (e.g. only 1,1 * nominal current), the possible overload period is longer.

As soon as the Ixt value 100 % is reached, the output current of the device is limited to nominal current. The maximum output current can be supplied again, if the Ixt value is below 95 %.

**Example for Ixt monitoring**

| | |
|---|---|
| Power unit nominal current: | 100 A |
| Power unit peak current: | 120 A |
| Device output current: | 120 A |
| Overload period: | 30 s |



## 5.4 Function diagrams

The function diagrams below illustrate the converter structure and the different setting options. For a more detailed description of the individual parameters refer to sections ▹Parameter description - Converter data◃ from page 181 to ▹Parameter description - System parameters◃ from page 349.

For explanations regarding the symbols used and the graphic representations as well as the basic ALink and DLink combinations refer section ▹Converter structure◃ from page 85.

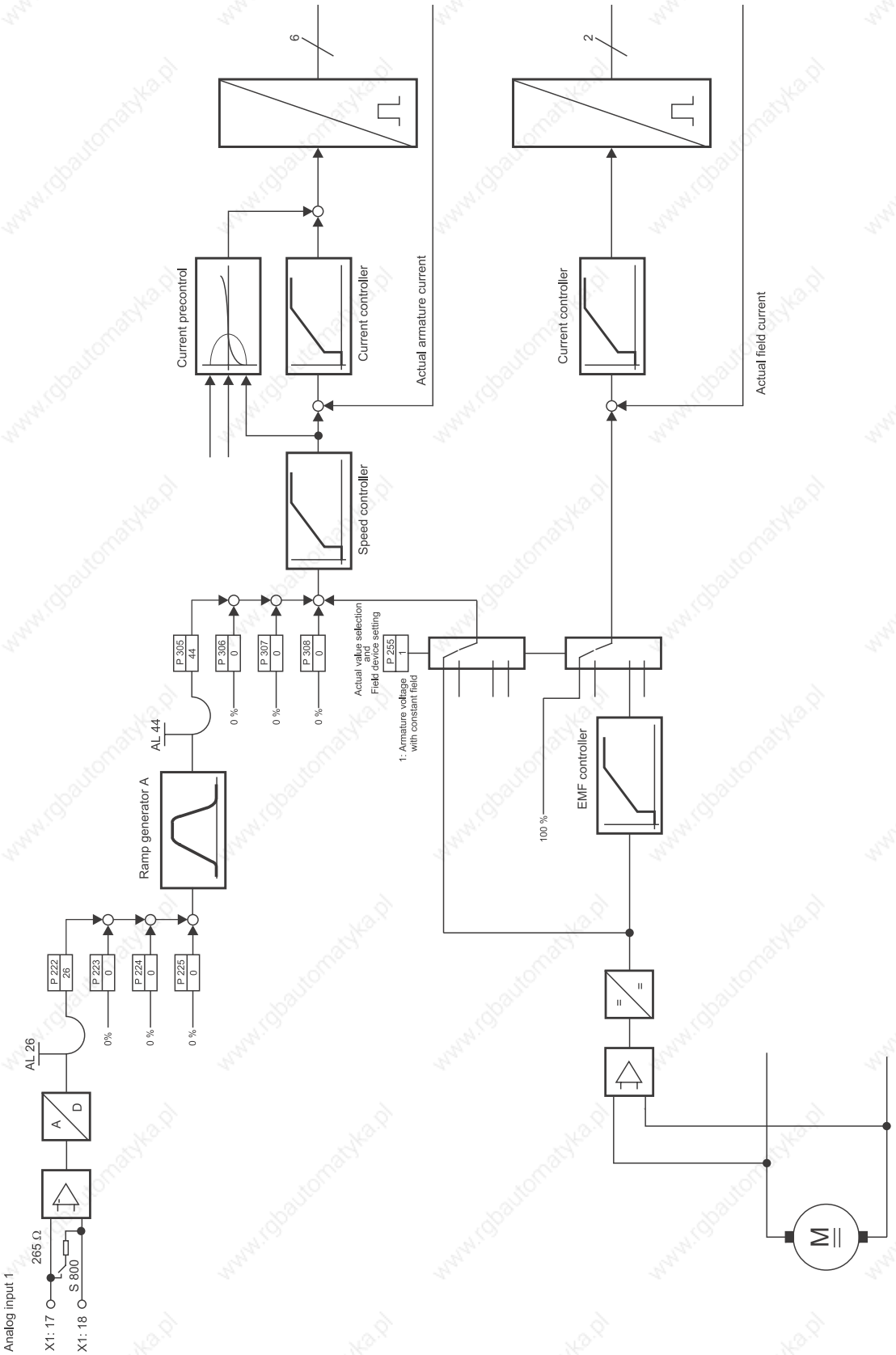



Illustration 34: Function diagram - As-supplied converter configuration

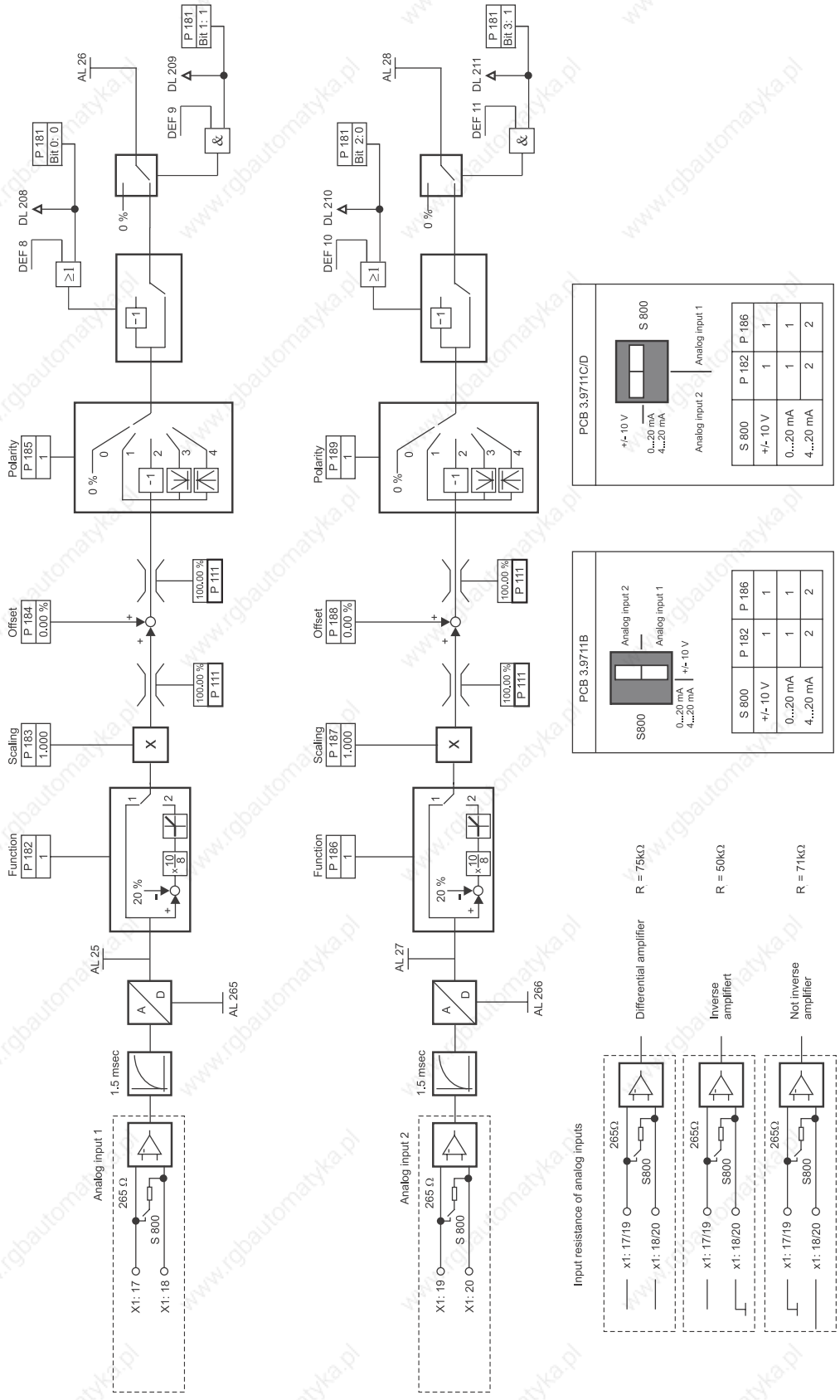



Illustration 35: Function diagram - Analog inputs 1 and 2

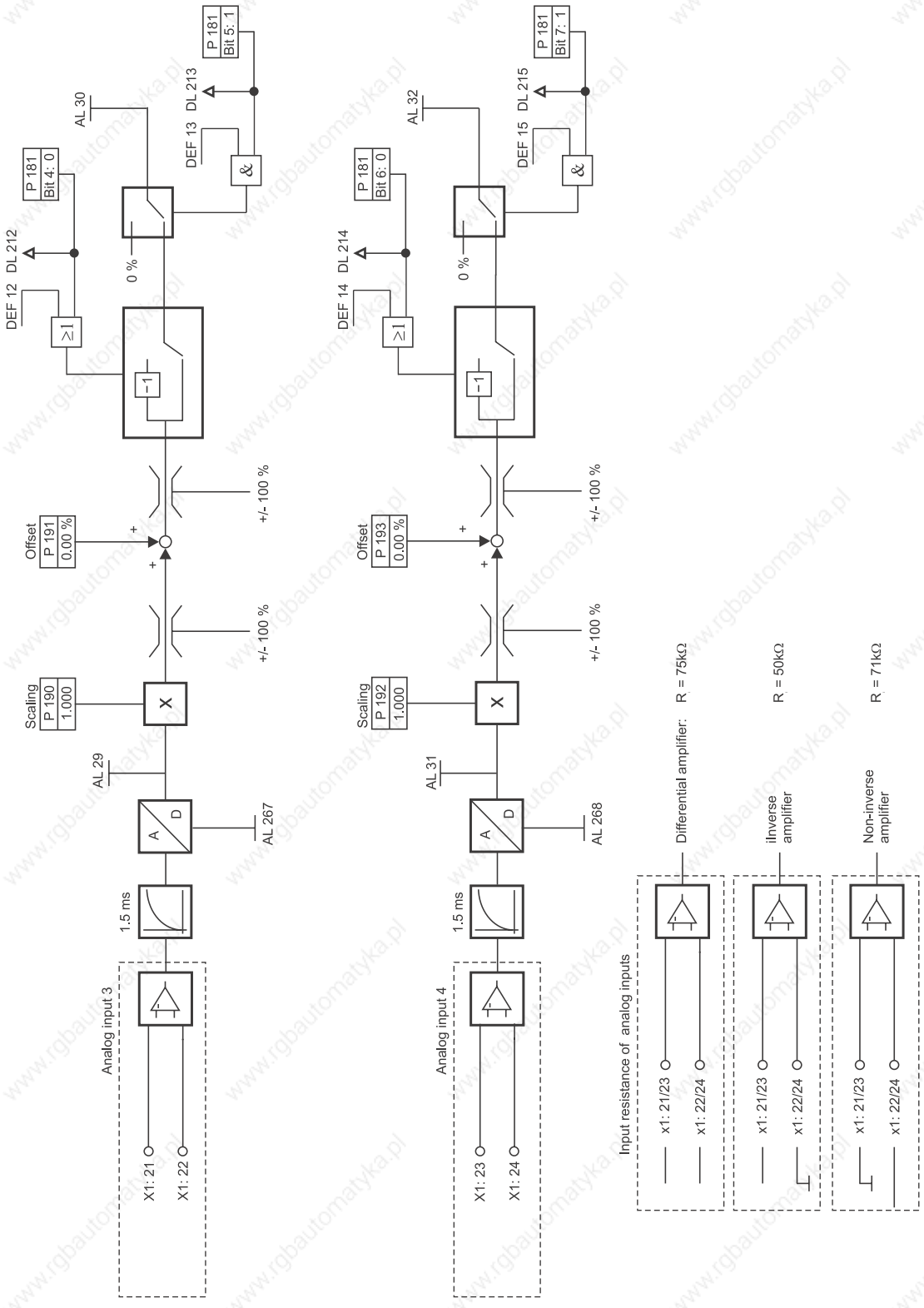



Illustration 36: Function diagram - Analog inputs 3 and 4

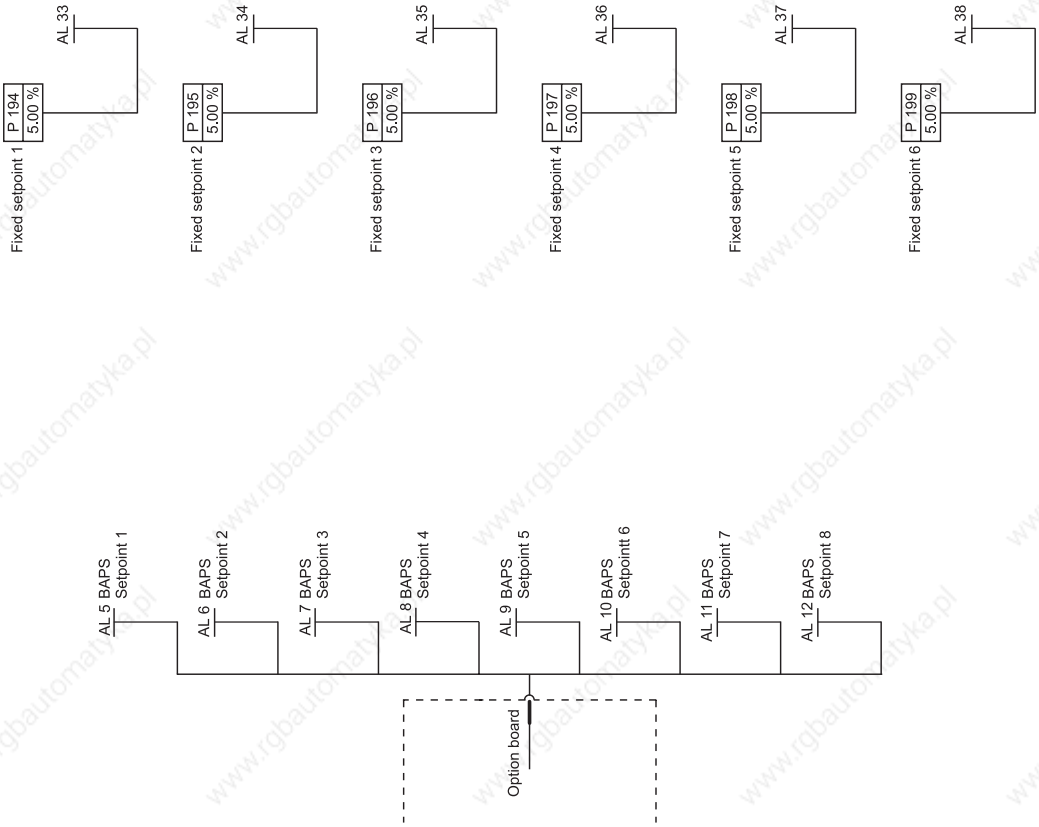



Illustration 37: Function diagram - Setpoints

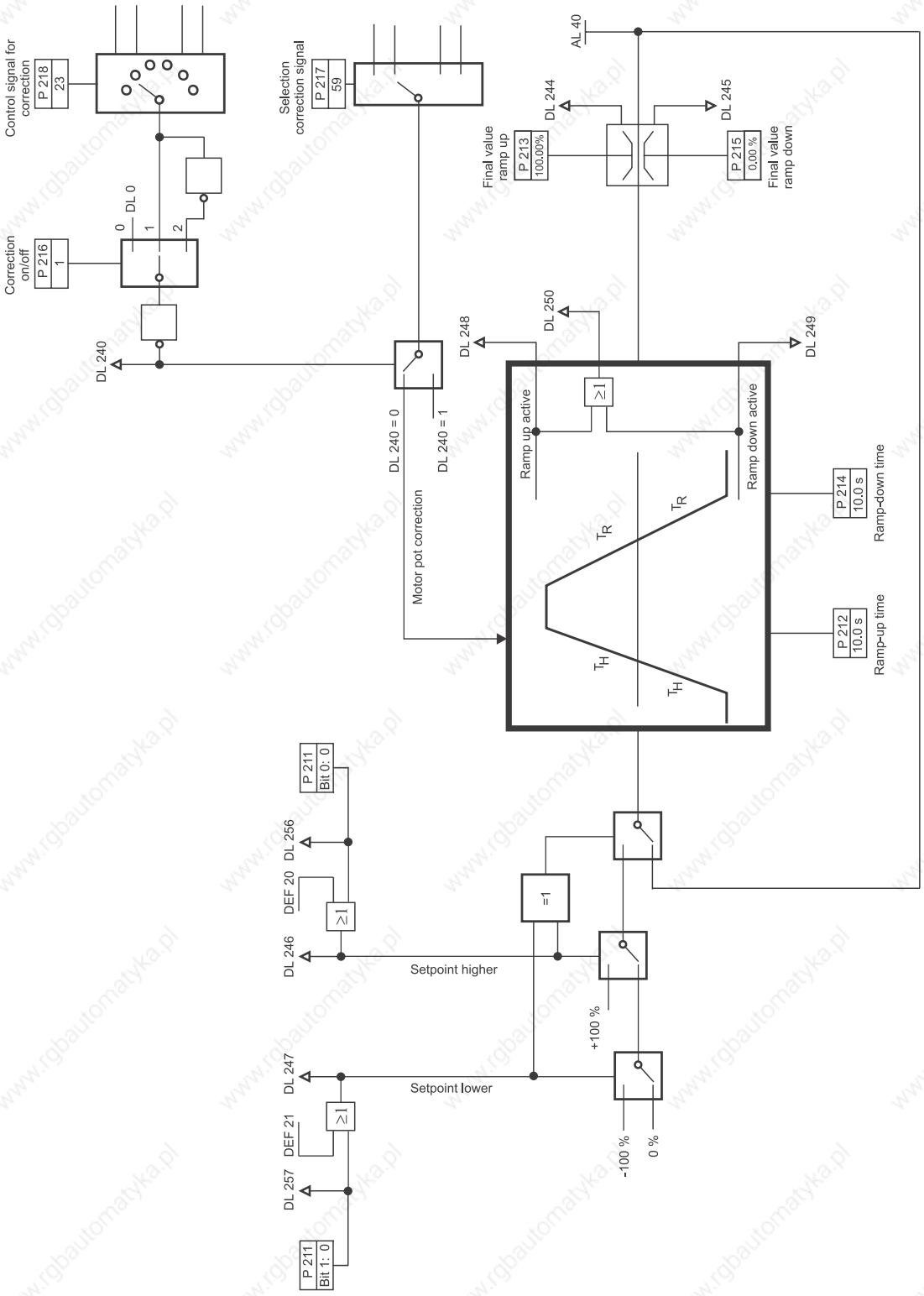



Illustration 38: Function diagram - Motorised potentiometer

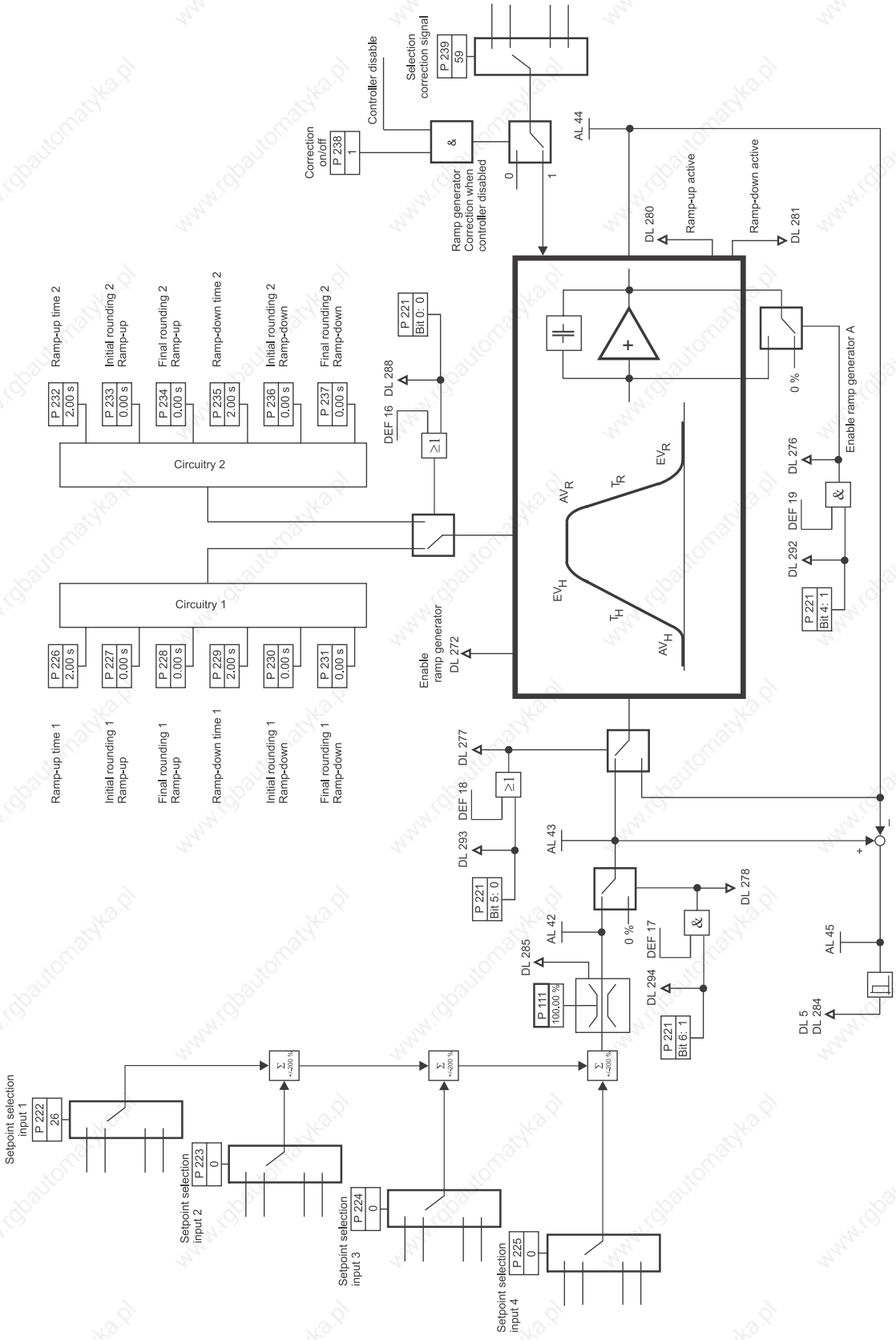



Illustration 39: Function diagram - Ramp generator A

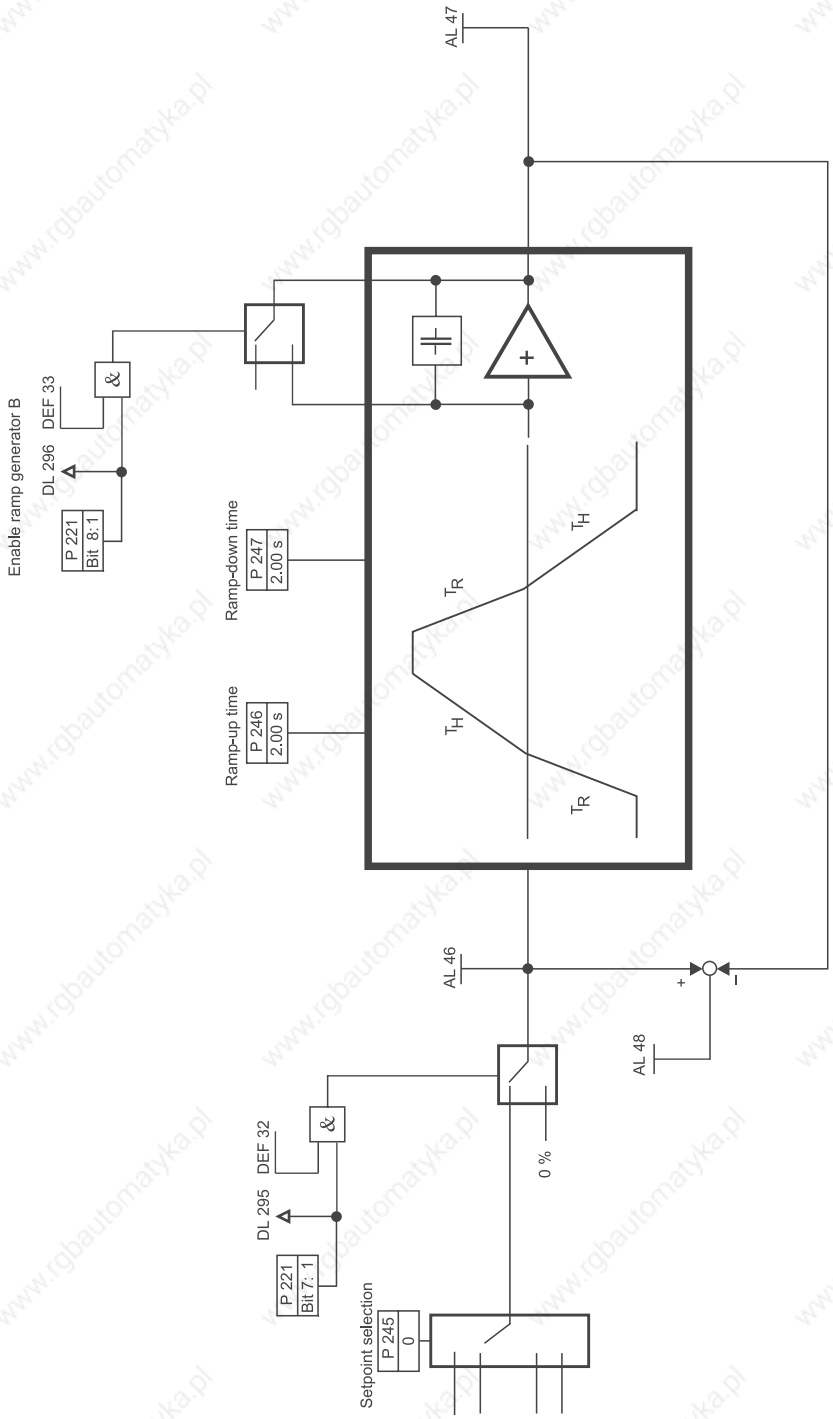



Illustration 40: Function diagram - Ramp generator B

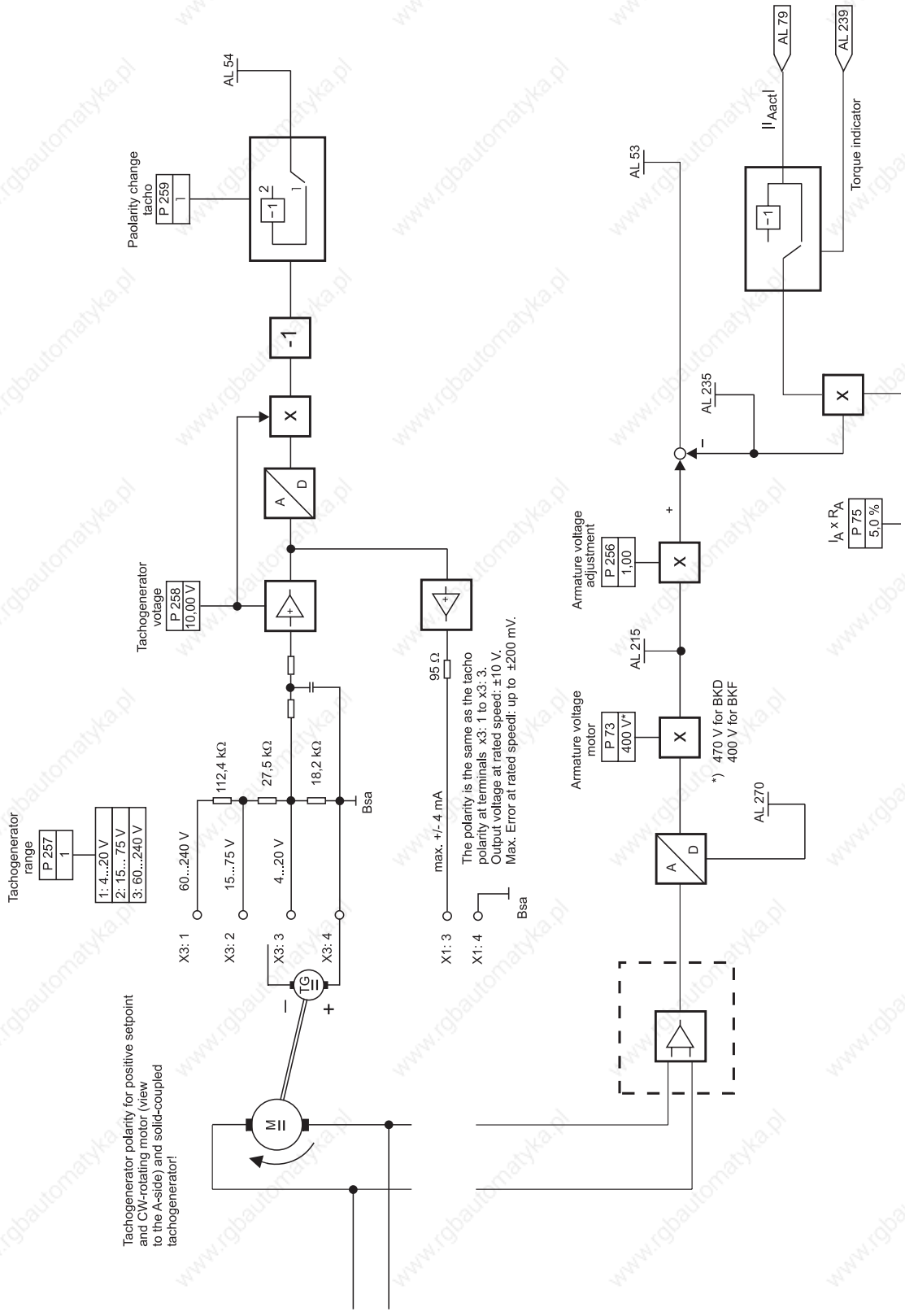



Illustration 41: Function diagram - Analog tacho / armature voltage detection input

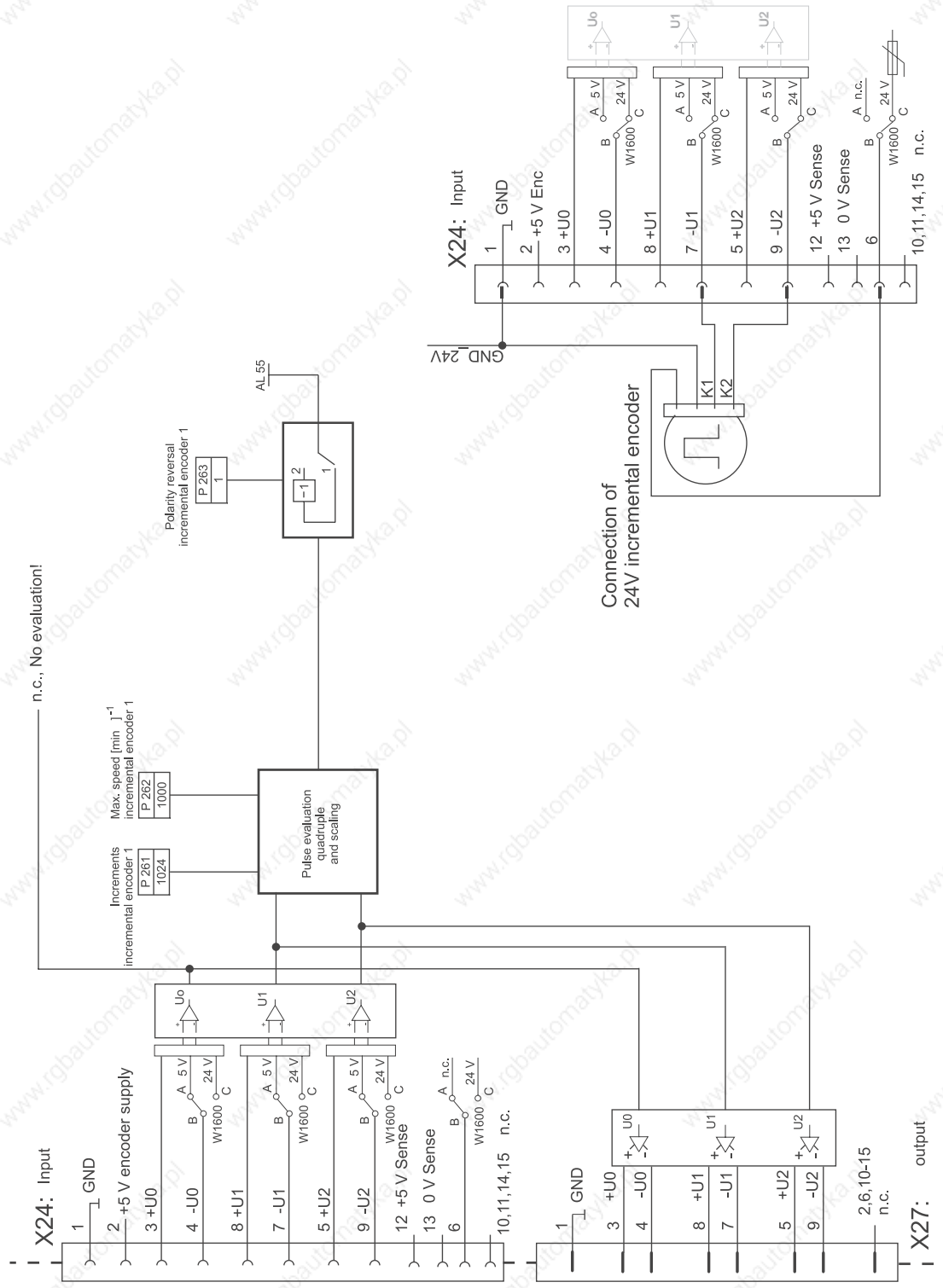



Illustration 42: Function diagram - Incremental encoder 1

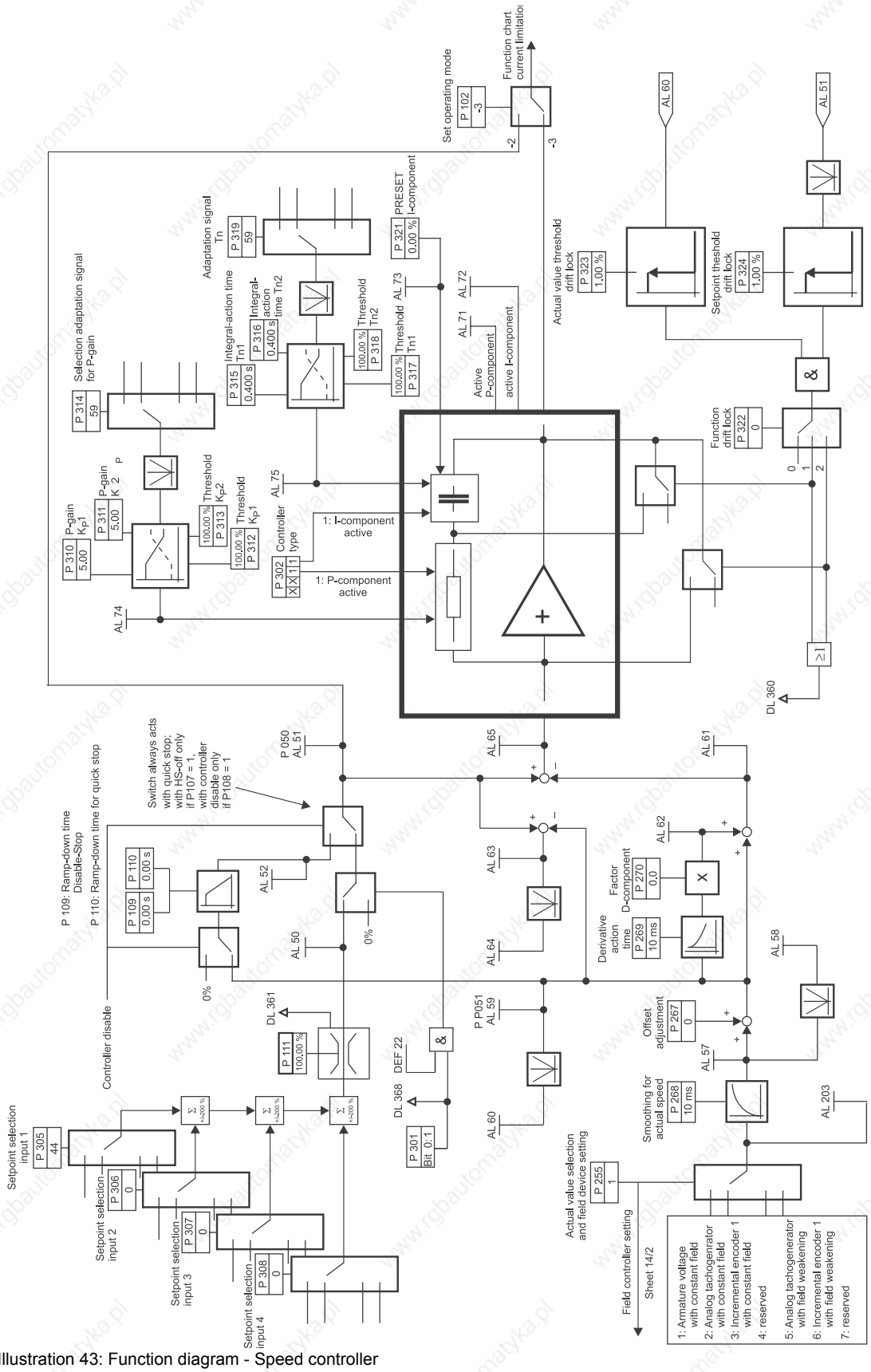



Illustration 43: Function diagram - Speed controller

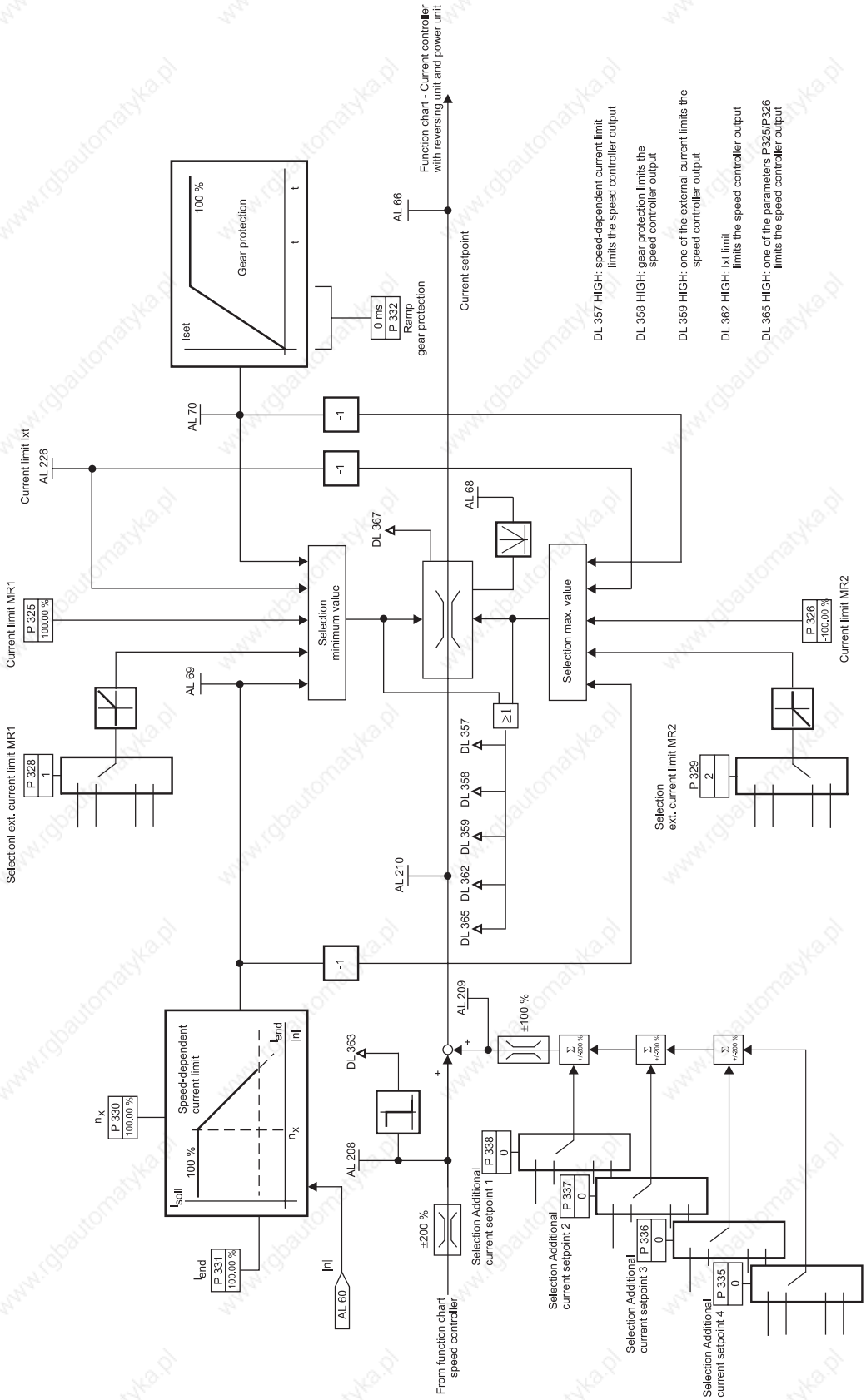



Illustration 44: Function diagram - Current limitation

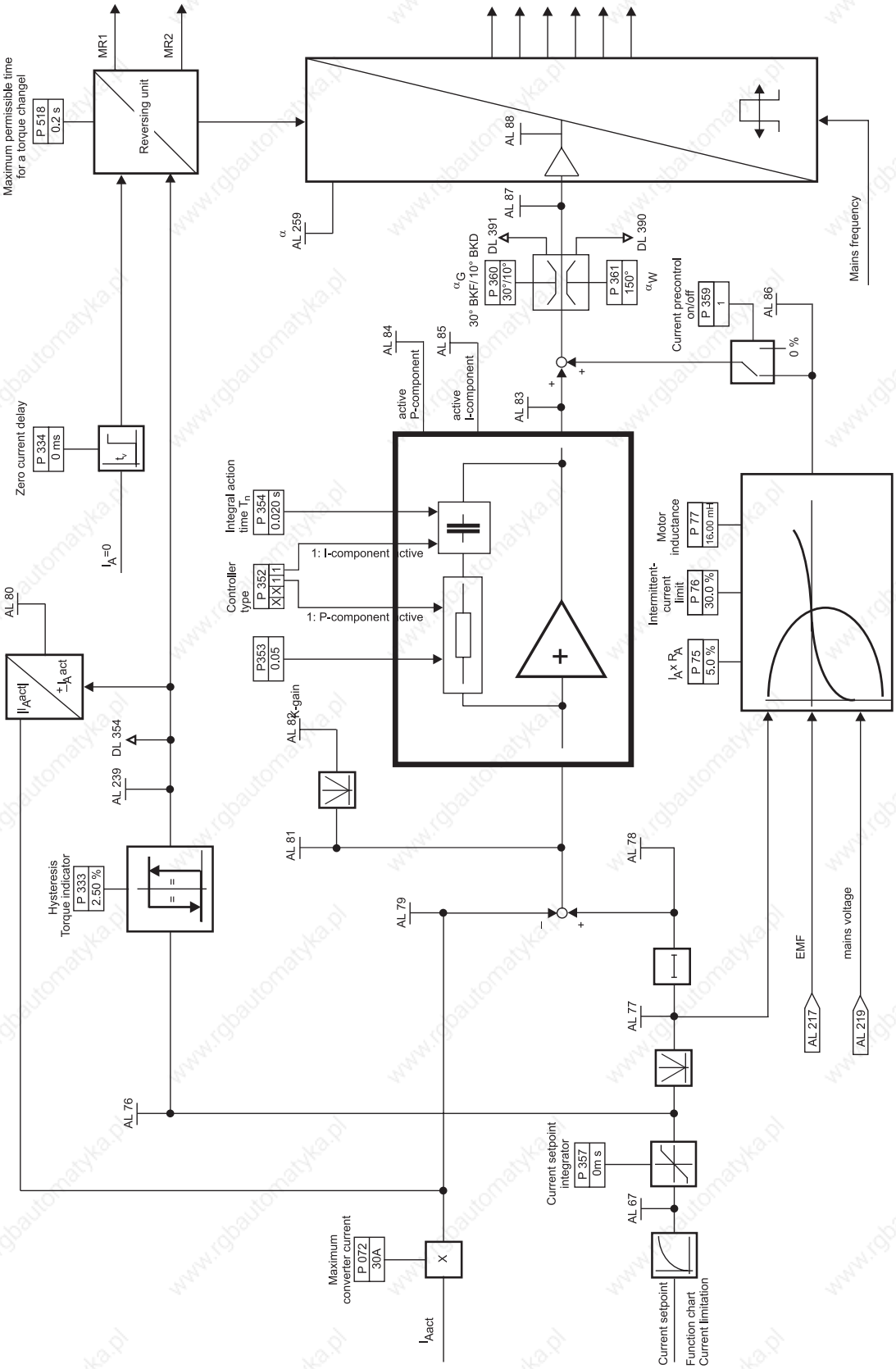



Illustration 45: Function diagram - Current controller with reversing unit and power unit

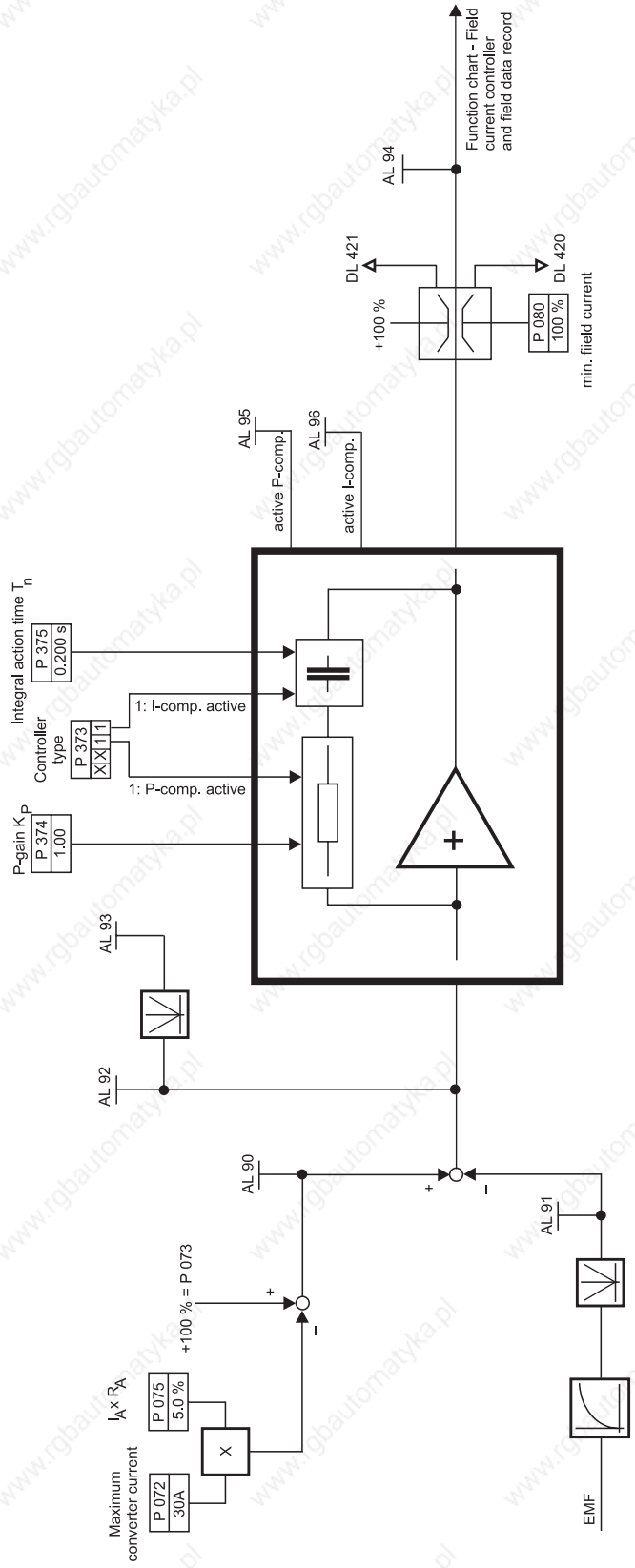



Illustration 46: Function diagram - Field unit EMF controller

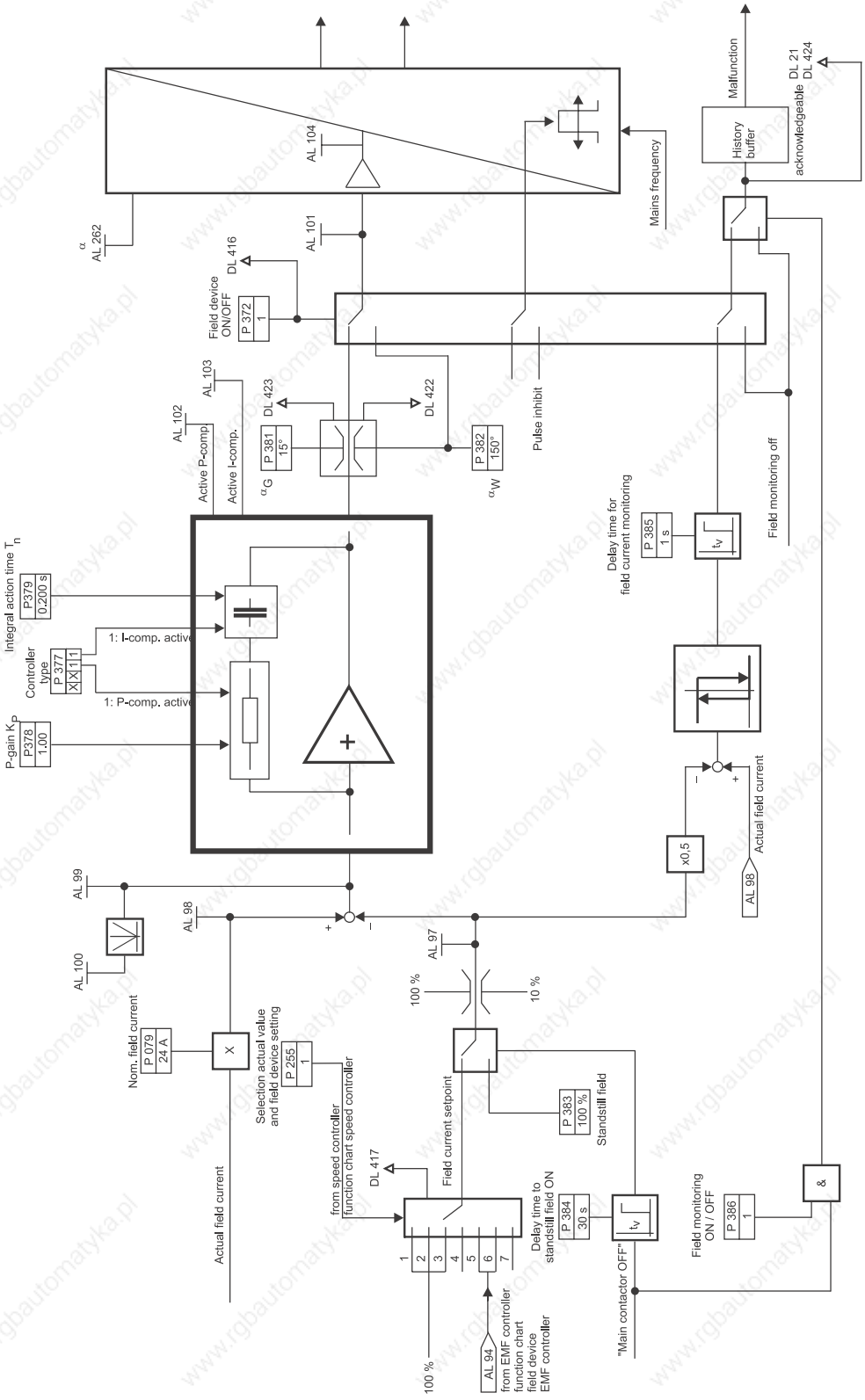



Illustration 47: Function diagram - Field unit, field current controller and field control unit

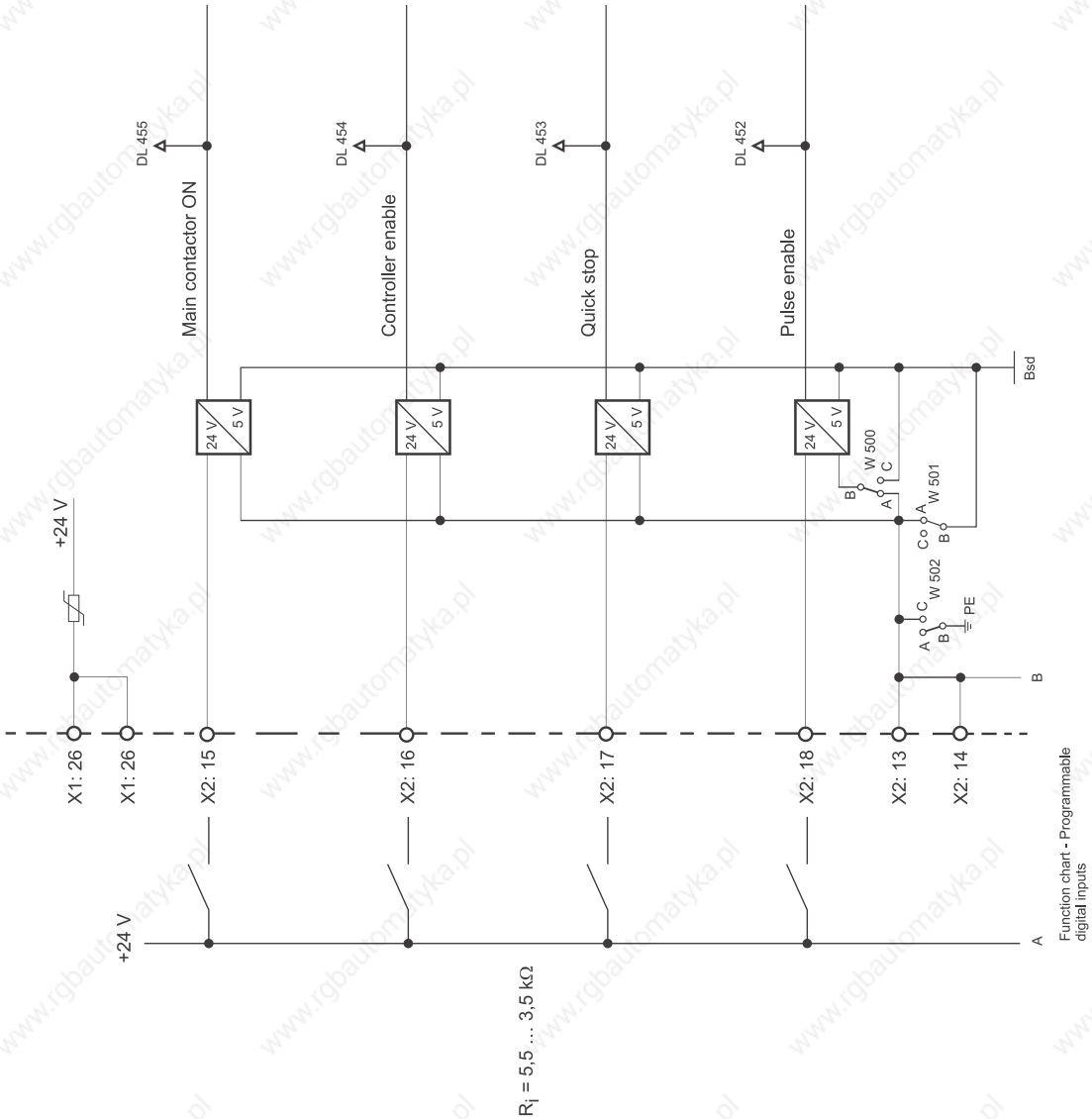



Illustration 48: Function diagram - Digital inputs for Controller enable

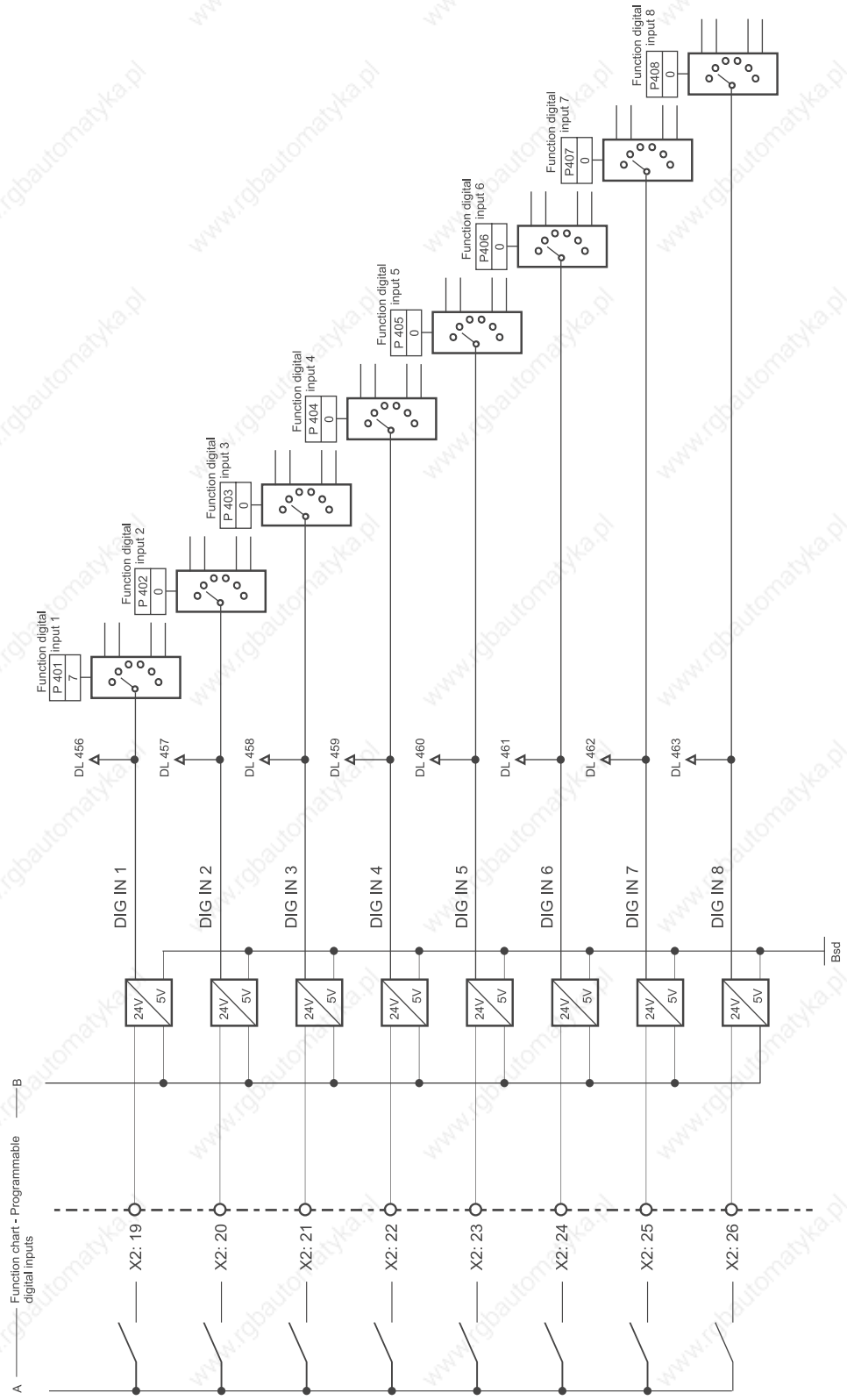



Illustration 49: Function diagram - Programmable digital inputs

Digital input multipliers see ▹Parameter description - Digital input multipliers◃ on page 258.

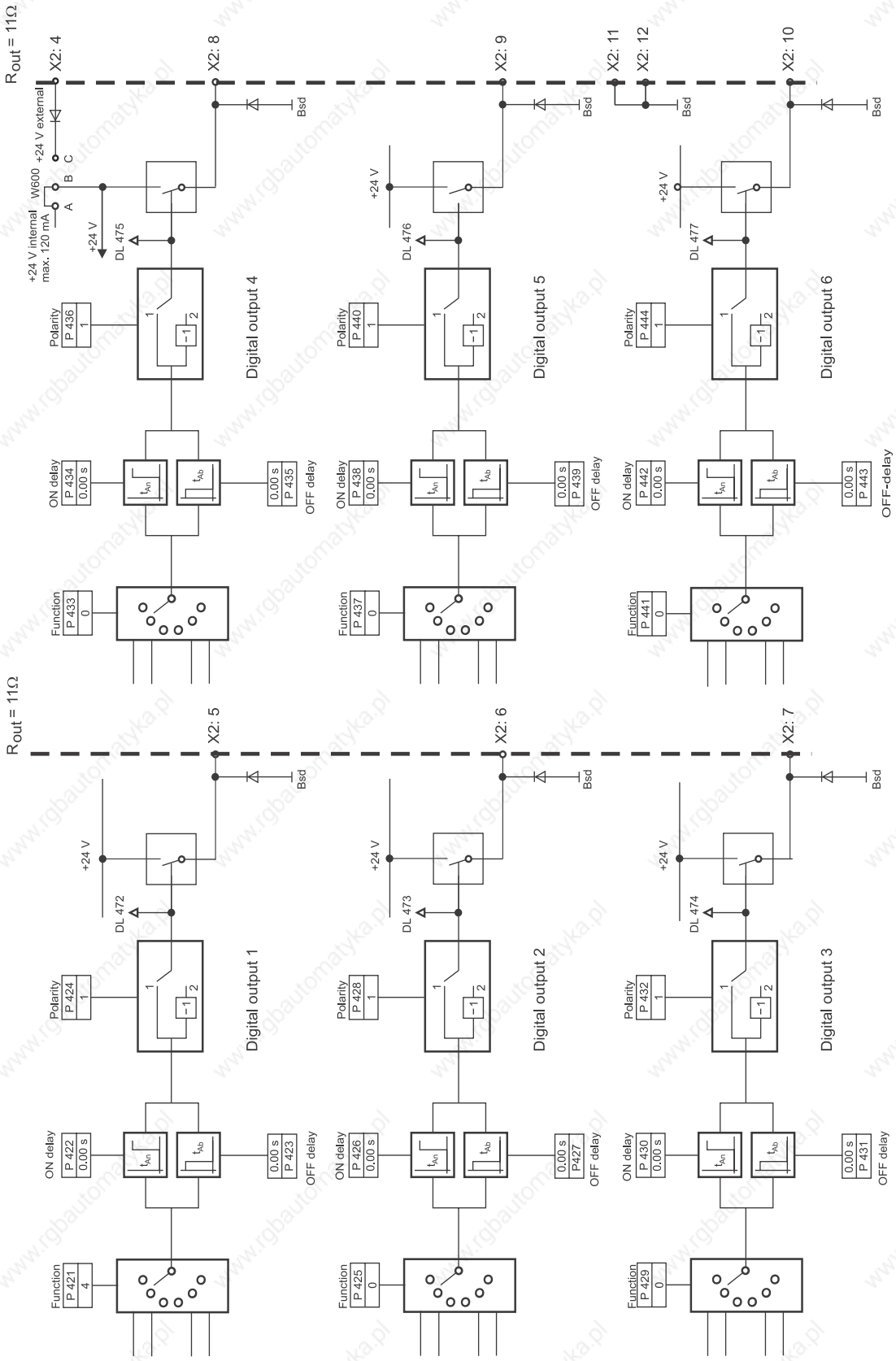



Illustration 50: Function diagram - Programmable digital outputs

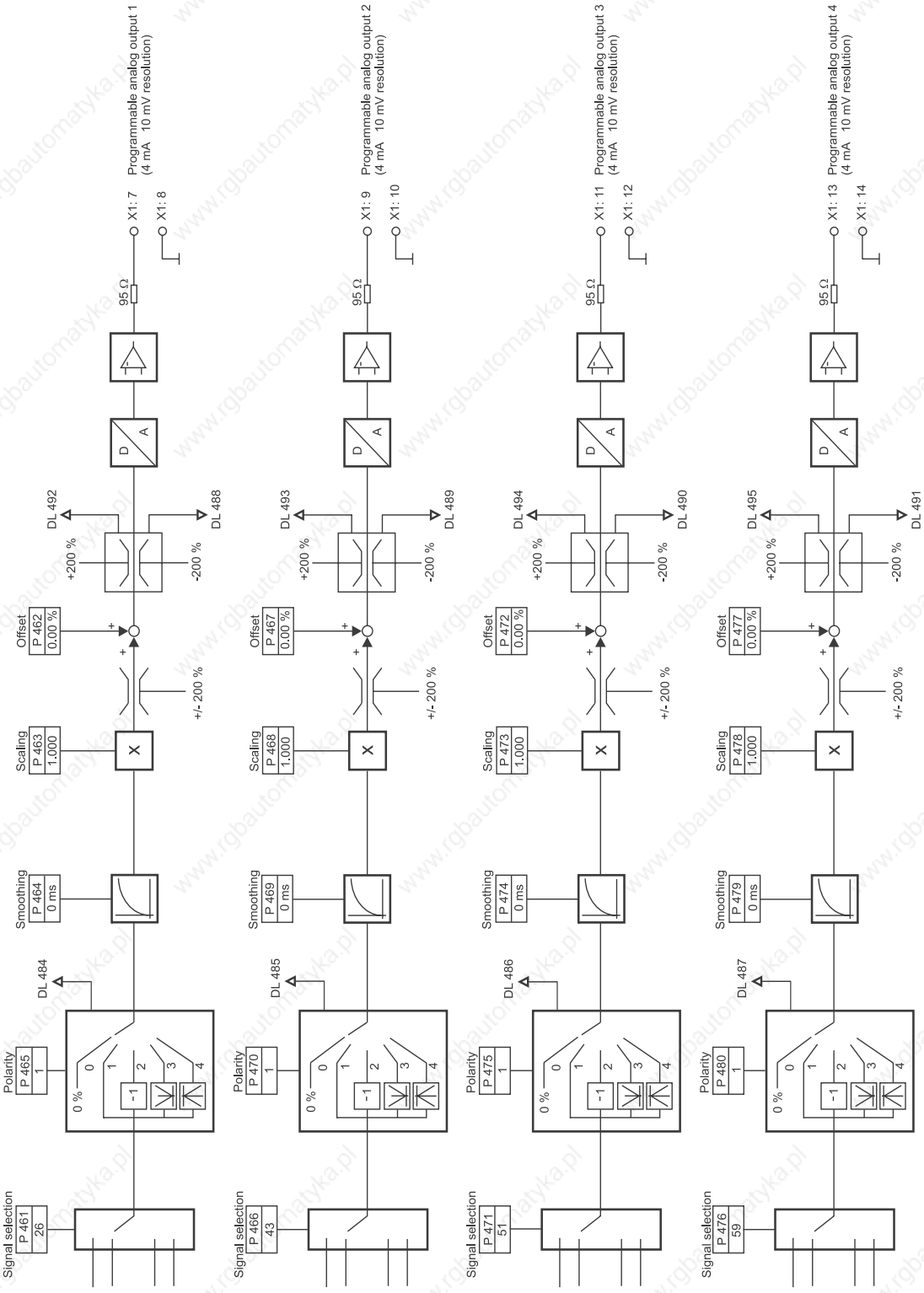



Illustration 51: Function diagram - Programmable analog outputs

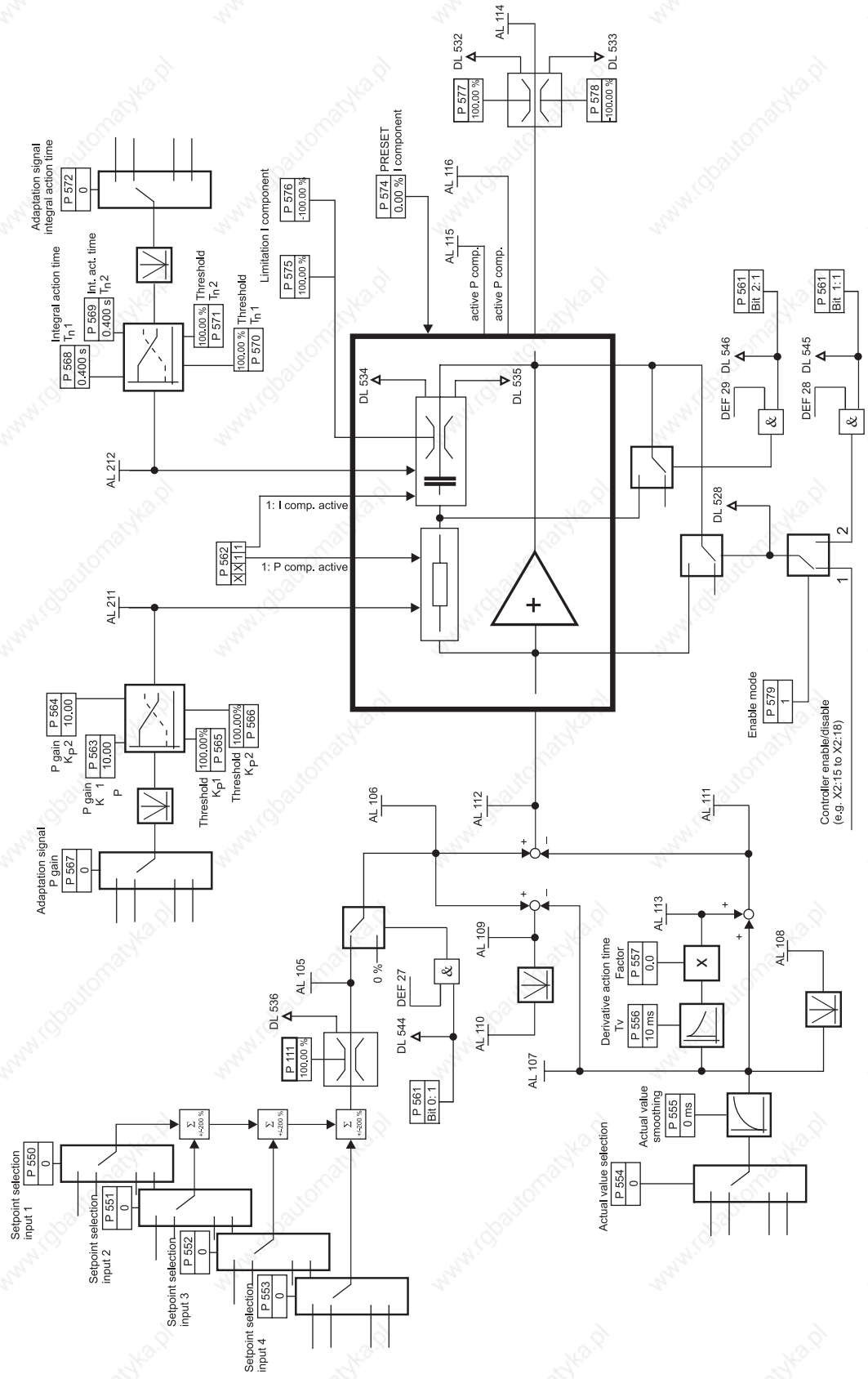



Illustration 52: Function diagram - Unassigned PI controller

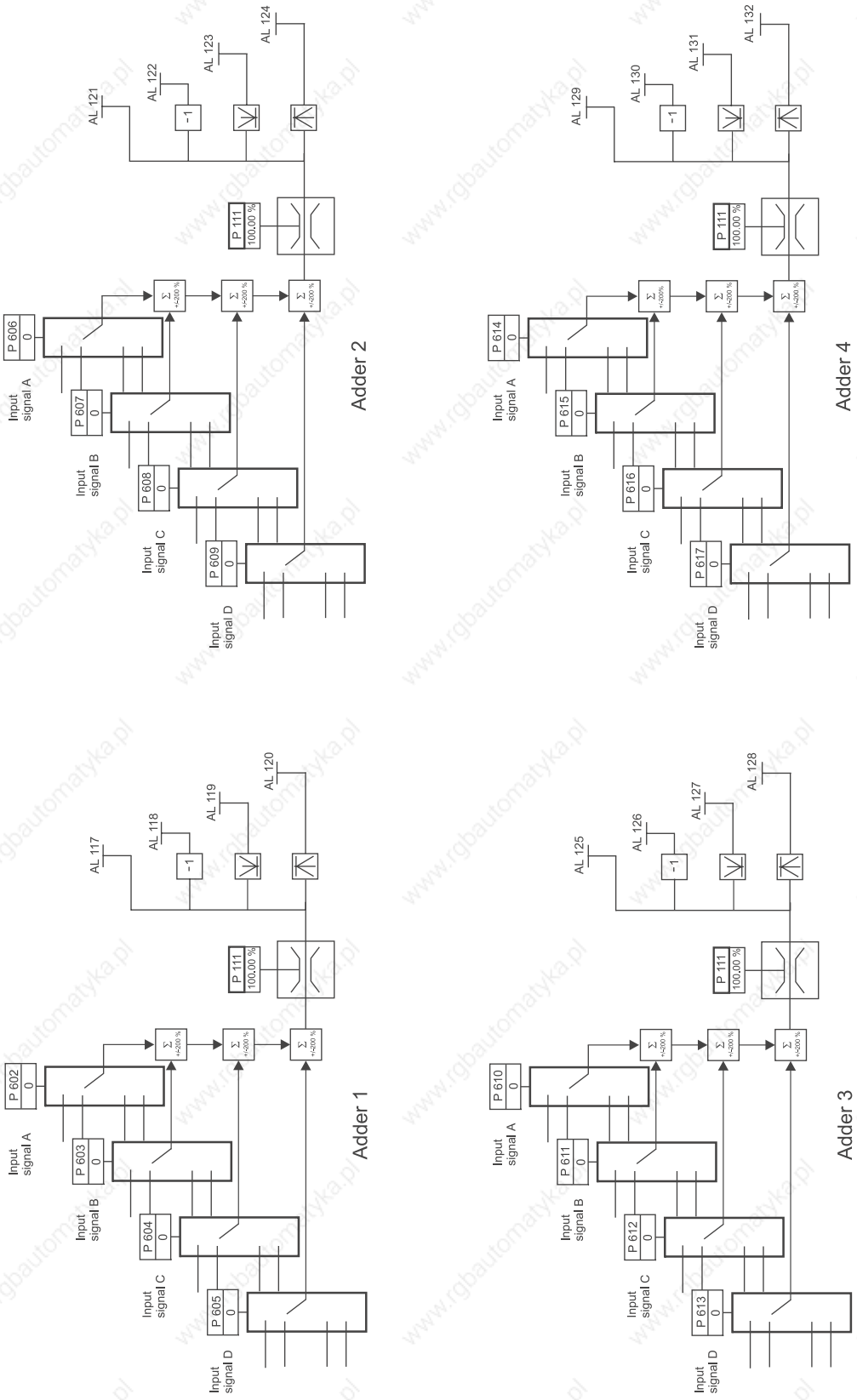



Illustration 53: Function diagram - Freely interconnectable adders

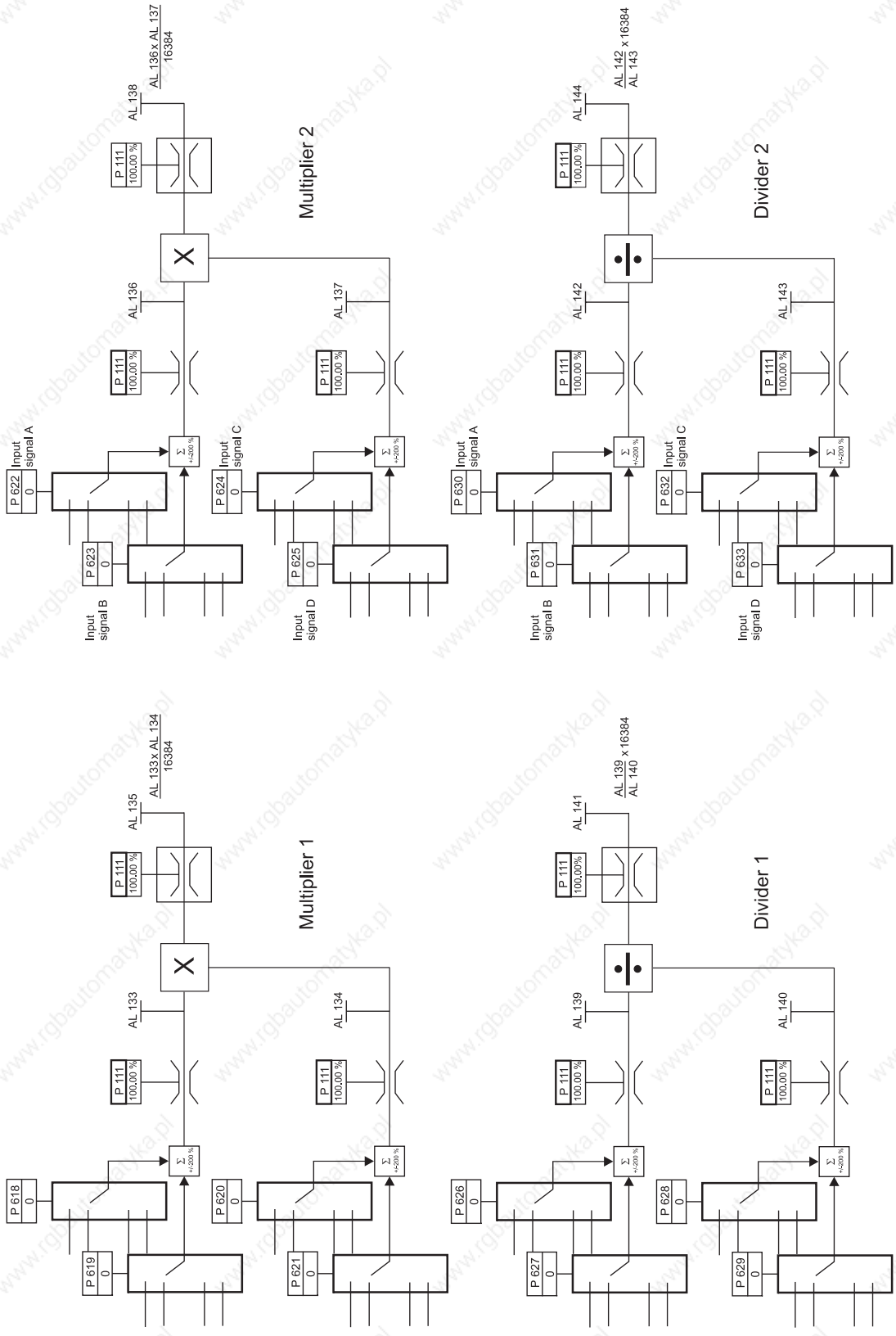



Illustration 54: Function diagram - Freely interconnectable multipliers / dividers

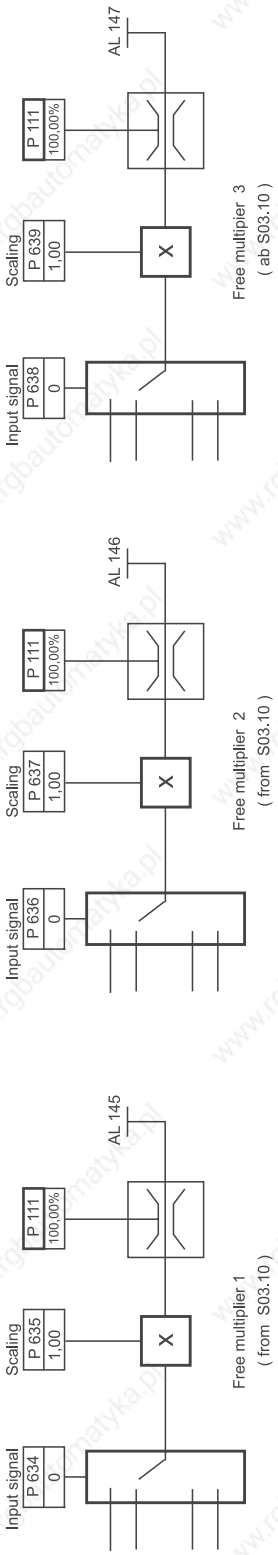



Illustration 55: Function diagram - Freely interconnectable function blocks 1

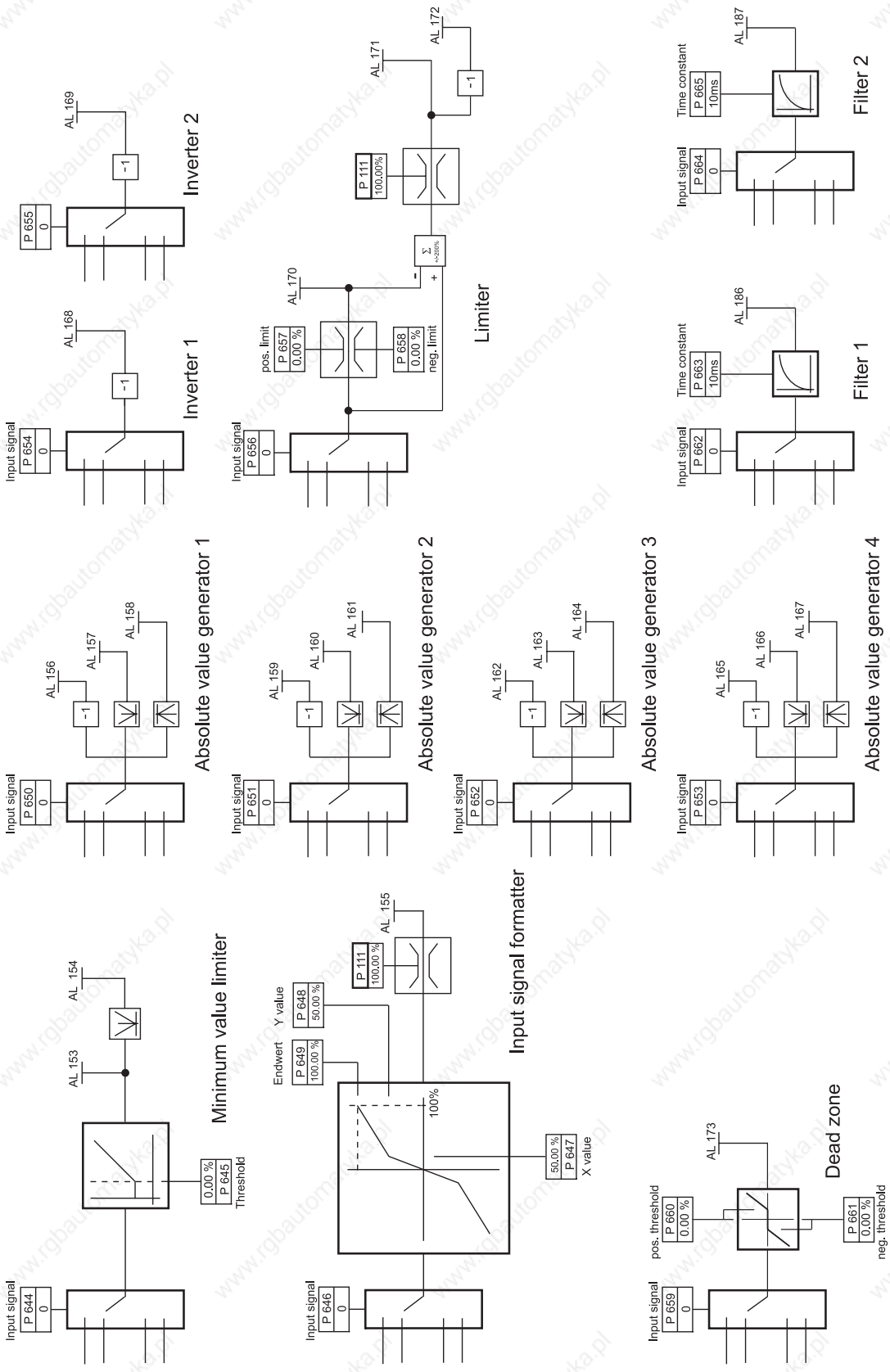



Illustration 56: Function diagram - Freely interconnectable function blocks 2

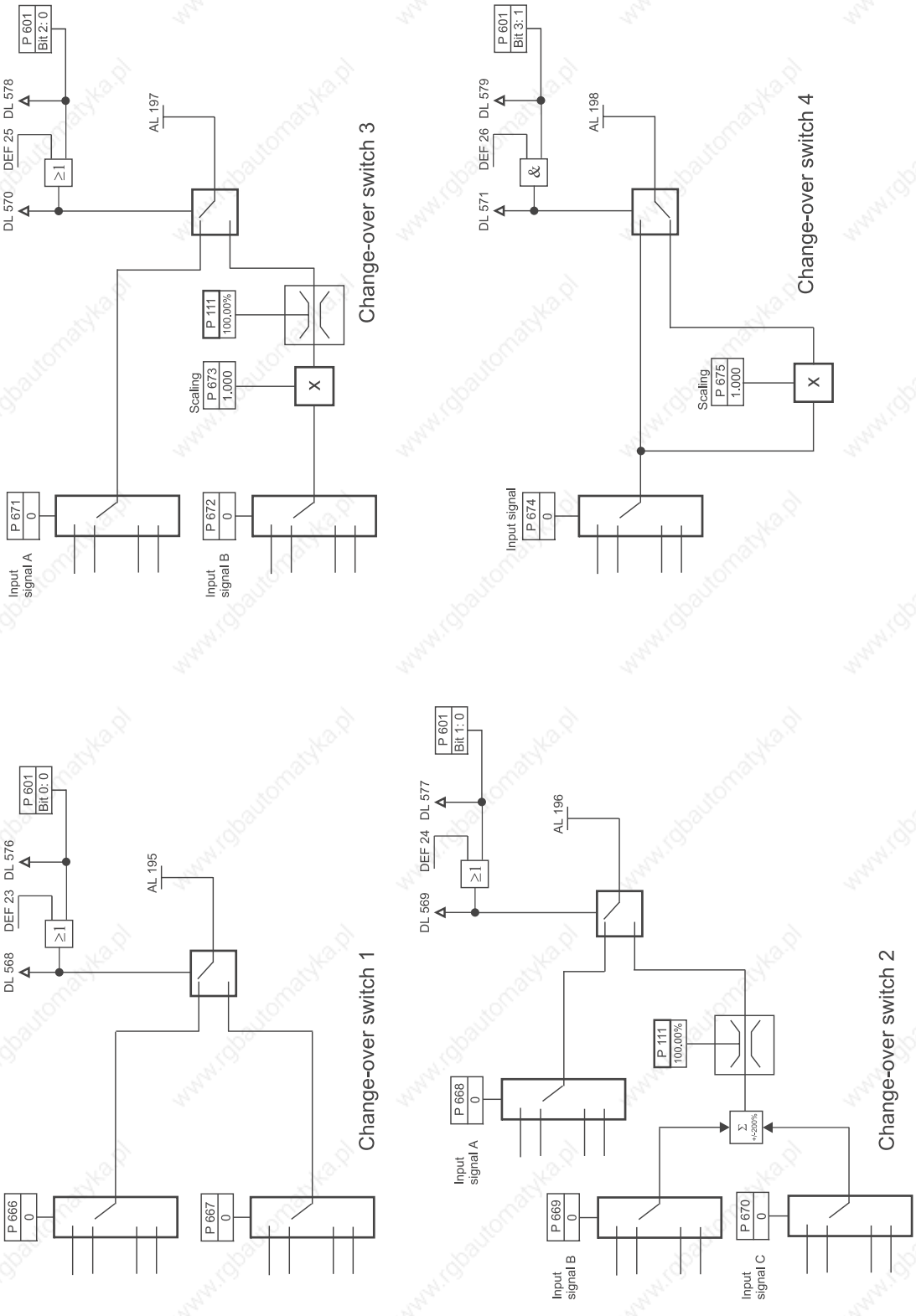



Illustration 57: Function diagram - Freely interconnectable changeover switches

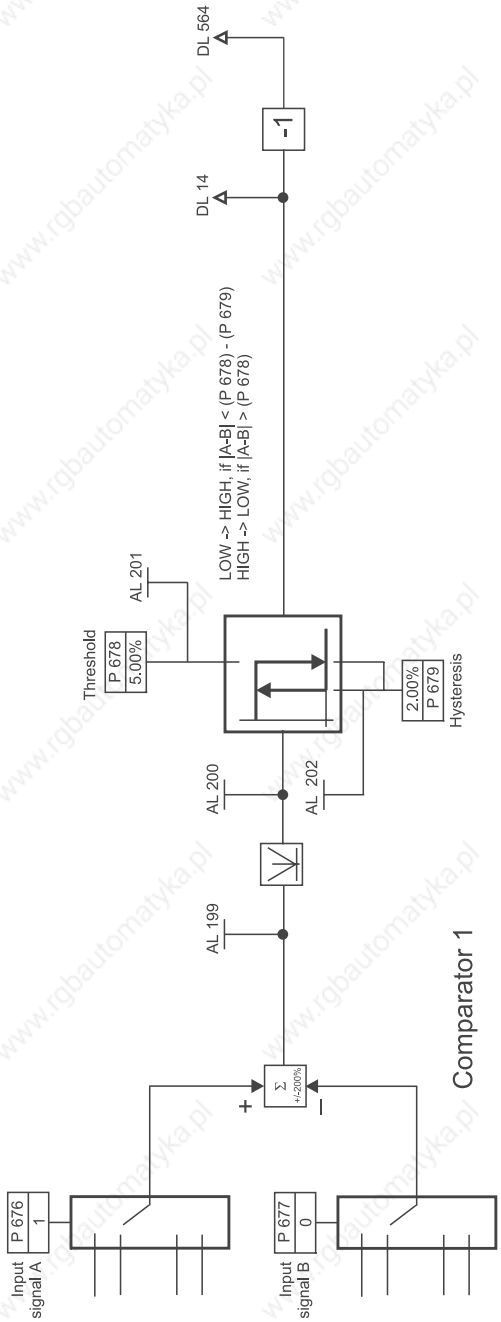



Illustration 58: Function diagram - Freely interconnectable comparator

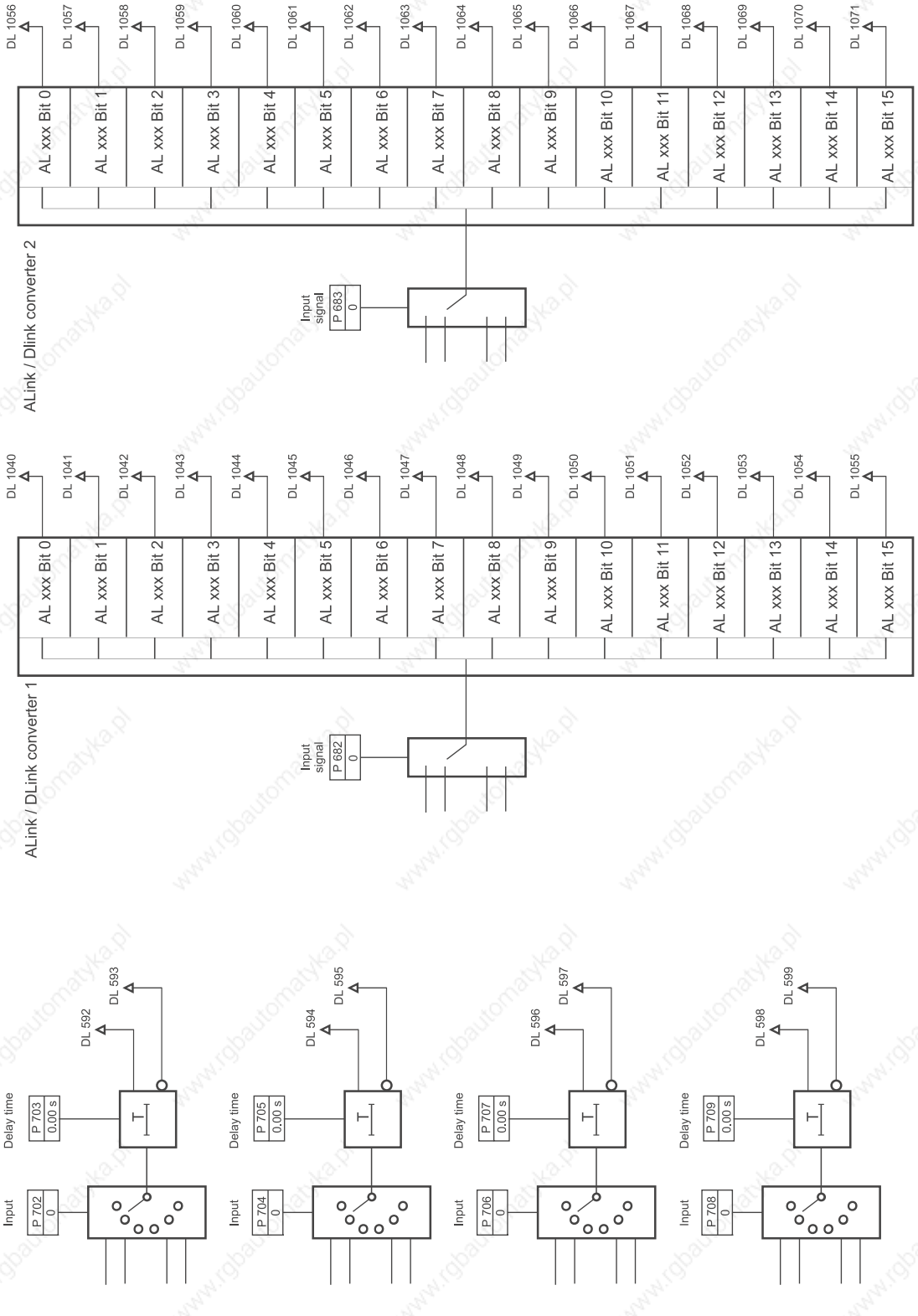



Illustration 59: Function diagram - Unassigned digital functions

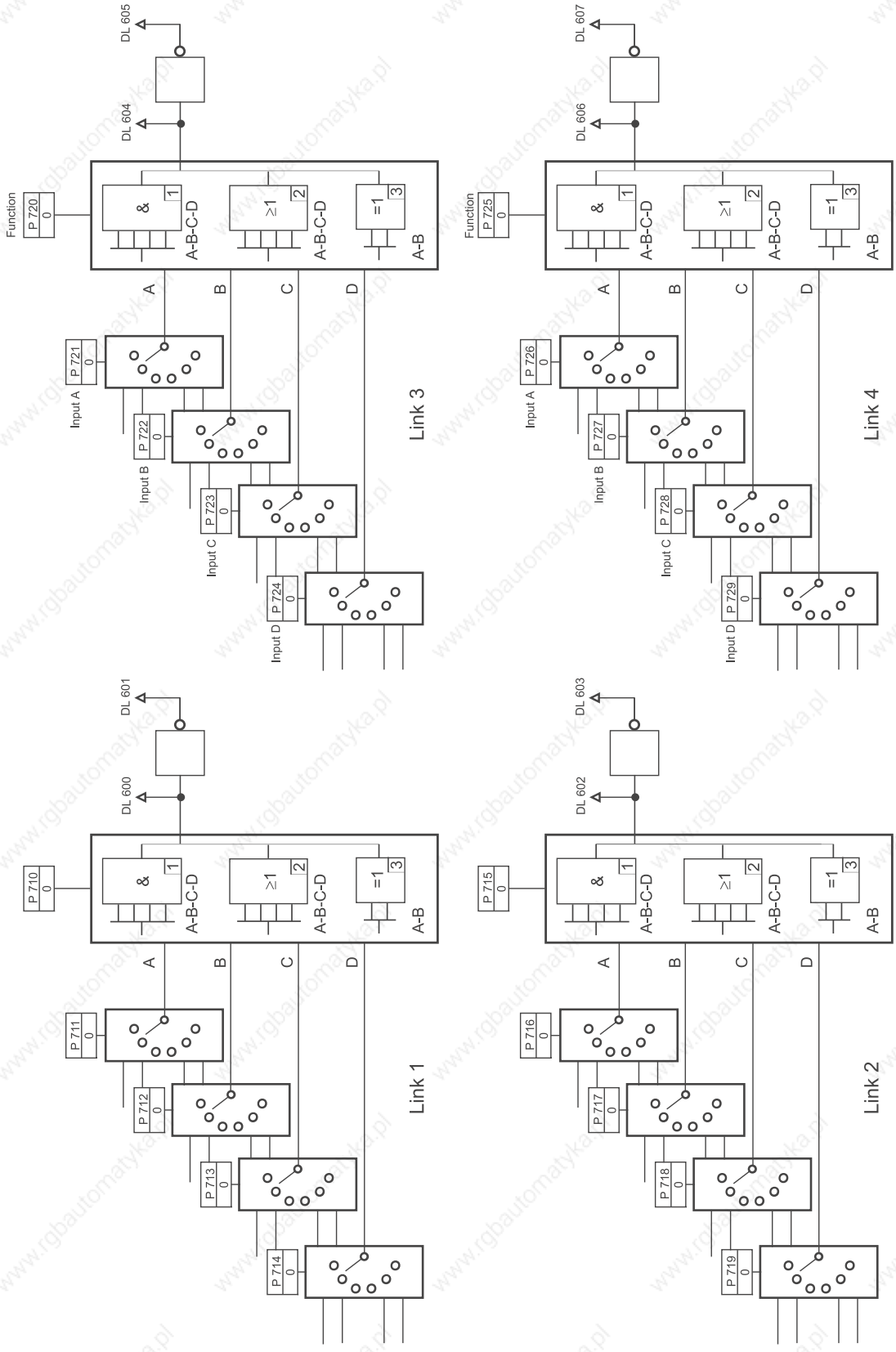



Illustration 60: Function diagram - Unassigned digital relations

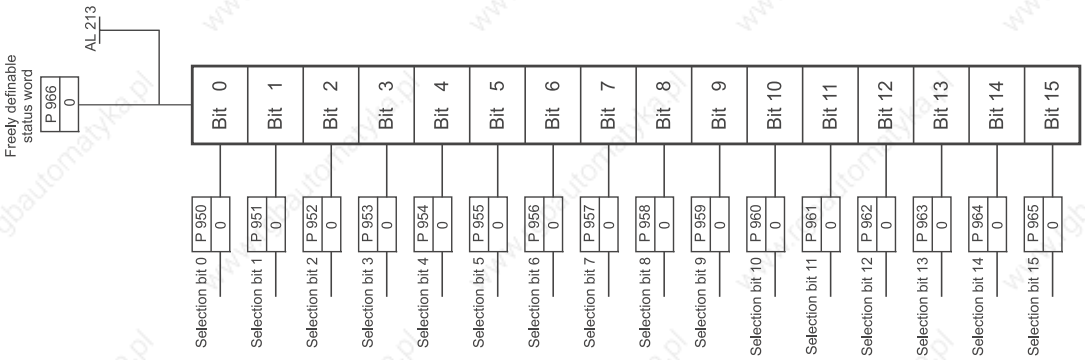



Illustration 61: Function diagram - Freely definable status word

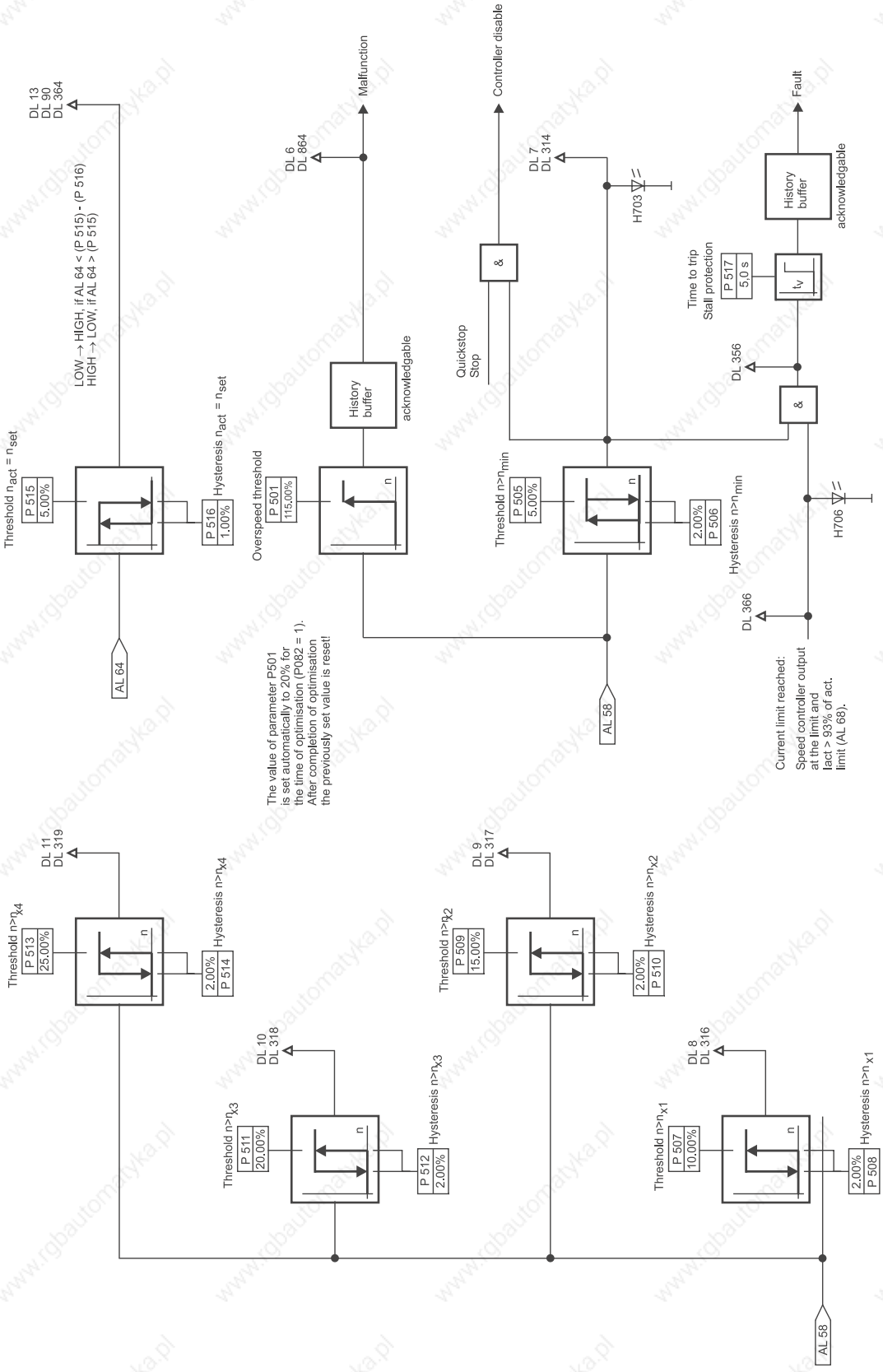



Illustration 62: Function diagram - Monitoring functions 1

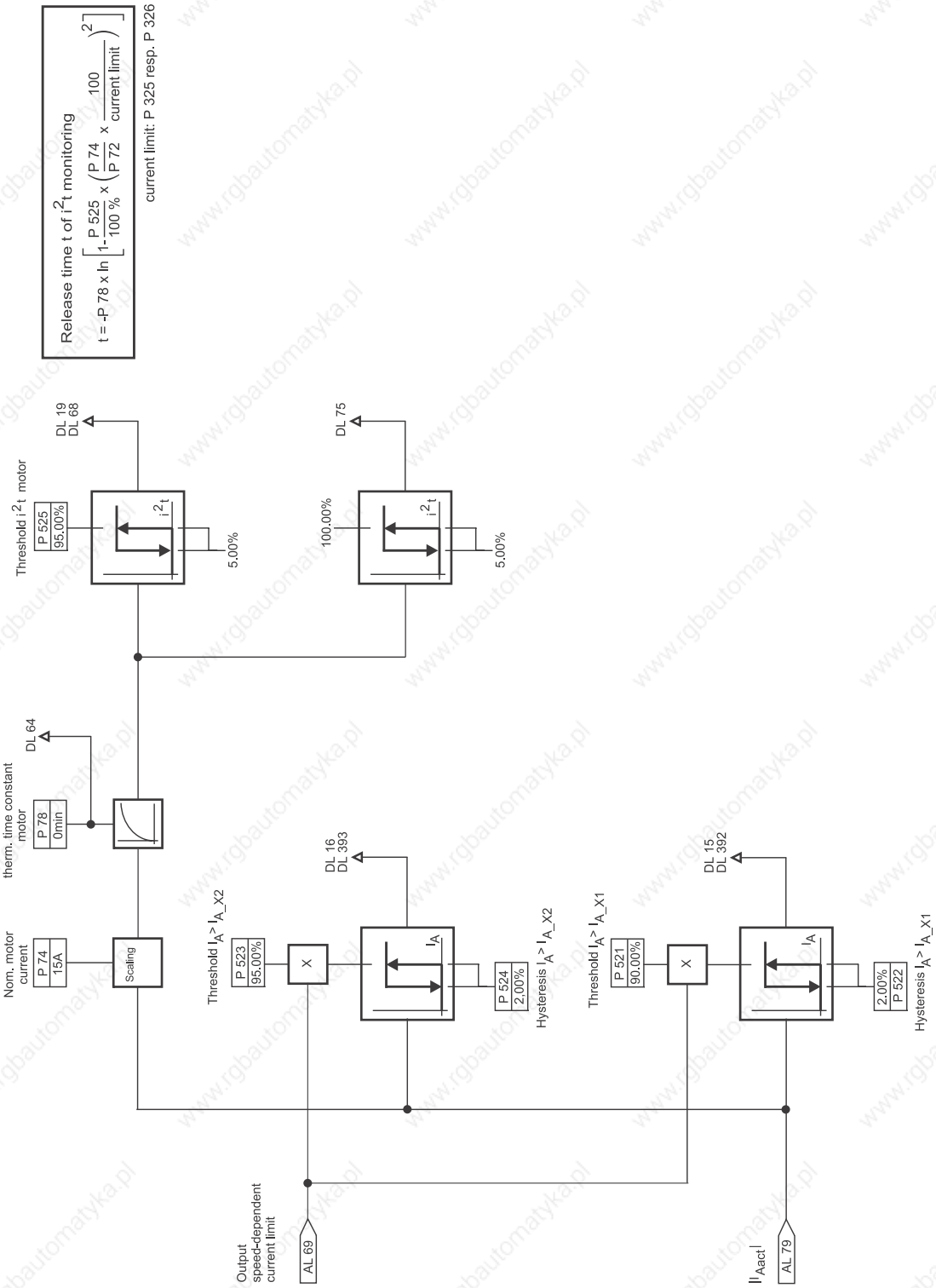



Illustration 63: Function diagram - Monitoring functions 3

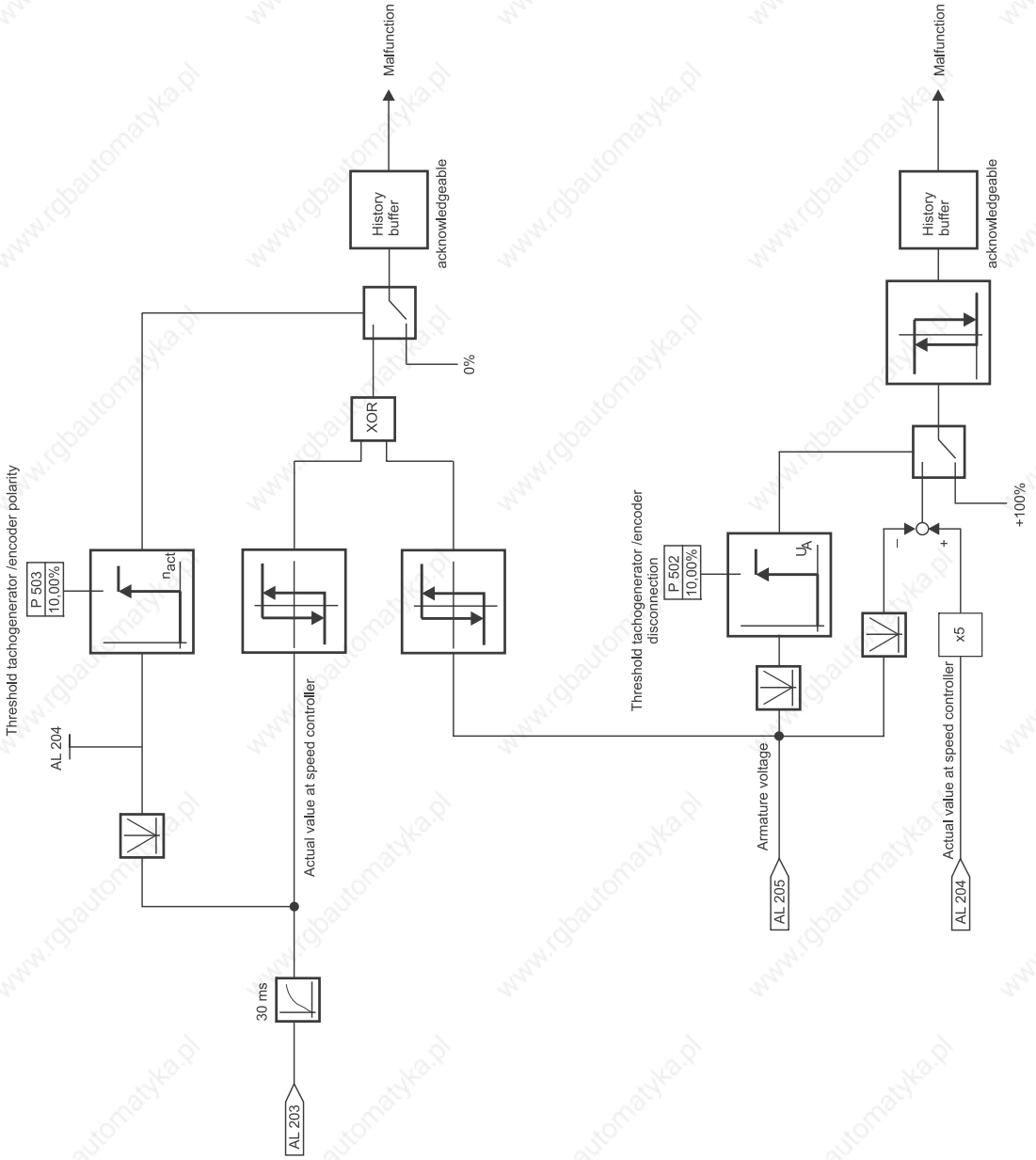



Illustration 64: Function diagram - Monitoring functions 4

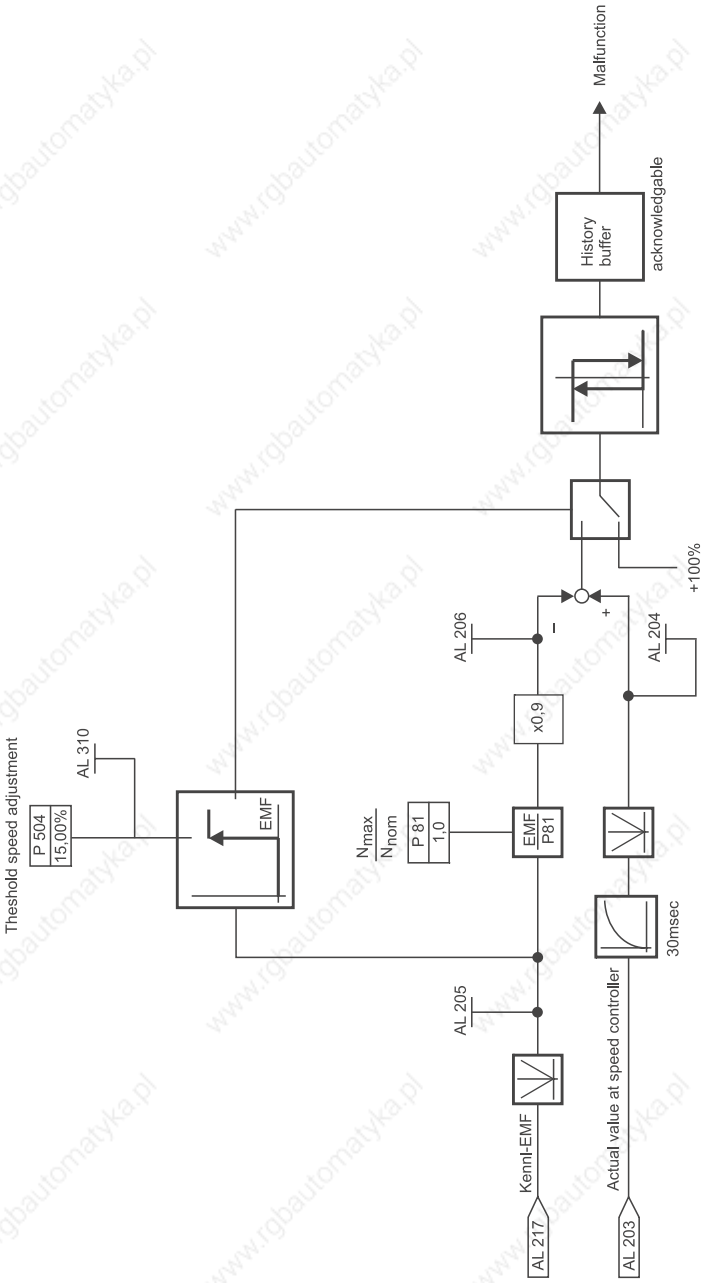



Illustration 65: Function diagram - Monitoring functions 5

## 5.5 Parameter list

When setting parameter values with the unit ´hex´, the value must start with a leading ‘h‘.

**CONVERTER DATA**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 1 | Converter state | | hex | | | | R |
| 2 | Power unit type (1 = BKD / 4 = BKF) | | Q | | | | R |
| 3 | Rated current of power unit | | A | | | | R |
| 4 | Rated current of power unit rated, EEPROM | | A | PD | | | R |
| 5 | Power unit peak current | | A | | 3.20 | | R |
| 6 | Rated current of field power unit | | A | | | | R |
| 7 | Rated current of field power unit, EEPROM | | A | PD | | | R |
| 8 | | | | | | | |
| 9 | | | | | | | |

**MEASURED VALUES**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 10 | Electronics supply (mains voltage) | | Veff | | | | R |
| 11 | Mains frequency | | Hz | | | | R |
| 12 | Rotating field (after main contactor ON) | | - | | | | R |
| 13 | Armature voltage | | V | | | | R |
| 14 | Armature voltage | | % | | | | R |
| 15 | Armature current | | A | | | | R |
| 16 | Armature current | | % | | | | R |
| 17 | ObjLst Index<br>For internal use, inaccessible to the user and without any further significance | | - | | | | |
| 18 | ObjLst ObjNr.<br>For internal use, inaccessible to the user and without any further significance | | - | | | | |
| 19 | | | | | | | |
| 20 | Power unit state | | hex | | | | R |
| 21 | Field current | | A | | | | R |
| 22 | Field current | | % | | | | R |
| 23 | Power input | | % | | | | R |
| 24 | Power output | | % | | | | R |
| 25 | Power unit temperature | | °C | | | | R |
| 26 | | | | | | | |
| 27 | Motor temperatur channel 1 | | °C | | S 03.10 | | R |
| 28 | Motor temperatur channel 2 | | °C | | S 03.10 | | R |
| 29 | | | | | | | |
| 30 | State motor $i^2t$ | | hex | | | | R |
| 31 | Motor $i^2t$ value | | % | | | | R |

**SERVICE PARAMETERS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 32 | 7S display ON and keypad enable | | - | | | on | R/W |
| 33 | | | | | | | |
| 34 | Parameter selection Pxxx (7S display) (PC) | | - | | | on | R/W |
| 35 | Software version | | - | | | | R |
| 36 | Converter software type | | - | | | | R |
| 37 | Error number | | - | | | | R |
| 38 | Number of errors | | - | | | | R |
| 39 | Warning number | | - | | | | R |
| 40 | Number of warnings | | - | | | | R |
| 41 | | | | | | | |
| 42 | Code, controller enables (on 7S display) | | hex | | | | R |
| 43 | Code, digital inputs (on 7S display) | | hex | | | | R |
| 44 | Code, digital outputs (on 7S display) | | hex | | | | R |
| 45 | Code, data records (on 7S display) | | hex | PD | | | R |
| 46 | ALink selection for P 047 | 0 | ALink | DR | | on | R/W |
| 47 | Value of ALink (P 046) | | - | | | | R |
| 48 | ALink selection for P 049 | 0 | ALink | DR | | on | R/W |
| 49 | Value of ALink (P 048) | | - | | | | R |
| 50 | Speed setpoint (corresponds to ALink 51) | | % | | | | R |
| 51 | Actual speed (corresponds to ALink 59) | | % | | | | R |
| 52 | | | | | | | |
| 53 | | | | | | | |
| 54 | | | | | | | |
| 55 | | | | | | | |
| 56 | | | | | | | |
| 57 | | | | | | | |

**SERVICE PARAMETERS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 58 | | | | | | | |
| 59 | | | | | | | |
| 60 | | | | | | | |
| 61 | | | | | | | |
| 62 | | | | | | | |
| 63 | | | | | | | |
| 64 | | | | | | | |
| 65 | | | | | | | |
| 66 | | | | | | | |
| 67 | | | | | | | |
| 68 | | | | | | | |
| 69 | | | | | | | |

**BASIC SETTINGS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 70 | Electronics supply (mains voltage) | 400 | Veff | PD | | off | R/W |
| 71 | Power unit supply (mains voltage) | 400 | Veff | PD | | off | R/W |
| 72 | Maximum converter current | 30 | A | DR | | off | R/W |
| 73 | Motor armature voltage BKD<br>BKF | 470<br>400 | V | DR | | off | R/W |
| 74 | Rated motor current<br>NOTE: The default values must be replace by the values of the used motor, if you install a UL 508C-conform machine. | 15 | A | DR | | off | R/W |
| 75 | Motor armature voltage drop $I_A x R_A$ | 5.0 | % | DR | | on | R/W |
| 76 | Intermittent-current limit | 30.0 | % | DR | | on | R/W |
| 77 | Motor inductance | | mH | DR | | on | R/W |
| 78 | Thermal time constant of the motor<br>NOTE: The default values must be replace by the values of the used motor, if you install a UL 508C-conform machine. | 0 | min | DR | | on | R/W |
| 79 | Rated field current | 24.00 | A | DR | | on | R/W |
| 80 | Minimum field current of the motor | 100 | % | DR | | on | R/W |
| 81 | Field weakening range ($N_{Max}$ /$N_{Rated}$) | 1.0 | - | DR | | off | R/W |
| 82 | Optimisation (motor) | 0 | - | | | off | R/W |
| 83 | | | | | | | |
| 84 | | | | | | | |
| 85 | | | | | | | |
| 86 | | | | | | | |
| 87 | | | | | | | |
| 88 | | | | | | | |
| 89 | | | | | | | |
| 90 | | | | | | | |
| 91 | | | | | | | |

**BASIC SETTINGS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 92 | | | | | | | |
| 93 | | | | | | | |
| 94 | | | | | | | |
| 95 | | | | | | | |
| 96 | | | | | | | |
| 97 | | | | | | | |
| 98 | | | | | | | |
| 99 | | | | | | | |

**OPERATING MODE SETTINGS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 100 | Status word of current controller | | hex | | | | R |
| 101 | Control word (controller) | | hex | | | on | R/W |
| 102 | Set operating mode | -3 | - | DR | | on | R/W |
| 103 | Actual operating mode | | - | | | | R |
| 104 | Function P 100: Bit 14 | | DLink | DR | | on | R/W |
| 105 | Function P 100: Bit 15 | | DLink | DR | | on | RW |
| 106 | Error acknowledge mode | 1 | - | PD | | on | R/W |
| 107 | Stop mode (main contactor - MC) | 0 | - | PD | | off | R/W |
| 108 | Disable mode (controller disable - CD) | 0 | - | PD | | off | R/W |
| 109 | Ramp-down time, disable/stop (CD/MC) | 0.00 | s | DR | | on | R/W |
| 110 | Ramp-down time, quick stop (QS) | 0.00 | s | DR | | on | R/W |
| 111 | General signal limit | 100.00 | % | DR | | on | R/W |
| 112 | Evaluation power unit´s temperature | 0 | - | PD | S 3.15 | on | R/W |
| 113 | | | | | | | |
| 114 | | | | | | | |
| 115 | | | | | | | |
| 116 | | | | | | | |
| 117 | | | | | | | |
| 118 | | | | | | | |
| 119 | | | | | | | |

**COMMUNICATION**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 120 | Drive address (for USS connection) | 0 | - | PD | | off | R/W |
| 121 | Communication source | 0 | hex | PD | S 3.12 | on | R/W |
| 122 | Communication source monitoring | 0 | hex | PD | S 3.12 | on | R/W |
| 123 | Monitoring period<br>The value of parameter P 123 is transferred only at boot time. Any modification becomes effective only upon rebooting the converter (the new value must be stored before) ! Communication timeout monitoring with installed field bus option card. | 0 | ms | PD | S 3.12 | on | R/W |
| 124 | | | | | | | |
| 125 | PC write authorisation (BASS) | | - | | | on | R/W |
| 126 | Baud rate, PC (BASS) | | Bit/s | | | | R |
| 127 | Edit data record for PC (BASS) | | - | | | on | R/W |
| 128 | PC state (BASS) | | hex | | | | |
| 129 | | | | | | | |
| 130 | USS state | | hex | | | | R |
| 131 | USS mode | 0 | hex | PD | | on | R/W |
| 132 | Baud rate USS | 9600 | Bit/s | PD | | on | R/W |
| 133 | Number of PIV elements (USS) | 3 | - | PD | | on | R/W |
| 134 | Number of PCD elements (USS) | 2 | - | PD | | on | R/W |
| 135 | Actual value 1 (USS) | 59 | ALink | PD | | on | R/W |
| 136 | Actual value 2 (USS) | 79 | ALink | PD | | on | R/W |
| 137 | | | | | | | |
| 138 | | | | | | | |
| 139 | | | | | | | |
| 140 | BAPS status | | hex | | | | R |
| 141 | BAPS master command word | | hex | | | | R |
| 142 | BAPS slave acknowledge | | hex | | | | R |
| 143 | BAPS state, parameter channel | | hex | | | | R |

| COMMUNICATION | | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
| 144 | Edit data record for BAPS | 0 | - | | S 03.06 | on | R/W |
| 145 | | | | | | | |
| 146 | | | | | | | |
| 147 | | | | | | | |
| 148 | | | | | | | |
| 149 | | | | | | | |

**DATA RECORD MANAGER**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 150 | State of data record manager | | hex | | | | R |
| 151 | Boot source | 0 | - | PD | | on | R/W |
| 152 | Load data record | | - | | | on | R/W |
| 153 | Save data record | | - | | | on | R/W |
| 154 | Disable data record change | 0 | - | PD | | on | R/W |
| 155 | Data record error | | hex | | | | R |
| 156 | Error in parameter Pxxx | | - | | | | R |
| 157 | Command of data record manager | | - | | | on | R/W |
| 158 | Data record number | | - | | | on | R/W |
| 159 | Active passwords | | hex | | | | |
| 160 | EEPROM programming cycles | | - | PD | | | R |
| 161 | Article number | | - | | | | |
| 162 | | | | | | | |
| 163 | | | | | | | |
| 164 | | | | | | | |
| 165 | | | | | | | |
| 166 | | | | | | | |
| 167 | | | | | | | |
| 168 | | | | | | | |
| 169 | | | | | | | |
| 170 | | | | | | | |
| 171 | | | | | | | |
| 172 | | | | | | | |
| 173 | | | | | | | |
| 174 | | | | | | | |
| 175 | | | | | | | |

| DATA RECORD MANAGER | | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
| 176 | | | | | | | |
| 177 | | | | | | | |
| 178 | | | | | | | |
| 179 | | | | | | | |

| ANALOG INPUTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
| 180 | | | | | | | |
| 181 | Control word (analog inputs) | | hex | | | on | R/W |
| 182 | Function, analog input 1 | 1 | - | PD | | off | R/W |
| 183 | Scaling, analog input 1 | 1.000 | - | DR | | on | R/W |
| 184 | Offset; analog input 1 | 0.00 | % | DR | | on | R/W |
| 185 | Polarity, analog input 1 | 1 | - | DR | | on | R/W |
| 186 | Function, analog input 2 | 1 | - | PD | | off | R/W |
| 187 | Scaling, analog input 2 | 1.000 | - | DR | | on | R/W |
| 188 | Offset; analog input 2 | 0.00 | % | DR | | on | R/W |
| 189 | Polarity, analog input 2 | 1 | - | DR | | on | R/W |
| 190 | Scaling, analog input 3 | 1.000 | - | DR | | on | R/W |
| 191 | Offset; analog input 3 | 0.00 | % | DR | | on | R/W |
| 192 | Scaling, analog input 4 | 1.000 | - | DR | | on | R/W |
| 193 | Offset; analog input 4 | 0.00 | % | DR | | on | R/W |

**INTERNAL SETPOINTS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 194 | Fixed setpoint 1 | 5.00 | % | DR | | on | R/W |
| 195 | Fixed setpoint 2 | 5.00 | % | DR | | on | R/W |
| 196 | Fixed setpoint 3 | 5.00 | % | DR | | on | R/W |
| 197 | Fixed setpoint 4 | 5.00 | % | DR | | on | R/W |
| 198 | Fixed setpoint 5 | 5.00 | % | DR | | on | R/W |
| 199 | Fixed setpoint 6 | 5.00 | % | DR | | on | R/W |
| 200 | | | | | | | |
| 201 | Generator, setpoint, 1 (internal setpoint generator) | 5.00 | % | DR | | on | R/W |
| 202 | Generator, setpoint 2 (internal setpoint generator) | 0.00 | % | DR | | on | R/W |
| 203 | Generator, time 1 (internal setpoint generator) | 5.00 | s | DR | | on | R/W |
| 204 | Generator, time 2 (internal setpoint generator) | 5.00 | s | DR | | on | R/W |
| 205 | | | | | | | |
| 206 | | | | | | | |
| 207 | | | | | | | |
| 208 | | | | | | | |
| 209 | | | | | | | |

**MOTORISED POTENTIOMETER**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 210 | Status word | | hex | | | | R |
| 211 | Control word | | hex | | | on | R/W |
| 212 | Ramp-up time | 10.0 | s | DR | | on | R/W |
| 213 | Upper limit | 100.00 | % | DR | | on | R/W |
| 214 | Ramp-down time | 10.0 | s | DR | | on | R/W |
| 215 | Lower limit | 0.00 | % | DR | | on | R/W |
| 216 | Correction ON/OFF | 1 | - | PD | | on | R/W |
| 217 | Selection, correction signal | 59 | ALink | PD | | on | R/W |
| 218 | Selection, control signal for correction | 23 | DLink | PD | S 03.06 | on | R/W |
| 219 | | | | | | | |

**RAMP GENERATOR A**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 220 | Status word | | hex | | | | R |
| 221 | Control word | | hex | | | on | R/W |
| 222 | Setpoint selection, input 1 | 26 | ALink | DR | | on | R/W |
| 223 | Setpoint selection, input 2 | 0 | ALink | DR | | on | R/W |
| 224 | Setpoint selection, input 3 | 0 | ALink | DR | | on | R/W |
| 225 | Setpoint selection, input 4 | 0 | ALink | DR | | on | R/W |
| 226 | Ramp-up time 1 | 2.00 | s | DR | | on | R/W |
| 227 | Initial rounding 1, ramp-up | 0.00 | s | DR | | on | R/W |
| 228 | Final rounding 1, ramp-up | 0.00 | s | DR | | on | R/W |
| 229 | Ramp-down time 1 | 2.00 | s | DR | | on | R/W |
| 230 | Initial rounding 1, ramp-down | 0.00 | s | DR | | on | R/W |
| 231 | Final rounding 1, ramp-down | 0.00 | s | DR | | on | R/W |
| 232 | Ramp-up time 2 | 2.00 | s | DR | | on | R/W |
| 233 | Initial rounding 2, ramp-up | 0.00 | s | DR | | on | R/W |
| 234 | Final rounding 2, ramp-up | 0.00 | s | DR | | on | R/W |
| 235 | Ramp-down time 2 | 2.00 | s | DR | | on | R/W |
| 236 | Initial rounding 2, ramp-down | 0.00 | s | DR | | on | R/W |
| 237 | Final rounding 2, ramp-down | 0.00 | s | DR | | on | R/W |
| 238 | Correction ON/OFF | 1 | - | PD | | on | R/W |
| 239 | Selection, correction signal | 59 | ALink | PD | | on | R/W |
| 240 | | | | | | | |
| 241 | | | | | | | |
| 242 | | | | | | | |
| 243 | | | | | | | |
| 244 | | | | | | | |

**RAMP GENERATOR B**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 245 | Setpoint selection | 0 | ALink | DR | | on | R/W |
| 246 | Ramp-up time | 2.00 | s | DR | | on | R/W |
| 247 | Ramp-down time | 2.00 | s | DR | | on | R/W |
| 248 | | | | | | | |
| 249 | | | | | | | |

**SPEED CONTROLLER ACTUAL VALUES**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 250 | Status word | | hex | | | | R |
| 251 | | | | | | | |
| 252 | | | | | | | |
| 253 | | | | | | | |
| 254 | | | | | | | |
| 255 | Selection of actual value and field unit setting | 1 | - | DR | | off | R/W |
| 256 | Armature voltage adjustment | 1.00 | - | DR | | on | R/W |
| 257 | Tachogenerator range | 1 | - | DR | | off | R/W |
| 258 | Tachogenerator voltage | 10.00 | V | DR | | on | R/W |
| 259 | Tachogenerator polarity change | 1 | | DR | 3.20 | off | R/W |
| 260 | Status word of incremental encoder | | hex | | | | R |
| 261 | Increments of incremental encoder 1 | 1024 | - | PD | | off | R/W |
| 262 | Max. speed, incremental encoder 1 | 500 | $min^{-1}$ | DR | | on | R/W |
| 263 | Polarity reversal of incremental encoder 1 | 1 | - | PD | | off | R/W |
| 264 | | | | | | | |
| 265 | | | | | | | |
| 266 | | | | | | | |
| 267 | Speed offset (for the actual value at the speed controller) | 0 | - | DR | | on | R/W |
| 268 | Actual speed smoothing | 10 | ms | DR | | on | R/W |
| 269 | Derivative-action time (actual value D component) | 10 | ms | DR | | on | R/W |
| 270 | Factor, D component | 0.0 | - | DR | | on | R/W |
| 271 | | | | | | | |
| 272 | | | | | | | |
| 273 | | | | | | | |
| 274 | | | | | | | |
| 275 | | | | | | | |

| SPEED CONTROLLER ACTUAL VALUES | | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
| 276 | | | | | | | |
| 277 | | | | | | | |
| 278 | | | | | | | |
| 279 | | | | | | | |
| 280 | | | | | | | |
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| 298 | | | | | | | |
| 299 | | | | | | | |

| SPEED CONTROLLER SETPOINTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter no. | Description | Default | Unit | Storage location | From software release | On- / offline | R/W |
| 300 | Status | | hex | | | | R |
| 301 | Control word | | hex | | | on | R/W |
| 302 | Controller type | 11 | hex | DR | | on | R/W |
| 303 | | | | | | | |
| 304 | | | | | | | |
| 305 | Setpoint selection, input 1 | 44 | ALink | DR | | on | R/W |
| 306 | Setpoint selection, input 2 | 0 | ALink | DR | | on | R/W |
| 307 | Setpoint selection, input 3 | 0 | ALink | DR | | on | R/W |
| 308 | Setpoint selection, input 4 | 0 | ALink | DR | | on | R/W |
| 309 | | | | | | | |

| SPEED CONTROLLER PARAMETER SETS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
| 310 | P-gain $K_P$ 1 | 5.00 | - | DR | | on | R/W |
| 311 | P-gain $K_P$ 2 | 5.00 | - | DR | | on | R/W |
| 312 | Threshold, P-gain $K_P$ 1 | 100.00 | % | DR | | on | R/W |
| 313 | Threshold, P-gain $K_P$ 2 | 100.00 | % | DR | | on | R/W |
| 314 | Adaptation signal $K_P$ | 59 | ALink | DR | | on | R/W |
| 315 | Integral-action time $T_n$1 | 0,400 | s | DR | | on | R/W |
| 316 | Integral-action time $T_n$2 | 0,400 | s | DR | | on | R/W |
| 317 | Threshold, integral-action time $T_n$1 | 100.00 | % | DR | | on | R/W |
| 318 | Threshold, integral-action time $T_n$2 | 100.00 | % | DR | | on | R/W |
| 319 | Adaptation signal $T_n$ | 59 | ALink | DR | | on | R/W |
| 320 | | | | | | | |
| 321 | Preset integral component - set TD | 0.00 | % | DR | | on | R/W |
| 322 | Drift lock | 0 | - | DR | | on | R/W |
| 323 | Drift lock, actual-value threshold | 1.00 | % | DR | | on | R/W |
| 324 | Drift lock, setpoint threshold | 1.00 | % | DR | | on | R/W |

**CURRENT LIMITS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 325 | Current limit TD1 (positive) | 100.00 | % | DR | | on | R/W |
| 326 | Current limit TD2 (negative) | -100.00 | % | DR | | on | R/W |
| 327 | | | | | | | |
| 328 | External current limit TD1 | 1 | ALink | DR | | on | R/W |
| 329 | External current limit TD2 | 2 | ALink | DR | | on | R/W |
| 330 | Threshold, speed-dependent limit $n_x$ | 100.00 | % | DR | | on | R/W |
| 331 | Current limit at $n_{max}$ ($I_{end}$) | 100.00 | % | DR | | on | R/W |
| 332 | Ramp, gear protection (ramp-up/down time) | 0 | ms | DR | | on | R/W |
| 333 | Hysteresis, TD indicator | 2.50 | % | DR | | on | R/W |
| 334 | Zero-current delay (for torque change, BKF) | 0 | ms | DR | | on | R/W |
| 335 | Additional current setpoint 1 | 0 | ALink | DR | S 03.06 | on | R/W |
| 336 | Additional current setpoint 2 | 0 | ALink | DR | S 03.06 | on | R/W |
| 337 | Additional current setpoint 3 | 0 | ALink | DR | S 03.06 | on | R/W |
| 338 | Additional current setpoint 4 | 0 | ALink | DR | S 03.06 | on | R/W |
| 339 | | | | | | | |
| 340 | | | | | | | |
| 341 | | | | | | | |
| 342 | | | | | | | |
| 343 | | | | | | | |
| 344 | | | | | | | |
| 345 | | | | | | | |
| 346 | | | | | | | |
| 347 | | | | | | | |
| 348 | | | | | | | |
| 349 | | | | | | | |

| CURRENT CONTROLLER | | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
| 350 | Status (armature current controller) | | hex | | | | R |
| 351 | | | | | | | |
| 352 | Controller type | 11 | hex | DR | | on | R/W |
| 353 | P-gain $K_P$ | 0.05 | - | DR | | on | R/W |
| 354 | Integral-action time $T_n$ | 0.020 | s | DR | | on | R/W |
| 355 | | | | | | | |
| 356 | | | | | | | |
| 357 | Current setpoint, integrator | 0 | ms | DR | | on | R/W |
| 358 | | | | | | | |
| 359 | Current precontrol ON/OFF | 1 | - | PD | | off | R/W |
| 360 | Rectifier firing angle limit ($\alpha_G$ armature BKD/BKF) | 10 / 30 | °el | DR | | on | R/W |
| 361 | Inverter firing angle limit ($\alpha_W$ armature) | 150 | °el | DR | | on | R/W |
| 362 | $di_{Set}/dt$ Precontrol ON/OFF | 1 | | DR | | on | R/W |
| 363 | | | | | | | |
| 364 | | | | | | | |
| 365 | | | | | | | |
| 366 | | | | | | | |
| 367 | | | | | | | |
| 368 | | | | | | | |
| 369 | | | | | | | |

**FIELD UNIT**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 370 | Status word | | hex | | | | R |
| 371 | | | | | | | |
| 372 | Field unit ON/OFF | 1 | - | DR | | off | R/W |
| 373 | EMF controller - controller type | 11 | hex | DR | | on | R/W |
| 374 | Field EMF controller - P-gain $K_P$ | 1.00 | - | DR | | on | R/W |
| 375 | Field EMF controller - integral-action time $T_n$ | 0.200 | s | DR | | on | R/W |
| 376 | | | | | | | |
| 377 | Field current controller - controller type | 11 | hex | DR | | on | R/W |
| 378 | Field current controller - P-gain $K_P$ | 1.00 | - | DR | | on | R/W |
| 379 | Current controller - integral-action time $T_n$ | 0.200 | s | DR | | on | R/W |
| 380 | | | | | | | |
| 381 | Rectifier firing angle limit ($\alpha_G$ field) | 15 | °el | DR | | on | R/W |
| 382 | Inverter firing angle limit ($\alpha_W$ field) | 150 | °el | DR | | on | R/W |
| 383 | Field current setpoint for standstill field | 100 | % | DR | | on | R/W |
| 384 | Delay to standstill field ON | 30 | s | DR | | on | R/W |
| 385 | Field current monitoring delay | 1 | s | DR | | on | R/W |
| 386 | Field monitoring ON/OFF | 1 | - | DR | | on | R/W |
| 387 | | | | | | | |
| 388 | | | | | | | |
| 389 | | | | | | | |
| 390 | | | | | | | |
| 391 | | | | | | | |
| 392 | | | | | | | |
| 393 | | | | | | | |
| 394 | | | | | | | |
| 395 | | | | | | | |

**FIELD UNIT**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 396 | | | | | | | |
| 397 | | | | | | | |
| 398 | | | | | | | |
| 399 | | | | | | | |

| DIGITAL INPUTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
| 400 | Status word (digital inputs) | | hex | | | | R |
| 401 | Function, digital input 1 (X2: 19) | 7 | - | PD | | off | R/W |
| 402 | Function, digital input 2 (X2: 20) | 0 | - | PD | | off | R/W |
| 403 | Function, digital input 3 (X2: 21) | 0 | - | PD | | off | R/W |
| 404 | Function, digital input 4 (X2: 22) | 0 | - | PD | | off | R/W |
| 405 | Function, digital input 5 (X2: 23) | 0 | - | PD | | off | R/W |
| 406 | Function, digital input 6 (X2: 24) | 0 | - | PD | | off | R/W |
| 407 | Function, digital input 7 (X2: 25) | 0 | - | PD | | off | R/W |
| 408 | Function, digital input 8 (X2: 26) | 0 | - | PD | | off | R/W |

**DIGITAL INPUT MULTIPLIERS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 409 | Function, multiplier 1.1 (multiplier 1, output 1) | 0 | | PD | | off | R/W |
| 410 | Function, multiplier 1.2 (multiplier 1, output 2) | 0 | | PD | | off | R/W |
| 411 | Function, multiplier 1.3 (multiplier 1, output 3) | 0 | | PD | | off | R/W |
| 412 | Function, multiplier 1.4 (multiplier 1, output 4) | 0 | | PD | | off | R/W |
| 413 | Function, multiplier 2.1 (multiplier 2, output 1) | 0 | | PD | | off | R/W |
| 414 | Function, multiplier 2.2 (multiplier 2, output 2) | 0 | | PD | | off | R/W |
| 415 | Function, multiplier 2.3 (multiplier 2, output 3) | 0 | | PD | | off | R/W |
| 416 | Function, multiplier 2.4 (multiplier 2, output 4) | 0 | | PD | | off | R/W |
| 417 | | | | | | | |
| 418 | | | | | | | |
| 419 | | | | | | | |

**DIGITAL OUTPUTS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 420 | Status word (digital outputs) | | hex | | | | R |
| 421 | Function, digital output 1 | 4 | DLink | DR | | on | R/W |
| 422 | ON delay, digital output 1 | 0.00 | s | DR | | on | R/W |
| 423 | OFF delay, digital output 1 | 0.00 | s | DR | | on | R/W |
| 424 | Polarity, digital output 1 | 1 | - | DR | | on | R/W |
| 425 | Function, digital output 2 | 0 | DLink | DR | | on | R/W |
| 426 | ON delay, digital output 2 | 0.00 | s | DR | | on | R/W |
| 427 | OFF delay, digital output 2 | 0.00 | s | DR | | on | R/W |
| 428 | Polarity, digital output 2 | 1 | - | DR | | on | R/W |
| 429 | Function, digital output 3 | 0 | DLink | DR | | on | R/W |
| 430 | ON delay, digital output 3 | 0.00 | s | DR | | on | R/W |
| 431 | OFF delay, digital output 3 | 0.00 | s | DR | | on | R/W |
| 432 | Polarity, digital output 3 | 1 | - | DR | | on | R/W |
| 433 | Function, digital output 4 | 0 | DLink | DR | | on | R/W |
| 434 | ON delay, digital output 4 | 0.00 | s | DR | | on | R/W |
| 435 | OFF delay, digital output 4 | 0.00 | s | DR | | on | R/W |
| 436 | Polarity, digital output 4 | 1 | - | DR | | on | R/W |
| 437 | Function, digital output 5 | 0 | DLink | DR | | on | R/W |
| 438 | ON delay, digital output 5 | 0.00 | s | DR | | on | R/W |
| 439 | OFF delay, digital output 5 | 0.00 | s | DR | | on | R/W |
| 440 | Polarity, digital output 5 | 1 | - | DR | | on | R/W |
| 441 | Function, digital output 6 | 0 | DLink | DR | | on | R/W |
| 442 | ON delay, digital output 6 | 0.00 | s | DR | | on | R/W |
| 443 | OFF delay, digital output 6 | 0.00 | s | DR | | on | R/W |
| 444 | Polarity, digital output 6 | 1 | - | DR | | on | R/W |
| 445 | | | | | | | |

**DIGITAL OUTPUTS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 446 | | | | | | | |
| 447 | | | | | | | |
| 448 | | | | | | | |
| 449 | | | | | | | |
| 450 | | | | | | | |
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| 452 | | | | | | | |
| 453 | | | | | | | |
| 454 | | | | | | | |
| 455 | | | | | | | |
| 456 | | | | | | | |
| 457 | | | | | | | |
| 458 | | | | | | | |
| 459 | | | | | | | |

**ANALOG OUTPUTS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 460 | Status word | | hex | | | | R |
| 461 | Signal selection, analog output 1 | 26 | ALink | DR | | on | R/W |
| 462 | Offset, analog output 1 | 0.00 | % | DR | | on | R/W |
| 463 | Scaling, analog output 1 | 1.000 | - | DR | | on | R/W |
| 464 | Filtering, analog output 1 | 0 | ms | DR | | on | R/W |
| 465 | Polarity, analog output 1 | 1 | - | DR | | on | R/W |
| 466 | Signal selection, analog output 2 | 43 | ALink | DR | | on | R/W |
| 467 | Offset, analog output 2 | 0.00 | % | DR | | on | R/W |
| 468 | Scaling, analog output 2 | 1.000 | - | DR | | on | R/W |
| 469 | Filtering, analog output 2 | 0 | ms | DR | | on | R/W |
| 470 | Polarity, analog output 2 | 1 | - | DR | | on | R/W |
| 471 | Signal selection, analog output 3 | 51 | ALink | DR | | on | R/W |
| 472 | Offset, analog output 3 | 0.00 | % | DR | | on | R/W |
| 473 | Scaling, analog output 3 | 1.000 | - | DR | | on | R/W |
| 474 | Filtering, analog output 3 | 0 | ms | DR | | on | R/W |
| 475 | Polarity, analog output 3 | 1 | - | DR | | on | R/W |
| 476 | Signal selection, analog output 4 | 59 | ALink | DR | | on | R/W |
| 477 | Offset, analog output 4 | 0.00 | % | DR | | on | R/W |
| 478 | Scaling, analog output 4 | 1.000 | - | DR | | on | R/W |
| 479 | Filtering, analog output 4 | 0 | ms | DR | | on | R/W |
| 480 | Polarity, analog output 4 | 1 | - | DR | | on | R/W |
| 481 | | | | | | | |
| 482 | | | | | | | |
| 483 | | | | | | | |
| 484 | | | | | | | |
| 485 | | | | | | | |

**ANALOG OUTPUTS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 486 | | | | | | | |
| 487 | | | | | | | |
| 488 | | | | | | | |
| 489 | | | | | | | |
| 490 | | | | | | | |
| 491 | | | | | | | |
| 492 | | | | | | | |
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| 495 | | | | | | | |
| 496 | | | | | | | |
| 497 | | | | | | | |
| 498 | | | | | | | |
| 499 | | | | | | | |

**MONITORING FUNCTIONS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 501 | Threshold, overspeed monitoring | 115.00 | % | DR | | on | R/W |
| 502 | Threshold, tachogenerator/encoder failure | 10.00 | % | DR | | on | R/W |
| 503 | Threshold, tachogenerator/encoder polarity | 10.00 | % | DR | | on | R/W |
| 504 | Threshold, speed adjustment | 15.00 | % | DR | | on | R/W |
| 505 | Threshold $n > n_{min}$ | 5.00 | % | DR | | on | R/W |
| 506 | Hysteresis $n > n_{min}$ | 2.00 | % | DR | | on | R/W |
| 507 | Threshold $n > n_{x1}$ | 10.00 | % | DR | | on | R/W |
| 508 | Hysteresis $n > n_{x1}$ | 2.00 | % | DR | | on | R/W |
| 509 | Threshold $n > n_{x2}$ | 15.00 | % | DR | | on | R/W |
| 510 | Hysteresis $n > n_{x2}$ | 2.00 | % | DR | | on | R/W |
| 511 | Threshold $n > n_{x3}$ | 20.00 | % | DR | | on | R/W |
| 512 | Hysteresis $n > n_{x3}$ | 2.00 | % | DR | | on | R/W |
| 513 | Threshold $n > n_{x4}$ | 25.00 | % | DR | | on | R/W |
| 514 | Hysteresis $n > n_{x4}$ | 2.00 | % | DR | | on | R/W |
| 515 | Threshold $n_{Actual} = n_{Set}$ (at speed controller) | 5.00 | % | DR | | on | R/W |
| 516 | Hysteresis $n_{Actual} = n_{Set}$ (at speed controller) | 1.00 | % | DR | | on | R/W |
| 517 | Stall protection, time to trip | 5.0 | s | DR | | on | R/W |
| 518 | Maximum torque reversal time | 0.2 | s | PD | | on | R/W |
| 519 | 'Armature-circuit-open' time to trip | 1.0 | s | DR | | on | R/W |
| 520 | | | | | | | |
| 521 | Threshold $I_A > I_{A_X1}$ | 90.00 | % | DR | | on | R/W |
| 522 | Hysteresis $I_A > I_{A_X1}$ | 2.00 | % | DR | | on | R/W |
| 523 | Threshold $I_A > I_{A_X2}$ | 95.00 | % | DR | | on | R/W |
| 524 | Hysteresis $I_A > I_{A_X2}$ | 2.00 | % | DR | | on | R/W |
| 525 | Threshold, motor $i^2t$ monitoring | 100 | % | DR | | on | R/W |

**MONITORING FUNCTIONS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 526 | Maximum line stabilisation time | 0.5 | s | PD | | on | R/W |
| 527 | Maximum time to restart (after mains failure) | 0.0 | s | PD | | on | R/W |
| 528 | Frequency threshold | 65,0 | Hz | DR | S 03.10 | on | R/W |
| 529 | | | | | | | |
| 530 | | | | | | | |
| 531 | | | | | | | |
| 532 | | | | | | | |
| 533 | | | | | | | |
| 534 | | | | | | | |
| 535 | Tachogenerator/encoder failure monitoring ON/OFF | 1 | - | DR | S 03.06 | on | R/W |
| 536 | Tachogenerator/encoder polarity monitoring ON/ OFF | 1 | - | DR | S 03.06 | on | R/W |
| 537 | Speed adjustment monitoring ON/OFF | 1 | - | DR | S 03.06 | on | R/W |
| 538 | | | | | | | |
| 539 | | | | | | | |
| 540 | Status word motor temperature | | hex | | S 03.10 | | R |
| 541 | Temperature monitoring channel 1 ON/OFF | | | DR | S 03.10 | on | R/W |
| 542 | Warning temperature channel 1 | + 80 | °C | DR | S 03.10 | on | R/W |
| 543 | Shut down temperature channel 1 | + 80 | °C | DR | S 03.10 | on | R/W |
| 544 | Temperature monitoring channel 2 ON/OFF | | | DR | S 03.10 | on | R/W |
| 545 | Warning temperature channel 2 | + 80 | °C | DR | S 03.10 | on | R/W |
| 546 | Shut down temperature channel 2 | + 80 | °C | DR | S 03.10 | on | R/W |
| 547 | Message threshold motor temperatur channel 1 | + 80 | °C | DR | S 03.20 | on | R/W |
| 548 | Message threshold motor temperatur channel 2 | + 80 | °C | DR | S 03.20 | on | R/W |
| 549 | | | | | | | |

**UNASSIGNED PI CONTROLLER**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 550 | Setpoint selection, input 1 (unass. PI controller) | 0 | ALink | DR | | on | R/W |
| 551 | Setpoint selection, input 2 | 0 | ALink | DR | | on | R/W |
| 552 | Setpoint selection, input 3 | 0 | ALink | DR | | on | R/W |
| 553 | Setpoint selection, input 4 | 0 | ALink | DR | | on | R/W |
| 554 | Actual-value selection | 0 | ALink | DR | | on | R/W |
| 555 | Actual-value smoothing | 0 | ms | DR | | on | R/W |
| 556 | Actual-value derivative-action time (derivative-action element) | 10 | ms | DR | | on | R/W |
| 557 | Factor of D component | 0.0 | - | DR | | on | R/W |
| 558 | | | | | | | |
| 559 | | | | | | | |
| 560 | Status word | | hex | | | | R |
| 561 | Control word | | hex | | | on | R/W |
| 562 | Controller type | 11 | hex | DR | | on | R/W |
| 563 | P-gain $K_P$ 1 | 10.00 | - | DR | | on | R/W |
| 564 | P-gain $K_P$ 2 | 10.00 | - | DR | | on | R/W |
| 565 | Threshold, P-gain $K_P$ 1 | 100.00 | % | DR | | on | R/W |
| 566 | Threshold, P-gain $K_P$ 2 | 100.00 | % | DR | | on | R/W |
| 567 | Adaptation signal, proportional gain $K_P$ | 0 | ALink | DR | | on | R/W |
| 568 | Integral-action time $T_n1$ | 0,400 | s | DR | | on | R/W |
| 569 | Integral-action time $T_n2$ | 0,400 | s | DR | | on | R/W |
| 570 | Threshold for Integral-action time $T_n1$ | 100.00 | % | DR | | on | R/W |
| 571 | Threshold for Integral-action time $T_n2$ | 100.00 | % | DR | | on | R/W |
| 572 | Signal selection, integral-action time $T_n$ | 0 | ALink | DR | | on | R/W |
| 573 | | | | | | | |
| 574 | Preset I component | 0.00 | % | DR | | on | R/W |

**UNASSIGNED PI CONTROLLER**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 575 | Positive limit for I component | 100.00 | % | DR | | on | R/W |
| 576 | Negative limit for I component | -100.00 | % | DR | | on | R/W |
| 577 | Positive limit for controller output | 100.00 | % | DR | | on | R/W |
| 578 | Negative limit for controller output | -100.00 | % | DR | | on | R/W |
| 579 | Enable mode | 1 | - | PD | | on | R/W |
| 580 | | | | | | | |
| 581 | | | | | | | |
| 582 | | | | | | | |
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| 597 | | | | | | | |
| 598 | | | | | | | |
| 599 | | | | | | | |

**UNASSIGNED FUNCTION BLOCKS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 600 | Status word | | hex | | | | R |
| 601 | Control word | | hex | | | on | R/W |
| 602 | Input signal A at unassigned adder 1 | 0 | ALink | DR | | on | R/W |
| 603 | Input signal B at unassigned adder 1 | 0 | ALink | DR | | on | R/W |
| 604 | Input signal C at unassigned adder 1 | 0 | ALink | DR | | on | R/W |
| 605 | Input signal D at unassigned adder 1 | 0 | ALink | DR | | on | R/W |
| 606 | Input signal A at unassigned adder 2 | 0 | ALink | DR | | on | R/W |
| 607 | Input signal B at unassigned adder 2 | 0 | ALink | DR | | on | R/W |
| 608 | Input signal C at unassigned adder 2 | 0 | ALink | DR | | on | R/W |
| 609 | Input signal D at unassigned adder 2 | 0 | ALink | DR | | on | R/W |
| 610 | Input signal A at unassigned adder 3 | 0 | ALink | DR | | on | R/W |
| 611 | Input signal B at unassigned adder 3 | 0 | ALink | DR | | on | R/W |
| 612 | Input signal C at unassigned adder 3 | 0 | ALink | DR | | on | R/W |
| 613 | Input signal D at unassigned adder 3 | 0 | ALink | DR | | on | R/W |
| 614 | Input signal A at unassigned adder 4 | 0 | ALink | DR | | on | R/W |
| 615 | Input signal B at unassigned adder 4 | 0 | ALink | DR | | on | R/W |
| 616 | Input signal C at unassigned adder 4 | 0 | ALink | DR | | on | R/W |
| 617 | Input signal D at unassigned adder 4 | 0 | ALink | DR | | on | R/W |
| 618 | Input signal A at unassigned multiplier 1 | 0 | ALink | DR | | on | R/W |
| 619 | Input signal B at unassigned multiplier 1 | 0 | ALink | DR | | on | R/W |
| 620 | Input signal C at unassigned multiplier 1 | 0 | ALink | DR | | on | R/W |
| 621 | Input signal D at unassigned multiplier 1 | 0 | ALink | DR | | on | R/W |
| 622 | Input signal A at unassigned multiplier 2 | 0 | ALink | DR | | on | R/W |
| 623 | Input signal B at unassigned multiplier 2 | 0 | ALink | DR | | on | R/W |
| 624 | Input signal C at unassigned multiplier 2 | 0 | ALink | DR | | on | R/W |
| 625 | Input signal D at unassigned multiplier 2 | 0 | ALink | DR | | on | R/W |

**UNASSIGNED FUNCTION BLOCKS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 626 | Input signal A at unassigned divider 1 | 0 | ALink | DR | | on | R/W |
| 627 | Input signal B at unassigned divider 1 | 0 | ALink | DR | | on | R/W |
| 628 | Input signal C at unassigned divider 1 | 0 | ALink | DR | | on | R/W |
| 629 | Input signal D at unassigned divider 1 | 0 | ALink | DR | | on | R/W |
| 630 | Input signal A at unassigned divider 2 | 0 | ALink | DR | | on | R/W |
| 631 | Input signal B at unassigned divider 2 | 0 | ALink | DR | | on | R/W |
| 632 | Input signal C at unassigned divider 2 | 0 | ALink | DR | | on | R/W |
| 633 | Input signal D at unassigned divider 2 | 0 | ALink | DR | | on | R/W |
| 634 | Input selection multiplier 1 | 0 | ALink | DR | S 03.10 | on | R/W |
| 635 | Factor multiplier 1 | 1,00 | | DR | S 03.10 | on | R/W |
| 636 | Input selection multiplier 2 | 0 | ALink | DR | S 03.10 | on | R/W |
| 637 | Factor multiplier 2 | 1,00 | | DR | S 03.10 | on | R/W |
| 638 | Input selection multiplier 3 | 0 | ALink | DR | S 03.10 | on | R/W |
| 639 | Factor multiplier 3 | 1,00 | | DR | S 03.10 | on | R/W |
| 640 | | | | | | | |
| 641 | | | | | | | |
| 642 | | | | | | | |
| 643 | | | | | | | |
| 644 | Input, minimum value limiter | 0 | ALink | DR | | on | R/W |
| 645 | Threshold, minimum value limiter | 0.00 | % | DR | | on | R/W |
| 646 | Input signal formatter | 0 | ALink | DR | | on | R/W |
| 647 | X value of input signal formatter | 50.00 | % | DR | | on | R/W |
| 648 | Y value of input signal formatter | 50.00 | % | DR | | on | R/W |
| 649 | Final value of input signal formatter | 100.00 | % | DR | | on | R/W |
| 650 | Input, absolute value generator 1 | 0 | ALink | DR | | on | R/W |
| 651 | Input. absolute value generator 2 | 0 | ALink | DR | | on | R/W |
| 652 | Input, absolute value generator 3 | 0 | ALink | DR | | on | R/W |

**UNASSIGNED FUNCTION BLOCKS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 653 | Input, absolute value generator 4 | 0 | ALink | DR | | on | R/W |
| 654 | Input, inverter 1 | 0 | ALink | DR | | on | R/W |
| 655 | Input, inverter 2 | 0 | ALink | DR | | on | R/W |
| 656 | Input, limiter | 0 | ALink | DR | | on | R/W |
| 657 | Positive limit, limiter | 0.00 | % | DR | | on | R/W |
| 658 | Negative limit, limiter | 0.00 | % | DR | | on | R/W |
| 659 | Input, dead band | 0 | ALink | DR | | on | R/W |
| 660 | Positive threshold, dead band | 0.00 | % | DR | | on | R/W |
| 661 | Negative threshold, dead band | 0.00 | % | DR | | on | R/W |
| 662 | Input, filter 1 | 0 | ALink | DR | | on | R/W |
| 663 | Time constant, filter 1 | 10 | ms | DR | | on | R/W |
| 664 | Input selection, filter 2 | 0 | ALink | DR | | on | R/W |
| 665 | Time constant, filter 2 | 10 | ms | DR | | on | R/W |
| 666 | Input A, changeover switch 1 | 0 | ALink | DR | | on | R/W |
| 667 | Input B, changeover switch 1 | 0 | ALink | DR | | on | R/W |
| 668 | Input A, changeover switch 2 | 0 | ALink | DR | | on | R/W |
| 669 | Input B, changeover switch 2 | 0 | ALink | DR | | on | R/W |
| 670 | Input C, changeover switch 2 | 0 | ALink | DR | | on | R/W |
| 671 | Input A, changeover switch 3 | 0 | ALink | DR | | on | R/W |
| 672 | Input B, changeover switch 3 | 0 | ALink | DR | | on | R/W |
| 673 | Scaling, input B, changeover switch 3 | 1,000 | - | DR | | on | R/W |
| 674 | Input, changeover switch 4 | 0 | ALink | DR | | on | R/W |
| 675 | Scaling, changeover switch 4 | 1,000 | - | DR | | on | R/W |
| 676 | Input A, comparator | 1 | ALink | DR | | on | R/W |
| 677 | Input B, comparator | 0 | ALink | DR | | on | R/W |
| 678 | Threshold, comparator | 5.00 | % | DR | | on | R/W |
| 679 | Hysteresis, comparator | 2.00 | % | DR | | on | R/W |

| UNASSIGNED FUNCTION BLOCKS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
| 680 | DLink selection for P 681 | 0 | DLink | DR | | on | R/W |
| 681 | Value of selected DLink | 0 | - | | | | R |
| 682 | Input Alink/DLink converter 1 | 0 | ALink | DR | | on | R/W |
| 683 | Input Alink/DLink converter 2 | 0 | ALink | DR | | on | R/W |
| 684 | Set source parameter 1 for DLink 44/45 | 0 | - | DR | | on | R/W |
| 685 | Bit mask for source parameter 1 | 0 | hex | DR | | on | R/W |
| 686 | Bit pattern for source parameter 1 | 0 | hex | DR | | on | R/W |
| 687 | Set source parameter 2 for DLink 46/47 | 0 | - | DR | | on | R/W |
| 688 | Bit mask for source parameter 2 | 0 | hex | DR | | on | R/W |
| 689 | Bit pattern for source parameter 2 | 0 | hex | DR | | on | R/W |
| 690 | DLink x writing target parameter (P 691) | 0 | DLink | DR | | on | R/W |
| 691 | Target parameter, DLink x (P690) | 0 | - | DR | | on | R/W |
| 692 | Write mask for target parameter (P691) | 0 | hex | DR | | on | R/W |
| 693 | Write pattern at DLink x: HIGH (P691) | 0 | hex | DR | | on | R/W |
| 694 | Write pattern at DLink x: LOW (P691) | 0 | hex | DR | | on | R/W |
| 695 | DLink x writing target parameter (P 696) | 0 | DLink | DR | | on | R/W |
| 696 | Target parameter, DLink x (P695) | 0 | - | DR | | on | R/W |
| 697 | Write mask for target parameter (P696) | 0 | hex | DR | | on | R/W |
| 698 | Write pattern at DLink x: HIGH (P696) | 0 | hex | DR | | on | R/W |
| 699 | Write pattern at DLink x: LOW (P696) | 0 | hex | DR | | on | R/W |

| UNASSIGNED DIGITAL FUNCTIONS - DLINK FUNCTIONS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
| 700 | | | | | | | |
| 701 | | | | | | | |
| 702 | Input at unassigned digital inverter 1 | 0 | DLink | DR | | on | R/W |
| 703 | Delay time for unassigned digital inverter 1 | 0.00 | s | DR | | on | R/W |
| 704 | Input selection at unassigned digital inverter 2 | 0 | DLink | DR | | on | R/W |
| 705 | Delay time for unassigned digital inverter 2 | 0.00 | s | DR | | on | R/W |
| 706 | Input selection at unassigned digital inverter 3 | 0 | DLink | DR | | on | R/W |
| 707 | Delay time for unassigned digital inverter 3 | 0.00 | s | DR | | on | R/W |
| 708 | Input selection at unassigned digital inverter 4 | 0 | DLink | DR | | on | R/W |
| 709 | Delay time for unassigned digital inverter 4 | 0.00 | s | DR | | on | R/W |
| 710 | Function, gate 1 (AND/OR/XOR) | 0 | - | DR | | on | R/W |
| 711 | Input A, gate 1 | 0 | DLink | DR | | on | R/W |
| 712 | Input B, gate 1 | 0 | DLink | DR | | on | R/W |
| 713 | Input C, gate 1 | 0 | DLink | DR | | on | R/W |
| 714 | Input D, gate 1 | 0 | DLink | DR | | on | R/W |
| 715 | Function, gate 2 (AND/OR/XOR) | 0 | | DR | | on | R/W |
| 716 | Input A, gate 2 | 0 | DLink | DR | | on | R/W |
| 717 | Input B, gate 2 | 0 | DLink | DR | | on | R/W |
| 718 | Input C, gate 2 | 0 | DLink | DR | | on | R/W |
| 719 | Input D, gate 2 | 0 | DLink | DR | | on | R/W |
| 720 | Function, gate 3 (AND/OR/XOR) | 0 | | DR | | on | R/W |
| 721 | Input A, gate 3 | 0 | DLink | DR | | on | R/W |
| 722 | Input B, gate 3 | 0 | DLink | DR | | on | R/W |
| 723 | Input C, gate 3 | 0 | DLink | DR | | on | R/W |
| 724 | Input D, gate 3 | 0 | DLink | DR | | on | R/W |
| 725 | Function, gate 4 (AND/OR/XOR) | 0 | | DR | | on | R/W |

| UNASSIGNED DIGITAL FUNCTIONS - DLINK FUNCTIONS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
| 726 | Input A, gate 4 | 0 | DLink | DR | | on | R/W |
| 727 | Input B, gate 4 | 0 | DLink | DR | | on | R/W |
| 728 | Input C, gate 4 | 0 | DLink | DR | | on | R/W |
| 729 | Input D, gate 4 | 0 | DLink | DR | | on | R/W |
| 730 | DLink selection for freely definable error | 0 | DLink | DR | S 03.15 | on | R/W |
| 731 | | | | | | | |
| 732 | | | | | | | |
| 733 | | | | | | | |
| 734 | | | | | | | |
| 735 | | | | | | | |
| 736 | | | | | | | |
| 737 | | | | | | | |
| 738 | | | | | | | |
| 739 | | | | | | | |
| 740 | DLink x writing target parameter (P741) | 0 | DLink | DR | S 03.20 | on | R/W |
| 741 | Target parameter, DLink x (P740) | 0 | PNr | DR | S 03.20 | on | R/W |
| 742 | Write mask for target parameter (P741) | 0 | hex | DR | S 03.20 | on | R/W |
| 743 | Write pattern at DLink x: HIGH (P741) | 0 | hex | DR | S 03.20 | on | R/W |
| 744 | Write pattern at DLink x: LOW (P741) | 0 | hex | DR | S 03.20 | on | R/W |
| 745 | DLink x writing target parameter (P746) | 0 | DLink | DR | S 03.20 | on | R/W |
| 746 | Target parameter, DLink x (P745) | 0 | PNr | DR | S 03.20 | on | R/W |
| 747 | Write mask for target parameter (P746) | 0 | hex | DR | S 03.20 | on | R/W |
| 748 | Write pattern at DLink x: HIGH (P746) | 0 | hex | DR | S 03.20 | on | R/W |
| 749 | Write pattern at DLink x: LOW (P746) | 0 | hex | DR | S 03.20 | on | R/W |
| 750 | DLink x writing target parameter (P751) | 0 | DLink | DR | S 03.20 | on | R/W |
| 751 | Target parameter, DLink x (P750) | 0 | PNr | DR | S 03.20 | on | R/W |
| 752 | Write mask for target parameter (P751) | 0 | hex | DR | S 03.20 | on | R/W |

| UNASSIGNED DIGITAL FUNCTIONS - DLINK FUNCTIONS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
| 753 | Write pattern at DLink x: HIGH (P751) | 0 | hex | DR | S 03.20 | on | R/W |
| 754 | Write pattern at DLink x: LOW (P751) | 0 | hex | DR | S 03.20 | on | R/W |
| 755 | DLink x writing target parameter (P756) | 0 | DLink | DR | S 03.20 | on | R/W |
| 756 | Target parameter, DLink x (P755) | 0 | PNr | DR | S 03.20 | on | R/W |
| 757 | Write mask for target parameter (P756) | 0 | hex | DR | S 03.20 | on | R/W |
| 758 | Write pattern at DLink x: HIGH (P756) | 0 | hex | DR | S 03.20 | on | R/W |
| 759 | Write pattern at DLink x: LOW (P756) | 0 | hex | DR | S 03.20 | on | R/W |
| 760 | | | | | | | |
| 761 | | | | | | | |
| 762 | | | | | | | |
| 763 | | | | | | | |
| 764 | | | | | | | |
| 765 | | | | | | | |
| 766 | | | | | | | |
| 767 | | | | | | | |

**OPTION BOARD PARAMETERS**

| Parameter no. | Description | Default | Unit | Storage location | from software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 768 | Option board OB parameter 0<br>The option board parameter contents is read out only at boot time. Online modifications have no effect on the drive ! In combination with field bus option boards. | 6040 | hex | PD | | on | R/W |
| 769 | Option board OB parameter 1 | 0 | hex | PD | | on | R/W |
| 770 | Option board OB parameter 2 | 002E | hex | PD | | on | R/W |
| 771 | Option board OB parameter 3 | 0 | hex | PD | | on | R/W |
| 772 | Option board OB parameter 4 | 0030 | hex | PD | | on | R/W |
| 773 | Option board OB parameter 5 | 0 | hex | PD | | on | R/W |
| 774 | Option board OB parameter 6 | 0 | hex | PD | | on | R/W |
| 775 | Option board OB parameter 7 | 0 | hex | PD | | on | R/W |
| 776 | Option board OB parameter 8 | 0 | hex | PD | | on | R/W |
| 777 | Option board OB parameter 9 | 0 | hex | PD | | on | R/W |
| 778 | Option board OB parameter 10 | 0 | hex | PD | | on | R/W |
| 779 | Option board OB parameter 11 | 0 | hex | PD | | on | R/W |
| 780 | Option board OB parameter 12 | 0 | hex | PD | | on | R/W |
| 781 | Option board OB parameter 13 | 0 | hex | PD | | on | R/W |
| 782 | Option board OB parameter 14 | 1 | hex | PD | | on | R/W |
| 783 | Option board OB parameter 15 | 1 | hex | PD | | on | R/W |
| 784 | Option board OB parameter 16 | 6041 | hex | PD | | on | R/W |
| 785 | Option board OB parameter 17 | 0 | hex | PD | | on | R/W |
| 786 | Option board OB parameter 18 | 003B | hex | PD | | on | R/W |
| 787 | Option board OB parameter 19 | 0 | hex | PD | | on | R/W |
| 788 | Option board OB parameter 20 | 004F | hex | PD | | on | R/W |
| 789 | Option board OB parameter 21 | 0 | hex | PD | | on | R/W |
| 790 | Option board OB parameter 22 | 0 | hex | PD | | on | R/W |
| 791 | Option board OB parameter 23 | 0 | hex | PD | | on | R/W |

**OPTION BOARD PARAMETERS**

| Parameter no. | Description | Default | Unit | Storage location | from software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 792 | Option board OB parameter 24 | 0 | hex | PD | | on | R/W |
| 793 | Option board OB parameter 25 | 0 | hex | PD | | on | R/W |
| 794 | Option board OB parameter 26 | 0 | hex | PD | | on | R/W |
| 795 | Option board OB parameter 27 | 0 | hex | PD | | on | R/W |
| 796 | Option board OB parameter 28 | 0 | hex | PD | | on | R/W |
| 797 | Option board OB parameter 29 | 0 | hex | PD | | on | R/W |
| 798 | Option board OB parameter 30 | 0 | hex | PD | | on | R/W |
| 799 | Option board OB parameter 31 | 0 | hex | PD | | on | R/W |
| 800 | | | | | | | |
| 801 | | | | | | | |
| 802 | | | | | | | |
| 803 | | | | | | | |
| 804 | | | | | | | |
| 805 | | | | | | | |
| 806 | | | | | | | |
| 807 | | | | | | | |
| 808 | | | | | | | |
| 809 | | | | | | | |

**ERROR MESSAGES**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 900 | System error 1 (error bit array) | | hex | | | | R |
| 901 | System error 2 (error bit array) | | hex | | | | R |
| 902 | System warning 1 (warning bit array) | | hex | | | | R |
| 903 | System warning 2 (warning bit array) | | hex | | | | R |
| 904 | | | | | | | |
| 905 | | | | | | | |
| 906 | | | | | | | |
| 907 | | | | | | | |
| 908 | | | | | | | |
| 909 | | | | | | | |
| 910 | Error in converter control module | | hex | | | | R |
| 911 | Error in speed controller module | | hex | | | | R |
| 912 | Error in incremental encoder 1 module | | hex | | | | R |
| 913 | Error in data record manager 1 module | | hex | | | | R |
| 914 | Error in operating system module | | hex | | | | R |
| 915 | Error in microcontroller module | | hex | | | | R |
| 916 | Error in EMF module | | hex | | | | R |
| 917 | Error in power stage module | | hex | | | | R |
| 918 | Error in field unit module | | hex | | | | R |
| 919 | Error in motor potentiometer module | | hex | | | | R |
| 920 | Error in digital outputs module | | hex | | | | R |
| 921 | Error in actual-value detector module | | hex | | | | R |
| 922 | Error in reversing unit module | | hex | | | | R |
| 923 | Error in power unit module | | hex | | | | R |
| 924 | Error in digital inputs module | | hex | | | | R |
| 925 | Error in analog inputs module | | hex | | | | R |

**ERROR MESSAGES**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 926 | Error in armature current controller module | | hex | | | | R |
| 927 | Error in data record manager 2 module | | hex | | | | R |
| 928 | Error in data record manager 3 module | | hex | | S 03.03 | | R |
| 929 | Error in unassigned function blocks module | | hex | | S 03.10 | | R |
| 930 | Error in module motor temperature monitoring | | hex | | S 03.10 | | R |
| 931 | | | | | | | |
| 932 | | | | | | | |
| 933 | | | | | | | |
| 934 | | | | | | | |
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| 946 | | | | | | | |
| 947 | | | | | | | |
| 948 | | | | | | | |
| 949 | | | | | | | |

**FREELY DEFINABLE STATUS WORD**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 950 | Select bit 0 | 0 | DLink | PD | | on | R/W |
| 951 | Select bit 1 | 0 | DLink | PD | | on | R/W |
| 952 | Select bit 2 | 0 | DLink | PD | | on | R/W |
| 953 | Select bit 3 | 0 | DLink | PD | | on | R/W |
| 954 | Select bit 4 | 0 | DLink | PD | | on | R/W |
| 955 | Select bit 5 | 0 | DLink | PD | | on | R/W |
| 956 | Select bit 6 | 0 | DLink | PD | | on | R/W |
| 957 | Select bit 7 | 0 | DLink | PD | | on | R/W |
| 958 | Select bit 8 | 0 | DLink | PD | | on | R/W |
| 959 | Select bit 9 | 0 | DLink | PD | | on | R/W |
| 960 | Select bit 10 | 0 | DLink | PD | | on | R/W |
| 961 | Select bit 11 | 0 | DLink | PD | | on | R/W |
| 962 | Select bit 12 | 0 | DLink | PD | | on | R/W |
| 963 | Select bit 13 | 0 | DLink | PD | | on | R/W |
| 964 | Select bit 14 | 0 | DLink | PD | | on | R/W |
| 965 | Select bit 15 | 0 | DLink | PD | | on | R/W |
| 966 | Freely definable status word | 0 | hex | | | | R |
| 967 | | | | | | | |
| 968 | | | | | | | |
| 969 | | | | | | | |
| 970 | | | | | | | |
| 971 | | | | | | | |
| 972 | | | | | | | |
| 973 | | | | | | | |
| 974 | | | | | | | |
| 975 | | | | | | | |

**FREELY DEFINABLE STATUS WORD**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 976 | | | | | | | |
| 977 | | | | | | | |
| 978 | | | | | | | |
| 979 | | | | | | | |
| 980 | | | | | | | |
| 981 | | | | | | | |
| 982 | | | | | | | |
| 983 | | | | | | | |
| 984 | | | | | | | |
| 985 | | | | | | | |
| 986 | | | | | | | |
| 987 | | | | | | | |
| 988 | | | | | | | |
| 989 | | | | | | | |

**SYSTEM PARAMETERS**

| Parameter no. | Description | Default | Unit | Memory location | From software release | On- / offline | R/W |
|---|---|---|---|---|---|---|---|
| 990 | | | | | | | |
| 991 | | | | | | | |
| 992 | | | | | | | |
| 993 | Timing via AL 302 | | Mod. no. | PD | | on | R/W |
| 994 | Minimum-value memory (AL316) | | ALink | DR | | on | R/W |
| 995 | Maximum-value memory (AL317) | | ALink | DR | | on | R/W |
| 996 | Parameter/ALink converter 1 (ALink 300) | 1 | - | | | | |
| 997 | Parameter/ALink converter 2 (ALink 301) | 1 | - | | | | |
| 998 | Memory location address | FF1C | hex | PD | | on | R/W |
| 999 | Memory location address contents | 0 | hex | | | | R |

## 5.6 Parameter description - Converter data

P 001 **Converter state**

Converter state (refer ▹Converter control states◃ on page 74).

| Value | Description |
|---|---|
| 0 | Not ready to operate |
| 1 | Switch-on disabled |
| 2 | Ready To Operate |
| 3 | Switched on |
| 4 | Operation enabled |
| 5 | Disable operation active |
| 6 | Stop active |
| 7 | Quick stop active |
| E | Malfunction reaction active |
| F | Malfunction |

P 002 **Power unit type**

The value of the analog power unit identification is displayed (R501 on PCB 3.9712). The displayed value does not apply on error 16 !

| Value | Description |
|---|---|
| 1 | BKD 6 (1-quadrant operation) |
| 4 | BKF 12 (4-quadrant operation) |

P 003 **Rated current of power unit**

The armature power unit current level is read from the identifier upon supply voltage application and displayed in Amps.

P 004 **Rated current of power unit, EEPROM**

The current levels of the armature power unit is read from the EEPROM and displayed in Amps.

Any deviations of the stored value from the contents of parameter P 003 result in error message 67, and the ready-to-operate relay drops out.

P 003 and P 004 may have different contents when changing the memory module or controller print.

P 005 **Power unit peak current (from S 03.20)**

Maximum current of the armature power unit.

Some power units can supply a higher current as the rated current for a short period. This peak current is read from the identifier after connecting the power supply and is then displayed in this parameter.

The possible overload period is limited via a Ixt calculation. The overload time is displayed in ALink AL 227 (see also ▹Overload function◃ on page 98).

P 006 **Rated current of field power unit**

The field power unit current level is read from the identifier upon supply voltage application and displayed in Amps.

P 007 **Rated current of field power unit, EEPROM**

The current level of the field power units read from the EEPROM and displayed in Amps.

Any deviations of the stored value from the contents of parameter P 006 result in error message 69, and the ready-to-operate relay drops out.

P 006 and P 007 may have different contents when changing memory module or controller print.

## 5.7 Parameter description - Measured values

P 010 **Electronics supply (mains voltage)**

Displays the current mains supply at the electronics feed-in point X6:1 / X6:3 in $V_{eff}$.

P 011 **Mains frequency**

Displays the current mains frequency in Hertz.

P 012 **Rotating field (after main contactor ON)**

| Value | Description |
|---|---|
| 0 | Unassigned, rotating field is measured only when main contactor ON (X2: 15) |
| 1 | CW rotating field |
| 2 | CCW rotating field |

P 013 **Armature voltage [V]**

Displays the current armature voltage in Volts with polarity.

P 014 **Armature voltage [%]**

Displays the current armature voltage in percent with polarity, with 100 % corresponding to the set motor rated voltage (P 073).

P 015 **Armature current [A]**

Displays the current armature current in Amps with polarity.

P 016 **Armature current [%]**

Displays the armature current in percent with polarity, with 100 % corresponding to the set converter rated current (see also P 072). This value is also stored in ALink 80.

P 017 **ObjLst Index**

Internal parameter for option boards.

P 018 **ObjLst ObjNr**

Internal parameter for option boards.

P 020 **Power unit state**

Parameter number in hexadecimal representation: 0014

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 0: Spare | DL0048 |
| 1 | 0: Spare | DL0049 |
| 2 | 0: Spare | DL0050 |
| 3 | 1: Error in module power unit | DL0051 |
| 4 | 0: Spare | DL0052 |
| 5 | 1: Pre-warning limit temperature power unit | DL0053 |
| 6 | 1: Warning: Power unit temperature > limit temperature | DL0054 |
| 7 | 1: Mains frequency ≥ frequency threshold ( $f_{mains} \geq$ P528) | DL0055 |
| 8 | 1: Ixt threshold exceeded, current set value is limited to power unit rated current (P003) (from S 03.20) | DL0056 |
| 9 | 0: Spare | DL0057 |
| 10 | 0: Spare | DL0058 |
| 11 | 0: Spare | DL0059 |
| 12 | 0: Spare | DL0060 |
| 13 | 0: Spare | DL0061 |
| 14 | 0: Spare | DL0062 |
| 15 | 0: Spare | DL0063 |

P 021 **Field current [A]**

Displays the measured field current in Amps.

P 022 **Field current [%]**

Displays the measured field current in percent, with 100 % corresponding to the set rated field current (see also P 079). This value is also stored in ALink 98.

P 023 **Power input [%]**

The electrically input power is calculated from the product of converter output current (ALink 80) and armature voltage (ALink 215) and displayed in percent. This value is also stored in ALink 222. 100 % in the display correspond to the product of P 072 (rated armature current) and P 073 (rated armature voltage) and result in 10 V at the analog output.

P 024 **Power output [%]**

The electrically output power is calculated from the product of converter output current (ALink 80) and motor EMF (ALink 217) and displayed in percent. This value is stored in ALink 223. The value is smaller by the losses (motor-dependent) than the power input (P 023) and thus lower than 100 %.

P 025 **Power unit temperature [°C]**

Displays the temperature at the heat sink in °C.

P 027 **Display motor temperature channel 1 [°C]**

| P541 | displayed is |
|---|---|
| P541 = 0:<br>(monitoring channel OFF) | Always displayed 0 °C! |
| P541 = 1<br>(monitoring channel ON): | Displayed is the measured temperature of monitoring channel 1 (sensor connected at X8:1 and X8:2 on board 3.0043). |

The value can be used with ALink 346 [°C].

P 028 **Display motor temperature channel 2 [°C]**

| P544 | displayed is |
|---|---|
| P544 = 0:<br>(monitoring channel OFF) | Always displayed 0 °C! |
| P544 = 1<br>(monitoring channel ON): | Displayed is the measured temperature of monitoring channel 1 (sensor connected at X8:4 and X8:5 on board 3.0043). |

The value can be used with ALink 347 [°C].

P 030 **State motor $i^2t$**

Parameter number in hexadecimal representation: 001E

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 1: $i^2t$ monitoring active | DL0064 |
| 1 | 0: Spare | DL0065 |
| 2 | 0: Spare | DL0066 |
| 3 | 0: Spare | DL0067 |
| 4 | 1: $i^2t$ value has exceeded the threshold | DL0068 |
| 5 | 0: Spare | DL0069 |
| 6 | 0: Spare | DL0070 |
| 7 | 0: Spare | DL0071 |
| 8 | 0: Spare | DL0072 |
| 9 | 0: Spare | DL0073 |
| 10 | 0: Spare | DL0074 |
| 11 | 1: $i^2t$ value has exceeded 100 % | DL0075 |
| 12 | 0: Spare | DL0076 |
| 13 | 0: Spare | DL0077 |
| 14 | 0: Spare | DL0078 |
| 15 | 0: Spare | DL0079 |

P 031 **Motor $i^2t$ value [%]**

Displays the motor i²t monitoring value. This value is stored in ALink 220. 100 % correspond to the motor rated temperature and result in 2.5 V at the analog output and in the decimal value 4096 in ALink 220.

P 032 **7S display ON and keypad enable**

| Value | Description |
|---|---|
| 0 | Switch off display |
| 17 | Switch on display (through PC input, for example) and write authority: Display active for input |
| Others | Switch on display (read-only, through PC input, for example) |

A setting of P 032 = 17 means that the keypad is always authorised for input, independent of the set communication source (P 121).

| | | | |
|---|---|---|---|
| Range: | 0...10000 | Save: | None |
| Standard value: | 0 | Modify: | Online |

P 034 **Parameter selection P xxx (7S display) (PC)**

Selects the parameter shown in the display (high-speed parameter selection on the 7S display via the PC).

| | | | |
|---|---|---|---|
| Range: | 1...999 | Save: | None |
| Standard value: | 1 | Modify: | Online |

P 035 **Software version**

This parameter displays the converter software version.

P 036 **Converter software type**

| Value | Description |
|---|---|
| 0 | Serial software |
| 99 | Development version |

P 037 **Error number**

Any existing error switches the display on automatically and displays parameter P 037. The error memory is read out one error after the other, with the first error marked '**1.**' in the display. The MODE key at the converter is not active. In the case of an error, DLink 3 can be used to set a digital output.

The control may set bit 7 in P 101 from 0 to 1, or a digital input (X2: 19 to X2: 26) with the digital input function 7 may be used for error acknowledgement. Depending on the setting in parameter P 106, the errors are acknowledged individually or as a group. Any unacknowledgeable errors will be resignalled. In such a case, reboot the converter by switching the supply voltage off and on again.

Error list refer ▹BKF7000 error list (P 037)◃ from page 424.

Every error has been assigned its own bit in parameters P 910 to P 929 to ensure fast error access via communication-based control (see also P 900 and P 901).

P 038 **Number of errors**

Number of errors occurred

P 039 **Warning number**

One or several warnings switch the display on automatically and display parameter P 039 (unless there are errors). The warning memory messages are read out one after the other. The MODE key at the converter is not active. In the case of a warning, DLink 4 can be used to set a digital output.

Warnings cannot be acknowledged but are cancelled by the converter as soon as the condition that tripped the warning, is no longer present (parameter conflict resolved, for example).

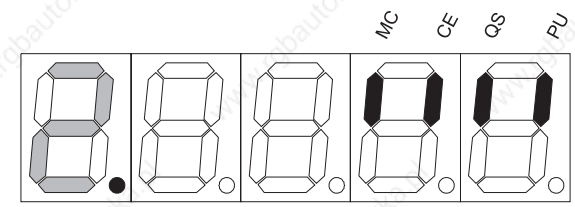
Warning list refer ▹BKF7000 (P 039) Warning list◃ from page 427.

Every warning has been assigned its own bit in parameters P 902 and P 903 to ensure fast control access to all warnings via communication-based control.

P 040 **Number of warnings**

Number of warnings incurred

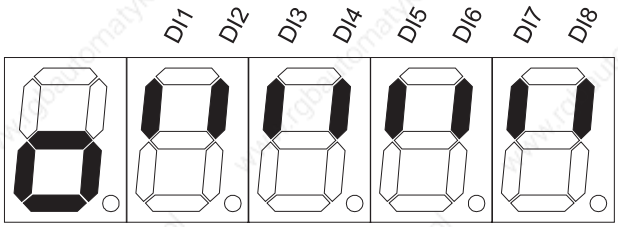
P 042 **Code, controller enables**




as of S03.08:
display P001
(controller state)

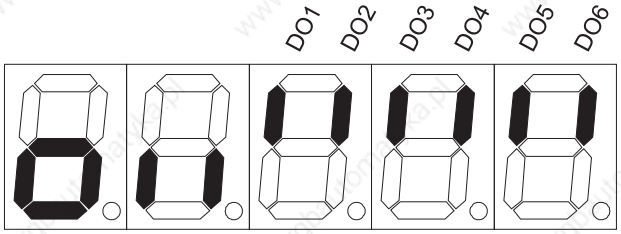
Enable bar on: Enable signal present

P 043 **Code, digital inputs DI**




DIx on: Digital input x set

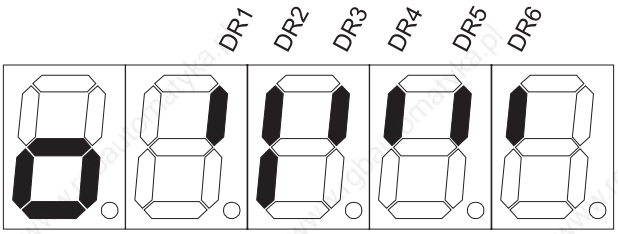
P 044 **Code, digital outputs DA**




DOx on: Digital output x set

Lower bar on: Relay set

P 045 **Code, data records DR**




DR x on in upper row: Data record x programmed

DR x on in lower row: Data record x active (DR 2 active in this case, for example)

P 046 **Alink selection for P 047**

Selects the ALink whose value (contents) is to be displayed in P 047.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 | | Modify: | Online |

P 047 **Value of ALink (P 046)**

Value (contents) of the ALink selected with P 046.

P 048 **Alink selection for P 049**

Selects the ALink whose value (contents) is to be displayed in P 049.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 | | Modify: | Online |

P 049 **Value of ALink (P 048)**

Value (contents) of the ALink selected with P 048.

P 050 **Speed setpoint [%]**

Displays the setpoint at the speed controller input in percent, with 100 % corresponding to the set maximum speed (see also ALink 51).

P 051 **Actual speed [%]**

Displays the actual value at the speed controller input in percent, with 100 % corresponding to the set maximum speed (see also ALink 59).

## 5.8 Parameter description - Basic settings

P 070 **Electronics supply (mains voltage)**

Input of the rated value of the connection voltage at electronics supply X6: 1 (3U1) and X6: 3 (3W1).

The power supply unit can be operated directly on voltages from 380 $V_{eff}$ to 500 $V_{eff}$. Lower mains voltages either require a series transformer, or the power supply unit must be supplied with an **additional** 24 $V_{DC}$ externally at terminals X7: 1 (+24 V) and X7: 2 (GND).

| | | | |
|---|---|---|---|
| Range: | 200 $V_{eff}$...500 $V_{eff}$ | Save: | Primary data |
| Standard value: | 400 $V_{eff}$ | Modify: | Offline |

P 071 **Power unit supply (mains voltage)**

Input of the rated value of the connection voltage at the armature power unit

1U1, 1V1 and 1W1.

| | | | |
|---|---|---|---|
| Range: | 200 $V_{eff}$...500 $V_{eff}$ | Save: | Primary data |
| Standard value: | 400 $V_{eff}$ | Modify: | Offline |

P 072 **Maximum converter current [A]**

Input of the max. output current of the power unit in Amps.

The actual value display of parameter P 016 is scaled to this value, i. e., 100 % correspond to the set value. This value is also output as 10 V at the analog outputs (AL 79 and AL 80).

| | | | |
|---|---|---|---|
| Range: | 50...100 % of the converter current displayed in parameter P 003. | Save: | Data record |
| Standard value: | 50 % of the converter current displayed in parameter P 003. | Modify: | Offline |

P 073 **Motor armature voltage [V]**

Inputs the motor rated voltage in Volts.

The actual value display of parameter P 014 is scaled to this value, i. e., 100 % correspond to the set value. This value is also output as 10 V at the analog outputs (AL 215).

| | | | |
|---|---|---|---|
| Range: | 50 V...600 V | Save: | Data record |
| Standard value: | 400 V for BKF (4-Q)<br>470 V for BKD (1-Q) | Modify: | Offline |

P 074 **Rated motor current [A]**

Input of the rated current of the connected motor in Amps.

For motor $i^2t$ value calculation. Signalling output using DLink 19 at one of the digital outputs.

Refer to parameters P 078 and P 525.

| | | | |
|---|---|---|---|
| Range: | 50 %...100 % of the current set in parameter P 072. | Save: | Data record |
| Standard value: | 50 % of the current set in parameter P 072. | Modify: | Offline |

NOTE:
You must set the nominal current of the used motor, if you install a UL 508C-conform machine (see Appendix C).

P 075 **Motor armature voltage drop $I_A x R_A$ [%]**

The value is measured during optimization (P 082 = 1). The specification refers to the motor rated voltage set with parameter P 073 and is valid for the set converter current in P 072!

| | | | |
|---|---|---|---|
| Range: | 0.0 %...100.0 % | Save: | Data record |
| Standard value: | 5.0 % | Modify: | Online |

P 076 **Intermittent-current limit [%]**

The value is measured during optimization (P 082 = 1). The specification refers to the power unit output current set with parameter P 072.

| | | | |
|---|---|---|---|
| Range: | 0.0 %...100.0 % | Save: | Data record |
| Standard value: | 30.0 % | Modify: | Online |

P 077 **Motor inductance**

The value is measured during optimization (P 082 = 1).

| | | | |
|---|---|---|---|
| Range: | 0.10 mH...100.00 mH | Save: | Data record |
| Standard value: | | Modify: | Online |

P 078 **Thermal time constant of the motor**

For the time constant contact the motor manufacturer.

The $i^2t$ monitoring function is **switched off** if a value of **0 min.** is entered.

$i^2t$ monitoring is not active during optimization '1' (P 082 = 1).

| | | | |
|---|---|---|---|
| Range: | 0 min...180 min | Save: | Data record |
| Standard value: | 0 min | Modify: | Online |

NOTE:
You must set the thermal time constant of the used motor, if you install a UL 508C-conform machine (see Appendix C).

P 079 **Rated field current**

Inputs the field rated current of the connected motor in Amps.

The actual value display of parameter P 022 is scaled to this value, i. e., 100 % correspond to the set value. This value is also output as 10 V at the analog outputs (AL 98).

| | | | |
|---|---|---|---|
| Range: | 20 %...100 % of the field current displayed in parameter P 006 | Save: | Data record |
| Standard value: | 100 % of the field current displayed in parameter P 006 | Modify: | Online |

P 080 **Minimum field current of the motor**

Input of the minimum field current for field-weakened drives. 100 % correspond to the field current set in parameter P 079. Also note parameter P 382, Gating angle, maximum limit $\alpha_W$ Field. Effective only at P 255 = 5 and/or 6

| | | | |
|---|---|---|---|
| Range: | 10 %...100 % | Save: | Data record |
| Standard value: | 100 % | Modify: | Online |

P 081 **Field weakening range ($N_{Max}$ /$N_{Rated}$)**

For tachogenerator/encoder monitoring, in particular for monitoring the tachogenerator connection at terminal X3 of board 3.9711.

Definition:

$N_{Max}$ speed at minimum field current (final speed during field weakening) and rated armature voltage (400/420 V and/or 460/470 V).

$N_{Rated}$ speed at field rated current and rated armature voltage (400/420 V and/or 460/470 V).

| | | | |
|---|---|---|---|
| Range: | 1.0...4.0<br>1,0...8,0 from S 03.15 | Save: | Data record |
| Standard value: | 1.0 | Modify: | Offline |

P 082 **Optimization (motor)**

| Value | Description |
|---|---|
| 0 | Normal operation (no optimisation and/or optimisation completed) |
| 1 | Optimization for IxR, intermittent-current limit and motor inductance |

**CAUTION**

Set the value of parameter P 527 to 0.0 before starting optimisation.

Block the motor before starting optimization.
This is especially necessary, it the motor is operated with armature voltage control. In this case the motor could adopt excessive speed (remanence).

Do not save data records if optimization is activated (P 082 ≠ 0)! For P 082 ≠ 0, the parameters P 501 = 20 %, P 372 = 0 and P 078 = 0 min and these settings would be saved.

i²t monitoring of the motor and stall protection are inactive during optimization.

Disabling the drive during optimization terminates optimization, and the controller adopts Switch-on disabled state (see P 001).

After completed or terminated optimization, the drive is started in (speed) controlled mode on re-enable.

| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | None |
| Standard value: | 0 | Modify: | Offline |

## 5.9 Parameter description - Drive manager

P 100 **Status word of the controller**

Parameter number in hexadecimal representation: 0064

This parameter corresponds to DRIVECOM object 6041hex and is the output word of the converter control state machine.

| Bit no. | Name | Comment | DLink |
|---|---|---|---|
| 0 | Ready to operate | Converter control state machine | DL0080 |
| 1 | Switched on | Converter control state machine | DL0081 |
| 2 | Operation enabled | Converter control state machine | DL0082 |
| 3 | Malfunction | Converter control state machine | DL0083 |
| 4 | Voltage disabled | 0: Disable voltage has been requested (command or main contactor contact) | DL0084 |
| 5 | Quick stop | Converter control state machine | DL0085 |
| 6 | Switch-on disabled | Converter control state machine | DL0086 |
| 7 | Warning | See also P 039 and P 902 / P 903 | DL0087 |
| 8 | Message | At least one bit is set in the unassigned status word P 966. | DL0088 |
| 9 | Remote | 1: Converter can be parameterized via the set communication source* | DL0089 |
| 10 | Setpoint reached | 1: The specified setpoint has been reached | DL0090 |
| 11 | 0: Spare | 0: Spare | DL0091 |
| 12 | 0: Spare | 0: Spare | DL0092 |
| 13 | 0: Spare | 0: Spare | DL0093 |
| 14 | Configurable state bit | see P 104 | DL0094 |
| 15 | Configurable state bit | see P 105 | DL0095 |

* Always 0 only when reading the status word via PROFIBUS-DP and USS protocol in the case of CAN and WinBASS.

The converter states are represented by the following status word bit combinations:

| P 001 | State of the converter control | Bit in status word | | | | | |
|---|---|---|---|---|---|---|---|
| | | Bit no. 6 Switch-on dis-abled | Bit no. 5* Quick stop | Bit no. 3 Mal-function | Bit no. 2 Opera-tion enabled | Bit no. 1 Switche d on | Bit no. 0 Ready To Operate |
| 0 | NOT READY TO OPERATE | 0 | x | 0 | 0 | 0 | 0 |
| 1 | SWITCH-ON DISABLED | 1 | x | 0 | 0 | 0 | 0 |
| 2 | READY TO OPERATE | 0 | 1 | 0 | 0 | 0 | 1 |
| 3 | SWITCHED ON | 0 | 1 | 0 | 0 | 1 | 1 |
| 4 | OPERATION ENABLED | 0 | 1 | 0 | 1 | 1 | 1 |
| 5 | DISABLE OPERATION ACTIVE | 0 | 1 | 0 | 1 | 1 | 1 |
| 6 | STOP DRIVE ACTIVE | 0 | 1 | 0 | 1 | 1 | 1 |
| 7 | QUICK STOP ACTIVE | 0 | 0 | 0 | 1 | 1 | 1 |
| E | MALFUNCTION REACTION ACTIVE | 0 | x | 1 | 1 | 1 | 1 |
| F | MALFUNCTION | 0 | x | 1 | 0 | 0 | 0 |

Bits identified x have no bearing on the converter control state.

* LOW active

P 101 **Control word (controller)**

Parameter number in hexadecimal representation: 0065. This parameter corresponds to DRIVECOM object 6040hex and is the input word of the converter control state machine (refer ▹State machine of the converter control◃ on page 72).

| Bit no. | DLink | Name | Comment |
|---|---|---|---|
| 0 | DL0096 | Switch on | Converter control state machine |
| 1 | DL0097 | Disable voltage | Converter control state machine |
| 2 | DL0098 | Quick stop | Converter control state machine |
| 3 | DL0099 | Enable operation | Converter control state machine |
| 4 | DL0100 | Spare | Always set to zero |
| 5 | DL0101 | Spare | Always set to zero |
| 6 | DL0102 | Spare | Always set to zero |
| 7 | DL0103 | Reset malfunction | Converter control state machine |
| 8 | DL0104 | Spare | Always set to zero |
| 9 | DL0105 | Spare | Always set to zero |
| 10 | DL0106 | Spare | Always set to zero |
| 11 | DL0107 | Free control bit | Can be used freely (e.g. for DLink connections) |
| 12 | DL0108 | Spare | Always set to zero |
| 13 | DL0109 | Spare | Always set to zero |
| 14 | DL0110 | Spare | Always set to zero |
| 15 | DL0111 | Write protection | See below. |

If the write protection bit (bit no. 15) is set in the control word, the control word is protected from further write accesses until processed by the drive manager. After the write-protected control word has been processed, the drive manager resets the write protection bit.

The converter control commands are defined by the following bit combinations in the control word:

| Command | Bit no. 15 Write protection | Bit no. 7 Reset mal-function | Bit no. 3 Enable opera-tion | Bit no. 2* Quick stop | Bit no. 1* Disable voltage | Bit no. 0 Switch on | Trans-itions** |
|---|---|---|---|---|---|---|---|
| Stop | x | x | x | 1 | 1 | 0 | 2, 6, 8 |
| Switch on | x | x | x | 1 | 1 | 1 | 3 |
| Disable voltage | x | x | x | x | 0 | x | 7, 9, 10, 12 |
| Quick stop | x | x | x | 0 | 1 | x | 7, 10, 11 |
| Disable operation | x | x | 0 | 1 | 1 | 1 | 5 |
| Enable operation | x | | 1 | 1 | 1 | 1 | 4 |
| Reset mal-function | x | 0 -> 1 | x | x | x | x | 15 |

Bits identified x have no bearing on the converter control state.

* LOW active

** Transitions in the converter control state machine

P 102 **Set operating mode**

Selects the controller type

| Value | Description |
|---|---|
| -3 | Speed control |
| -2 | Current control |

Range: -3...-2 Save: Data record

Standard value: -3 Modify: Online

P 103 **Actual operating mode**

Indicates that the setting of parameter P 102 has been accepted.

P 104 **Function P 100: Bit 14**

P 105 **Function P 100: Bit 15**

The state of two DLinks can be copied into the converter status word P 100 (bit 14 and bit 15)
Setting: See freely definable control word P 950 - P 965 and P 966.

Range: 0...1200 (DLink no.) Save: Primary data

Standard value: 0 Modify: Online

P 106 **Error acknowledge mode**

| Value | Description |
|---|---|
| 0 | Errors must be acknowledged individually |
| 1 | Errors are acknowledged as a group (except non-acknowledgeable errors) |
| 2 | Errors are acknowledged as a group (a reset is performed for non-acknowledgeable errors) (from S03.10) |

| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | Primary data |
| Range: | 0...2 from S03.10 | | |
| Standard value: | 1 | Modify: | Online |

P 107 **Stop mode (main contactor - MC)**

This parameter defines drive functioning upon deactivation of the main contactor enable (X2: 15) and/or upon the command 'Stop' while the controller is enabled.

| Value | Description |
|---|---|
| 0 | Disable drive functioning (coast) |
| 1 | Decelerate along the deceleration ramp (see P 109); controller is disabled, when speed is lower than the set speed threshold P 505/P 506 |

| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | Primary data |
| Standard value: | 0 | Modify: | Offline |

P 108 **Disable mode (controller disable - CD)**

This parameter defines drive functioning upon deactivation of the controller enable (X2: 16) and/or upon the command 'Stop' while the controller is enabled.

| Value | Description |
|---|---|
| 0 | Disable drive functioning (coast) |
| 1 | Decelerate along the deceleration ramp (see P 109); controller is disabled, when speed is lower than the set speed threshold P 505/P 506 |

| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | Primary data |
| Standard value: | 0 | Modify: | Offline |

P 109 **Ramp-down time, disable/stop (CD/MC)**

Deceleration in states 5 (Disable operation active) and 6 (Stop drive active) slows the drive down to 0 speed along a separate deceleration ramp. The time entered here applies for a 100 % setpoint change. This ramp does not affect ramp generators A and B. The value 0 s corresponds to 'Decelerate at current limit'.

| | | | |
|---|---|---|---|
| Range: | 0,00...600.00 s | Save: | Data record |
| Standard value: | 0,00 s | Modify: | Online |

P 110 **Ramp-down time, quick stop (QS)**

Deceleration in state 7 (Quick stop active) slows the drive down to 0 speed along a separate deceleration ramp. The time entered here applies to a 100 % setpoint change. This ramp does not affect ramp generators A and B. The value 0s corresponds to 'Decelerate at current limit'.

| | | | |
|---|---|---|---|
| Range: | 0.00...600.00 s | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 111 **General signal limit**

Global signal limitation. The input and/or output signals of various function groups are limited to this value. Refer to the function charts for the areas where this limit is effective (refer ▹Function diagrams◃ from page 100).

| | | | |
|---|---|---|---|
| Range: | 0.00...110.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |

P 112 **Power unit activate temperature error F 104 (from S 03.15)**

P112 = 0:
When reaching the power unit´s limit temperature (AL 221) only a warning is generated, the drive is not shut down.

P112 = 1:
When reaching the power unit´s limit temperature the drive is switched off without torque, the ready for use relay is disabled and the error message F 104 is generated (see warning W13).

| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | Primary data |
| Standard value: | 0 | Modify: | Online |

NOTE:
You must set P112 equal to 1, if you install a UL 508C-conform machine (see Appendix C).

## 5.10 Parameter description - Communication

P 120 **Drive address (for USS connection)**

The converter address for USS connection and BASS protocol is set here. Address 32 is the broadcast address.

| | | | |
|---|---|---|---|
| Range: | 0...32 | Save: | Primary data |
| Standard value: | 0 | Modify: | Offline |

P 121 **Communication source**

This parameter manages the access rights of the different communication sources.

Communication sources are the function modules that exchange data with a higher-level control via a communications protocol. Since several such function modules may be implemented within a drive, but not all modules must access all parameters at the same time (in particular the converter-control control word (P 101)), write access must be managed accordingly.

The converter control activates and deactivates the various communication modules dependent on the parameter 'Communication source'. Each communication module has a state parameter that displays the current state (RUN: Parameter write enabled / STOP: Read only).

A communication module must write drive parameters only when it is in RUN state. Any write access is prohibited in STOP state. The drive parameters may be read in any state, however.

The parameters 'Communication source' (P 121) and 'PC write authority (BASS)' (P 125) can always be written via the PC service interface (BASS protocol: WinBASS operating program) and the dual-port-RAM communication process data channel.

The following communication sources are possible in accordance with converter configuration:

| Bit no. | Description |
|---|---|
| 0 | 1: BASS protocol enabled via RS 232 (PC interface) |
| 1 | 1: USS protocol enabled via RS 485 |
| 2 | 1: Dual-port RAM (BAPS process data via option board) |
| 3 | 1: Dual-port RAM (BAPS parameter channel via option boards) |
| 4* | 1: Dual-port RAM (BAPS cyclic data and demand data via option boards)<br>Control word P 101 cannot be changed ! |
| 5 | 0: Spare |
| 6 | 0: Spare |
| 7 | 0: Spare |
| 8 | 0: Spare |
| 9 | 0: Spare |
| 10 | 0: Spare |
| 11 | 0: Spare |
| 12 | 0: Spare |
| 13 | 0: Spare |
| 14 | 0: Spare |
| 15 | 0: Spare |

* Cyclic data and demand data transmission can be monitored with P 122 = 4, or P 122 = 8 or P 122 = 12 (=$0C_{hex}$).

Since cyclic DPRAM communication does not write directly to parameters but stores the set-points in separate ALinks, write authorization via bit no. 2 is applicable only for the converter-control control word (P 101).

If the parameter 'Communication source' is set to 0, the drive can be controlled only via the hardware signals pulse enable (PU), quick stop (QS), main contactor enable (MC) and controller disable (CD).

The control relay of the main contactor drops out automatically when the communication source is changed. If the communication source is changed while the drive is enabled, the new value is valid straightly and without any additional action. Note, that the former valid communication source (also when controlling the drive), cannot stop / disable the drive via control word when it will be disabled by parameter communication source

If the communication source is changed while the drive is disabled, the relay to control the main contactor drops out automatically. To enable the drive, a positive edge of the control input „main contactor ON“ (X2:15) is necessary!

This safety mechanism is necessary, because the drive is perhaps only via one command of the communication disabled (e.g. command „disable operation“), but all hardware enables are given. When switching to operation with communication source 0, only the hardware enables are evaluated, the drive would change from disabled state automatically to operation enabled and start running.

| | | | |
|---|---|---|---|
| Range: | 0...31 | Save: | Primary data |
| Standard value: | 0 | Modify: | Offline: up to S03.11<br>Online: from S03.12 |

P 122 **Communication source monitoring**

This parameter may be used to activate communication source monitoring.

| Bit no. | Description |
|---|---|
| 0 | 1: BASS protocol monitored via RS 232 (PC interface) |
| 1 | 1: USS protocol monitored via RS 485 |
| 2 | 1: Dual-port RAM (BAPS process data) is monitored |
| 3 | 1: Dual-port RAM (BAPS parameter data channel) is monitored |
| 4 | 0: Spare |
| 5 | 0: Spare |
| 6 | 0: Spare |
| 7 | 0: Spare |
| 8 | 0: Spare |
| 9 | 0: Spare |
| 10 | 0: Spare |
| 11 | 0: Spare |
| 12 | 0: Spare |
| 13 | 0: Spare |
| 14 | 0: Spare |
| 15 | 0: Spare |

| | | | |
|---|---|---|---|
| Range: | 0...15 | Save: | Primary data |
| Standard value: | 0 | Modify: | Offline: up to S03.11<br>Online: from S03.12 |

P 123 **Monitoring period**

This parameter is used to set the communication monitoring period that applies to all communication sources.

If no data arrives from the current communication source during the time set in parameter 'Monitoring period' because the interface cable is interrupted or the communication card is defective, for example, the drive changes to malfunction state, and an error is displayed (error 1 .. 4). The monitoring period may be up to one minute, with the resolution being 1 ms. The monitoring function is not active at a 0 ms entry.

Field bus option boards at the BAPS interface evaluate this parameter at boot time only. Any changes to the parameter require the converter to be rebooted with the field bus card.

| | | | |
|---|---|---|---|
| Range: | 0...60000 ms | Save: | Primary data |
| Standard value: | 0 | Modify: | Offline: up to S03.11<br>Online: from S03.12 |

P 125 **PC write authorization (BASS)**

At P 125 = 1, the converter can be parameterized via PC independent of the set communication source (P 121). The advantage is that the control (enables) of the converter does not have to be via the PC in this case and thus no conflicts with the machine control can occur.

| Value | Description |
|---|---|
| 0 | P 121 Communication source defines **write** authorisation for PC communication (BASS protocol) |
| 1 | Write accesses via PC communication are possible independent of P 121 (BASS protocol) |

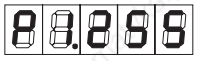
| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | None |
| Standard value: | 0 | Modify: | Online |

P 126 **Baud rate, PC (BASS)**

The Baud rate for PC communication is fixed to 9600 Baud (BASS protocol). This parameter is for display only and cannot be modified.

P 127 **Edit data record for PC (BASS)**

Setting is independent of the selection made with parameter P 144 !

| Value | Description |
|---|---|
| 0 | The parameters for display and PC communication are always read and modified from the current data record.<br>Even after a data record change, it is always the **current** data record (display of current data record number in P 152) that is displayed / processed.<br>The display shows a 'P' in the first position (left) and the data record number with a decimal point in the second position:<br>  |
| 1..6 | The parameters for display and PC communication are read from the current data record and modified therein.<br>Even after a data record change, it is always the **selected** data record that is displayed / processed.<br>The display shows the data record number in the first position (left) and a 'P' in the second position:<br> |

| | | | |
|---|---|---|---|
| Range: | 0...6 | Save: | None |
| Standard value: | 0 | Modify: | Online |

P 128 **PC state (BASS)**

Parameter number in hexadecimal representation: 0080

| Bit no. | DLink | Description |
|---|---|---|
| 0 | DL0112 | 1: Communication enabled (see also communication source) |
| 1 | DL0113 | 0: Spare |
| 2 | DL0114 | 0: Spare |
| 3 | DL0115 | 0: Spare |
| 4 | DL0116 | Drive address bit 0 (see also USS drive address) |
| 5 | DL0117 | Drive address bit 1 (see also USS drive address) |
| 6 | DL0118 | Drive address bit 2 (see also USS drive address) |
| 7 | DL0119 | Drive address bit 3 (see also USS drive address) |
| 8 | DL0120 | Drive address bit 4 (see also USS drive address) |
| 9 | DL0121 | Drive address bit 5 (see also USS drive address) |
| 10 | DL0122 | Drive address bit 6 (see also USS drive address) |
| 11 | DL0123 | Drive address bit 7 (see also USS drive address) |
| 12 | DL0124 | 0: Spare |
| 13 | DL0125 | 0: Spare |
| 14 | DL0126 | 0: Spare |
| 15 | DL0127 | 0: Spare |

P 130 **USS state**

Parameter number in hexadecimal representation:0082

Description of USS protocol interface refer ▹Appendix B - USS protocol◃ from page 457.

| Bit no. | DLink | Description |
|---|---|---|
| 0 | DL0128 | 0: STOP : Incoming messages are not answered<br>1: RUN : Message evaluation active |
| 1 | DL0129 | 0: Spare |
| 2 | DL0130 | 0: Spare |
| 3 | DL0131 | 0: Spare |
| 4 | DL0132 | 1: No messages to own address received for longer than 1 s |
| 5 | DL0133 | 1: No messages on the bus for longer than 5 s |
| 6 | DL0134 | 0: Spare |
| 7 | DL0135 | 1: Error during function module initialisation |
| 8 | DL0136 | 0: Spare |
| 9 | DL0137 | 0: Spare |
| 10 | DL0138 | 1: Error during actual-value read |
| 11 | DL0139 | 1: Error during setpoint write |
| 12 | DL0140 | 0: Spare |
| 13 | DL0141 | 0: Spare |
| 14 | DL0142 | 0: Spare |
| 15 | DL0143 | 0: Spare |

P 131 **USS mode**

This parameter is used to set the USS protocol operating mode.

| Bit | Description |
|---|---|
| 0 | 1: Scaling active<br>0: Scaling inactive |
| 1 | 1: Broadcast coding active<br>0: Broadcast coding inactive |
| 2 | 1: Response delay active<br>0: Response delay inactive |
| 3 | Spare: Always set to zero |
| 4 | Spare: Always set to zero |
| 5 | Spare: Always set to zero |
| 6 | Spare: Always set to zero |
| 7 | Spare: Always set to zero |
| 8 | Spare: Always set to zero |
| 9 | Spare: Always set to zero |
| 10 | Spare: Always set to zero |
| 11 | Spare: Always set to zero |
| 12 | Spare: Always set to zero |
| 13 | Spare: Always set to zero |
| 14 | Spare: Always set to zero |
| 15 | Spare: Always set to zero |

| | | | |
|---|---|---|---|
| Range: | 0...7 | Save: | Primary data |
| Standard value: | 0 | Modify: | Online |

**Bit no. 0 is used to select scaling for the parameter handling word PIV area.**

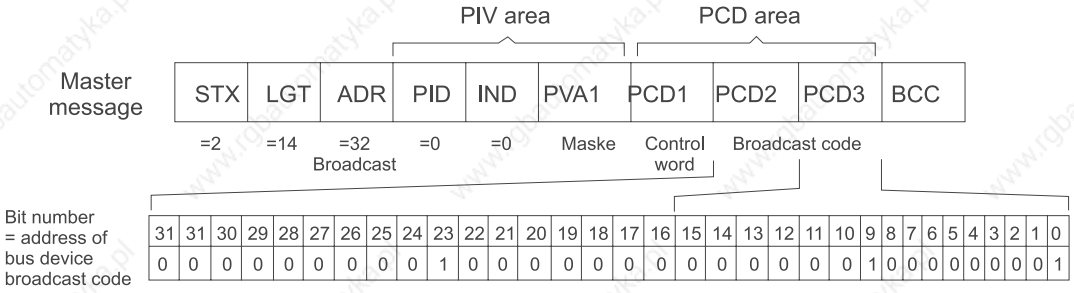
With scaling off, the parameters are represented in the message in the original scaling (± 100.00 %, ± 2048 etc.); with scaling on, they are related uniformly to 4000h.

**Bit no. 1 activates broadcast coding.**

As a rule, a broadcast message addresses all existing (maximum 32) bus devices. Broadcast coding can be used to select the drives which the broadcast message is to reach. Only the selected drives respond to the control word contained in the broadcast message. The masking of this control word with the mask transmitted in PVA1 (PIV area) remains effective regardless.

- Broadcast coding requires the following prerequisites:
  - The number of USS PIV elements (P 133) must be set to ≥ 3
  - The number of USS PCD elements (P 134) must be set to ≥ 3
  - USS mode (P 131) bit no. 1 must be set to = 1.

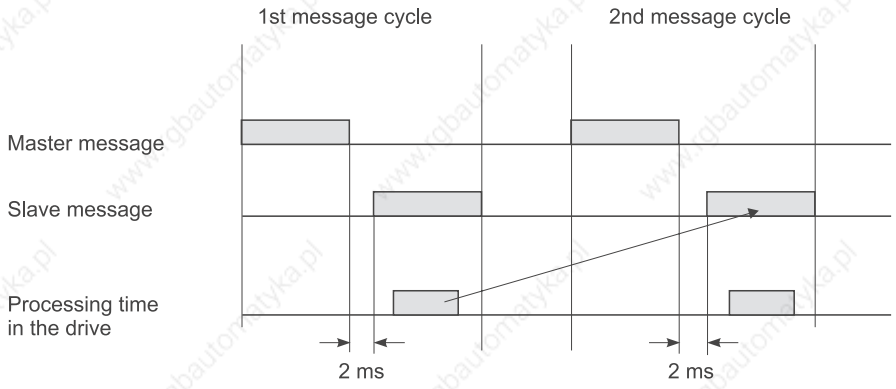
- The example below illustrates how broadcast coding works:
  Assumption: Number of process data words PCD = 3, number of parameter handling words PIV = 3



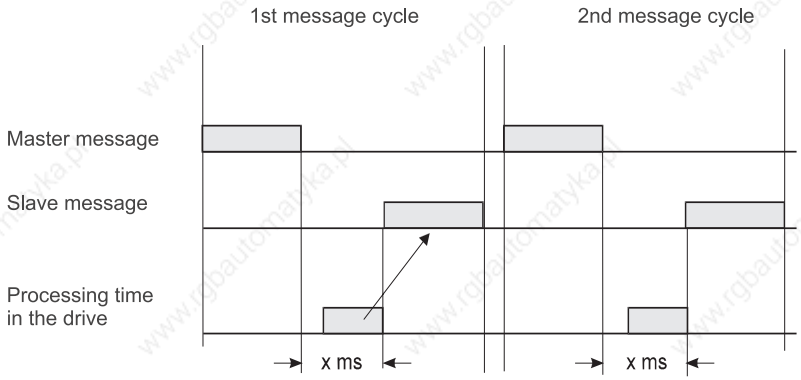

The broadcast code is in PCD 2 (HIGH word) and PCD 3 (LOW word) and indicates in this example that the control word in PZD1 (masked with the value in PVA 1) is to be accepted and executed by bus devices with the addresses 0, 9 and 23. All other bus devices are to ignore the information.

**Bit no. 2 selects a response delay.**

In accordance with the USS protocol specification, the drive sends its response message with a maximum delay of 2 ms after receiving the master message. This short period of time, however, does not always allow complete processing of the information contained in the master message (in the PCD area, for example), so that, therefore, a preliminary response message with not-yet-current contents is returned to the master. The correct response will be transmitted to the master only during the next message cycle (see arrow in the diagram below). In other words, responses are subject to a delay of one message cycle.



The information contained in the master message is processed after its receipt at the activated response delay (P 131, bit no. 2 = 1), and only then is the response message returned to the master (see arrow in the diagram below). Although this saves one message cycle, this approach creates uncertainty as to when exactly the response message is sent. At the activated response delay, message timing is no longer as specified.




P 132 **Baud rate USS**

This parameter is used to set the baud rate for the RS485 interface.

| | | | |
|---|---|---|---|
| Range: | 150...19200 Baud | Save: | Primary data |
| Standard value: | 9600 Baud | Modify: | Online |

P 133 **Number of PIV elements (USS)**

This parameter sets the number PIV elements in the PIV area of the net data block. The specification always relates to word-length PIV elements.

| Value | Description |
|---|---|
| 0 | 0 words (no parameterisation possible) |
| 3 | Always 3 words |
| 4 | Always 4 words |

| | | | |
|---|---|---|---|
| Range: | 0…4 words | Save: | Primary data |
| Standard value: | 3 words | Modify: | Online |

P 134 **Number of PCD elements (USS)**

This parameter can be used to change the number of process data elements in the net data block. The specification always relates to word-length PCD elements.

| Value | Description |
|---|---|
| 0 | No process data |
| 1 | Control word/status word transmitted in PCD1 (no setpoint/actual value) |
| 2 | Control word/status word and 1 setpoint/actual value |
| 3 | Control word/status word and 2 setpoints/actual values |

| | | | |
|---|---|---|---|
| Range: | 0…3 words | Save: | Primary data |
| Standard value: | 2 words | Modify: | Online |

P 135 **Actual value 1 (USS)**

This parameter is used to set the number of the ALink that is transmitted as actual value 1 in the PCD area (as per PCD number P 134).

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Primary data |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 59 | Modify: | Online |

P 136 **Actual value 2 (USS)**

This parameter is used to set the number of the ALink that is transmitted as actual value 2 the PCD area (as per PCD number P 134).

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Primary data |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 79 | Modify: | Online |

### BAPS communication

The BAPS interface interlinks with optional field bus cards such as CAN, PROFIBUS-DP and CANopen. The following parameters refer to this interface and, with the exception of P 144, serve diagnostic purposes only.

P 140 **BAPS state, process data**

Parameter number in hexadecimal representation: 008C

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 1: Communication enabled (see also communication source) | DL0144 |
| 1 | 1: Communication source $10_{hex}$ active | DL0145 |
| 2 | 0: Spare | DL0146 |
| 3 | 0: Spare | DL0147 |
| 4 | 1: Communication initialised | DL0148 |
| 5 | 0: Spare | DL0149 |
| 6 | 0: Spare | DL0150 |
| 7 | 0: Spare | DL0151 |
| 8 | | DL0152 |
| 9 | | DL0153 |
| 10 | | DL0154 |
| 11 | Messages from option boards (refer BAPS description) | DL0155 |
| 12 | | DL0156 |
| 13 | | DL0157 |
| 14 | | DL0158 |
| 15 | | DL0159 |

P 141 **BAPS master command word**

Master command word:

| $Value_{[hex]}$ | Description |
|---|---|
| 00 | No communication (process data) |
| 01 | Cyclic data exchange |
| 02 | Write configuration<br>Initialise communication |
| 03<br>...<br>FFFF | Spare |

P 142 **BAPS slave acknowledge**

Slave acknowledge:

| Value$_{[hex]}$ | Description |
|---|---|
| 00 | No communication (process data) |
| 01 | Setpoints read, actual values written |
| 02 | Configuration/initialisation performed without errors |
| 03<br>...<br>7F | Spare |
| 80 | Received uninterpretable command |
| 81 | No configuration/initialisation performed |
| 82 | Error reading actual value |
| 83 | Error writing setpoint |
| 84<br>...<br>FFFF | Spare |

P 143 **BAPS state, parameter channel**

Parameter number in hexadecimal representation: 008F

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 1: Communication enabled (see also communication source) | DL0160 |
| 1 | 1: Communication source $10_{hex}$ active | DL0161 |
| 2 | 0: Spare | DL0162 |
| 3 | 0: Spare | DL0163 |
| 4 | 0: Spare | DL0164 |
| 5 | 0: Spare | DL0165 |
| 6 | 0: Spare | DL0166 |
| 7 | 0: Spare | DL0167 |
| 8 | 0: Spare | DL0168 |
| 9 | 0: Spare | DL0169 |
| 10 | 0: Spare | DL0170 |
| 11 | 0: Spare | DL0171 |
| 12 | 0: Spare | DL0172 |
| 13 | 0: Spare | DL0173 |
| 14 | 0: Spare | DL0174 |
| 15 | 0: Spare | DL0175 |

P 144 **Edit data record for BAPS (from S03.06)**

This parameter is used to select a fixed data record for BAPS parameter channel communication. Setting is independent of the selection made with parameter P 127 !

PC display and display remain unaffected !

| Value | Description |
|---|---|
| 0 | The parameter values are read from the current data record, or data are written to parameters of the current data record. |
| 1..6 | The parameter values are read only from the selected data record, or data are written to parameters of the selected data record. The selected data record does not have to be identical to the current data record ! |

| | | | |
|---|---|---|---|
| Range: | 0...6 | Save: | None |
| Standard value: | 0 | Modify: | Online |

## 5.11 Parameter description - Data record manager

Converter operating data are stored in a non-volatile EEPROM memory so that they remain preserved after switch-off.

Some of the parameters are stored only once (primary), others in data records. The remaining parameters (actual values, status words etc.) are not stored.

There are 6 data records available in the EEPROM (1 to 6). In addition to this, data record 7 includes a ROM data record in whose RAM copies parameters can be modified. These modifications are lost when the converter is switched off, but can be copied to one of the data records 1 to 6 (P 153).

All 7 data records exist currently in the RAM, and it is possible to switch between data records 1 to 6 (P 152).

All primary parameters are automatically written to the EEPROM when one of these parameters is changed. Additionally, all primary data are also stored after each data record save (P 153).

The converters are supplied with an empty EEPROM so that errors 6 and 58 occur in P 037 on switch-on. In this case, proceed as follows:

All machine-relevant parameters require adjustment (P 125 = 1 for PC input / P 032 = 17 for key pad input); enter P 153 = 7.1 to create data record 1 in the EEPROM. Once bits 0 and 1 have been set in P 150 (display xxx3 hex, xxx7 hex, xxxB hex or xxxF hex, may take approx. 40 seconds), the boot source can be set to data record 1 (P 151 = 1). Once P 150 then displays value xxxFh again (may take approx. 10 seconds), the converter must be rebooted by switching it off and on again.

P 150 **State of data record manager**

Parameter number in hexadecimal representation: 0096

| Bit no. | Description | DLink |
|---|---|---|
| 0 | =0: STOP : Data record manager ready to operate | DL0176 |
| 1 | =1: RUN : Data record manager executing a command<br>=2 : Spare<br>=3 : STAND_BY : Data record manager has completed a command | DL0177 |
| 2 | 1: Error in module<br>(error code refer P 155: Data record manager message)<br>see also P 927 | DL0178 |
| 3 | 1: Error in module<br>(error code refer P 155: Data record manager message)<br>see also P 913 | DL0179 |
| 4 | 1: Warning: Data record was not saved | DL0180 |
| 5 | 1: Parameter scaling active in the background | DL0181 |
| 6 | 1: Error in module, see also P 928 | DL0182 |
| 7 | 0: Spare | DL0183 |
| 8 | 1: Data record 1 active | DL0184 |
| 9 | 1: Data record 2 active | DL0185 |
| 10 | 1: Data record 3 active | DL0186 |
| 11 | 1: Data record 4 active | DL0187 |
| 12 | 1: Data record 5 active | DL0188 |
| 13 | 1: Data record 6 active | DL0189 |
| 14 | 1: Data record 7 active | DL0190 |
| 15 | 0: Spare | DL0191 |

P 151 **Boot source**

Once all programmed data records have been copied during the boot, the system switches to the data record entered in this parameter. If the programming of the data record entered here is invalid, the system switches to the ROM data set 7 (the ready-to-operate relay drops out - error 6).

In as-supplied condition, the EEPROM is empty, and the boot source is set to 0.

| | | | |
|---|---|---|---|
| Range: | 1...6 | Save: | Primary data |
| Standard value: | 0 | Modify: | Online |

P 152 **Load data record**

If a new value is entered in this parameter, the system switches to this data record (note P 154 and error 57). Note that the RAM data record is changed. Therefore even changes are not saved are valid. To load data records from the EEPROM refer to (P157=6) ▹P 157 Data record manager command◃ on page 218.

This changeover is completed within one controller cycle. Exception: Parameters used to set times must be processed during the rest time (duration approx. 10 ms):

In addition to time-specific parameters, the following parameters also require scaling during the rest time (duration approx. 10 ms):

P 072 to P 076, P 079, P 081, P 102, P 104, P 105, P 111, P 213, P 215, P 222 to P 225, P 255, P 257, P 258, P 262, P 270, P 310 to P 313, P 315 to P 318, P 330 to P 333, P 360, P 361, P 381, P 382, P 421 to P 424, P 428 to P 431, P 435, P 439, P 443, P 447, P 461 to P 463, P 466 to P 468, P 471 to P 473, P 476 to P 478, P 501, P 505 to P 514, P 521 to P 524, P 692, P 693, P 996 and P 997.

| | | | |
|---|---|---|---|
| Range: | 1...6 | Save: | None |
| Standard value: | 1 | Modify: | Online |

**WARNING**

This affects all parameters stored in the data records, including parameters that can only be set while the **drive is disabled** - **offline** setting. Parameters stored in the data records are identified **'DR'** in the column Memory location in the parameter list. The parameter description includes the note **'Save: Data record'.**

The system doesn't check the correctness of the values. Therefore it is vital to take care when editing the values - you have to ensure that a parameter set change entails no unintentional or dangerous statuses at the machine.

Parameter P 154 = 1 allows data record changes only while the drive is disabled.

P 153 **Save data record**

This parameter can be used to write a data record into the EEPROM. The position before the point indicates the RAM source data record, the one after the point the target data record in the EEPROM.

**Example**: 2.2 writes data record 2 from the RAM into data record 2 in the EEPROM

3.4 writes data record 3 from the RAM into data record 4 in the EEPROM
Data record 4 in the RAM.

The primary parameters are always written into the EEPROM automatically upon a change. They are also written automatically into the EEPROM after each data record save.

Saving a data record takes about 40 s.

NOTE:

You should copy data records (e.g. data record 1 to data record 2) only if the controller is disabled. Several parameters can only be changed if the controller is disabled and it is possible this parameters are copied incorrectly.

| | | | |
|---|---|---|---|
| Range: | 1.0...7.6 | Save: | None |
| Standard value: | 1.1 | Modify: | Offline |

P 154 **Disable data record change**

| Value | Description |
|---|---|
| 0 | Data record change at controller disabled/enabled. |
| 1 | Data record change, controller disabled only |

Any data record change requested at P 154 = 1 and enabled controller will not be executed, and warning 8 is displayed. The original data record remains active.

If the request remains active (possible only at switching input - terminals X2: 19 to X2: 26), the system changes to the requested data record on controller disable, and the warning is deleted.

| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | Primary data |
| Standard value: | 0 | Modify: | Online |

P 155 **Data record error**

| Bit no. | Description |
|---|---|
| 0 | 1: Undefined command (in parameter P 157) |
| 1 | 1: Data record does not exist |
| 2 | 1: Incorrect checksum |
| 3 | 1: Parameter cannot be written (see also P 037: Errors 59 to 65) |
| 4 | Spare |
| 5 | 1: EEPROM too small |
| 6 | 1: Error in configuration list (see also P 037: Errors 59 to 65) |
| 7 | 1: Undefined parameter format (see also P 037: Errors 59 to 65) |
| 8 | 1: Error in data record 1 |
| 9 | 1: Error in data record 2 |
| 10 | 1: Error in data record 3 |
| 11 | 1: Error in data record 4 |
| 12 | 1: Error in data record 5 |
| 13 | 1: Error in data record 6 |
| 14 | Spare |
| 15 | 1: Error in primary data |

P 156 **Error in parameter Pxxx**

The number of a parameter affected by a message in P 155 is displayed here.

P 157 **Data record manager command**

| Value | Description |
|---|---|
| 0 | Reset data record manager (P 155 and P 156 are set to zero) |
| 1 | Erase EEPROM (possible only after password entry) |
| 2 | Spare |
| 3 | Save primary data to EEPROM |
| 4 | Spare |
| 5 | Save data record to EEPROM) Source and target data record are identical and to be entered with parameter P 158. |
| 6 | Read data record from EEPROM (data record number = P 158)<br>CAUTION: No data record change |
| 7 | Erase data record from EEPROM (data record number = P 158) |
| 8 | Enter password |
| 9 | Unlock EEPROM |
| 10 | Lock EEPROM |

| | | | |
|---|---|---|---|
| Range: | 0...10 | Save: | None |
| Standard value: | 0 | Modify: | Online |

P 158 **Data record number**

In this parameter, enter the number of the data record to be written to the EEPROM, to be read or erased from the EEPROM (see also P 157 = 5, 6, 7). This parameter is set automatically when writing parameters P 152 and P 153.

| | | | |
|---|---|---|---|
| Range: | 1...7 | Save: | None |
| Standard value: | 1 | Modify: | Online |

P 159 **Active passwords**

Any passwords that have already been entered, are displayed here.

| Bit no. | Description |
|---|---|
| 0 | Spare |
| 1 | Spare |
| 2 | Spare |
| 3 | Spare |
| 4 | 1: Erase EEPROM (P 157 = 1) |
| 5..15 | Spare |

P 160 **EEPROM programming cycles**

Saving a data record increases this parameter internally by 1 each time and saves it in the EEPROM. It is set to zero only when the EEPROM is erased.

## 5.12 Parameter description - Analog inputs

P 181 **Control word (analog inputs)**

Parameter number in hexadecimal representation: 00B5

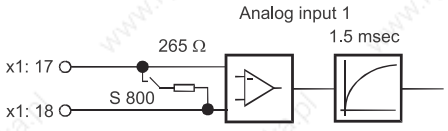
| Bit no. | Description | DLink |
|---|---|---|
| 0 | 1: Invert analog input 1 | DL0208 |
| 1 | 0: Set analog input 1 to zero | DL0209 |
| 2 | 1: Invert analog input 2 | DL0210 |
| 3 | 0: Set analog input 2 to zero | DL0211 |
| 4 | 1: Invert analog input 3 | DL0212 |
| 5 | 0: Set analog input 3 to zero | DL0213 |
| 6 | 1: Invert analog input 4 | DL0214 |
| 7 | 0: Set analog input 4 to zero | DL0215 |
| 8 | Spare: Always set to zero | DL0216 |
| 9 | Spare: Always set to zero | DL0217 |
| 10 | Spare: Always set to zero | DL0218 |
| 11 | Spare: Always set to zero | DL0219 |
| 12 | Spare: Always set to zero | DL0220 |
| 13 | Spare: Always set to zero | DL0221 |
| 14 | Spare: Always set to zero | DL0222 |
| 15 | Spare: Always set to zero | DL0223 |

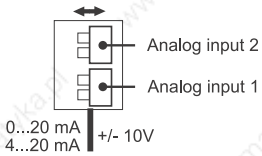
P 182 **Function, analog input 1 (at terminal X1: 17/18)**

1: Voltage input +/- 10 V or current input 0...20 mA input

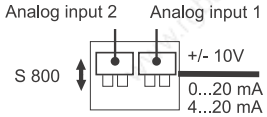
2: Current input 4...20 mA (I < 3.3 mA results in malfunction and error message 51, acknowledgeable).

If used as a current input, move switch 'S800 - Analog input 1' into the lefthand (board 3.9711.B) and/or lower position (from board 3.9711.C).




| S 800 | P 182 |
|---|---|
| +/- 10V | 1 |
| 0...20 mA | 1 |
| 4...20 mA | 2 |



| | | | |
|---|---|---|---|
| Range: | 1...2 | Save: | Primary data |
| Standard value: | 1 | Modify: | Offline |

P 183 **Scaling, analog input 1**

Multiplier for the value at analog input 1

| | | | |
|---|---|---|---|
| Range: | 0.000...5.000 | Save: | Data record |
| Standard value: | 1.000 | Modify: | Online |

P 184 **Offset, analog input 1**

Enters a constant that is added to the value at analog input 1 after scaling.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 0.00 % | Modify: | Online |

P 185 **Polarity, analog input 1**

**0**: Analog input 1 switched off. The value 0 is written in ALink AL 26 independent of the input signal value.

**1**: Input signal transmitted with polarity

**2**: Input signal transmitted after polarity change

**3**: Positive absolute value of the input signal

**4**: Negative absolute value of the input signal

| | | | |
|---|---|---|---|
| Range: | 0...4 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

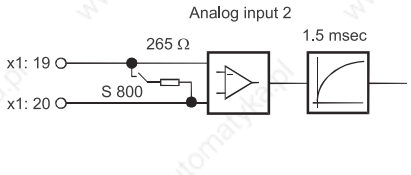
The value of the input signal is available in **AL 26**.

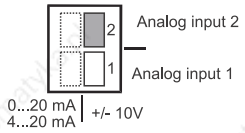
P 186 **Function, analog input 2 (at terminal X1: 19/20)**

**1**: Voltage input +/- 10 V or current input 0...20 mA

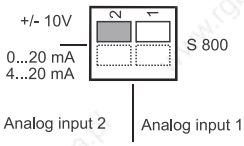
**2**: Current input 4...20 mA (I < 3.3 mA results in malfunction and error message 51, acknowledgeable).

If used as a current input, move switch 'S800 - Analog input 2' into the lefthand (board 3.9711.B) and/or lower position (from board 3.9711.C).




| S 800 | P 186 |
|---|---|
| +/- 10V | 1 |
| 0...20 mA | 1 |
| 4...20 mA | 2 |




| | | | |
|---|---|---|---|
| Range: | 1...2 | Save: | Primary data |
| Standard value: | 1 | Modify: | Offline |

P 187 **Scaling, analog input 2**

Multiplier for the value at analog input 2

| | | | |
|---|---|---|---|
| Range: | 0.000...5.000 | Save: | Data record |
| Standard value: | 1.000 | Modify: | Online |

P 188 **Offset, analog input 2**

Enters a constant that is added to the value at analog input 2 after scaling.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 0.00 % | Modify: | Online |

P 189 **Polarity, analog input 2**

**0**: Analog input 2 switched off. The value 0 is written in ALink AL 28 independent of the input signal value.

**1**: Input signal transmitted with polarity

**2**: Input signal transmitted after polarity change

**3**: Positive absolute value of the input signal

**4**: Negative absolute value of the input signal

| | | | |
|---|---|---|---|
| Range: | 0...4 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

The value of the input signal is available in **AL28**.

P 190 **Scaling, analog input 3 (at terminal X1: 21/22)**

Multiplier for the value at analog input 3

| | | | |
|---|---|---|---|
| Range: | 0.000...5.000 | Save: | Data record |
| Standard value: | 1.000 | Modify: | Online |

P 191 **Offset, analog input 3**

Enters a constant that is added to the value at analog input 3 after scaling.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 0.00 % | Modify: | Online |

The value of the input signal is available in **AL 30**.

P 192 **Scaling, analog input 4 (at terminal X1: 23/24)**

Multiplier for the value at analog input 4

| | | | |
|---|---|---|---|
| Range: | 0.000...5.000 | Save: | Data record |
| Standard value: | 1.000 | Modify: | Online |

P 193 **Offset, analog input 4**

Enters a constant that is added to the value at analog input 4 after scaling.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 0.00 % | Modify: | Online |

The value of the input signal is available in **AL 32**.

## 5.13 Parameter description - Internal setpoints

P 194 **Fixed setpoint 1**

To be used as internal setpoint or multiplier of an unassigned multiplier, offset at ramp generator input etc., for example.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 5.00 % | Modify: | Online |

The value is available in **AL 33**.

P 195 **Fixed setpoint 2**

To be used as internal setpoint or multiplier of an unassigned multiplier, offset at ramp generator input etc., for example.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 5.00 % | Modify: | Online |

The value is available in **AL 34**.

P 196 **Fixed setpoint 3**

To be used as internal setpoint or multiplier of an unassigned multiplier, offset at ramp generator input etc., for example.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 5.00 % | Modify: | Online |

The value is available in **AL 35**.

P 197 **Fixed setpoint 4**

To be used as internal setpoint or multiplier of an unassigned multiplier, offset at ramp generator input etc., for example.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 5.00 % | Modify: | Online |

The value is available in **AL 36**.

P 198 **Fixed setpoint 5**

To be used as internal setpoint or multiplier of an unassigned multiplier, offset at ramp generator input etc., for example.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 5.00 % | Modify: | Online |

The value is available in **AL 37**.

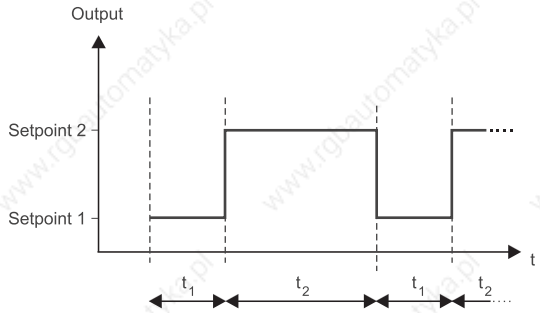
P 199 **Fixed setpoint 6**

To be used as internal setpoint or multiplier of an unassigned multiplier, offset at ramp generator input etc., for example.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 5.00 % | Modify: | Online |

The value is available in **AL 38**.

## 5.14 Parameter description - Setpoint generator




P 201 **Generator, setpoint 1 (internal setpoint generator)**

Effective for the time set with P 203.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 5.00 % | Modify: | Online |

P 202 **Generator setpoint, 2 (internal setpoint generator)**

Effective for the time set with P 204.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 0.00 % | Modify: | Online |

P 203 **Generator, time 1 (internal setpoint generator)**

The setpoint set with P 201 remains effective for this time.

| | | | |
|---|---|---|---|
| Range: | 0.02s...300.00 s | Save: | Data record |
| Standard value: | 5.00 s | Modify: | Online |

P 204 **Generator, time 2 (internal setpoint generator)**

The setpoint set with P 202 remains effective for this time.

| | | | |
|---|---|---|---|
| Range: | 0.02s...300.00 s | Save: | Data record |
| Standard value: | 5.00 s | Modify: | Online |

The output of the setpoint generator is available in **AL 39**.

## 5.15 Parameter description - Motor potentiometer

The motor potentiometer function is a simulation of a standard motor potentiometer. Note though that unlike a mechanical potentiometer, the setpoint is not saved when the device is switched off and on. Certain adjustable operating states (controller disable, for example) allow the set value to be corrected.

P 210 **Status word (motor potentiometer)**

Parameter number in hexadecimal representation: 00D2

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 1: Motor potentiometer correction inactive | DL0240 |
| 1 | 0: Spare | DL0241 |
| 2 | 0: Spare | DL0242 |
| 3 | 1: Error in module (conflicting parameters, for example) | DL0243 |
| 4 | 1: Upper limit reached | DL0244 |
| 5 | 1: Lower limit reached | DL0245 |
| 6 | 1: Setpoint **UP** | DL0246 |
| 7 | 1: Setpoint **DOWN** | DL0247 |
| 8 | 1: Ramp-up active | DL0248 |
| 9 | 1: Ramp-down active | DL0249 |
| 10 | 1: Motorised potentiometer running up or down | DL0250 |
| 11 | 0: Spare | DL0251 |
| 12 | 0: Spare | DL0252 |
| 13 | 0: Spare | DL0253 |
| 14 | 0: Spare | DL0254 |
| 15 | 0: Spare | DL0255 |

P 211 **Control word (motor potentiometer)**

Parameter number in hexadecimal representation: 00D3

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 1: MP up | DL0256 |
| 1 | 1: MP down | DL0257 |
| 2 | Spare: Always set to zero | DL0258 |
| 3 | Spare: Always set to zero | DL0259 |
| 4 | Spare: Always set to zero | DL0260 |
| 5 | Spare: Always set to zero | DL0261 |
| 6 | Spare: Always set to zero | DL0262 |
| 7 | Spare: Always set to zero | DL0263 |
| 8 | Spare: Always set to zero | DL0264 |
| 9 | Spare: Always set to zero | DL0265 |
| 10 | Spare: Always set to zero | DL0266 |
| 11 | Spare: Always set to zero | DL0267 |

| Bit no. | Description | DLink |
|---|---|---|
| 12 | Spare: Always set to zero | DL0268 |
| 13 | Spare: Always set to zero | DL0269 |
| 14 | Spare: Always set to zero | DL0270 |
| 15 | Spare: Always set to zero | DL0271 |

P 212 **Ramp-up time (motor potentiometer)**

Time valid for one 100.00 % setpoint difference and for a setpoint range of -100.00 % to +100.00 %.

| | | | |
|---|---|---|---|
| Range: | 0.1 s...600.0 s | Save: | Data record |
| Standard value: | 10.00 s | Modify: | Online |

P 213 **Upper limit (motor potentiometer)**

Maximum value which the motor potentiometer does not exceed despite operation of the 'UP' key (refer to DIF20/21▹Page 418 ◃). This value must be higher than the lower limit value set with P 215. Otherwise error '42' is displayed.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |

P 214 **Ramp-down time (motor potentiometer)**

Time valid for one 100.00 % setpoint difference and for a setpoint range of +100.00 % to -100.00 %.

| | | | |
|---|---|---|---|
| Range: | 0.1 s...600.0 s | Save: | Data record |
| Standard value: | 10.00 s | Modify: | Online |

P 215 **Lower limit (motor potentiometer)**

Minimum value which the motor potentiometer does not fall below despite operation of the 'DOWN' key (refer to DIF20/21▹Page 418 ◃). This value must be smaller than the upper limit value set with P 213. Otherwise error '42' is displayed.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 0.00 % | Modify: | Online |

P 216 **Correction ON/OFF (motor potentiometer)**

Corrects the motor potentiometer in certain states (drive disabled, for example).

**0**: Motor potentiometer is not corrected. The 'UP' and 'DOWN' keys (refer to DIF20/21▹Page 418 ◃) remain active even if the drive is disabled.

**1**: Motor potentiometer is corrected if the selected DLink is HIGH (P 218). The 'UP' and 'DOWN' keys (refer to DIF20/21▹Page 418 ◃) are not active. The motor potentiometer output is set to the value of the signal selected with parameter P 217.

**2**: Motor potentiometer is corrected if the selected DLink is LOW (P 218). The 'UP' and 'DOWN' keys (refer to DIF20/21 ▹Page 418 ◃) are not active. The motor potentiometer output is set to the value of the signal selected with parameter P 217.

| | | | | |
|---|---|---|---|---|
| Range: | 0...1 | | Save: | Primary data |
| Range: | 0...2 | from S03.06 | | |
| Standard value: | 1 | | Modify: | Online |

P 217 **Selection, correction signal**

Selection of the signal (ALink) to whose value the output of the motor potentiometer is set when correction is active.

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Primary data |
| Range: | 0...350 | | from S03.03 |
| Standard value: | 59 | Modify: | Online |

P 218 **Selection, control signal for correction (motor potentiometer) (from S03.06)**

Selection of the signal (DLink) used to control motor potentiometer correction. Correction is active

at P 216 = 1 if the selected DLink is HIGH.

at P 216 = 2 if the selected DLink is LOW.

See also parameter P 217.

| | | | |
|---|---|---|---|
| Range: | 0...1200 | Save: | Primary data |
| Standard value: | 23 | Modify: | Online |

The output of the motor potentiometer does not change if the 'UP' and 'DOWN' keys (refer to DIF20/21 ▹Page 418 ◃) are operated at the same time !

The output of the motor potentiometer is available in **AL 40**.

## 5.16 Parameter description - Ramp generator A

P 220 **Status word (ramp generator A)**

Parameter number in hexadecimal representation: 00DC

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 1: Ramp generator RUN | DL0272 |
| 1 | 0: Spare | DL0273 |
| 2 | 0: Spare | DL0274 |
| 3 | 1: Error in module | DL0275 |
| 4 | 1: Ramp generator output internally set to 0 (ramp generator enable) | DL0276 |
| 5 | 1: Ramp regenerator output stopped at its value (ramp generator stop) | DL0277 |
| 6 | 1: Ramp generator input internally set to setpoint 0 | DL0278 |
| 7 | 1: Quickstop or main contactor deceleration ramp active | DL0279 |
| 8 | 1: Running up | DL0280 |
| 9 | 1: Running down | DL0281 |
| 10 | 0: Spare | DL0282 |
| 11 | 0: Spare | DL0283 |
| 12 | 1: Ramp generator output = ramp generator input (setpoint reached) | DL0284 |
| 13 | 1: Setpoint limited | DL0285 |
| 14 | 0: Spare | DL0286 |
| 15 | 0: Spare | DL0287 |

P 221 **Control word (ramp generator A)**

Parameter number in hexadecimal representation: 00DD

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 0: Ramp generator A, parameter set 1<br>1: Ramp generator A, parameter set 2 | DL0288 |
| 1 | Spare: Always set to zero | DL0289 |
| 2 | Spare: Always set to zero | DL0290 |
| 3 | Spare: Always set to zero | DL0291 |
| 4 | 0: Ramp generator A, output zero | DL0292 |
| 5 | 0: Stop ramp generator A | DL0293 |
| 6 | 0: Ramp generator A, setpoint zero | DL0294 |
| 7 | 0: Disable ramp generator B input (setpoint) | DL0295 |
| 8 | 0: Disable ramp generator B output | DL0296 |
| 9 | Spare: Always set to zero | DL0297 |
| 10 | Spare: Always set to zero | DL0298 |
| 11 | Spare: Always set to zero | DL0299 |
| 12 | Spare: Always set to zero | DL0300 |
| 13 | Spare: Always set to zero | DL0301 |
| 14 | Spare: Always set to zero | DL0302 |
| 15 | Spare: Always set to zero | DL0303 |

P 222 **Setpoint selection, input 1 (ramp generator A)**

Selection of the signal (ALink) at ramp generator input A. Is added to the signals selected with parameters P 223, P 224 and P 225.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 26 | | Modify: | Online |

P 223 **Setpoint selection, input 2 (ramp generator A)**

Selection of the signal (ALink) at ramp generator input A. Is added to the signals selected with parameters P 222, P 224 and P 225.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 224 **Setpoint selection, input 3 (ramp generator A)**

Selection of the signal (ALink) at ramp generator input A. Is added to the signals selected with parameters P 222, P 223 and P 225.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 225 **Setpoint selection, input 4 (ramp generator A)**

Selection of the signal (ALink) at ramp generator input A. Is added to the signals selected with parameters P 222, P 223 and P 224.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

Generated by the four setpoints (P 222 to P 225, limited to the value of parameter P 111), the addition setpoint at ramp generator input A is available in **AL 42**.

**Defining the times of ramp generator A**

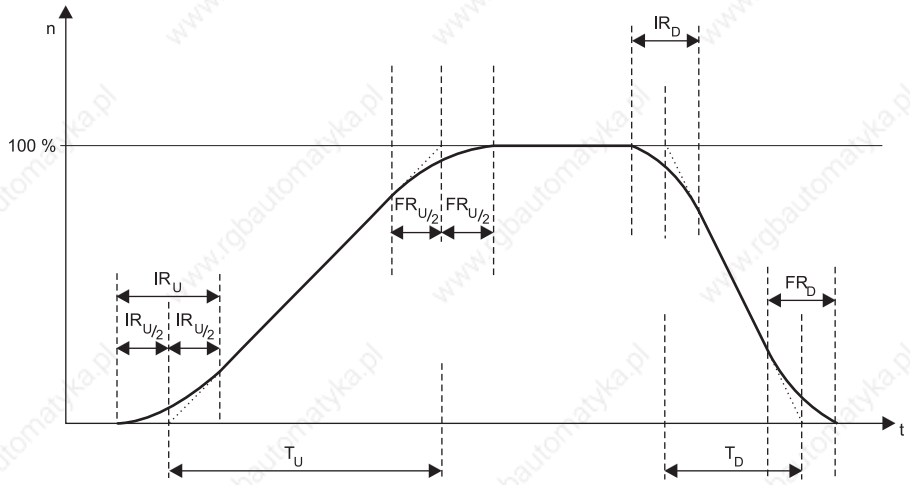



Illustration 66: Times of ramp generator A

| | | | |
|---|---|---|---|
| $IR_U$ | Initial rounding, UP | $IR_D$ | Initial rounding, DOWN |
| $T_U$ | Ramp-up time | $T_D$ | Ramp-down time |
| $FR_U$ | Final rounding, UP | $FR_D$ | Final rounding, DOWN |

The resulting ramp-up/down times are as follows:

$$t_{up} = \frac{P\ 227}{2} + P\ 226 + \frac{P\ 228}{2} \quad \text{und} \quad t_{down} = \frac{P\ 230}{2} + P\ 229 + \frac{P\ 231}{2}$$

For ramp generator parameter set 2, enter the values of the respective parameters

P 226 **Ramp-up time 1 (ramp generator A)**

Time valid for one 100.00 % setpoint difference and for a setpoint range of 0.00 % to +100.00 % and from 0.00 % to - 100.00 %.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...600.00 s | Save: | Data record |
| Standard value: | 2.00 s | Modify: | Online |

P 227 **Initial rounding 1, ramp-up (ramp generator A)**

| | | | |
|---|---|---|---|
| Range: | 0.00 s...10.00 s | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 228 **Final rounding 1, ramp-up (ramp generator A)**

| | | | |
|---|---|---|---|
| Range: | 0.00 s...10.00 s | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 229 **Ramp-down time 1 (ramp generator A)**

Time valid for one 100.00 % setpoint difference and for a setpoint range from +100.00 % to 0.00 % and from -100.00 % to 0.00 %.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...600.00 s | Save: | Data record |
| Standard value: | 2.00 s | Modify: | Online |

P 230 **Initial rounding 1, ramp-down (ramp generator A)**

| | | | |
|---|---|---|---|
| Range: | 0.00 s...10.00 s | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 231 **Final rounding 1, ramp-down (ramp generator A)**

| | | | |
|---|---|---|---|
| Range: | 0.00 s...10.00 s | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 232 **Ramp-up time 2 (ramp generator A)**

Time valid for one 100.00 % setpoint difference and for a setpoint range of 0.00 % to +100.00 % and from 0.00 % to -100.00 %.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...600.00 s | Save: | Data record |
| Standard value: | 2.00 s | Modify: | Online |

P 233 **Initial rounding 2, ramp-up (ramp generator A)**

| | | | |
|---|---|---|---|
| Range: | 0.00 s...10.00 s | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 234 **Final rounding 2, ramp-up (ramp generator A)**

| | | | |
|---|---|---|---|
| Range: | 0.00 s...10.00 s | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 235 **Ramp-down time 2 (ramp generator A)**

Time valid for one 100.00 % setpoint difference and for a setpoint range from +100.00 % to 0.00 % and from -100.00 % to 0.00 %.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...600.00 s | Save: | Data record |
| Standard value: | 2.00 s | Modify: | Online |

P 236 **Initial rounding 2, ramp-down (ramp generator A)**

| | | | |
|---|---|---|---|
| Range: | 0.00 s...10.00 s | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 237 **Final rounding 2, ramp-down (ramp generator A)**

| | | | |
|---|---|---|---|
| Range: | 0.00 s...10.00 s | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

Digital input function DIF 16 can be used to switch between ramp generator parameter sets 1 and 2.

P 238 **Correction ON/OFF (ramp generator A)**

Corrects the ramp generator A while the drive is disabled.

**0**: Ramp generator A is not corrected. Ramp generator A is active even while the drive is disabled.

**1**: Ramp generator A is corrected. Ramp generator A does not respond to the applied setpoint(s) while the drive is disabled. The output of ramp generator A is set to the value of the signal selected with parameter P 239.

| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | Primary data |
| Standard value: | 1 | Modify: | Online |

P 239 **Selection, correction signal (ramp generator A)**

Selection of the signal (ALink) to whose value the output of ramp generator A is set while the drive is disabled.

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Primary data |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 59 | Modify: | Online |

The output of ramp generator A is available in **AL 44**.

## 5.17 Parameter description - Ramp generator B

P 245 **Setpoint selection (ramp generator B)**

Selects the signal (ALink) at ramp generator input B.

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 246 **Ramp-up time (ramp generator B)**

Time valid for one 100.00 % setpoint difference and for a setpoint range of 0.00 % to +100.00 % and from 0.00 % to -100.00 %.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...600.00 s | Save: | Data record |
| Standard value: | 2.00 s | Modify: | Online |

P 247 **Ramp-down time (ramp generator B)**

Time valid for one 100.00 % setpoint difference and for a setpoint range from +100.00 % to 0.00 % and from -100.00 % to 0.00 %.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...600.00 s | Save: | Data record |
| Standard value: | 2.00 s | Modify: | Online |

The output of ramp generator B is available in **AL 47**.

## 5.18 Parameter description - Speed controller actual values

P 250 **Status word (actual value detection)**

Parameter number in hexadecimal representation: 0FA

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 1: Actual value detection active | DL0304 |
| 1 | 0: Spare | DL0305 |
| 2 | 0: Spare | DL0306 |
| 3 | 1: Error in module | DL0307 |
| 4 | 0: Spare | DL0308 |
| 5 | n > overspeed | DL0309 |
| 6 | 0: Spare | DL0310 |
| 7 | 0: Spare | DL0311 |
| 8 | 0: Spare | DL0312 |
| 9 | 0: Spare | DL0313 |
| 10 | $n > n_{min}$ | DL0314 |
| 11 | 0: Spare | DL0315 |
| 12 | $n > n_{_x1}$ | DL0316 |
| 13 | $n > n_{_x2}$ | DL0317 |
| 14 | $n > n_{_x3}$ | DL0318 |
| 15 | $n > n_{_x4}$ | DL0319 |

P 255 **Selection of actual value and field unit setting**

**NOTE**

While armature voltage control P 255 = 1, it is only allowed to switch off the internal field device (P 372 = 0), when an external field device with field current monitoring is operating!

Change from field weakening to constant field only while the controller is disabled and the motor is in standstill condition (n = 0) (save data record change accordingly)!

From S 03.10 changing parameters (per keyboard, PC or data interface) is only possible with disabled controller and standstill condition (standstill message, speed is lower than the speed threshold set with P 505 / P 506). If P 255 cannot be changed when the motor stands still, increase the value of P 505, change parameter P 255 and then reset P 505 on the former needed value.

This parameter must be set also when current control is set (P 102 = -2) !

| Value | Description |
|---|---|
| 1 | Armature voltage and constant field |
| 2 | Analog tachogenerator and constant field |
| 3 | Incremental encoder 1 and constant field |
| 4 | Spare |
| 5 | Analog tachogenerator and field weakening |
| 6 | Incremental encoder 1 and field weakening |
| 7 | Spare |

| | | | |
|---|---|---|---|
| Range: | 1...7 | Save: | Data record |
| Standard value: | 1 | Modify: | Offline |

The selected speed controller actual value is available in **AL 57** (without offset - P 267) and/or **AL 59** (with offset - P 267).

P 256 **Armature voltage adjustment**

'Speed' adjustment during armature voltage control (P 255 = 1). Motor speed decreases at input values < 1.00 and increases at input values > 1.00.

| | | | |
|---|---|---|---|
| Range: | 0.90...1.10 | Save: | Data record |
| Standard value: | 1.00 | Modify: | Online |

The armature voltage actual value for the speed controller is available in **AL 53**.

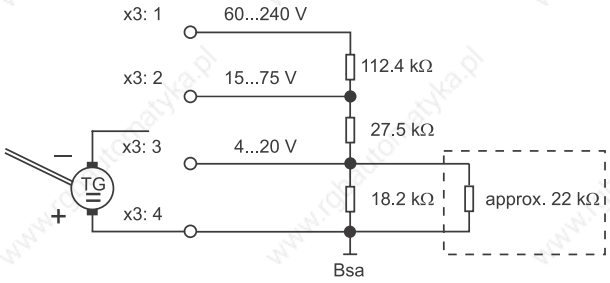
P 257 **Tachogenerator range**

Defines the analog tachogenerator connection (at P 255 = 2 and 5).

**NOTE**

Make sure in particular that the tachogenerator range selected with P 257 is in accordance with tachogenerator connection at terminal X3 of board 3.9711!

| Value | Tachogenerator voltage (P 258) | Connection terminals |
|---|---|---|
| 1 | 4 V to 20 V range | X3: 3 and X3: 4 |
| 2 | 15 V to 75 V range | X3: 2 and X3: 4 |
| 3 | 60 V to 240 V range | X3: 1 and X3: 4 |




| | | | |
|---|---|---|---|
| Range: | 1...3 | Save: | Data record |
| Standard value: | 1 | Modify: | Offline |

P 258 **Tachogenerator voltage**

Input of the tachogenerator voltage at maximum speed (at P 255 = 2 and 5).

| | | | |
|---|---|---|---|
| Range: | 4.00 V...240.00 V | Save: | Data record |
| Standard value: | 10.00 V | Modify: | Online |

The tachogenerator actual value is available in **AL 54**.

P 259 **Tachogenerator polarity change (from S 03.20)**

Inverting the speed actual value signal of the tachogenerator input.

In general, the tacho generator should be connected with correct polarity. For special use, e.g. run of a BKD with a change-over of the field current, the actual value signal can be inverted with this parameter.

| Value | Meaning |
|---|---|
| 1 | Polarity change switched-off |
| 2 | Polarity change switched-on |

| | | | |
|---|---|---|---|
| Range: | 1... 2 | Save: | Data record |
| Standard value: | 1 | Modify: | Offline |

P 260 **Status word of incremental encoder**

Parameter number in hexadecimal representation: 0104

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 0: Spare | DL0336 |
| 1 | 0: Spare | DL0337 |
| 2 | 0: Spare | DL0338 |
| 3 | 1: Error in module | DL0339 |
| 4 | 0: Spare | DL0340 |
| 5 | 0: Spare | DL0341 |
| 6 | 0: Spare | DL0342 |
| 7 | 0: Spare | DL0343 |
| 8 | 1: Warning - Evaluation limit frequency exceeded | DL0344 |
| 9 | 0: Spare | DL0345 |
| 10 | 0: Spare | DL0346 |
| 11 | 0: Spare | DL0347 |
| 12 | 0: Spare | DL0348 |
| 13 | 0: Spare | DL0349 |
| 14 | 0: Spare | DL0350 |
| 15 | 0: Spare | DL0351 |

P 261 **Increments of incremental encoder 1**

Sets the number of increments of the used incremental encoder (at P 255 = 3 and 6). The incremental encoder **must have two** tracks displaced against each other by 90°, the frequency limit of the incremental encoder **must be** $\geq$ 300 kHz.

Max. frequency of the encoder evaluation: 200 kHz

max. speed: $n_{max} = \frac{60 \cdot 200000}{P\ 261} [min^{-1}]$

**Theoretical** minimum speed: $n_{min} = \frac{90 \cdot f_{mains}}{P\ 261} [min^{-1}]$

Actual value signal resolution: $A = \frac{9000 \cdot f_{mains}}{P\ 261 \cdot P\ 262}\ \%$

Adaptation of the input for incremental encoder 1 (SUB-D plug X24, 15-pole female connector):

| | | | |
|---|---|---|---|
| 5 V differential signals | Board 3.9711 | W1600 | B-A |
| 24 V single ended signals | Board 3.9711 | W1600 | B-C |

| | | | |
|---|---|---|---|
| Range: | 100...10000 | Save: | Primary data |
| Standard value: | 1024 | Modify: | Offline |

P 262 **Max. speed of incremental encoder 1**

Sets the maximum speed (at P 255 = 3 and 6).

Collision of parameters P 261 and P 262 (max. frequency of 200 kHz exceeded) limits the speed setting (P 262) and displays warning '1' in the display (P 039) (formula for the maximum possible speed refer P 261).

| | | | |
|---|---|---|---|
| Range: | 100...6000 [$min^{-1}$] | Save: | Data record |
| Standard value: | 500 [$min^{-1}$] | Modify: | Online |

P 263 **Polarity reversal of incremental encoder 1**

Required if the directions of rotation of incremental encoder and motor differ due to the mechanical attachment of the incremental encoder.

| Value | Description |
|---|---|
| 1 | Polarity reversal OFF |
| 2 | Polarity reversal ON |

| | | | |
|---|---|---|---|
| Range: | 1...2 | Save: | Primary data |
| Standard value: | 1 | Modify: | Offline |

The actual value of the incremental encoder is available in **AL 55**.

P 267 **Speed offset (for the actual value at the speed controller)**

Set value is added to the actual value, 100 corresponds to 0.61 % of the maximum speed. Effective after actual value smoothing (P 268).

| | | | |
|---|---|---|---|
| Range: | -400...+400 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 268 **Actual speed smoothing**

As time constants lower than 8 ms remain ineffective (at $f_{Mains}$ = 45 Hz), input of values between 1 and 7 ms results in automatic input of a value of 8 ms. Smoothing is switched off at a setting of 0 ms. There also is a hardware smoothing of approx. 1 ms.

| | | | |
|---|---|---|---|
| Range: | 0...100 ms | Save: | Data record |
| Standard value: | 10 ms | Modify: | Online |

P 269 **Derivative-action time (actual speed D component)**

Sets the derivative-action time of the $DT_1$ element.

| | | | |
|---|---|---|---|
| Range: | 0...1000 ms | Save: | Data record |
| Standard value: | 10 ms | Modify: | Online |

P 270 **Factor, D component**

Multiplier for the output of the $DT_1$ element (P 269).

| | | | |
|---|---|---|---|
| Range: | 0.0...5.0 | Save: | Data record |
| Standard value: | 0.0 | Modify: | Online |

The effective D component of the actual value is available in **AL 62**.

## 5.19 Parameter description - Speed controller setpoints

P 300 **Status word (speed controller)**

Parameter number in hexadecimal representation: 012C

| Bit no. | Description | DLink |
|---|---|---|
| 0 | =0: Speed controller disabled | DL0352 |
| 1 | =1: Speed controller enabled<br>=2: Spare<br>=3: Speed controller deactivated (current control) | DL0353 |
| 2 | =0: Torque direction 1 requested<br>=1: Torque direction 2 requested | DL0354 |
| 3 | 1: Error in module | DL0355 |
| 4 | 1: Drive blocked | DL0356 |
| 5 | 1: Speed-dependent limit active | DL0357 |
| 6 | 1: Gear protection limit active | DL0358 |
| 7 | 1: External limit active | DL0359 |
| 8 | 1: Drift lock active | DL0360 |
| 9 | 1: Setpoint limited | DL0361 |
| 10 | 1: Ixt limit is reached (from S 03.20) | DL0362 |
| 11 | 0: Speed controller output positive<br>1: Speed controller output negative | DL0363 |
| 12 | 1: Setpoint reached (n_Actual = n_Set) | DL0364 |
| 13 | 1: Parameter limit active (P 328 / P 329) | DL0365 |
| 14 | 1: Current limit reached | DL0366 |
| 15 | 1: Speed controller output at one of the limits (bits 5,6,7,10 or 13) (from S 03.20) | DL0367 |

P 301 **Control word (speed controller)**

Parameter number in hexadecimal representation: 012D

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 0: Disable speed controller setpoint (after addition) | DL0368 |
| 1 | Spare: Always set to zero | DL0369 |
| 2 | Spare: Always set to zero | DL0370 |
| 3 | Spare: Always set to zero | DL0371 |
| 4 | Spare: Always set to zero | DL0372 |
| 5 | Spare: Always set to zero | DL0373 |
| 6 | Spare: Always set to zero | DL0374 |
| 7 | Spare: Always set to zero | DL0375 |
| 8 | Spare: Always set to zero | DL0376 |
| 9 | Spare: Always set to zero | DL0377 |
| 10 | Spare: Always set to zero | DL0378 |
| 11 | Spare: Always set to zero | DL0379 |
| 12 | Spare: Always set to zero | DL0380 |
| 13 | Spare: Always set to zero | DL0381 |
| 14 | Spare: Always set to zero | DL0382 |
| 15 | Spare: Always set to zero | DL0383 |

P 302 **Controller type (speed controller)**

Defines the speed controller parameter set

| Value | Description |
|---|---|
| xx00 | Proportional and integral components not active, controller switched off, output = 0 |
| xx01 | P-component OFF, I-component active, I-controller, P 315 and P 316 are integration times |
| xx10 | P-component active, I-component OFF, P controller |
| xx11 | P- and I-components active, PI controller |

| | | | |
|---|---|---|---|
| Range: | xx00/xx01/xx10/xx11 | Save: | Data record |
| Standard value: | 11hex | Modify: | Online |

P 305 **Setpoint selection, input 1 (speed controller)**

Selects the signal (ALink) effective as setpoint at the speed controller. Is added to the signals selected with parameters P 306, P 307 and P 308.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 44 | | Modify: | Online |

P 306 **Setpoint selection, input 2 (speed controller)**

Selects the signal (ALink) effective as setpoint at the speed controller. Is added to the signals selected with parameters P 305, P 307 and P 308.

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 307 **Setpoint selection, input 3 (speed controller)**

Selects the signal (ALink) effective as setpoint at the speed controller. Is added to the signals selected with parameters P 305, P 306 and P 308.

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 308 **Setpoint selection, input 4 (speed controller)**

Selects the signal (ALink) effective as setpoint at the speed controller. Is added to the signals selected with parameters P 305, P 306 and P 307.

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 | | from S03.03 |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 310 **P-gain $K_P$1 (speed controller)**

Proportional gain 1 of the speed controller. Is effective when the signal selected with parameter P 314 falls below the value set in parameter P 312.

| | | | |
|---|---|---|---|
| Range: | 0.10...100.00 | Save: | Data record |
| Standard value: | 10.00 | Modify: | Online |

P 311 **P-gain $K_P$2 (speed controller)**

Proportional gain 2 of the speed controller. Is effective when the signal selected with parameter P 314 exceeds the value set in parameter P 313.

| | | | |
|---|---|---|---|
| Range: | 0.10...100.00 | Save: | Data record |
| Standard value: | 10.00 | Modify: | Online |

The currently effective proportional gain is available in **AL 74**.

P 312 **Threshold, P-gain $K_P$ 1**

The proportional gain $K_P$ 1 of the speed controller (P 310) becomes effective as soon as the signal selected with parameter P 314 falls below the set value.

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |

P 313 **Threshold, P-gain $K_P$ 2**

The proportional gain $K_P$ 2 of the speed controller (P 311) becomes effective as soon as the signal selected with parameter P 314 exceeds the set value.

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |

P 314 **Adaptation signal $K_P$**

Selects the signal (ALink) used to adapt the speed controller P-gain.

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 | | from S03.03 |
| Standard value: | 59 | Modify: | Online |

- The threshold set with parameter P 313 is higher than the one set with parameter P 312.

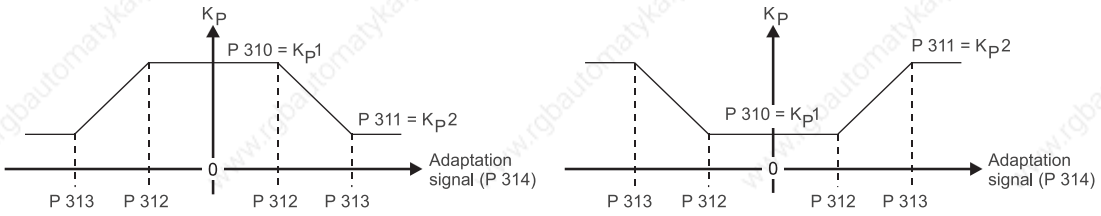



Illustration 67: $K_P$ adaptation for the speed controller - Fig. 1

- The threshold set with parameter P 313 is lower than or equal to the one set with parameter P 312.

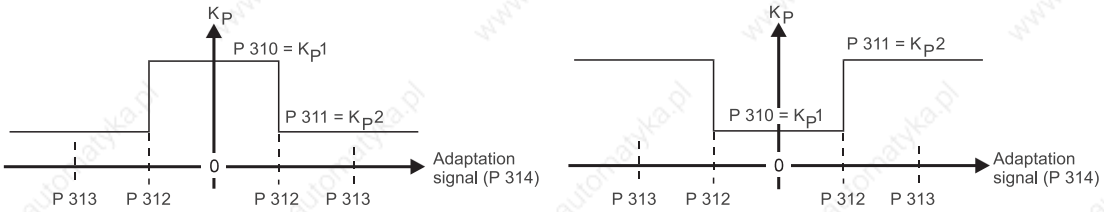



Illustration 68: $K_P$ adaptation for the speed controller - Fig. 2

P 315 **Integral-action time $T_n$1 (speed controller)**

Speed controller integral-action time 1. Is effective when the signal selected with parameter P 319 falls below the value set in parameter P 317.

| | | | |
|---|---|---|---|
| Range: | 0.020 s...10.000 s | Save: | Data record |
| Standard value: | 0.400 s | Modify: | Online |

P 316 **Integral-action time $T_n2$ (speed controller)**

Speed controller integral-action time 2. Is effective when the signal selected with parameter P 319 exceeds the value set in parameter P 318.

| | | | |
|---|---|---|---|
| Range: | 0.020 s...10.000 s | Save: | Data record |
| Standard value: | 0.400 s | Modify: | Online |

The currently effective integral-action time is available in **AL 75**.

P 317 **Threshold, integral-action time $T_n1$ (speed controller)**

The speed controller integral-action time $T_{n1}$ (P 315) becomes effective as soon as the signal selected with parameter P 319 falls below the set value.

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |

P 318 **Threshold, integral-action time $T_n2$ (speed controller)**

The speed controller integral-action time $T_n2$ (P 316) becomes effective as soon as the signal selected with parameter P 319 exceeds the set value.

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |

P 319 **Adaptation signal $T_n$ (speed controller)**

Selects the signal (ALink) which is used to adapt the speed controller integral-action time.

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 59 | Modify: | Online |

▸ The threshold set with parameter P 318 is higher than the one set with parameter P 317.

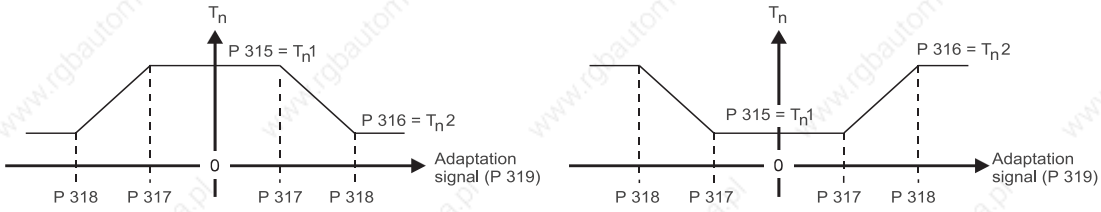



Illustration 69: $T_n$ adaptation for the speed controller - Fig. 1

- The threshold set with parameter P 318 is lower than or equal to the one set with parameter P 317.

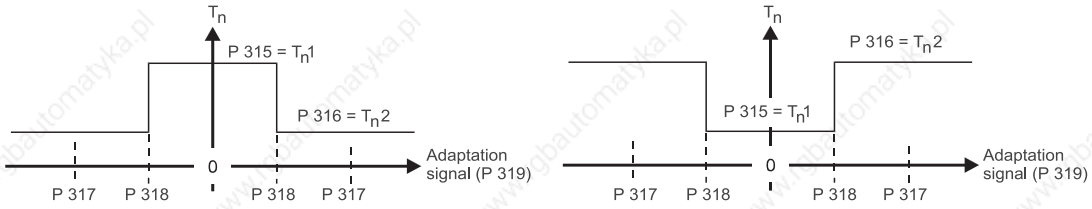



Illustration 70: $T_n$ adaptation for the speed controller - Fig. 2

P 321 **Preset integral component - set TD (speed controller)**

While the drive is disabled, the set value is transferred into the I component of the speed controller (AL 72), and the associated torque direction is set with polarity for BKF-series converters (positive values result in torque direction 1, negative values in torque direction 2), for example improved starting characteristics for lift drives (BKF).

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 0.00 % | Modify: | Online |

P 322 **Drift lock (speed controller)**

The drift lock settings are effective only in speed control (P 102 = -3).

If the actual value falls below the threshold set with P 323 **and** the setpoint falls below the threshold set with P 324, the speed controller feedback is affected as follows:

| Value | Description |
|---|---|
| 0 | Speed controller feedback not affected |
| 1 | Speed controller I component is short-circuited, P component active |
| 2 | Speed controller feedback is short-circuited, the drive coasts, **but is not disabled!** |

The feedback or the integral component is enabled if the setpoint exceeds the threshold set with P 324, **or** the actual value exceeds the threshold set with P 323.

| | | | |
|---|---|---|---|
| Range: | 0...2 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 323 **Drift lock, actual value threshold (speed controller)**

| | | | |
|---|---|---|---|
| Range: | 0.00 %...20.00 % | Save: | Data record |
| Standard value: | 1.00 % | Modify: | Online |

P 324 **Drift lock, setpoint threshold (speed controller)**

| | | | |
|---|---|---|---|
| Range: | 0.00 %...20.00 % | Save: | Data record |
| Standard value: | 1.00 % | Modify: | Online |

## 5.20 Parameter description - Current limit

P 325 **Current limit torque direction 1 (positive)**

Input in percent of parameter P 072

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |

P 326 **Current limit torque direction 2 (negative)**

Input in percent of parameter P 072

| | | | |
|---|---|---|---|
| Range: | 0.00 %...-100.00 % | Save: | Data record |
| Standard value: | -100.00 % | Modify: | Online |

P 328 **External current limit TD1**

Selects the signal (ALink) that acts upon the current limit TD 1.

An input signal of 0 to +100 % sets the current limit accordingly for torque direction 1. For negative signals, this current limit remains at 0 % !

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 1 (= +100 %) | Modify: | Online |

P 329 **External current limit TD2**

Selects the signal (ALink) that acts upon the current limit TD 2.

An input signal of 0 to -100 % sets the current limit accordingly for torque direction 2. For positive signals, this current limit remains at 0 % !

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 2 (= -100 %) | Modify: | Online |

P 330 **Threshold, speed-dependent current limit $n_x$**

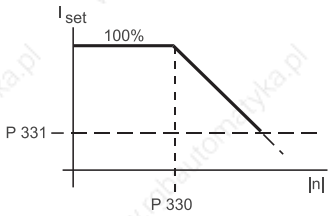
Speed from which the speed-dependent current limitation is activated. Input value in percent of the maximum speed.

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |

P 331 **Current limit at $n_{max}$ ($I_{End}$) (speed-dependent current limitation)**

Current limit at maximum speed. Input in percent of parameter P 072.

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |




P 332 **Ramp, gear protection (ramp-up and down time)**

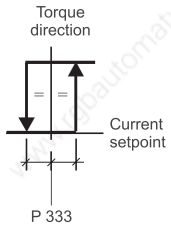
Ramp that acts upon the current limitation only after a torque change or after the drive has been enabled, thus limiting the rate of current rise. The time refers to a current setpoint change of 100.00 %.

| | | | |
|---|---|---|---|
| Range: | 0...500 ms | Save: | Data record |
| Standard value: | 0 ms | Modify: | Online |

P 333 **Hysteresis, torque direction detection**

Changeover threshold (torque change), symmetrical to zero.

| | | | |
|---|---|---|---|
| Range: | 0.00 %..6.25% | Save: | Data record |
| Range: | 0.00 %...20.00 % from S 03.06 | | |
| Standard value: | 2.50 % | Modify: | Online |




P 334 **Zero-current delay (for torque change, BKF)**

Delays the zero-current signal by the set time. This extends the changeover pause during a torque change by the input time (required for large inductances in the DC circuit).

Observe parameter **P 518**.

| | | | |
|---|---|---|---|
| Range: | 0...200 ms | Save: | Data record |
| Standard value: | 0 ms | Modify: | Online |

P 335 **Additional current setpoint 1 (from S03.06)**

Selects the ALink whose value is added to the speed controller output together with the signals selected with parameters P 336, P 337 and P 338 to form the resulting current setpoint.

The total of the additional current setpoints is limited to ±100 % prior to addition to the speed controller output. This limited total is available in **AL 209**.

| | | | |
|---|---|---|---|
| Range: | 0...350 | Save: | Data record |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 336 **Additional current setpoint 2 (from S03.06)**

Selects the ALink whose value is added to the speed controller output together with the signals selected with parameters P 335, P 337 and P 338 to form the resulting current setpoint.

The sum total of the additional current setpoints is limited to ±100 % prior to addition to the speed controller output. This limited sum total is available in **AL 209**.

| | | | |
|---|---|---|---|
| Range: | 0...350 | Save: | Data record |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 337 **Additional current setpoint 3 (from S03.06)**

Selects the ALink whose value is added to the speed controller output together with the signals selected with parameters P 335, P 336 and P 338 to form the resulting current setpoint.

The sum total of the additional current setpoints is limited to ±100 % prior to addition to the speed controller output. This limited sum total is available in **AL 209**.

| | | | |
|---|---|---|---|
| Range: | 0...350 | Save: | Data record |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 338 **Additional current setpoint 4 (from S03.06)**

Selects the ALink whose value is added to the speed controller output together with the signals selected with parameters P 335, P 336 and P 337 to form the resulting current setpoint.

The sum total of the additional current setpoints is limited to ±100 % prior to addition to the speed controller output. This limited sum total is available in **AL 209**.

| | | | |
|---|---|---|---|
| Range: | 0...350 | Save: | Data record |
| Standard value: | 0 (= 0 %) | Modify: | Online |

**NOTE**

When using the additional current setpoints (selection with parameters P 335 to P 338), make sure to observe the polarity of the resulting additional setpoint available in AL 209 !

Otherwise a **dangerous** or unwanted **state** may occur at the machine !

## 5.21 Parameter description - Current controller

P 350 **State (armature current controller)**

Parameter number in hexadecimal representation: 015E

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 1: Current controller enabled | DL0384 |
| 1 | 0: Spare | DL0385 |
| 2 | 0: Spare | DL0386 |
| 3 | 1: Error in module | DL0387 |
| 4 | 0: Spare | DL0388 |
| 5 | 0: Spare | DL0389 |
| 6 | 1: Inverter firing angle ($\alpha_w$) reached | DL0390 |
| 7 | 1: Rectifier firing angle ($\alpha_G$) reached | DL0391 |
| 8 | 1: $I_{A_x1}$ threshold exceeded (refer P521) | DL0392 |
| 9 | 1: $I_{A_x2}$ threshold exceeded (refer P523) | DL0393 |
| 10 | 0: Spare | DL0394 |
| 11 | 0: Spare | DL0395 |
| 12 | 0: Spare | DL0396 |
| 13 | 0: Spare | DL0397 |
| 14 | 0: Spare | DL0398 |
| 15 | 0: Spare | DL0399 |

P 352 **Controller type (current controller)**

Defines the current controller parameter set

| Value | Description |
|---|---|
| xx00 | P- and I-components not active, controller switched off, output = 0 |
| xx01 | P-component OFF, I-component active, I-controller, P 354 is integration time |
| xx10 | P-component active, I- component OFF, P controller |
| xx11 | P- and I-components active, PI controller |

| | | | |
|---|---|---|---|
| Range: | xx00/xx01/xx10/xx11 | Save: | Data record |
| Standard value: | 11hex | Modify: | Online |

P 353 **P-gain $K_P$ (current controller)**

| | | | |
|---|---|---|---|
| Range: | 0.01...100.00 | Save: | Data record |
| Standard value: | 0.05 | Modify: | Online |

P 354 **Integral-action time $T_n$ (current controller)**

| | | | |
|---|---|---|---|
| Range: | 0.010 s...1,500 s | Save: | Data record |
| Standard value: | 0.020 s | Modify: | Online |

P 357 **Current setpoint, integrator**

Limits current rise in the armature circuit. The current setpoint integrator is **always** effective. The time refers to a current setpoint change of 100.00 %. Required for older-model motors (brush sparking in the case of motors with unlaminated yoke due to flow distortion upon excessive rates of current rise in the armature circuit).

| | | | |
|---|---|---|---|
| Range: | 0...100 ms | Save: | Data record |
| Standard value: | 0 ms | Modify: | Online |

P 359 **Current precontrol ON/OFF**

| Value | Description |
|---|---|
| 0 | Current controller in operation only, current precontrol OFF |
| 1 | Current controller and current precontrol active |

| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | Primary data |
| Standard value: | 1 | Modify: | Offline |

P 360 **Rectifier firing angle limit $\alpha_G$ (armature)**

Minimum angle for the control unit (LED H706)

| | | | |
|---|---|---|---|
| Range: | 10°...90° | Save: | Data record |
| Standard value: | 10° for BKD (1-Q)<br>30° for BKF (4-Q) | Modify: | Online |

P 361 **Inverter firing angle limit $\alpha_W$ (armature)**

Maximum angle for the control unit (LED H706)

| | | | |
|---|---|---|---|
| Range: | 90°...170° | Save: | Data record |
| Standard value: | 150° | Modify: | Online |

P 362 **$di_{set}/dt$ precontrol ON/OFF**

Optimizes current rise within the armature circuit.

| Value | Description |
|---|---|
| 0 | $di_{set}/dt$ component not active |
| 1 | $di_{set}/dt$ component active |

| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | Primary data |
| Standard value: | 1 | Modify: | Offline |

## 5.22 Parameter description - Field unit

P 370 **Status word field unit**

Parameter number in hexadecimal representation: 0172

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 1: Field unit ON | DL0416 |
| 1 | 0: Constant field<br>1: Field weakening | DL0417 |
| 2 | 0: Spare | DL0418 |
| 3 | 1: Error in module | DL0419 |
| 4 | 1: Minimum current limit reached | DL0420 |
| 5 | 1: Maximum current limit reached | DL0421 |
| 6 | 1: Inverter firing angle ($\alpha_W$) reached | DL0422 |
| 7 | 1: Rectifier firing angle ($\alpha_G$) reached | DL0423 |
| 8 | 1: Field current actual value < 50 % field current setpoint (incl. P 385) | DL0424 |
| 9 | 0: Spare | DL0425 |
| 10 | 0: Spare | DL0426 |
| 11 | 0: Spare | DL0427 |
| 12 | 0: Spare | DL0428 |
| 13 | 0: Spare | DL0429 |
| 14 | 0: Spare | DL0430 |
| 15 | 0: Spare | DL0431 |

P 372 **Field unit ON/OFF**

Pay attention to NOTE at parameter P 255!

| Value | Description |
|---|---|
| 0 | Internal field unit OFF<br>The firing pulses of the field unit are disabled internally, field connection monitoring and field current monitoring are OFF. |
| 1 | Internal field unit and monitoring functions active |

Range: 0...1 Save: Data record

Standard value: 1 Modify: Offline

P 373 **Field EMF controller - controller type (EMF controller active only during field weakening)**

Defines the field EMF controller parameter set

| Value | Description |
|---|---|
| xx00 | P- and I-components not active, controller switched off, output = 0 |
| xx01 | P-component OFF, I-component active, I controller, P 375 is integration time |
| xx10 | P-component active, I-component OFF, P controller |
| xx11 | P- and I-components active, PI controller |

| | | | |
|---|---|---|---|
| Range: | xx00/xx01/xx10/xx11 | Save: | Data record |
| Standard value: | 11hex | Modify: | Online |

P 374 **Field EMF controller - P-gain $K_P$**

| | | | |
|---|---|---|---|
| Range: | 0.10...100.00 | Save: | Data record |
| Standard value: | 1.00 | Modify: | Online |

P 375 **Field EMF controller - integral-action time $T_n$**

| | | | |
|---|---|---|---|
| Range: | 0,020 s...10,000 s | Save: | Data record |
| Standard value: | 0,200 s | Modify: | Online |

P 377 **Field current controller - controller type**

Defines the field EMF controller parameter set

| Value | Description |
|---|---|
| xx00 | P- and I-components not active, controller switched off, output = 0 |
| xx01 | P-component OFF, I-component active, I controller, P 379 is integration time |
| xx10 | P-component active, I-component OFF, P controller |
| xx11 | P- and I-components active, PI controller |

| | | | |
|---|---|---|---|
| Range: | xx00/xx01/xx10/xx11 | Save: | Data record |
| Standard value: | 11hex | Modify: | Online |

P 378 **Field current controller - P gain $K_P$**

| | | | |
|---|---|---|---|
| Range: | 0.10...100.00 | Save: | Data record |
| Standard value: | 1.00 | Modify: | Online |

P 379 **Field current controller - integral-action time $T_n$**

| | | | |
|---|---|---|---|
| Range: | 0.020 s...10.000 s | Save: | Data record |
| Standard value: | 0.200 s | Modify: | Online |

P 381 **Rectifier firing angle limit $\alpha_G$ (field)**

Minimum firing angle for the control unit. 15° result in a max. field direct voltage of approx. 0.98 x $U_{eff}$ [V]. This does not take into account mains voltage drops due to the commutating chokes !

| | | | |
|---|---|---|---|
| Range: | 10°...90° | Save: | Data record |
| Standard value: | 15° | Modify: | Online |

P 382 **Inverter firing angle limit $\alpha_W$ (field)**

Maximum firing angle for the control unit. 150° result in a min. field direct voltage of approx. 0.067 x $U_{eff}$ [V]. This does not take into account mains voltage drops due to the commutating chokes !

| | | | |
|---|---|---|---|
| Range: | 90°...150° | Save: | Data record |
| Standard value: | 150° | Modify: | Online |

P 383 **Field current setpoint for standstill field**

Related to the field current set with parameter P 079.

The field current is reduced to this value after the contact 'Main contactor ON' was opened at terminal X2: 15 and the time set in P 384 has expired. Input value 100 % with this parameter if the field current is not to be reduced.

| | | | |
|---|---|---|---|
| Range: | 20 %...100 % | Save: | Data record |
| Standard value: | 100 % | Modify: | Online |

P 384 **Delay to standstill field ON**

| | | | |
|---|---|---|---|
| Range: | 0 s...120 s | Save: | Data record |
| Standard value: | 30 s | Modify: | Online |

P 385 **Delay for field current monitoring**

Time to trip for minimum field current monitoring (threshold = 50 % of the field current setpoint).

The field current monitoring state is displayed in DLink 21. DLink 21 = HIGH means that the monitoring function has tripped.

| | | | |
|---|---|---|---|
| Range: | 1s...30 s | Save: | Data record |
| Standard value: | 1s | Modify: | Online |

P 386 **Field monitoring ON/OFF**

| Value | Description |
|---|---|
| 0 | Field current monitoring is active only if the contact 'Main contactor ON' at terminal X2: 15 is closed. |
| 1 | Field current monitoring always active independent of contact 'Main contactor ON' |

Range: 0...1
Standard value: 1
Save: Data record
Modify: Online

## 5.23 Parameter description - Digital inputs

P 400 **Status word digital inputs**

Parameter number in hexadecimal representation: 0190

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 0: Spare | DL0448 |
| 1 | 0: Spare | DL0449 |
| 2 | 0: Spare | DL0450 |
| 3 | 1: Error in module | DL0451 |
| 4 | 1: Pulse enable at terminal | DL0452 |
| 5 | 1: Quick stop signal at terminal | DL0453 |
| 6 | 1: Controller enable at terminal | DL0454 |
| 7 | 1: Main contactor enable at terminal | DL0455 |
| 8 | 1: Digital input 1 HIGH | DL0456 |
| 9 | 1: Digital input 2 HIGH | DL0457 |
| 10 | 1: Digital input 3 HIGH | DL0458 |
| 11 | 1: Digital input 4 HIGH | DL0459 |
| 12 | 1: Digital input 5 HIGH | DL0460 |
| 13 | 1: Digital input 6 HIGH | DL0461 |
| 14 | 1: Digital input 7 HIGH | DL0462 |
| 15 | 1: Digital input 8 HIGH | DL0463 |

P 401 **Function, digital input 1 (X2: 19)**

Enters the digital input function assigned to this terminal. For a description of the available functions 0 to 33 refer to chapter ▹Digital input functions DIF◃ from page 94.

| | | | |
|---|---|---|---|
| Range: | 0 ...33 (DIF no.) | Save: | Primary data |
| Standard value: | 7 (Acknowledge error) | Modify: | Offline |

P 402 **Function, digital input 2 (X2: 20)**

Enters the digital input function assigned to this terminal. For a description of the available functions 0 to 33 refer to chapter ▹Digital input functions DIF◃ from page 94.

| | | | |
|---|---|---|---|
| Range: | 0 ...33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

P 403 **Function, digital input 3 (X2: 21)**

Enters the digital input function assigned to this terminal. For a description of the available functions 0 to 33 refer to chapter ▹Digital input functions DIF◃ from page 94.

| | | | |
|---|---|---|---|
| Range: | 0 ...33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

P 404 **Function, digital input 4 (X2: 22)**

Enters the digital input function assigned to this terminal. For a description of the available functions 0 to 33 refer to chapter ▹Digital input functions DIF◃ from page 94.

| | | | |
|---|---|---|---|
| Range: | 0 ...33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

P 405 **Function, digital input 5 (X2: 23)**

Enters the digital input function assigned to this terminal. For a description of the available functions 0 to 33 refer to chapter ▹Digital input functions DIF◃ from page 94.

| | | | |
|---|---|---|---|
| Range: | 0 ...33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

P 406 **Function, digital input 6 (X2: 24)**

Enters the digital input function assigned to this terminal. For a description of the available functions 0 to 33 refer to chapter ▹Digital input functions DIF◃ from page 94.

| | | | |
|---|---|---|---|
| Range: | 0 ...33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

P 407 **Function, digital input 7 (X2: 25)**

Enters the digital input function assigned to this terminal. For a description of the available functions 0 to 33 refer to chapter ▹Digital input functions DIF◃ from page 94.

| | | | |
|---|---|---|---|
| Range: | 0 ...33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

P 408 **Function, digital input 8 (X2: 26)**

Enters the digital input function assigned to this terminal. For a description of the available functions 0 to 33 refer to chapter ▹Digital input functions DIF◃ from page 94.

| | | | |
|---|---|---|---|
| Range: | 0 ...33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

## 5.24 Parameter description - Digital input multipliers

Multiplier 1 (or multiplier 2) can be assigned to any of the 8 digital inputs (X2: 19 to X2: 26) and has four outputs each of which is assigned a function (DIF no.). This way, the digital input x can initiate up to four different actions at the same time. Enter the value 30 in the associated parameter (P 401 to P 408) to switch the multiplier to digital input x. It is also possible to define multiplier 2 as target for multiplier 1. The digital input x can then initiate max. 7 actions.

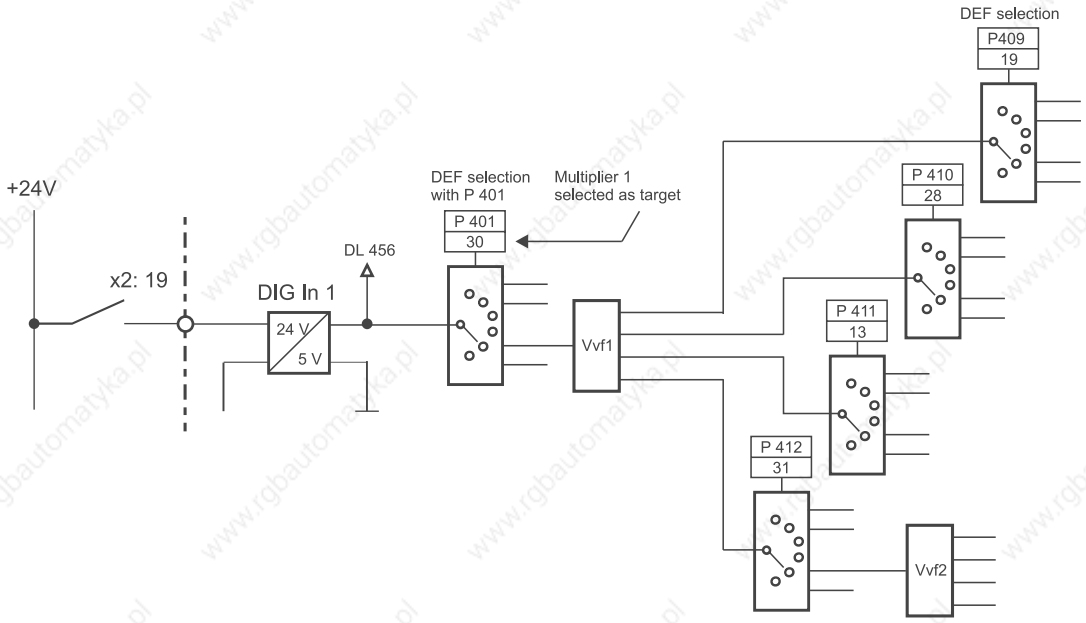



Illustration 71: Multiplier 1 and multiplier 2

**NOTE**

Only multiplier 2 must be connected after multiplier 1. The combination the other way round is not permissible.
In that case multiplier 1 has no effect !

**Entering the own multiplier as target is not permissible either !**

P 409 **Function, multiplier 1.1 (multiplier 1, output 1)**

| | | | |
|---|---|---|---|
| Range: | 0/ 7 …29/31 …33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

P 410 **Function, multiplier 1.2 (multiplier 1, output 2)**

| | | | |
|---|---|---|---|
| Range: | 0/ 7 …29/31 …33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

P 411 **Function, multiplier 1.3 (multiplier 1, output 3)**

| | | | |
|---|---|---|---|
| Range: | 0/ 7 …29/31 …33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

P 412 **Function, multiplier 1.4 (multiplier 1, output 4)**

| | | | |
|---|---|---|---|
| Range: | 0/ 7 …29/31 …33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

P 413 **Function, multiplier 2.1 (multiplier 2, output 1)**

| | | | |
|---|---|---|---|
| Range: | 0/ 7 …29/32 …33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

P 414 **Function, multiplier 2.2 (multiplier 2, output 2)**

| | | | |
|---|---|---|---|
| Range: | 0/ 7 …29/32 …33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

P 415 **Function, multiplier 2.3 (multiplier 2, output 3)**

| | | | |
|---|---|---|---|
| Range: | 0/ 7 …29/32 …33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

P 416 **Function, multiplier 2.4 (multiplier 2, output 4)**

| | | | |
|---|---|---|---|
| Range: | 0/ 7 …29/32 …33 (DIF no.) | Save: | Primary data |
| Standard value: | 0 (OFF) | Modify: | Offline |

## 5.25 Parameter description - Digital outputs

P 420 **Status word digital outputs**

Parameter number in hexadecimal representation: 01A4

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 0: Spare | DL0464 |
| 1 | 0: Spare | DL0465 |
| 2 | 0: Spare | DL0466 |
| 3 | 1: Error in module | DL0467 |
| 4 | 0: Spare | DL0468 |
| 5 | 0: Spare | DL0469 |
| 6 | 0: Spare | DL0470 |
| 7 | 0: Spare | DL0471 |
| 8 | 1: Digital output 1 at terminal HIGH | DL0472 |
| 9 | 1: Digital output 2 at terminal HIGH | DL0473 |
| 10 | 1: Digital output 3 at terminal HIGH | DL0474 |
| 11 | 1: Digital output 4 at terminal HIGH | DL0475 |
| 12 | 1: Digital output 5 at terminal HIGH | DL0476 |
| 13 | 1: Digital output 6 at terminal HIGH | DL0477 |
| 14 | 1: Ready-to-operate relay energised | DL0478 |
| 15 | 1: Main contactor relay energised | DL0479 |

P 421 **Function, digital output 1 (at terminal X2: 5)**

Selects the DLink whose state is output at this terminal.

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 4 (warning present) | Modify: | Online |

P 422 **ON delay, digital output 1**

During this time, the selected message must be active for the output to adopt HIGH level. Any internal activation of the message, shorter than the set time, keeps the output at LOW level.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...30.00 s<br>0.00 s...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 423 **OFF delay, digital output 1**

If the output was HIGH as a consequence of the selected message, it will remain active for the set time even after the message has been deactivated internally. If the internal message is no longer active for a period of time shorter than the OFF time, the output remains at HIGH level.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...30.00 s<br>0.00 s...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 424 **Polarity, digital output 1**

| Value | Description |
|---|---|
| 1 | Output at digital output 1 with polarity. Once the event selected with P 421 occurs, digital output 1 adopts HIGH level.<br>Output HIGH active |
| 2 | Inverted output at digital output 1. Once the event selected with P421 occurs, digital output 1 adopts LOW level.<br>Output LOW active |

| | | | |
|---|---|---|---|
| Range: | 1...2 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

P 425 **Function, digital output 2 (at terminal X2: 6)**

Selects the DLink whose state is to be output at this terminal.

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 426 **ON delay, digital output 2**

During this time, the selected message must be active for the output to adopt HIGH level. Any internal activation of the message, shorter than the set time, keeps the output at LOW level.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...30.00 s<br>0.00 s...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 427 **OFF delay, digital output 2**

If the output was HIGH as a consequence of the selected message, it will remain active for the set time even after the message has been deactivated internally. If the internal message is no longer active for a period of time shorter than the OFF time, the output remains at HIGH level.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...30.00 s<br>0.00 s...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 428 **Polarity, digital output 2**

| Value | Description |
|---|---|
| 1 | Output at digital output 2 with polarity. Once the event selected with P 425 occurs, the digital output 2 adopts HIGH level.<br>Output HIGH active |
| 2 | Inverted output at digital output 2. Once the event selected with P 425 occurs, the digital output 2 adopts LOW level.<br>Output LOW active |

| | | | |
|---|---|---|---|
| Range: | 1...2 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

P 429 **Function, digital output 3 (at terminal X2: 7)**

Selects the DLink whose state is to be output at this terminal.

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 430 **ON delay, digital output 3**

During this time, the selected message must be active for the output to adopt HIGH level. Any internal activation of the message, shorter than the set time, keeps the output at LOW level.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...30.00 s<br>0.00 s...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 431 **OFF delay, digital output 3**

If the output was HIGH as a consequence of the selected message, it will remain active for the set time even after the message has been deactivated internally. If the internal message is no longer active for a period of time shorter than the OFF time, the output remains at HIGH level.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...30.00 s<br>0.00 s...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 432 **Polarity, digital output 3**

| Value | Description |
|---|---|
| 1 | Output at digital output 3 with polarity. Once the event selected with P 429 occurs, the digital output 3 adopts HIGH level.<br>Output HIGH active |
| 2 | Inverted output at digital output 3. Once the event selected with P 429 occurs, the digital output 3 adopts LOW level.<br>Output LOW active |

| | | | |
|---|---|---|---|
| Range: | 1...2 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

P 433 **Function, digital output 4 (at terminal X2: 8)**

Selects the DLink whose state is to be output at this terminal.

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 434 **ON delay, digital output 4**

During this time, the selected message must be active for the output to adopt HIGH level. Any internal activation of the message, shorter than the set time, keeps the output at LOW level.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...30.00 s<br>0.00 s...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 435 **OFF delay, digital output 4**

If the output was HIGH as a consequence of the selected message, it will remain active for the set time even after the message has been deactivated internally. If the internal message is no longer active for a period of time shorter than the OFF time, the output remains at HIGH level.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...30.00 s<br>0.00 s...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 436 **Polarity, digital output 4**

| Value | Description |
|---|---|
| 1 | Output at digital output 4 with polarity. Once the event selected with P 433 occurs, the digital output 4 adopts HIGH level.<br>Output HIGH active |
| 2 | Inverted output at digital output 4. Once the event selected with P 433 occurs, the digital output 4 adopts LOW level.<br>Output LOW active |

| | | | |
|---|---|---|---|
| Range: | 1...2 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

P 437 **Function, digital output 5 (at terminal X2: 9)**

Selects the DLink whose state is to be output at this terminal.

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 438 **ON delay, digital output 5**

During this time, the selected message must be active for the output to adopt HIGH level. Any internal activation of the message, shorter than the set time, keeps the output at LOW level.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...30.00 s<br>0.00 s...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 439 **OFF delay, digital output 5**

If the output was HIGH as a consequence of the selected message, it will remain active for the set time even after the message has been deactivated internally. If the internal message is no longer active for a period of time shorter than the OFF time, the output remains at HIGH level.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...30.00 s<br>0.00 s...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 440 **Polarity, digital output 5**

| Value | Description |
|---|---|
| 1 | Output at digital output 5 with polarity. Once the event selected with P 437 occurs, the digital output 5 adopts HIGH level.<br>Output HIGH active |
| 2 | Inverted output at digital output 5. Once the event selected with P 437 occurs, the digital output 5 adopts LOW level.<br>Output LOW active |

| | | | |
|---|---|---|---|
| Range: | 1...2 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

P 441 **Function, digital output 6 (at terminal X2: 10)**

Selects the DLink whose state is output at this terminal.

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 442 **ON delay, digital output 6**

During this time, the selected message must be active for the output to adopt HIGH level. Any internal activation of the message, shorter than the set time, keeps the output at LOW level.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...30.00 s<br>0.00 s...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 443 **OFF delay, digital output 6**

If the output was HIGH as a consequence of the selected message, it will remain active for the set time even after the message has been deactivated internally. If the internal message is no longer active for a period of time shorter than the OFF time, the output remains at HIGH level.

| | | | |
|---|---|---|---|
| Range: | 0.00 s...30.00 s<br>0.00 s...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 444 **Polarity, digital output 6**

| Value | Description |
|---|---|
| 1 | Output at digital output 6 with polarity. Once the event selected with P 441 occurs, the digital output 6 adopts HIGH level.<br>Output HIGH active |
| 2 | Inverted output at digital output 6. Once the event selected with P 441 occurs, the digital output 6 adopts LOW level.<br>Output LOW active |

| | | | |
|---|---|---|---|
| Range: | 1...2 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

## 5.26 Parameter description - Analog outputs

P 460 **Status word analog outputs**

Parameter number in hexadecimal representation: 01CC

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 0: Spare | DL0480 |
| 1 | 0: Spare | DL0481 |
| 2 | 0: Spare | DL0482 |
| 3 | 0: Spare | DL0483 |
| 4 | 1: Analog output 1 ON (P 461 ≠ 0) | DL0484 |
| 5 | 1: Analog output 2 ON (P 466 ≠ 0) | DL0485 |
| 6 | 1: Analog output 3 ON (P 471 ≠ 0) | DL0486 |
| 7 | 1: Analog output 4 ON (P 476 ≠ 0) | DL0487 |
| 8 | 1: Analog output 1, negative signal limit active | DL0488 |
| 9 | 1: Analog output 2, negative signal limit active | DL0489 |
| 10 | 1: Analog output 3, negative signal limit active | DL0490 |
| 11 | 1: Analog output 4, negative signal limit active | DL0491 |
| 12 | 1: Analog output 1, positive signal limit active | DL0492 |
| 13 | 1: Analog output 2, positive signal limit active | DL0493 |
| 14 | 1: Analog output 3, positive signal limit active | DL0494 |
| 15 | 1: Analog output 4, positive signal limit active | DL0495 |

P 461 **Signal selection, analog output 1 (at terminal X1: 7/8)**

Selects the signal (ALink) to be output.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 26 | | Modify: | Online |

P 462 **Offset, analog output 1**

Enters a constant added to the value of the output signal selected with P 461 after smoothing and scaling.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 0.00 % | Modify: | Online |

P 463 **Scaling, analog output 1**

Multiplier for the output signal selected with P 461 after smoothing and before offset.

| | | | |
|---|---|---|---|
| Range: | 0,000...5,000 | Save: | Data record |
| Standard value: | 1.000 | Modify: | Online |

P 464 **Smoothing, analog output 1**

before scaling and offset.

As time constants lower than 8 ms remain ineffective (at $f_{mains}$ = 45 Hz), input of values between 1 and 7 ms results in automatic entry of a value of 8 ms. Smoothing is switched off at a setting of 0 ms.

| | | | |
|---|---|---|---|
| Range: | 0...1000 ms | Save: | Data record |
| Standard value: | 0 ms | Modify: | Online |

P 465 **Polarity, analog output 1**

before smoothing

| Value | Description |
|---|---|
| 0 | Analog output 1 switched off, always 0 V (no tri-state) |
| 1 | Output at analog output 1 with polarity |
| 2 | Inverted output at analog output 1 |
| 3 | Positive absolute value output at analog output 1 |
| 4 | Negative absolute value output at analog output 1 |

| | | | |
|---|---|---|---|
| Range: | 0...4 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

P 466 **Signal selection, analog output 2 (at terminal X1: 9/10)**

Selects the signal (ALink) to be output.

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 43 | Modify: | Online |

P 467 **Offset, analog output 2**

Enters a constant added to the value of the output signal selected with P 466 after smoothing and scaling.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 0.00 % | Modify: | Online |

P 468 **Scaling, analog output 2**

Multiplier for the output signal selected with P 466 after smoothing and before offset.

| | | | |
|---|---|---|---|
| Range: | 0,000...5,000 | Save: | Data record |
| Standard value: | 1.000 | Modify: | Online |

P 469 **Smoothing, analog output 2**

before scaling and offset.

As time constants lower than 8 ms remain ineffective (at $f_{mains}$ = 45 Hz), input of values between 1 and 7 ms results in automatic entry of a value of 8 ms. Smoothing is switched off at a setting of 0 ms.

| | | | |
|---|---|---|---|
| Range: | 0...1000 ms | Save: | Data record |
| Standard value: | 0 ms | Modify: | Online |

P 470 **Polarity, analog output 2**

before smoothing

| Value | Description |
|---|---|
| 0 | Analog output 2 switched off, always 0 V (no tri-state) |
| 1 | Output at analog output 2 with polarity |
| 2 | Inverted output at analog output 2 |
| 3 | Positive absolute value output at analog output 2 |
| 4 | Negative absolute value output at analog output 2 |

| | | | |
|---|---|---|---|
| Range: | 0...4 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

P 471 **Signal selection, analog output 3 (at terminal X1: 11/12)**

Selects the signal (ALink) to be output.

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 | from S03.03 | |
| Standard value: | 51 | Modify: | Online |

P 472 **Offset, analog output 3**

Enters a constant added to the value of the output signal selected with P 471 after smoothing and scaling.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 0.00 % | Modify: | Online |

P 473 **Scaling, analog output 3**

Multiplier for the output signal selected with P 471 after smoothing and before offset.

| | | | |
|---|---|---|---|
| Range: | 0,000...5,000 | Save: | Data record |
| Standard value: | 1.000 | Modify: | Online |

P 474 **Smoothing, analog output 3**

before scaling and offset.

As time constants lower than 8 ms remain ineffective (at $f_{mains}$ = 45 Hz), input of values between 1 and 7 ms results in automatic entry of a value of 8 ms. Smoothing is switched off at a setting of 0 ms.

| | | | |
|---|---|---|---|
| Range: | 0...1000 ms | Save: | Data record |
| Standard value: | 0 ms | Modify: | Online |

P 475 **Polarity, analog output 3**

before smoothing

| Value | Description |
|---|---|
| 0 | Analog output 3 switched off, always 0 V (no tri-state) |
| 1 | Output at analog output 3 with polarity |
| 2 | Inverted output at analog output 3 |
| 3 | Positive absolute value output at analog output 3 |
| 4 | Negative absolute value output at analog output 3 |

| | | | |
|---|---|---|---|
| Range: | 0...4 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

P 476 **Signal selection, analog output 4 (at terminal X1: 13/14)**

Selects the signal (ALink) to be output.

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 59 | Modify: | Online |

P 477 **Offset, analog output 4**

Enters a constant added to the value of the output signal selected with P 476 after smoothing and scaling.

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 0.00 % | Modify: | Online |

P 478 **Scaling, analog output 4**

Multiplier for the output signal selected with P 476 after smoothing and before offset.

| | | | |
|---|---|---|---|
| Range: | 0,000...5,000 | Save: | Data record |
| Standard value: | 1.000 | Modify: | Online |

P 479 **Smoothing, analog output 4**

before scaling and offset.

As time constants lower than 8 ms remain ineffective (at $f_{mains}$ = 45 Hz), input of values between 1 and 7 ms results in automatic entry of a value of 8 ms. Smoothing is switched off at a setting of 0 ms.

| | | | |
|---|---|---|---|
| Range: | 0...1000 ms | Save: | Data record |
| Standard value: | 0 ms | Modify: | Online |

P 480 **Polarity, analog output 4**

before smoothing

| Value | Description |
|---|---|
| 0 | Analog output 4 switched off, always 0 V (no tri-state) |
| 1 | Output at analog output 4 with polarity |
| 2 | Inverted output at analog output 4 |
| 3 | Positive absolute value output at analog output 4 |
| 4 | Negative absolute value output at analog output 4 |

| | | | |
|---|---|---|---|
| Range: | 0...4 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

## 5.27 Parameter description - Monitoring functions

P 501 **Threshold, overspeed monitoring**

Sets the trip threshold for overspeed monitoring. Input value in percent of the maximum speed.

Exceeding the threshold leads to error message '44', and the ready-to-operate relay drops out. This error is acknowledgeable.

**NOTE**

This is no redundant safety system as an assumption is made as to the motor speed from the actual speed determined by the converter.

Monitoring requires an **error-free** tachogenerator or incremental encoder.

Operator safety guidelines must be observed !

| | | | |
|---|---|---|---|
| Range: | 0.00 %...120.00 % | Save: | Data record |
| Standard value: | 115.00 % | Modify: | Online |

P 502 **Threshold, tachogenerator/encoder failure**

Sets the threshold from which tachogenerator/encoder monitoring becomes effective. The set value refers to the EMF determined by the drive (AL 205). A set value of 30 %, for example, means that tachogenerator/encoder failure monitoring cuts in only from an EMF of +/- 30 %.

Input value in percent of the rated EMF (calculated from the armature voltage).

The monitoring function causes error message '45', and the ready-to-operate relay drops out. Time to trip: 40 ms at $f_{mains}$ = 50 Hz. This error is acknowledgeable.

The associated error message may occur also when the **armature circuit is interrupted** !

**NOTE**

Increasing the input value switches the drive off at a tachogenerator/encoder failure only once a higher motor speed has been reached !

Operator safety guidelines must be observed !

| | | | |
|---|---|---|---|
| Range: | 5.00 %...65.00 % | Save: | Data record |
| Standard value: | 10.00 % | Modify: | Online |

P 503 **Threshold, tachogenerator/encoder polarity**

Sets the threshold from which tachogenerator/encoder polarity monitoring becomes effective. The set value refers to the tachogenerator/encoder signal. A set value of 50 %, for example, means that the tachogenerator/encoder polarity will be monitored only from a speed (AL 204) of +/- 50 % of the set maximum speed (P 257 and P 258 for tachogenerator control, P 262 for incremental encoder use for actual speed generation).

Input value in percent of the maximum speed.

The monitoring function causes error message '46', and the ready-to-operate relay drops out. Time to trip: 40 ms at $f_{mains}$ = 50 Hz. This error is acknowledgeable.

**NOTE**

Increasing the input value means that the drive will be switched off at a polarity reversal at tachogenerator or incremental encoder only once a higher motor speed has been reached.

This is no redundant safety system as an assumption is made as to the state of the actual value encoder (tachogenerator or incremental encoder) from the actual speed determined by the converter. Operator safety guidelines must be observed !

| | | | |
|---|---|---|---|
| Range: | 5.00 %...65.00 % | Save: | Data record |
| Standard value: | 10.00 % | Modify: | Online |

P 504 **Threshold, speed adjustment**

For use of tachogenerator and incremental encoder for actual speed generation. The actual speed (AL 204) is compared to the determined EMF. The scaled actual speed signal must always be larger than the EMF (AL 205). Serves to check the tachogenerator connection at terminal X3 (tachogenerator range P 257).

Input value in percent of the rated EMF (calculated from the armature voltage).

Exceeding the threshold leads to error message '47', and the ready-to-operate relay drops out. This error is acknowledgeable.

**NOTE**

This is no redundant safety system as an assumption is made as to the motor speed from the actual speed determined by the converter.

Monitoring requires an **error-free** tachogenerator or incremental encoder.

Operator safety guidelines must be observed !

| | | | |
|---|---|---|---|
| Range: | 5.00 %...65.00 % | Save: | Data record |
| Standard value: | 15.00 % | Modify: | Online |

P 505 **Threshold $n > n_{min}$**

Inputs the speed from which DLinks 314 and DLink 7 adopt HIGH state. Input value in percent of the maximum speed. This signal is used internally as zero-speed indication to terminate the deceleration process on quick stop, controller disable or main contactor OFF and to coast the drive.

The zero-speed signal is also displayed via LED H703.

See also description of parameters P 107 and P 108.

| | | | |
|---|---|---|---|
| Range: | 0.10 %...110.00 % | Save: | Data record |
| Standard value: | 5.00 % | Modify: | Online |

P 506 **Hysteresis n > $n_{min}$**

This value is subtracted from the threshold of the signal n > $n_{min}$ and thus defines the lower threshold (switching threshold). Any value larger than the value in parameter P 505, entered here, sets the lower threshold to the minimum value of 0.10 % !

Input value in percent of the maximum speed.

The signal n > $n_{min}$ is displayed via DLinks 7 and 314.

**DLink 7** changes from LOW to HIGH
as soon as the actual speed exceeds the value P 505.

**DLink 7** changes from HIGH to LOW
as soon as the actual speed falls below the value P 505 - P 506.

This signal is used internally as zero-speed indication to terminate the deceleration process on quick stop, controller disable or main contactor OFF and to coast the drive. See also description of parameters P 107 and P 108.

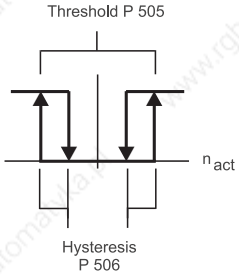
The zero-speed signal is also displayed via LED H703.

| | | | |
|---|---|---|---|
| Range: | 0.01 %...110.00 % | Save: | Data record |
| Standard value: | 2.00 % | Modify: | Online |

The standard values make

the signal (**DLink 7**) adopt LOW state
if the speed falls below 3 %,

the signal (**DLink 7**) adopt HIGH state
if the speed exceeds 5 %,




P 507 **Threshold n > $n_{x1}$**

Input value in percent of the maximum speed.

DLink 8 changes from LOW to HIGH as soon as the actual speed (AL 58) at the speed controller exceeds the set value.

DLink 8 changes from HIGH to LOW as soon as the actual speed at the speed controller falls below the set value minus the associated hysteresis (P 508).

| | | | |
|---|---|---|---|
| Range: | 0.10 %...110.00 % | Save: | Data record |
| Standard value: | 10.00 % | Modify: | Online |

P 508 **Hysteresis n > $n_{x1}$**

Input value in percent of the maximum speed.

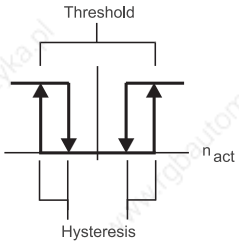
Any value larger than the value in parameter P 507, entered here, sets the lower threshold to the minimum value of 0.10 % !

| | | | |
|---|---|---|---|
| Range: | 0.01 %...110.00 % | Save: | Data record |
| Standard value: | 2.00 % | Modify: | Online |

The standard values make

DLink 8 adopt LOW state if the speed falls below 8 %

DLink 8 adopt HIGH state if the speed exceeds 10 %




P 509 **Threshold n > $n_{x2}$**

Input value in percent of the maximum speed.

DLink 9 changes from LOW to HIGH as soon as the actual speed (AL 58) at the speed controller exceeds the set value.

DLink 9 changes from HIGH to LOW as soon as the actual speed at the speed controller falls below the set value minus the associated hysteresis (P 510).

| | | | |
|---|---|---|---|
| Range: | 0.10 %...110.00 % | Save: | Data record |
| Standard value: | 15.00 % | Modify: | Online |

P 510 **Hysteresis n > $n_{x2}$**

Input value in percent of the maximum speed.

Any value larger than the value in parameter P 509, entered here, sets the lower threshold to the minimum value of 0.10 % !

| | | | |
|---|---|---|---|
| Range: | 0.01 %...110.00 % | Save: | Data record |
| Standard value: | 2.00 % | Modify: | Online |

See also diagram under parameter P 508.

P 511 **Threshold n > $n_{x3}$**

Input value in percent of the maximum speed.

DLink 10 changes from LOW to HIGH as soon as the actual speed (AL 58) at the speed controller exceeds the set value.

DLink 10 changes from HIGH to LOW as soon as the actual speed at the speed controller falls below the set value minus the associated hysteresis (P 512).

| | | | |
|---|---|---|---|
| Range: | 0.10 %...110.00 % | Save: | Data record |
| Standard value: | 20.00 % | Modify: | Online |

P 512 **Hysteresis n > $n_{x3}$**

Input value in percent of the maximum speed.

Any value larger than the value in parameter P 511, entered here, sets the lower threshold to the minimum value of 0.10 % !

| | | | |
|---|---|---|---|
| Range: | 0.01 %...110.00 % | Save: | Data record |
| Standard value: | 2.00 % | Modify: | Online |

See also diagram under parameter P 508.

P 513 **Threshold n > $n_{x4}$**

Input value in percent of the maximum speed.

DLink 11 changes from LOW to HIGH as soon as the actual speed (AL 58) at the speed controller exceeds the set value.

DLink 11 changes from HIGH to LOW as soon as the actual speed at the speed controller falls below the set value minus the associated hysteresis (P 514).

| | | | |
|---|---|---|---|
| Range: | 0.10 %...110.00 % | Save: | Data record |
| Standard value: | 25.00 % | Modify: | Online |

P 514 **Hysteresis n > $n_{x4}$**

Input value in percent of the maximum speed.

Any value larger than the value in parameter P 513, entered here, sets the lower threshold to the minimum value of 0.10 % !

| | | | |
|---|---|---|---|
| Range: | 0.01 %...110.00 % | Save: | Data record |
| Standard value: | 2.00 % | Modify: | Online |

See also diagram under parameter P 508.

P 515 **Threshold $n_{actual}$ = $n_{set}$ (at speed controller)**

Input value in percent of the maximum speed.

Once the difference between $n_{atual}$ and $n_{set}$ exceeds the set value, DLink 13 changes from HIGH to LOW.

Once the difference between $n_{actual}$ and $n_{set}$ falls below the set value minus the associated hysteresis (P 516), DLink 13 changes from LOW to HIGH.

| | | | |
|---|---|---|---|
| Range: | 0.10 %...50.00 % | Save: | Data record |
| Standard value: | 5.00 % | Modify: | Online |

P 516 **Hysteresis, $n_{actual} = n_{set}$ signal (at speed controller)**

Input value in percent of the maximum speed.

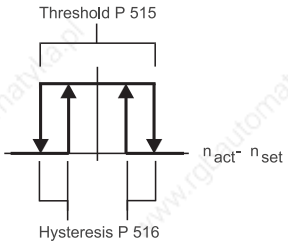
Any value larger than the value in parameter P 515, entered here, sets the lower threshold to the minimum value of 0.10 % !

| | | | |
|---|---|---|---|
| Range: | 0.01 %...50.00 % | Save: | Data record |
| Standard value: | 1.00 % | Modify: | Online |

The standard values make

DLink 13 adopt LOW state if the difference exceeds 5 %

DLink 13 adopt HIGH state if the difference falls below 4 %




P 517 **Stall protection, time to trip**

The anti-blocking protection is **switched off** when a value of **0.0 s** is entered. During optimization, the stall protection is switched off internally, and the original set value is redopted on completion of optimization activities.

If the entered value does not equal 0.00 s, the stall protection trips if the drive is operated continuously at the current limit for longer than the set period **and** the speed threshold set with parameters P 505/P 506 is not reached.

The monitoring function causes error message '8', and the ready-to-operate relay drops out. This error is acknowledgeable.

| | | | |
|---|---|---|---|
| Range: | 0.0 s...30.0 s | Save: | Data record |
| Standard value: | 5.0 s | Modify: | Online |

P 518 **Maximum torque reversal time**

Of significance only for BKF-series four-quadrant converters.

Monitors the torque change duration. For weak systems, enter a higher value here as required to take into account the longer time before the braking current is commutated. It must also be set longer than the time in parameter **P 334**.

The monitoring function causes error message '48', and the ready-to-operate relay drops out. This error is acknowledgeable.

| | | | |
|---|---|---|---|
| Range: | 0.1 s...2.0 s | Save: | Primary data |
| Standard value: | 0.2 s | Modify: | Online |

P 519 **'Armature-circuit-open' time to trip**

Time delay for the signal 'Armature circuit open'.

The monitoring function causes error message '37', and the ready-to-operate relay drops out. This error is acknowledgeable.

| | | | |
|---|---|---|---|
| Range: | 0.5 s...5.0 s | Save: | Data record |
| Range: | 0.5 s...60.0 s from S03.03 | | |
| Standard value: | 1.0 s | Modify: | Online |

P 521 **Threshold $I_A > I_{A_X1}$**

Input value in percent of the converter output current (P 072)

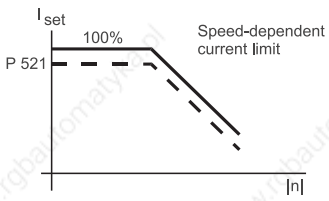
DLink 15 changes from LOW to HIGH as soon as the armature current exceeds the set value.

DLink 15 changes from HIGH to LOW as soon as the armature current falls below the set value minus the associated hysteresis (P 522).

The set threshold value is multiplied with the output of the speed-dependent current limit **AL 69** (refer P 330 and P 331).

| | | | |
|---|---|---|---|
| Range: | 0.10 %...110.00 % | Save: | Data record |
| Standard value: | 90.00 % | Modify: | Online |

Effect of the speed-dependent current limit on parameter P 521




P 522 **Hysteresis $I_A > I_{A_X1}$**

Input value in percent of the converter output current (P 072)

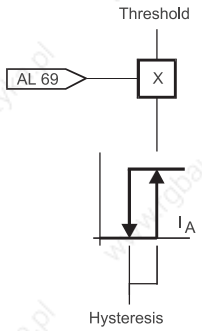
Any value larger than the value in parameter P 521, entered here, sets the lower threshold to the minimum value of 0.10 % !

| | | | |
|---|---|---|---|
| Range: | 0.01 %...110.00 % | Save: | Data record |
| Standard value: | 2.00 % | Modify: | Online |

The standard values make

DLink 15 adopt HIGH state as soon as the armature current exceeds 90 %

DLink 15 adopt LOW state as soon as the armature current falls below 88 %




P 523 **Threshold $I_A > I_{A_X2}$**

Input value in percent of the converter output current (P 072)

DLink 16 changes from LOW to HIGH as soon as the armature current exceeds the set value.

DLink 16 changes from HIGH to LOW as soon as the armature current falls below the set value minus the associated hysteresis (P 524).

The set threshold value is multiplied with the output of the speed-dependent current limit **AL 69** (refer P 330 and P 331) (applicable as per diagram under parameter P 521).

| | | | |
|---|---|---|---|
| Range: | 0.10 %...110.00 % | Save: | Data record |
| Standard value: | 95.00 % | Modify: | Online |

P 524 **Hysteresis $I_A > I_{A_X2}$**

Input value in percent of the converter output current (P 072)

Any value larger than the value in parameter P 523, entered here, sets the lower threshold to the minimum value of 0.10 % !

(applicable as per diagram under parameter P 522).

| | | | |
|---|---|---|---|
| Range: | 0.01 %...110.00 % | Save: | Data record |
| Standard value: | 2.00 % | Modify: | Online |

P 525 **Threshold, motor $i^2t$ monitoring**

The $i^2t$ monitoring function is **switched off** if a value of **0 min** is entered in parameter P 078. During optimization, the $i^2t$ monitoring function is switched off internally, and the original set value is redopted on completion of optimization activities.

Display of current $i^2t$ value in parameter P 031, 100 % correspond to the rated motor temperature (dec. value 4096 in ALink 220).

Time to trip for the $i^2t$ monitoring function on the condition that the set current in the armature circuit is flowing continuously:

$$t = -P\,78 \times \ln\left[1 - \frac{P\,525}{100\,\%} \times \left(\frac{P\,74}{P\,72} \times \frac{100}{\text{current limit}}\right)^2\right]$$

current limit: P 325 for TD1, P 326 for TD2

The signal changes from LOW to HIGH once the $i^2t$ value exceeds the set value.

The signal changes from HIGH to LOW once the $i^2t$ falls below the set value minus the associated fixed-set 5 % hysteresis.

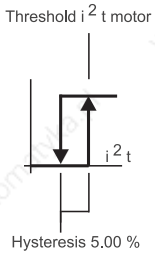
The signal can be output via DLink 19 (see also ▹DLink 19 Motor i2t monitoring◃ on page 411).

| | | | |
|---|---|---|---|
| Range: | 50 %...110 % | Save: | Data record |
| Standard value: | 100 % | Modify: | Online |

The standard values make

the signal (DLink 19) adopt HIGH state once the i2t value exceeds 100 %

the signal (DLink 19) adopt LOW state once the i2t value falls below 95 %




P 526 **Maximum line stabilization time (contact at terminal X2: 15)**

Once the contact 'main contactor ON' has closed, phase sequence, rotating field, phase failure at the power unit connections for the armature circuit and the phase sequence at the power unit connection of the field unit are checked. One measuring cycle takes 100 ms. Due to the different pick-up times of the contactors used for mains supply to the converter, several measuring cycles may result in errors despite correct connections. To avoid an error message in this case, set a **maximum time** with this parameter, during which the measuring cycles are repeated and the error messages are suppressed. Any error messages reporting connection errors will be issued only after the set time has elapsed.

Associated error messages: 19 to 22.

They cause the ready-to-operate relay to drop out; error '22' is acknowledgeable.

**NOTE**

If the contact 'Main contactor ON' is switched last by the enables, it **may** take max. the time set until the drive is enabled and the motor starts rotating !

| | | | |
|---|---|---|---|
| Range: | 0.1 s...5.0 s | Save: | Primary data |
| Standard value: | 0.5 s | Modify: | Online |

P 527 **Maximum time to restart (after mains failure)**

Mains failures shorter than the set time cause the drive to start automatically upon return of the mains voltage, as long as all enables are still present at the converter.

When operating the converter via communication interface (option card for field bus or USS protocol) and the automatical start upon return of the mains voltage should be used, the converter must be supplied additionally via the 24 V supply (X7).

When operating the converter without communication interface (parameter communication source P121 = 0) the function of the automatical start upon return of the mains voltage can be used without an additional 24 V supply.

A **0.0 s** input switches this function off.

**WARNING**

The safety regulations applicable to the machine must be observed since the drive **starts up automatically** on return of the mains voltage !

**Operator protection !**

| | | | |
|---|---|---|---|
| Range: | 0.0 s...3.0 s | Save: | Primary data |
| Standard value: | 0.0 s | Modify: | Online |

P 528 **Frequency threshold [Hz] (from S03.10)**

If the mains frequency is equal or higher than the set value, DLink 55 is set (HIGH). If the mains frequency is lower than the set value, DLink 55 is reset (LOW). The message has no hysteresis.

| | | | |
|---|---|---|---|
| Range: | 45,0 ... 65,0 Hz | Save: | Data record |
| Standard value: | 65,0 Hz | Modify: | Online |

P 535 **Tachogenerator/encoder failure monitoring ON/OFF (from S03.06)**

See also parameter P 502 and error 45

| Value | Description |
|---|---|
| 0 | Tachogenerator/encoder failure monitoring active only if drive is enabled |
| 1 | Tachogenerator/encoder failure monitoring always active, even if the drive is disabled |

| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

P 536 **Tachogenerator/encoder polarity monitoring ON/OFF (from S03.06)**

See also parameter P 503 and error 46

| Value | Description |
|---|---|
| 0 | Tachogenerator/encoder polarity monitoring active only if drive is enabled |
| 1 | Tachogenerator/encoder polarity monitoring always active, even if the drive is disabled |

| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

P 537 **Speed adjustment monitoring ON/OFF (from S03.06)**

See also parameters P 081, P 504 and error 47

| Value | Description |
|---|---|
| 0 | Speed adjustment monitoring active only if drive is enabled |
| 1 | Speed adjustment monitoring always active, even if the drive is disabled |

| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

## 5.28 Parameter description - motor temperature monitoring (from SV 03.10)

**CAUTION**

When confusing the poles of the temperature sensor, the resistance of the sensor is decreased when the temperature is higher than 100 °C with further increasing temperature. The temperature monitoring of the motor is in this case above 100 °C inefficient (see ▹Appendix E - Option board motor temperature monitoring◃ from page 479). If the connection between board 3.9711 and board 3.0043 is missing, an error message is generated in software version 3.14 and higher, when the temperature monitoring is activated (P 541 = 1 and / or P 544 = 1).

P 540 **Status word motor temperature monitoring**

Parameter number in hexadecimal representation: 021C

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 1: Motor temperature monitoring channel 1 active ( P 541 = 1 ) | DL0512 |
| 1 | 1: Motor temperature monitoring channel 2 active ( P 544 = 1 ) | DL0513 |
| 2 | 0: Spare | DL0514 |
| 3 | 1: Error in Module (F 96 till F 101) | DL0515 |
| 4 | 1: Warning motor temperature channel 1 active (W11) | DL0516 |
| 5 | 1: Warning motor temperature channel 1 active (W12) | DL0517 |
| 6 | 1: Temperature threshold channel 1 (P 547) exceeded | DL0518 |
| 7 | 1: Temperature threshold channel 2 (P 548) exceeded | DL0519 |
| 8 | 0: Spare | DL0520 |
| 9 | 0: Spare | DL0521 |
| 10 | 0: Spare | DL0522 |
| 11 | 0: Spare | DL0523 |
| 12 | 0: Spare | DL0524 |
| 13 | 0: Spare | DL0525 |
| 14 | 0: Spare | DL0526 |
| 15 | 0: Spare | DL0527 |

P 541 **Motor temperature monitoring measurement channel 1 ON/OFF (X8:1 and X8:2 LP3.0043)**

If the measurement channel is switched on, the connection of the assigned temperature sensor is monitored regarding disconnection and short circuit (F 98 and F 100).

Necessary temperature sensor: KTY 84-130.

| Value | Description |
|---|---|
| 0 | Measurement channel 1 switched off |
| 1 | Measurement channel 1 switched on, the monitoring is active. |

| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 542 **Warning temperature channel 1**

Only active when P541 = 1!

When reaching the set value the warning W11 is generated and the assigned DLinks DL 516 / DL 666 are set HIGH. If the temperature is lower than the set value minus the fix set hysteresis of 5 °C, the warning is automatically erased and the DLinks DL 516 / DL 666 are reset LOW.

| | | | |
|---|---|---|---|
| Range: | +5 °C...+200 °C | Save: | Data record |
| Standard value: | +80 °C | Modify: | Online |

P 543 **Switch off channel 1**

Only active when P541 = 1!

When reaching the set value the error F 96 is generated and the assigned DLink DL 1024 is set HIGH.

| | | | |
|---|---|---|---|
| Range: | +5 °C...+200 °C | Save: | Data record |
| Standard value: | +80 °C | Modify: | Online |

P 544 **Motor temperature monitoring measurement channel 2 ON/OFF (X8:4 and X8:5 LP3.0043)**

If the measurement channel is switched on, the connection of the assigned temperature sensor is monitored regarding disconnection and short circuit (F 99 and F 101).

Necessary temperature sensor: KTY 84-130.

| Value | Description |
|---|---|
| 0 | Measurement channel 2 switched off |
| 1 | Measurement channel 2 switched on, the monitoring is active. |

| | | | |
|---|---|---|---|
| Range: | 0...1 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 545 **Warning temperature channel 2**

Only active when P544 = 1!

When reaching the set value the warning W11 is generated and the assigned DLinks DL 517 / DL 667 are set HIGH. If the temperature is lower than the set value minus the fix set hysteresis of 5 °C, the warning is automatically erased and the DLinks DL 516 / DL 666 are reset LOW.

| | | | |
|---|---|---|---|
| Range: | +5 °C...+200 °C | Save: | Data record |
| Standard value: | +80 °C | Modify: | Online |

P 546 **Switch off channel 2**

Only active when P544 = 1!

When reaching the set value the error F 97 is generated and the assigned DLink DL 1025 is set HIGH.

| | | | |
|---|---|---|---|
| Range: | +5 °C...+200 °C | Save: | Data record |
| Standard value: | +80 °C | Modify: | Online |

P 547 **Message threshold motor temperature channel 1 (from S 03.20)**

Only active when P541 = 1!

Configurable message threshold for the motor temperature monitoring of channel 1. If the measured motor temperature of channel 1 is higher than this threshold, DLink DL 518 is set. The DLink is reset, if the temperature is lower than the threshold less a fixed hysteresis of 5 °C.

| | | | |
|---|---|---|---|
| Range: | +5 °C...+200 °C | Save: | Data record |
| Standard value: | +80 °C | Modify: | Online |

P 548 **Message threshold motor temperature channel 2 (from S 03.20)**

Only active when P544 = 1!

Configurable message threshold for the motor temperature monitoring of channel 2. If the measured motor temperature of channel 2 is higher than this threshold, DLink DL 519 is set. The DLink is reset, if the temperature is lower than the threshold less a fixed hysteresis of 5 °C.

| | | | |
|---|---|---|---|
| Range: | +5 °C...+200 °C | Save: | Data record |
| Standard value: | +80 °C | Modify: | Online |

## 5.29 Parameter description - Unassigned PI controller

P 550 **Setpoint selection, input 1 (unassigned PI controller)**

Selects the signal (ALink) effective as setpoint at the unassigned PI controller. Is added to the signals selected with parameters P 551, P 552 and P 553.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 551 **Setpoint selection, input 2 (unassigned PI controller)**

Selects the signal (ALink) effective as setpoint at the unassigned PI controller. Is added to the signals selected with parameters P 550, P 552 and P 553.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 552 **Setpoint selection, input 3 (unassigned PI controller)**

Selects the signal (ALink) effective as setpoint at the unassigned PI controller. Is added to the signals selected with parameters P 550, P 551 and P 553.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 553 **Setpoint selection, input 4 (unassigned PI controller)**

Selects the signal (ALink) effective as setpoint at the unassigned PI controller. Is added to the signals selected with parameters P 550, P 551 and P 552.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 554 **Actual value selection (unassigned PI controller)**

Selects the signal (ALink) effective as actual value at the unassigned PI controller.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 555 **Actual value smoothing (unassigned PI controller)**

As time constants lower than 8 ms remain ineffective (at $f_{mains}$ = 45 Hz), input of values between 1 and 7 ms results in automatic entry of a value of 8 ms. Smoothing is switched off at a setting of 0 ms.

| | | | |
|---|---|---|---|
| Range: | 0...100 ms | Save: | Data record |
| Standard value: | 0 ms | Modify: | Online |

P 556 **Actual-value derivative-action time (derivative-action element) (unassigned PI controller)**

Sets the derivative-action time of the $DT_1$ element.

| | | | |
|---|---|---|---|
| Range: | 0...1000 ms | Save: | Data record |
| Standard value: | 10 ms | Modify: | Online |

P 557 **Factor of D component (unassigned PI controller)**

Multiplier for the output of the $DT_1$ element (P 556).

| | | | |
|---|---|---|---|
| Range: | 0.0...5.0 | Save: | Data record |
| Standard value: | 0.0 | Modify: | Online |

The effective D component of the actual value is available in **AL 113**.

P 560 **Status word (unassigned PI controller)**

Parameter number in hexadecimal representation: 0230

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 1: Unassigned controller enabled | DL0528 |
| 1 | 0: Spare | DL0529 |
| 2 | 0: Spare | DL0530 |
| 3 | 1: Error in module | DL0531 |
| 4 | 1: Controller output, positive limit | DL0532 |
| 5 | 1: Controller output, negative limit | DL0533 |
| 6 | 1: I component, positive limit | DL0534 |
| 7 | 1: I component, negative limit | DL0535 |
| 8 | 1: Setpoint limit active | DL0536 |
| 9 | 0: Spare | DL0537 |
| 10 | 0: Spare | DL0538 |
| 11 | 0: Spare | DL0539 |
| 12 | 0: Spare | DL0540 |
| 13 | 0: Spare | DL0541 |
| 14 | 0: Spare | DL0542 |
| 15 | 0: Spare | DL0543 |

P 561 **Control word (unassigned PI controller)**

Parameter number in hexadecimal representation: 0231

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 0: Unassigned controller: Disable setpoint (after addition) | DL0544 |
| 1 | 0: Unassigned controller: Disable controller | DL0545 |
| 2 | 0: Unassigned controller: Disable I component | DL0546 |
| 3 | Spare: Always set to zero | DL0547 |
| 4 | Spare: Always set to zero | DL0548 |
| 5 | Spare: Always set to zero | DL0549 |
| 6 | Spare: Always set to zero | DL0550 |
| 7 | Spare: Always set to zero | DL0551 |
| 8 | Spare: Always set to zero | DL0552 |
| 9 | Spare: Always set to zero | DL0553 |
| 10 | Spare: Always set to zero | DL0554 |
| 11 | Spare: Always set to zero | DL0555 |
| 12 | Spare: Always set to zero | DL0556 |
| 13 | Spare: Always set to zero | DL0557 |
| 14 | Spare: Always set to zero | DL0558 |
| 15 | Spare: Always set to zero | DL0559 |

P 562 **Controller type (unassigned PI controller)**

Defines the unassigned PI controller parameter set

| Value | Description |
|---|---|
| xx00 | P- and I-components not active, controller switched off, output = 0 |
| xx01 | P-component OFF, I-component active, I controller, P 568, P 569 are integration times |
| xx10 | P-component active, I-component OFF, P controller |
| xx11 | P- and I-components active, PI controller |

| | | | |
|---|---|---|---|
| Range: | xx00/xx01/xx10/xx11 | Save: | Data record |
| Standard value: | 11hex | Modify: | Online |

P 563 **P-gain $K_P1$ (unassigned PI controller)**

P-gain 1 of the unassigned PI controller. Is effective when the signal selected with parameter P 567 falls below the value set in parameter P 565.

| | | | |
|---|---|---|---|
| Range: | 0.10...100.00 | Save: | Data record |
| Standard value: | 10.00 | Modify: | Online |

P 564 **P-gain $K_P$ 2 (unassigned PI controller)**

Proportional gain 2 of the unassigned PI controller. Is effective when the signal selected with parameter P 567 exceeds the value set in parameter P 566.

| | | | |
|---|---|---|---|
| Range: | 0.10...100.00 | Save: | Data record |
| Standard value: | 10.00 | Modify: | Online |

The currently effective proportional gain is available in **AL 211**.

P 565 **Threshold, P-gain $K_P$ 1 (unassigned PI controller)**

The proportional gain $K_P$ 1 (P 563) becomes effective as soon as the signal selected with parameter P 567 falls below the set value.

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |

P 566 **Threshold, P-gain $K_P$ 2 (unassigned PI controller)**

The proportional gain $K_P$ 2 (P 564) becomes effective as soon as the signal selected with parameter P 567 exceeds the set value.

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |

P 567 **Adaptation signal, P-gain $K_P$ (unassigned PI controller)**

Selects the signal (ALink) used for P-gain adaptation.

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 0 | Modify: | Online |

- The threshold set with parameter P 565 is higher than the one set with parameter P 566.

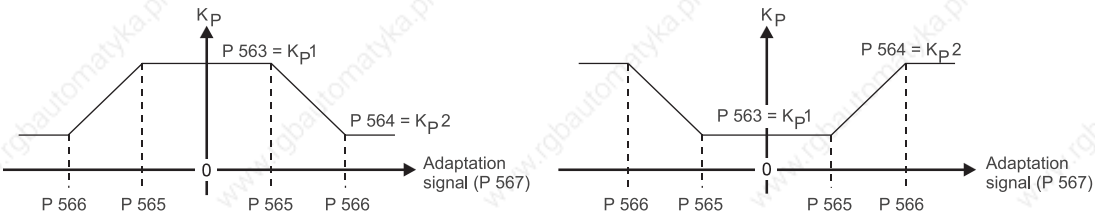



Illustration 72: $K_P$ adaptation for the unassigned PI controller - Fig. 1

- The threshold set with parameter P 566 is lower than or equal to the one set with parameter P 565.

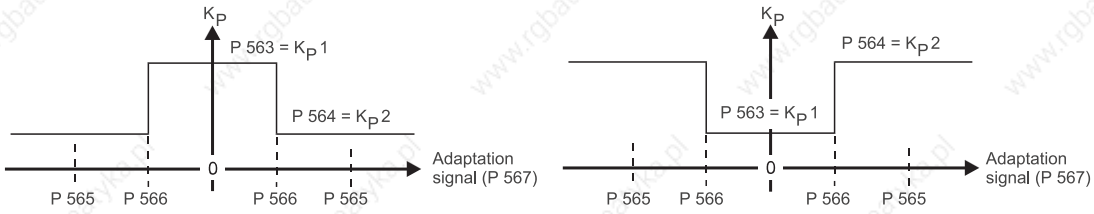



Illustration 73: $K_P$ adaptation for the unassigned PI controller - Fig. 2

P 568 **Integral-action time $T_n$ 1 (unassigned PI controller)**

Integral-action time 1 of the unassigned PI controller. Is effective when the signal selected with parameter P 572 falls below the value set in parameter P 571.

| | | | |
|---|---|---|---|
| Range: | 0,020 s...10,000 s | Save: | Data record |
| Standard value: | 0,400 s | Modify: | Online |

P 569 **Integral-action time $T_n$ 2 (unassigned PI controller)**

Integral-action time 2 of the unassigned PI controller. Is effective when the signal selected with parameter P 572 exceeds the value set in parameter P 571.

| | | | |
|---|---|---|---|
| Range: | 0,020 s...10,000 s | Save: | Data record |
| Standard value: | 0,400 s | Modify: | Online |

The currently effective integral-action time is available in **AL 212**.

P 570 **Threshold for Integral-action time $T_n$ 1 (unassigned PI controller)**

The integral-action time $T_{n1}$ (P 568) becomes effective as soon as the signal selected with parameter P 572 falls below the set value.

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |

P 571 **Threshold for Integral-action time $T_n$ 2 (unassigned PI controller)**

The integral-action time $T_{n2}$ (P 569) becomes effective as soon as the signal selected with parameter P 572 exceeds the set value.

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |

P 572 **Signal selection, unassigned PI controller, integral-action time**

Selects the signal (ALink) used for integral-action time adaptation.

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 0 | Modify: | Online |

- The threshold set with parameter P 571 is larger than the one set with parameter P 570.

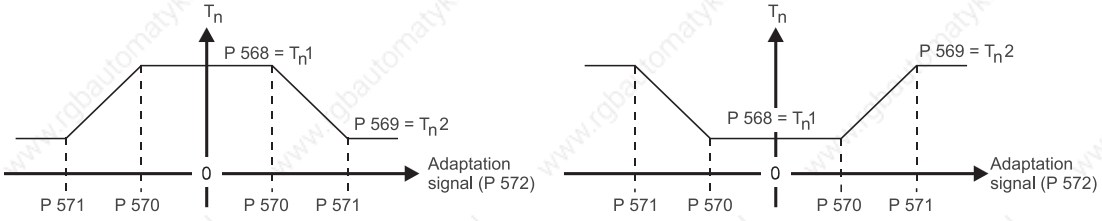



Illustration 74: $K_P$ adaptation for the unassigned PI controller - Fig. 1

- The threshold set with parameter P 571 is lower than or equal to the one set with parameter P 570.

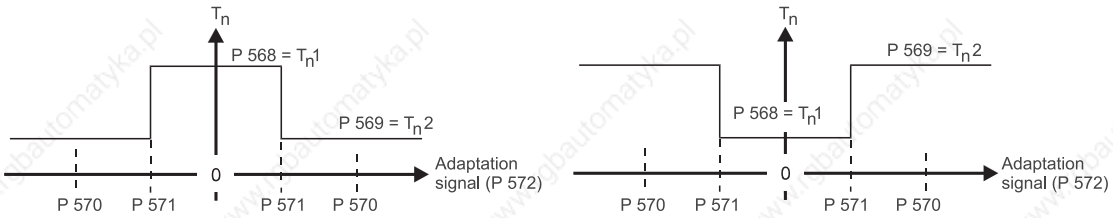



Illustration 75: $K_P$ adaptation for the unassigned PI controller - Fig. 2

P 574 **Preset I component (unassigned PI controller)**

While the PI controller is disabled (refer parameter P 579), the set value is transferred into the I component of the unassigned PI controller (AL 116).

| | | | |
|---|---|---|---|
| Range: | -100.00 %...+100.00 % | Save: | Data record |
| Standard value: | 0.00 % | Modify: | Online |

P 575 **Positive limit, I component (unassigned PI controller)**

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |

P 576 **Negative limit, I component (unassigned PI controller)**

| | | | |
|---|---|---|---|
| Range: | 0.00 %...-100.00 % | Save: | Data record |
| Standard value: | -100.00 % | Modify: | Online |

P 577 **Positive limit, controller output (unassigned PI controller)**

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |

P 578 **Negative limit, controller output (unassigned PI controller)**

| | | | |
|---|---|---|---|
| Range: | 0.00 %...-100.00 % | Save: | Data record |
| Standard value: | -100.00 % | Modify: | Online |

P 579 **Enable mode**

Selects whether the controller disable, controller enable contacts or converter malfunction have an effect on the unassigned PI controller (digital input function DIF 28 is then **ineffective**), or whether the unassigned PI controller is to be enabled/disabled **independently** of the converter enables via digital input function DIF 28.

| Value | Description |
|---|---|
| 1 | Converter controller enables affect unassigned PI controller, DIF 28 **ineffective** |
| 2 | Unassigned PI controller enabled/disabled **only** via digital input function DIF 28 |

| | | | |
|---|---|---|---|
| Range: | 1...2 | Save: | Primary data |
| Standard value: | 1 | Modify: | Online |

## 5.30 Parameter description - Unassigned function blocks

P 600 **Status word (unassigned function blocks)**

Parameter number in hexadecimal representation: 0258

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 0: Spare | DL0560 |
| 1 | 0: Spare | DL0561 |
| 2 | 0: Spare | DL0562 |
| 3 | 0: Spare | DL0563 |
| 4 | 1: Comparator input signals below the set threshold | DL0564 |
| 5 | 0: Spare | DL0565 |
| 6 | 0: Spare | DL0566 |
| 7 | 0: Spare | DL0567 |
| 8 | 1: Changeover switch 1 active (signal P 667 passed on) | DL0568 |
| 9 | 1: Changeover switch 2 active (signals P 669+P 670 passed on) | DL0569 |
| 10 | 1: Changeover switch 3 active (signal P 672*P 673 passed on) | DL0570 |
| 11 | 1: Changeover switch 4 active (signal P 674 passed on) | DL0571 |
| 12 | 0: Spare | DL0572 |
| 13 | 0: Spare | DL0573 |
| 14 | 0: Spare | DL0574 |
| 15 | 0: Spare | DL0575 |

P 601 **Control word (unassigned function blocks)**

Parameter number in hexadecimal representation: 0259

| Bit no. | Description | DLink |
|---|---|---|
| 0 | 1: Unassigned changeover switch 1 active (signal P 667 passed on) | DL0576 |
| 1 | 1: Unassigned changeover switch 2 active (signals P 669+P 670 passed on) | DL0577 |
| 2 | 1: Unassigned changeover switch 3 active (signal P 672*P 673 passed on) | DL0578 |
| 3 | 1: Unassigned changeover switch 4 active (signal P 674 passed on) | DL0579 |
| 4 | Spare: Always set to zero | DL0580 |
| 5 | Spare: Always set to zero | DL0581 |
| 6 | Spare: Always set to zero | DL0582 |
| 7 | Spare: Always set to zero | DL0583 |
| 8 | Spare: Always set to zero | DL0584 |
| 9 | Spare: Always set to zero | DL0585 |
| 10 | Spare: Always set to zero | DL0586 |
| 11 | Spare: Always set to zero | DL0587 |
| 12 | Spare: Always set to zero | DL0588 |
| 13 | Spare: Always set to zero | DL0589 |
| 14 | Spare: Always set to zero | DL0590 |
| 15 | Spare: Always set to zero | DL0591 |

**Parameter description - Arithmetic functions**

P 602 **Input signal A at unassigned adder 1**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 603 **Input signal B at unassigned adder 1**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 604 **Input signal C at unassigned adder 1**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 605 **Input signal D at unassigned adder 1**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

The outputs of unassigned adder 1 are available in ALinks 117 to 120.

P 606 **Input signal A at unassigned adder 2**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 607 **Input signal B at unassigned adder 2**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 608 **Input signal C at unassigned adder 2**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 609 **Input signal D at unassigned adder 2**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

The outputs of unassigned adder 2 are available in ALinks 121 to 124.

P 610 **Input signal A at unassigned adder 3**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 611 **Input signal B at unassigned adder 3**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 612 **Input signal C at unassigned adder 3**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 613 **Input signal D at unassigned adder 3**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

The outputs of unassigned adder 3 are available in ALinks 125 to 128.

P 614 **Input signal A at unassigned adder 4**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 615 **Input signal B at unassigned adder 4**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 616 **Input signal C at unassigned adder 4**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 617 **Input signal D at unassigned adder 4**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

The outputs of unassigned adder 4 are available in ALinks 129 to 132.

P 618 **Input signal A at unassigned multiplier 1**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 619 **Input signal B at unassigned multiplier 1**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 620 **Input signal C at unassigned multiplier 1**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 621 **Input signal D at unassigned multiplier 1**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

The multiplier output is

$$\frac{(\text{Input A} + \text{Input B}) \times (\text{Input C} + \text{Input D})}{100\ \%}$$

The output of the unassigned multiplier 1 is available in ALink 135.

P 622 **Input signal A at unassigned multiplier 2**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 623 **Input signal B at unassigned multiplier 2**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 624 **Input signal C at unassigned multiplier 2**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 625 **Input signal D at unassigned multiplier 2**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

The multiplier output is

$$\frac{(\text{Input A} + \text{Input B}) \times (\text{Input C} + \text{Input D})}{100\ \%}$$

The output of the unassigned multiplier 2 is available in ALink 138.

P 626 **Input signal A at unassigned divider 1**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 627 **Input signal B at unassigned divider 1**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 628 **Input signal C at unassigned divider 1**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 629 **Input signal D at unassigned divider 1**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

The divider output is

$$\frac{(\text{Input A} + \text{Input B})}{(\text{Input C} + \text{Input D})} \times 100\ \%; \quad \frac{0}{0} \text{ equals } +P\ 111; \quad \frac{\pm X}{0} \text{ equals } \pm P\ 111$$

The output of the unassigned divider 1 is available in ALink 141.

P 630 **Input signal A at unassigned divider 2**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 631 **Input signal B at unassigned divider 2**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 632 **Input signal C at unassigned divider 2**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 633 **Input signal D at unassigned divider 2**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

The divider output is

$$\frac{(\text{Input A} + \text{Input B})}{(\text{Input C} + \text{Input D})} \times 100\ \%; \quad \frac{0}{0} \text{ equals } +P\ 111; \quad \frac{\pm X}{0} \text{ equals } \pm P\ 111$$

The output of the unassigned divider 2 is available in ALink 144.

P 634 **Input signal at unassigned multiplier 1 (**from S03.10)

Selection of the ALink.

| | | | |
|---|---|---|---|
| Range: | 0...350 | Save: | Data record |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 635 **Scaling at unassigned multiplier 1 (**from S03.10)

The selected signal (parameter P634) is multiplied by the set factor. The result is limited by the set value in parameter P 111 if necessary and assigned in any case to ALink 145.

| | | | |
|---|---|---|---|
| Range: | -10,00...+10,00 | Save: | Data record |
| Standard value: | +1,00 | Modify: | Online |

P 636 **Input signal at unassigned multiplier 2 (**from S03.10)

Selection of the ALink.

| | | | |
|---|---|---|---|
| Range: | 0...350 | Save: | Data record |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 637 **Scaling at unassigned multiplier 2 (**from S03.10)

The selected signal (parameter P636) is multiplied by the set factor. The result is limited by the set value in parameter P 111 if necessary and assigned in any case to ALink 146.

| | | | |
|---|---|---|---|
| Range: | -10,00...+10,00 | Save: | Data record |
| Standard value: | +1,00 | Modify: | Online |

P 638 **Input signal at unassigned multiplier 3 (**from S03.10)

Selection of the ALink.

| | | | |
|---|---|---|---|
| Range: | 0...350 | Save: | Data record |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 639 **Scaling at unassigned multiplier 2 (**from S03.10)

The selected signal (parameter P638) is multiplied by the set factor. The result is limited by the set value in parameter P 111 if necessary and assigned in any case to ALink 147.

| | | | |
|---|---|---|---|
| Range: | -10,00...+10,00 | Save: | Data record |
| Standard value: | +1,00 | Modify: | Online |

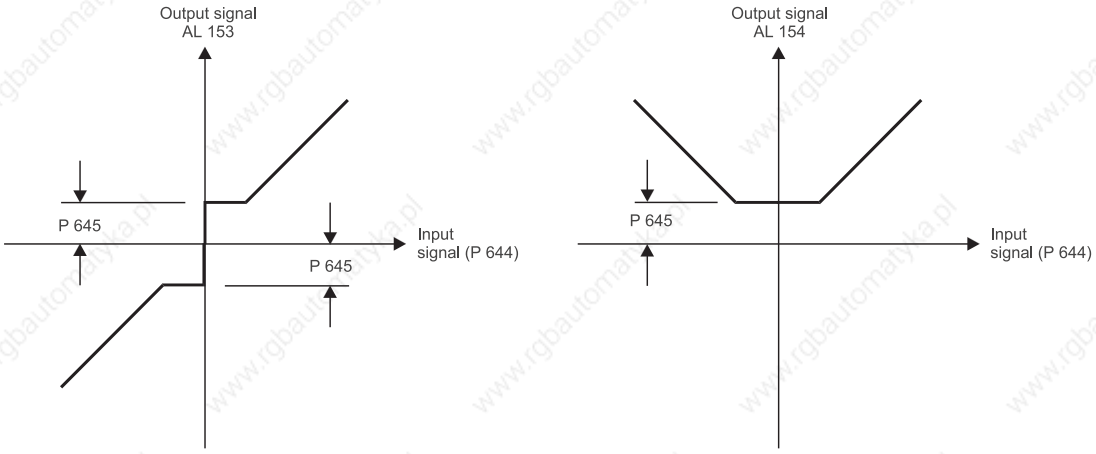
**Parameter description - Unassigned function blocks**

P 644 **Input signal, minimum value limiter**

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 645 **Threshold, minimum value limiter**

Inputs the minimum output value of the limiter. The limiter output does not adopt any smaller values, not even if the input signal selected with parameter P 644 falls below the set threshold. The limiter has a gain 1.




| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 0.00 % | Modify: | Online |

The output signals of the minimum value limiter are available in ALinks 153 and 154.

P 646 **Input signal formatter**

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 647 **X value of input signal formatter**

This parameter defines the value of the input signal at which the output signal rise changes.

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 50.00 % | Modify: | Online |

P 648 **Y value of input signal formatter**

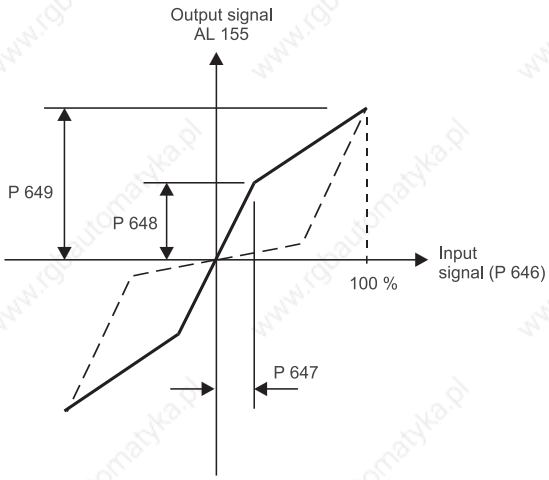
Once the input value reaches the value set with parameter P 647, the signal formatter output reaches the value set here.

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 50.00 % | Modify: | Online |

P 649 **Final value of input signal formatter**

Signal formatter output value reached at 100 % of the input signal.

| | | | |
|---|---|---|---|
| Range: | 0.00 %...100.00 % | Save: | Data record |
| Standard value: | 100.00 % | Modify: | Online |




The output signal of the input signal formatter is available in ALink 155.

P 650 **Input, absolute value generator 1**

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

The outputs of the unassigned absolute value generator are available in ALinks 156 to 158.

P 651 **Input, absolute value generator 2**

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

The outputs of the unassigned absolute value generator are available in ALinks 159 to 161.

P 652 **Input, absolute value generator 3**

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

The outputs of the unassigned absolute value generator are available in ALinks 162 to 164.

P 653 **Input, absolute value generator 4**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

The outputs of the unassigned absolute value generator are available in ALinks 165 to 167.

P 654 **Input, inverter 1**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

The output of the unassigned inverter is available in ALink 168.

P 655 **Input, inverter 2**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

The output of the unassigned inverter is available in ALink 169.

P 656 **Input, limiter**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 657 **Positive limit, limiter**

| | | | | |
|---|---|---|---|---|
| Range: | 0.00 %...110.00 % | | Save: | Data record |
| Range: | -100.00...100.00 | from S03.10 | | |
| Standard value: | 0.00 % | | Modify: | Online |

P 658 **Negative limit, limiter**

| | | | | |
|---|---|---|---|---|
| Range: | 0.00 %...-110.00 % | | Save: | Data record |
| Range: | -100.00...100.00 | from S03.10 | | |
| Standard value: | 0.00 % | | Modify: | Online |

The output of the unassigned limiter is available in ALink 170.

P 659 **Input, dead band**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 660 **Positive threshold, dead band**

| | | | |
|---|---|---|---|
| Range: | 0.00 %...110.00 % | Save: | Data record |
| Range: | -100.00...100.00 from S03.10 | | |
| Standard value: | 0.00 % | Modify: | Online |

P 661 **Negative threshold, dead band**

| | | | |
|---|---|---|---|
| Range: | 0.00 %...-110.00 % | Save: | Data record |
| Range: | -100.00...100.00 from S03.10 | | |
| Standard value: | 0.00 % | Modify: | Online |

The output of the unassigned dead band is available in ALink 173.

P 662 **Input, filter 1**

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 663 **Time constant, filter 1**

As time constants lower than 8 ms remain ineffective (at $f_{mains}$ = 45 Hz), input of values between 1 and 7 ms results in automatic entry of a value of 8 ms. Smoothing is switched off at a setting of 0 ms.

| | | | |
|---|---|---|---|
| Range: | 0...1000 ms | Save: | Data record |
| Standard value: | 10 ms | Modify: | Online |

The output of the unassigned filter is available in ALink 186.

P 664 **Input selection, filter 2**

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 from S03.03 | | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 665 **Time constant, filter 2**

As time constants lower than 8 ms remain ineffective (at $f_{mains}$ = 45 Hz), input of values between 1 and 7 ms results in automatic entry of a value of 8 ms. Smoothing is switched off at a setting of 0 ms.

| | | | |
|---|---|---|---|
| Range: | 0...1000 ms | Save: | Data record |
| Standard value: | 10 ms | Modify: | Online |

The output of the unassigned filter is available in ALink 187.

P 666 **Input A, changeover switch 1**

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 | from S03.03 | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 667 **Input B, changeover switch 1**

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 | from S03.03 | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

The unassigned changeover switch 1 is triggered via digital input function DIF 23 or via bit 0 in the control word of the unassigned function blocks (P 601).

Input A in ALink 195 if the control signal is LOW,

input B in ALink 195 if the control signal is HIGH.

P 668 **Input A, changeover switch 2**

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 | from S03.03 | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 669 **Input B, changeover switch 2**

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 | from S03.03 | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

P 670 **Input C, changeover switch 2**

| | | | |
|---|---|---|---|
| Range: | 0...330 | Save: | Data record |
| Range: | 0...350 | from S03.03 | |
| Standard value: | 0 (= 0 %) | Modify: | Online |

The unassigned changeover switch 2 is triggered via digital input function DIF 24 or via bit 1 in the control word of the unassigned function blocks (P 601).

Input A in ALink 196 if the control signal is LOW,

Sum of input signals B and C in ALink 196 if the control signal is HIGH.

P 671 **Input A, changeover switch 3**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 672 **Input B, changeover switch 3**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 673 **Scaling input B, changeover switch 3**

Multiplier for the value at input B

| | | | | |
|---|---|---|---|---|
| Range: | 0,000...5,000 | | Save: | Data record |
| Range: | -5,000...+5,000 | from S03.10 | | |
| Standard value: | 1.000 | | Modify: | Online |

The unassigned changeover switch 3 is triggered via digital input function DIF 25 or via bit 2 in the control word of the unassigned function blocks (P 601).

Input A in ALink 197 if the control signal is LOW.

Input signal B scaled with parameter P 673 in ALink 197 if the control signal is HIGH.

P 674 **Input, changeover switch 4**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 675 **Scaling, changeover switch 4**

Multiplier for the value at the input.

| | | | | |
|---|---|---|---|---|
| Range: | 0,000...1,000 | | Save: | Data record |
| Range: | -1,000...+1,000 | from S03.10 | | |
| Standard value: | 1,000 | | Modify: | Online |

The unassigned changeover switch 4 is triggered via digital input function DIF 26 or via bit 4 in the control word of the unassigned function blocks (P 601).

Input signal scaled with parameter P 675 in ALink 198 if the control signal is LOW.

Input signal in ALink 198 if the control signal is HIGH.

P 676 **Input A, comparator**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 1 (=+100 %) | | Modify: | Online |

P 677 **Input B, comparator**

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 678 **Threshold, comparator**

| | | | |
|---|---|---|---|
| Range: | 0.10 %...100.00 % | Save: | Data record |
| Standard value: | 5.00 % | Modify: | Online |

P 679 **Hysteresis, comparator**

This value is subtracted from the threshold of the unassigned comparator and thus defines the lower threshold. Any value larger than the value in parameter P 678, entered here, sets the lower threshold to the minimum value of 0.10 % !

The input signal of the comparator (AL 200) is the difference between the two input signals |input A – input B|.

The output signal of the comparator is available in DLink 14.

DLink 14 changes from LOW to HIGH if the absolute value of the input signal at the comparator falls below the value P 678 - P 679.

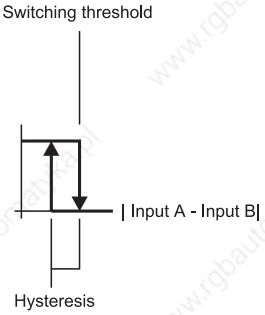
DLink 14 changes from HIGH to LOW if the absolute value of the input signal at the comparator exceeds the value P 678.

| | | | |
|---|---|---|---|
| Range: | 0.01 %...100.00 % | Save: | Data record |
| Standard value: | 2.00 % | Modify: | Online |

The standard values of P 678 and P 679

cause DLink 14 to adopt LOW state once the input signal at the comparator exceeds 5 %.

cause DLink 14 to adopt HIGH state once the input signal at the comparator falls below 3 %.



P 680 **DLink selection for P 681**

Shows the DLink whose value is to be displayed in P 681.

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 681 **Value of selected DLink (selected with P 680)**

Value of the selected DLink, display width 1 bit - '0' or '1'

'0' → LOW

'1' → HIGH

P 682 **Input ALink/DLink converter 1**

Each of the 16 bits of the selected ALink is copied into 16 fixed-assigned DLinks (DLink 1040 to DLink 1055).

Bit 0 of the ALink is copied into DLink 1040, bit 1 of the ALink into DLink 1041, etc.

| Bit no. of the selected ALink | | Corresponding DLink no. |
|---|---|---|
| 0 | → | 1040 |
| 1 | → | 1041 |
| 2 | → | 1042 |
| 3 | → | 1043 |
| 4 | → | 1044 |
| 5 | → | 1045 |
| 6 | → | 1046 |
| 7 | → | 1047 |
| 8 | → | 1048 |
| 9 | → | 1049 |
| 10 | → | 1050 |
| 11 | → | 1051 |
| 12 | → | 1052 |
| 13 | → | 1053 |
| 14 | → | 1054 |
| 15 | → | 1055 |

| | | | | | |
|---|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 | | Modify: | Online |

P 683 **Input ALink/DLink converter 2**

Each of the 16 bits of the selected ALink is copied into 16 fixed-assigned DLinks (DLink 1056 to DLink 1071).

Bit 0 of the ALink is copied into DLink 1056, bit 1 of the ALink into DLink 1057, etc.

| Bit no. of the selected ALink | | Corresponding DLink no. |
|---|---|---|
| 0 | → | 1056 |
| 1 | → | 1057 |
| 2 | → | 1058 |
| 3 | → | 1059 |
| 4 | → | 1060 |
| 5 | → | 1061 |
| 6 | → | 1062 |
| 7 | → | 1063 |
| 8 | → | 1064 |
| 9 | → | 1065 |
| 10 | → | 1066 |
| 11 | → | 1067 |
| 12 | → | 1068 |
| 13 | → | 1069 |
| 14 | → | 1070 |
| 15 | → | 1071 |

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 | | Modify: | Online |

P 684 **Set source parameter 1 for DLink 44/45**

Number of the parameter whose bit(s) is/are to be transferred into DLinks 44 and 45.

| | | | |
|---|---|---|---|
| Range: | 0...999 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 685 **Bit mask for source parameter 1**

**Selection mask** to define the bits of the source parameter (P 684), whose states (0 or 1) set DLink 44 to HIGH (and thus DLink 45 to LOW). Enter a '1' for each selected bit at the relevant position.

Example:

Selecting bits 2, 3, 8 and 9 requires a binary value of 0000'00**11**'0000'**11**00 to be entered as 030Chex. The state of these selected bits affects DLinks 44 and 45.

| | | | |
|---|---|---|---|
| Range: | 0000...FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 686 **Bit pattern for source parameter 1**

**State mask** for the bits selected with parameter P 685.

Example:

Bits nos. 2, 3, 8 and 9 of the source parameter (P 684) were selected. DLink 44 is now to change to HIGH (DLink 45 to LOW) if bit 2 = '1', bit 3 = '0', bit 8 = '0' and bit 9 = '1'. This results in a binary value of 0000'00**10**'0000'**01**00 and must be entered as 0204hex.

| | | | |
|---|---|---|---|
| Range: | 0000...FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

DLink 44 changes to HIGH (='1') if in the source parameter selected with parameter P 684 the bits defined with parameter P 685 correspond to the pattern defined with parameter P 686. DLink 45 is inverted with regard to DLink 44.

P 687 **Set source parameter 2 for DLink 46/47**

Number of the parameter whose bit(s) is/are to be transferred into DLinks 46 and 47.

| | | | |
|---|---|---|---|
| Range: | 0...999 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 688 **Bit mask for source parameter 2**

**Selection mask** to define the bits of the source parameter (P 687), whose states (0 or 1) set DLink 46 to HIGH (and thus DLink 47 to LOW). Enter a '1' for each selected bit at the relevant position.

Example:

Selecting bits 0, 5, 12 and 14 requires a binary value of 0**1**0**1**'0000'00**1**0'000**1** to be entered as 5021 hex. The state of these selected bits affects DLinks 46 and 47.

| | | | |
|---|---|---|---|
| Range: | 0000...FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 689 **Bit pattern for source parameter 2**

**State mask** for the bits selected with parameter P 688.

Example:

Bits nos. 0, 5, 12 and 14 of the source parameter (P 687) were selected.

DLink 46 will now change to HIGH (DLink 47 to LOW) when bit 0 = '1',

bit 5 = '0', bit 12 = '1' and bit 14 = '1'. This results in a binary value of 0**1**0**1**'0000'00**0**0'000**1** to be entered as 5001hex.

| | | | |
|---|---|---|---|
| Range: | 0000...FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

DLink 46 changes to HIGH (='1') if in the source parameter selected with parameter P 687 the bits defined with parameter P 688 correspond to the pattern defined with parameter P 689. DLink 47 is inverted with regard to DLink 46.

P 690 **DLink x writing target parameter (P 691)**

DLink number influencing the target parameter defined with P 691.

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 691 **Target parameter, DLink x (P690)**

Number of the parameter which is influenced by the DLink defined in P 690.

| | | | |
|---|---|---|---|
| Range: | 0...999 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 692 **Write mask for target parameter (P691)**

Mask for the bits of the target parameter (P 691), influenced by DLink x. For each selected bit a "1" must be set at the corresponding position.

Example:

Writing bits 3 and 4 requires a binary value of 0000'0000'000**1**'**1**000 to be entered as 0018hex.

| | | | |
|---|---|---|---|
| Range: | 0000...FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 693 **Write pattern for DLink x: HIGH (P691)**

Bit pattern (0/1) which is written at HIGH state of DLink x to the selected bits (P692) of the target parameter (P691).

Example:

As long as DLink x (selected with P 690) is HIGH, bit 3 is to be set to '0' and bit 4 to '1' in the target parameter selected with P 691. The bits were selected with P 692. Therefore a binary value of 0000'0000'000**1**'**0**000 is required and to be entered as 0010hex.

| | | | |
|---|---|---|---|
| Range: | 0000...FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 694 **Write pattern for DLink x: LOW (P691)**

Bit pattern (0/1) which is written at LOW state of DLink x to the selected bits (P692) of the target parameter (P691).

Example:

As long as DLink x (selected with P 690) is LOW, bit 3 is to be set to '1' and bit 4 to '0' in the target parameter selected with P 691. The bits were selected with P 692. Therefore a binary value of 0000'0000'000**0**'**1**000 is required and to be entered as 0008hex.

| | | | |
|---|---|---|---|
| Range: | 0000...FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 695 **DLink x writing target parameter (P 696)**

DLink number influencing the target parameter defined with P 696.

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 696 **Target parameter, DLink x (P695)**

Number of the parameter which is influenced by the DLink defined in P 695.

| | | | |
|---|---|---|---|
| Range: | 0...999 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 697 **Write mask for target parameter (P696)**

Mask for the bits of the target parameter (P 696), influenced by DLink x. For each selected bit a "1" must be set at the corresponding position.

Example:

Writing bits 3, 7 and 8 requires a binary value of 0000'000**1**'**1**000'**1**000 to be entered as 0188hex.

| | | | |
|---|---|---|---|
| Range: | 0000...FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 698 **Write pattern for DLink x: HIGH (P696)**

Bit pattern (0/1) which is written at HIGH state of DLink x to the selected bits (P697) of the target parameter (P696).

Example:

As long as DLink y (selected with P 695) is HIGH, bit 3 is to be set to '1', bit 7 to '1' and bit 8 to '0' in the target parameter selected with P 696. The bits were selected with P 697. This requires a binary value of 0000'000**0**'**1**000'**1**000 to be entered as 0088hex.

| | | | |
|---|---|---|---|
| Range: | 0000...FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 699 **Write pattern for DLink x: LOW (P696)**

Bit pattern (0/1) which is written at LOW state of DLink x to the selected bits (P697) of the target parameter (P696).

Example:

As long as DLink y (selected with P 695) is LOW, bit 3 is to be set to '0', bit 7 to '0' and bit 8 to '1' in the target parameter selected with P 696. The bits were selected with P 697. This requires a binary value of 0000'000**1**'**0**000'**0**000 to be entered as 0100hex.

| | | | |
|---|---|---|---|
| Range: | 0000...FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

## 5.31 Parameter description - DLink functions

P 702 **Input at unassigned digital inverter 1**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

The output of the unassigned inverter is available in DLinks DL 592 and DL 593.

P 703 **Delay time, unassigned digital inverter 1**

A level change of the DLink selected with P 702 is accepted into DLinks DL 592 (original signal) and DL 593 (inverted signal) only after the set time.

| | | | |
|---|---|---|---|
| Range: | 0.00...30.00 s<br>0.00...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 704 **Input at unassigned digital inverter 2**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

The output of the unassigned inverter is available in DLinks DL 594 and DL 595.

P 705 **Delay time, unassigned digital inverter 2**

A level change of the DLink selected with P 704 is accepted into DLinks DL 594 (original signal) and DL 595 (inverted signal) only after the set time.

| | | | |
|---|---|---|---|
| Range: | 0.00...30.00 s<br>0.00...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 706 **Input at unassigned digital inverter 3**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

The output of the unassigned inverter is available in DLinks DL 596 and DL 597.

P 707 **Delay time, unassigned binary inverter 3**

A level change of the DLink selected with P 706 is accepted into DLinks DL 596 (original signal) and DL 597 (inverted signal) only after the set time.

| | | | |
|---|---|---|---|
| Range: | 0.00...30.00 s<br>0.00...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 708 **Input at unassigned digital inverter 4**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

The output of the unassigned inverter is available in DLinks DL 598 and DL 599.

P 709 **Delay time for unassigned digital inverter 4**

A level change of the DLink selected with P 708 is accepted into DLinks DL 598 (original signal) and DL 599 (inverted signal) only after the set time.

| | | | |
|---|---|---|---|
| Range: | 0.00...30.00 s<br>0.00...160.00 s (from S 03.20) | Save: | Data record |
| Standard value: | 0.00 s | Modify: | Online |

P 710 **Function, gate 1 (AND/OR/XOR)**

This parameter selects one of the digital functions AND, OR or XOR. The operation result is stored in DLink DL 600, the inverted result in DLink DL 601.

| Value | Description |
|---|---|
| 0 | No relation active; DL 600 always LOW - DL 601 always HIGH |
| 1 | AND gate with **four** inputs, assign DL 1 to unassigned inputs |
| 2 | OR gate with **four** inputs, assign DL 0 to unassigned inputs |
| 3 | EXCLUSIVE OR gate with **two** inputs:<br>Only the signals set with parameters P 711 and P 712 are XOR-gated. |

| | | | |
|---|---|---|---|
| Range: | 0...3 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 711 **Input A, gate 1**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 712 **Input B, gate 1**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 713 **Input C, gate 1**

Setting this parameter at P 710 = **3 is ineffective !**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 714 **Input D, gate 1**

Setting this parameter at P 710 = **3 is ineffective !**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 715 **Function, gate 2 (AND/OR/XOR)**

This parameter selects one of the digital functions AND, OR or XOR. The operation result is stored in DLink DL 602, the inverted result in DLink DL 603.

| Value | Description |
|---|---|
| 0 | No relation active, DL 602 always LOW - DL 603 always HIGH |
| 1 | AND gate with **four** inputs , assign DL 1 to unassigned inputs |
| 2 | OR gate with **four** inputs, assign DL 0 to unassigned inputs |
| 3 | EXCLUSIVE OR gate with **two** inputs:<br>Only the signals set with parameters P 716 and P 717 are XOR-gated. |

| | | | |
|---|---|---|---|
| Range: | 0...3 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 716 **Input A, gate 2**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 717 **Input B, gate 2**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 718 **Input C, gate 2**

Setting this parameter at P 715 = **3 is ineffective !**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 719 **Input D, gate 2**

Setting this parameter at P 715 = **3 is ineffective !**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 720 **Function, gate 3 (AND/OR/XOR)**

This parameter selects one of the digital functions AND, OR or XOR. The operation result is stored in DLink DL 604, the inverted result in DLink DL 605.

| Value | Description |
|---|---|
| 0 | No relation active, DL 604 always LOW - DL 605 always HIGH |
| 1 | AND gate with **four** inputs , assign DL 1 to unassigned inputs |
| 2 | OR gate with **four** inputs, assign DL 0 to unassigned inputs |
| 3 | EXCLUSIVE OR gate with **two** inputs:<br>Only the signals set with parameters P 721 and P 722 are XOR-gated. |

| | | | |
|---|---|---|---|
| Range: | 0...3 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 721 **Input A, gate 3**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 722 **Input B, gate 3**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 723 **Input C, gate 3**

Setting this parameter at P 720 = **3 is ineffective !**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 724 **Input D, gate 3**

Setting this parameter at P 720 = **3 is ineffective !**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 725 **Function, gate 4 (AND/OR/XOR)**

This parameter selects one of the digital functions AND, OR or XOR. The operation result is stored in DLink DL 606, the inverted result in DLink DL 607.

| Value | Description |
|---|---|
| 0 | No relation active; DL 606 always LOW - DL 607 always HIGH |
| 1 | AND gate with **four** inputs , assign DL 1 to unassigned inputs |
| 2 | OR gate with **four** inputs, assign DL 0 to unassigned inputs |
| 3 | EXCLUSIVE OR gate with **two** inputs:<br>**Only the signals set with parameters P 726 and P 727 are XOR-gated.** |

| | | | |
|---|---|---|---|
| Range: | 0...3 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 726 **Input A, gate 4**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 727 **Input B, gate 4**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 728 **Input C, gate 4**

Setting this parameter at P 725 = **3 is ineffective !**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 729 **Input D, gate 4**

Setting this parameter at P 725 = **3 is ineffective !**

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 (LOW) | Modify: | Online |

P 730 **Input freely definable error F105 (from S 03.15)**

The set DLink enables the error reaction.
Error enable when DLink is HIGH. The error message is deactivated when P730 = 0. If P730 ≠ 0 the drive is switched torque-free and the ready for use relay is disabled, as soon as the selected DLink is HIGH.

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 740 **DLink x writing target parameter (P 741) (from S 03.20)**

DLink number influencing the target parameter defined with P 741.

| | | | |
|---|---|---|---|
| Range: | 0... 1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 741 **Target parameter, DLink x (P 740) (from S 03.20)**

Number of the parameter which is influenced by the DLink defined in P 740.

| | | | |
|---|---|---|---|
| Range: | 0... 999 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 742 **Write mask for target parameter (P 741) (from S 03.20)**

Mask for the bits of the target parameter (P 741), influenced by DLink x. For each selected bit a "1" must be set at the corresponding position.

Example: see P 692

| | | | |
|---|---|---|---|
| Range: | 0000... FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 743 **Write pattern for DLink x: HIGH (P 741) (from S 03.20)**

Bit pattern (0/1), which is written at HIGH state of DLink x to the selected bits (P 742) of the target parameter (P 741).

Example: see P 693

| | | | |
|---|---|---|---|
| Range: | 0000... FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 744 **Write pattern for DLink x: LOW (P 741) (from S 03.20)**

Bit pattern (0/1), which is written at LOW state of DLink x to the selected bits (P 742) of the target parameter (P 741).

Example: see P 694

| | | | |
|---|---|---|---|
| Range: | 0000... FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 745 **DLink x writing target parameter (P 746) (from S 03.20)**

Dlink number influencing the target parameter defined in P 746.

| | | | |
|---|---|---|---|
| Range: | 0... 1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 746 **Target parameter, DLink x (P 745) (from S 03.20)**

Number of the parameter which is influenced by the DLink defined in P 745.

| | | | |
|---|---|---|---|
| Range: | 0... 999 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 747 **Write mask for target parameter (P 746) (from S 03.20)**

Mask for the bits of the target parameter (P 746), influenced by DLink x. For each selected bit a "1" must be set at the corresponding position.

Example: see P 692

| | | | |
|---|---|---|---|
| Range: | 0000... FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 748 **Write pattern for DLink x: HIGH (P 746) (from S 03.20)**

Bit pattern (0/1), which is written at HIGH state of DLink x to the selected bits (P 747) of the target parameter (P 746).

Example: see P 693

| | | | |
|---|---|---|---|
| Range: | 0000... FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 749 **Write pattern at DLink x: LOW (P 746) (from S 03.20)**

Bit pattern (0/1), which is written at LOW state of DLink x to the selected bits (P 747) of the target parameter (P 746).

Example: see P 694

| | | | |
|---|---|---|---|
| Range: | 0000... FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 750 **DLink x writing target parameter (P 751) (from S 03.20)**

Dlink number influencing the target parameter defined in P 751.

| | | | |
|---|---|---|---|
| Range: | 0... 1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 751 **Target parameter, DLink x (P 750) (from S 03.20)**

Number of the parameter which is influenced by the DLink defined in P 750.

| | | | |
|---|---|---|---|
| Range: | 0... 999 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 752 **Write mask for target parameter (P 751) (from S 03.20)**

Mask for the bits of the target parameter (P 751), influenced by DLink x. For each selected bit a "1" must be set on the corresponding position.

Example: see P 692

| | | | |
|---|---|---|---|
| Range: | 0000... FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 753 **Write pattern at DLink x: HIGH (P 751) (from S 03.20)**

Bit pattern (0/1), which is written at HIGH state of DLink x to the selected bits (P 752) of the target parameter (P 751).

Example: see P 693

| | | | |
|---|---|---|---|
| Range: | 0000... FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 754 **Write pattern at DLink x: LOW (P 751) (from S 03.20)**

Bit pattern (0/1), which is written at LOW state of DLink x to the selected bits (P 752) of the target parameter (P 751).

Example: see P 694

| | | | |
|---|---|---|---|
| Range: | 0000... FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 755 **DLink x writing target parameter (P 756) (from S 03.20)**

Dlink number influencing the target parameter defined with P 756.

| | | | |
|---|---|---|---|
| Range: | 0... 1200 (DLink no.) | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 756 **Target parameter, DLink x (P 755) (from S 03.20)**

Number of the parameter which is influenced by the DLink defined in P 755.

| | | | |
|---|---|---|---|
| Range: | 0... 999 | Save: | Data record |
| Standard value: | 0 | Modify: | Online |

P 757 **Write mask for target parameter (P 756) (from S 03.20)**

Mask for the bits of the target parameter (P 756), influenced by DLink x. For each selected bit a "1" must be set on the corresponding position.

Example: see P 692

| | | | |
|---|---|---|---|
| Range: | 0000... FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 758 **Write pattern for DLink x: HIGH (P 756) (from S 03.20)**

Bit pattern (0/1), which is written at HIGH state of DLink x to the selected bits (P 757) of the target parameter (P 756).

Example: see P 693

| | | | |
|---|---|---|---|
| Range: | 0000... FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

P 759 **Write pattern for DLink x: LOW (P 756) (from S 03.20)**

Bit pattern (0/1), which is written at LOW state of DLink x to the selected bits (P 757) of the target parameter (P 756).

Example: see P 694

| | | | |
|---|---|---|---|
| Range: | 0000... FFFFhex | Save: | Data record |
| Standard value: | 0000hex | Modify: | Online |

## 5.32 Parameter description - Option board parameters

P 768 **Option board parameters X**

to

P 799

The settings of these parameters are stored in the converter and required by plug-in option boards. Enter as a HEX value. The description is dependent on the respective option board. For details refer to option board description.

P 768 Option board ZK 0

P 769 Option board ZK 1

etc.

P 799 Option board ZK 31

| | | | |
|---|---|---|---|
| Range: | 0000...8000 hex | Save: | Primary data |
| | | Modify: | Online |

## 5.33 Parameter description - Error messages

P 900 **System error 1 (error bit array)**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1= Error in converter control module, refer P 910 | 624 |
| 1 | Not assigned = 0 | 625 |
| 2 | Not assigned = 0 | 626 |
| 3 | Not assigned = 0 | 627 |
| 4 | Not assigned = 0 | 628 |
| 5 | Not assigned = 0 | 629 |
| 6 | Not assigned = 0 | 630 |
| 7 | 1= Error in speed controller module, refer P 911 | 631 |
| 8 | 1= Error in incremental encoder 1 evaluation module, see P 912 | 632 |
| 9 | 1= Error in data record manager module, see P 913 | 633 |
| 10 | Not assigned = 0 | 634 |
| 11 | 1= Error in operating system module, see P 930 | 635 |
| 12 | 1= Error in µP module, see P 915 | 636 |
| 13 | 1= Error in EMF module, see P 916 | 637 |
| 14 | 1= Error in power unit module, refer P 917 | 638 |
| 15 | 1= Error in field unit module, refer P 918 | 639 |

P 901 **System error 2 (error bit array)**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1= Error in motor potentiometer module, see P 919 | 640 |
| 1 | 1= Error in digital outputs module, see P 920 | 641 |
| 2 | 1= Error in actual value detector module, see P 921 | 642 |
| 3 | 1= Error in reversing unit module, see P 922 | 643 |
| 4 | 1= Error in power unit module, see P 923 | 644 |
| 5 | 1= Error in digital inputs module, see P 924 | 645 |
| 6 | 1= Error in analog inputs module, see P 925 | 646 |
| 7 | 1= Error in armature current controller module, see P 926 | 647 |
| 8 | Error in data record manager 2 module (see P 927) | 648 |
| 9 | Error in data record manager 3 module (see P 928) (from S03.03) | 649 |
| 10 | Error in unassigned function blocks module (see P 929) (from S03.10) | 650 |
| 11 | Error in module motor temperature monitoring (see P 930) (from S03.10) | 651 |
| 12 | Not assigned = 0 | 652 |
| 13 | Not assigned = 0 | 653 |
| 14 | Not assigned = 0 | 654 |
| 15 | Not assigned = 0 | 655 |

P 902 **System warning 1 (warning bit array)**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1= Warning 1 active: P 261 / P 262 parameter conflict | 656 |
| 1 | 1 = Warning 2 active: Data record save not completed | 657 |
| 2 | 1 = Warning 3 active: Power unit temperature exceeded | 658 |
| 3 | 1 = Warning 4 active: Data record not erased | 659 |
| 4 | 1 = Warning 5 active: P 072 / P 074 parameter conflict | 660 |
| 5 | 1 = Warning 6 active: Intermittent-current limit cannot be ascertained (at P 082 = 1) | 661 |
| 6 | 1 = Warning 7 active: Data record change not possible | 662 |
| 7 | 1 = Warning 8 active: Motor $i^2t$ tripped | 663 |
| 8 | 1 = Warning 9 active: Cannot erase boot data record | 664 |
| 9 | 1 = Warning 10 active: Cannot reset | 665 |
| 10 | 1= Warning 11 active: Warning temperature channel 1 (motor temp. ≥ P 542) | 666 |
| 11 | 1= Warning 12 active: Warning temperature channel 2 (motor temp. ≥ P 545) | 667 |
| 12 | 1= Warning 13 active: Pre-warning power unit temperature | 668 |
| 13 | Not assigned = 0 | 669 |
| 14 | Not assigned = 0 | 670 |
| 15 | Not assigned = 0 | 671 |

P 903 **System warning 2 (warning bit array)**

| Bit | Description | DLink |
|---|---|---|
| 0 | Not assigned = 0 | 672 |
| 1 | Not assigned = 0 | 673 |
| 2 | Not assigned = 0 | 674 |
| 3 | Not assigned = 0 | 675 |
| 4 | Not assigned = 0 | 676 |
| 5 | Not assigned = 0 | 677 |
| 6 | Not assigned = 0 | 678 |
| 7 | Not assigned = 0 | 679 |
| 8 | Not assigned = 0 | 680 |
| 9 | Not assigned = 0 | 681 |
| 10 | Not assigned = 0 | 682 |
| 11 | Not assigned = 0 | 683 |
| 12 | Not assigned = 0 | 684 |
| 13 | Not assigned = 0 | 685 |
| 14 | Not assigned = 0 | 686 |
| 15 | Not assigned = 0 | 687 |

P 910 **Error in converter control module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 1 active: BASS communication time monitoring | 688 |
| 1 | 1 = Error 2 active: USS communication time monitoring | 689 |
| 2 | 1 = Error 3 active: Process data channel time monitoring | 690 |
| 3 | 1 = Error 4 active: Parameter channel transmission time monitoring | 691 |
| 4 | Not assigned = 0 | 692 |
| 5 | Not assigned = 0 | 693 |
| 6 | Not assigned = 0 | 694 |
| 7 | Not assigned = 0 | 695 |
| 8 | 1 = Error 91 active: Undefined field bus card state | 696 |
| 9 | 1 = Error 92 active: Field bus error | 697 |
| 10 | 1 = Error 93 active: Field bus setpoint/actual-value configuration error | 698 |
| 11 | Not assigned = 0 | 699 |
| 12 | Not assigned = 0 | 700 |
| 13 | Not assigned = 0 | 701 |
| 14 | Not assigned = 0 | 702 |
| 15 | 1 = Error 7 active: Program branching error | 703 |

P 911 **Error in speed controller module**

| Bit | Description | DLink |
|---|---|---|
| 0 | Not assigned = 0 | 704 |
| 1 | 1 = Error 8 active: Drive blocked | 705 |
| 2 | Not assigned = 0 | 706 |
| 3 | Not assigned = 0 | 707 |
| 4 | Not assigned = 0 | 708 |
| 5 | Not assigned = 0 | 709 |
| 6 | Not assigned = 0 | 710 |
| 7 | Not assigned = 0 | 711 |
| 8 | Not assigned = 0 | 712 |
| 9 | Not assigned = 0 | 713 |
| 10 | Not assigned = 0 | 714 |
| 11 | Not assigned = 0 | 715 |
| 12 | Not assigned = 0 | 716 |
| 13 | Not assigned = 0 | 717 |
| 14 | Not assigned = 0 | 718 |
| 15 | Not assigned = 0 | 719 |

P 912 **Error in incremental encoder module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 9 active: Incremental encoder 1, scaling error | 720 |
| 1 | Not assigned = 0 | 721 |
| 2 | Not assigned = 0 | 722 |
| 3 | Not assigned = 0 | 723 |
| 4 | Not assigned = 0 | 724 |
| 5 | Not assigned = 0 | 725 |
| 6 | Not assigned = 0 | 726 |
| 7 | Not assigned = 0 | 727 |
| 8 | Not assigned = 0 | 728 |
| 9 | Not assigned = 0 | 729 |
| 10 | Not assigned = 0 | 730 |
| 11 | Not assigned = 0 | 731 |
| 12 | Not assigned = 0 | 732 |
| 13 | Not assigned = 0 | 733 |
| 14 | Not assigned = 0 | 734 |
| 15 | Not assigned = 0 | 735 |

P 913 **Error in data record manager 1 module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 10 active: EEPROM-to-RAM copy error | 736 |
| 1 | 1 = Error 11 active: Damaged boot data record header | 737 |
| 2 | 1 = Error 12 active: Boot data record checksum error | 738 |
| 3 | 1 = Error 13 active: Damaged primary data header | 739 |
| 4 | 1 = Error 14 active: EEPROM too small | 740 |
| 5 | 1 = Error 15 active: Error on data record save | 741 |
| 6 | 1 = Error 57 active: Ambiguous data record change source | 742 |
| 7 | 1 = Error 58 active: EEPROM empty | 743 |
| 8 | 1 = Error 59 active: Parameter error in data record 1 (write error/value) | 744 |
| 9 | 1 = Error 60 active: Parameter error in data record 2 (write error/value) | 745 |
| 10 | 1 = Error 61 active: Parameter error in data record 3 (write error/value) | 746 |
| 11 | 1 = Error 62 active: Parameter error in data record 4 (write error/value) | 747 |
| 12 | 1 = Error 63 active: Parameter error in data record 5 (write error/value) | 748 |
| 13 | 1 = Error 64 active: Parameter error in data record 6 (write error/value) | 749 |
| 14 | 1 = Error 65 active: Error in ROM data record (no. 7) | 750 |
| 15 | 1 = Error 66 active: Primary data parameter error | 751 |

P 914 **Error in operating system module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 16 active: Ambiguous converter type BKD/BKF (1-Q/4-Q) | 752 |
| 1 | 1 = Error 17 active: Error ext. ADC | 753 |
| 2 | 1 = Error 18 active: Unknown field power unit identification | 754 |
| 3 | 1 = Error 19 active: Field connection error (AC) | 755 |
| 4 | 1 = Error 20 active: Armature power unit connection error (AC) | 756 |
| 5 | 1 = Error 21 active: CCW rotating field at armature power unit | 757 |
| 6 | 1 = Error 22 active: Phase failure at armature power unit | 758 |
| 7 | Not assigned = 0 | 759 |
| 8 | Not assigned = 0 | 760 |
| 9 | Not assigned = 0 | 761 |
| 10 | Not assigned = 0 | 762 |
| 11 | Not assigned = 0 | 763 |
| 12 | Not assigned = 0 | 764 |
| 13 | Not assigned = 0 | 765 |
| 14 | Not assigned = 0 | 766 |
| 15 | Not assigned = 0 | 767 |

P 915 **Error in microcontroller module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 23 active: External bus error | 768 |
| 1 | 1 = Error 24 active: Program address error | 769 |
| 2 | 1 = Error 25 active: Data address error | 770 |
| 3 | 1 = Error 26 active: Protected OPCODE | 771 |
| 4 | 1 = Error 27 active: OPCODE error | 772 |
| 5 | 1 = Error 28 active: Stack underflow | 773 |
| 6 | 1 = Error 29 active: Stack overflow | 774 |
| 7 | 1 = Error 30 active: External watchdog tripped | 775 |
| 8 | 1 = Error 31 active: Internal watchdog tripped | 776 |
| 9 | 1 = Error 32 active: RAM test error | 777 |
| 10 | 1 = Error 70 active: Option board does not respond | 778 |
| 11 | Not assigned = 0 | 779 |
| 12 | Not assigned = 0 | 780 |
| 13 | Not assigned = 0 | 781 |
| 14 | Not assigned = 0 | 782 |
| 15 | Not assigned = 0 | 783 |

P 916 **Error in EMF module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 33 active: Parameter conflict P 071 / P 073 | 784 |
| 1 | 1 = Error 34 active: Repeated negative armature current actual value | 785 |
| 2 | 1 = Error 52 active: Mains undervoltage | 786 |
| 3 | 1 = Error 53 active: Overcurrent TD1 | 787 |
| 4 | 1 = Error 54 active: Overcurrent TD2 | 788 |
| 5 | Not assigned = 0 | 789 |
| 6 | Not assigned = 0 | 790 |
| 7 | Not assigned = 0 | 791 |
| 8 | Not assigned = 0 | 792 |
| 9 | Not assigned = 0 | 793 |
| 10 | Not assigned = 0 | 794 |
| 11 | Not assigned = 0 | 795 |
| 12 | Not assigned = 0 | 796 |
| 13 | Not assigned = 0 | 797 |
| 14 | Not assigned = 0 | 798 |
| 15 | Not assigned = 0 | 799 |

P 917 **Error in power unit module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 35 active: No synchronisation | 800 |
| 1 | 1 = Error 36 active: Firing pulse interval differs from specified value | 801 |
| 2 | Not assigned = 0 | 802 |
| 3 | 1 = Error 38 active: Mains frequency < 45 Hz | 803 |
| 4 | 1 = Error 39 active: Mains frequency > 65 Hz | 804 |
| 5 | 1 = Error 55 active: Zero-current detector defective | 805 |
| 6 | Not assigned = 0 | 806 |
| 7 | Not assigned = 0 | 807 |
| 8 | Not assigned = 0 | 808 |
| 9 | Not assigned = 0 | 809 |
| 10 | Not assigned = 0 | 810 |
| 11 | Not assigned = 0 | 811 |
| 12 | Not assigned = 0 | 812 |
| 13 | Not assigned = 0 | 813 |
| 14 | Not assigned = 0 | 814 |
| 15 | Not assigned = 0 | 815 |

P 918 **Error in field unit module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 40 active: Field current monitoring | 816 |
| 1 | 1 = Error 69 active: Field power unit differs from EEPROM value | 817 |
| 2 | Not assigned = 0 | 818 |
| 3 | Not assigned = 0 | 819 |
| 4 | Not assigned = 0 | 820 |
| 5 | Not assigned = 0 | 821 |
| 6 | Not assigned = 0 | 822 |
| 7 | Not assigned = 0 | 823 |
| 8 | Not assigned = 0 | 824 |
| 9 | Not assigned = 0 | 825 |
| 10 | Not assigned = 0 | 826 |
| 11 | Not assigned = 0 | 827 |
| 12 | Not assigned = 0 | 828 |
| 13 | Not assigned = 0 | 829 |
| 14 | Not assigned = 0 | 830 |
| 15 | Not assigned = 0 | 831 |

P 919 **Error in motor potentiometer module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 42 active: P 213 / P 215 parameter conflict | 832 |
| 1 | Not assigned = 0 | 833 |
| 2 | Not assigned = 0 | 834 |
| 3 | Not assigned = 0 | 835 |
| 4 | Not assigned = 0 | 836 |
| 5 | Not assigned = 0 | 837 |
| 6 | Not assigned = 0 | 838 |
| 7 | Not assigned = 0 | 839 |
| 8 | Not assigned = 0 | 840 |
| 9 | Not assigned = 0 | 841 |
| 10 | Not assigned = 0 | 842 |
| 11 | Not assigned = 0 | 843 |
| 12 | Not assigned = 0 | 844 |
| 13 | Not assigned = 0 | 845 |
| 14 | Not assigned = 0 | 846 |
| 15 | Not assigned = 0 | 847 |

P 920 **Error in digital outputs module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 43 active: Shortcircuit/overload at a digital output | 848 |
| 1 | Not assigned = 0 | 849 |
| 2 | Not assigned = 0 | 850 |
| 3 | Not assigned = 0 | 851 |
| 4 | Not assigned = 0 | 852 |
| 5 | Not assigned = 0 | 853 |
| 6 | Not assigned = 0 | 854 |
| 7 | Not assigned = 0 | 855 |
| 8 | Not assigned = 0 | 856 |
| 9 | Not assigned = 0 | 857 |
| 10 | Not assigned = 0 | 858 |
| 11 | Not assigned = 0 | 859 |
| 12 | Not assigned = 0 | 860 |
| 13 | Not assigned = 0 | 861 |
| 14 | Not assigned = 0 | 862 |
| 15 | Not assigned = 0 | 863 |

P 921 **Error in actual-value detector module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 44 active: Overspeed | 864 |
| 1 | 1 = Error 45 active: Tachogenerator/encoder failure or armature circuit open | 865 |
| 2 | 1 = Error 46 active: Tachogenerator/encoder polarity reversed | 866 |
| 3 | 1 = Error 47 active: Speed range error | 867 |
| 4 | Not assigned = 0 | 868 |
| 5 | Not assigned = 0 | 869 |
| 6 | Not assigned = 0 | 870 |
| 7 | Not assigned = 0 | 871 |
| 8 | Not assigned = 0 | 872 |
| 9 | Not assigned = 0 | 873 |
| 10 | Not assigned = 0 | 874 |
| 11 | Not assigned = 0 | 875 |
| 12 | Not assigned = 0 | 876 |
| 13 | Not assigned = 0 | 877 |
| 14 | Not assigned = 0 | 878 |
| 15 | Not assigned = 0 | 879 |

P 922 **Error in reversing unit module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 48 active: Torque change time exceeded | 880 |
| 1 | Not assigned = 0 | 881 |
| 2 | Not assigned = 0 | 882 |
| 3 | Not assigned = 0 | 883 |
| 4 | Not assigned = 0 | 884 |
| 5 | Not assigned = 0 | 885 |
| 6 | Not assigned = 0 | 886 |
| 7 | Not assigned = 0 | 887 |
| 8 | Not assigned = 0 | 888 |
| 9 | Not assigned = 0 | 889 |
| 10 | Not assigned = 0 | 890 |
| 11 | Not assigned = 0 | 891 |
| 12 | Not assigned = 0 | 892 |
| 13 | Not assigned = 0 | 893 |
| 14 | Not assigned = 0 | 894 |
| 15 | Not assigned = 0 | 895 |

P 923 **Error in power unit module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 49 active: Error of armature power unit identification | 896 |
| 1 | 1 = Error 67 active: Armature power unit identification differs from EEPROM value | 897 |
| 2 | 1= Error 102 active: Cable break temperature sensor power unit | 898 |
| 3 | 1= Error 103 active: Short circuit temperature sensor power unit | 899 |
| 4 | 1= Error 104 active: Power unit limit temperature exceeded, P 112 | 900 |
| 5 | Not assigned = 0 | 901 |
| 6 | Not assigned = 0 | 902 |
| 7 | Not assigned = 0 | 903 |
| 8 | Not assigned = 0 | 904 |
| 9 | Not assigned = 0 | 905 |
| 10 | Not assigned = 0 | 906 |
| 11 | Not assigned = 0 | 907 |
| 12 | Not assigned = 0 | 908 |
| 13 | Not assigned = 0 | 909 |
| 14 | Not assigned = 0 | 910 |
| 15 | Not assigned = 0 | 911 |

P 924 **Error in digital inputs module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 50 active: Data record selection error | 912 |
| 1 | Not assigned = 0 | 913 |
| 2 | Not assigned = 0 | 914 |
| 3 | Not assigned = 0 | 915 |
| 4 | Not assigned = 0 | 916 |
| 5 | Not assigned = 0 | 917 |
| 6 | Not assigned = 0 | 918 |
| 7 | Not assigned = 0 | 919 |
| 8 | Not assigned = 0 | 920 |
| 9 | Not assigned = 0 | 921 |
| 10 | Not assigned = 0 | 922 |
| 11 | Not assigned = 0 | 923 |
| 12 | Not assigned = 0 | 924 |
| 13 | Not assigned = 0 | 925 |
| 14 | Not assigned = 0 | 926 |
| 15 | Not assigned = 0 | 927 |

P 925 **Error in analog inputs module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 51 active: Input current < 3.3 mA at 4 mA...20 mA | 928 |
| 1 | 1 = Error 95 active: No +15 V or -15 V supply voltage | 929 |
| 2 | Not assigned = 0 | 930 |
| 3 | Not assigned = 0 | 931 |
| 4 | Not assigned = 0 | 932 |
| 5 | Not assigned = 0 | 933 |
| 6 | Not assigned = 0 | 934 |
| 7 | Not assigned = 0 | 935 |
| 8 | Not assigned = 0 | 936 |
| 9 | Not assigned = 0 | 937 |
| 10 | Not assigned = 0 | 938 |
| 11 | Not assigned = 0 | 939 |
| 12 | Not assigned = 0 | 940 |
| 13 | Not assigned = 0 | 941 |
| 14 | Not assigned = 0 | 942 |
| 15 | Not assigned = 0 | 943 |

P 926 **Error in armature current controller module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 56 active: Offset error armature current detection (< 50 mV) | 944 |
| 1 | 1 = Error 41 active: P 072 out of range | 945 |
| 2 | 1 = Error 37 active: Armature circuit open | 946 |
| 3 | Not assigned = 0 | 947 |
| 4 | Not assigned = 0 | 948 |
| 5 | Not assigned = 0 | 949 |
| 6 | Not assigned = 0 | 950 |
| 7 | Not assigned = 0 | 951 |
| 8 | Not assigned = 0 | 952 |
| 9 | Not assigned = 0 | 953 |
| 10 | Not assigned = 0 | 954 |
| 11 | Not assigned = 0 | 955 |
| 12 | Not assigned = 0 | 956 |
| 13 | Not assigned = 0 | 957 |
| 14 | Not assigned = 0 | 958 |
| 15 | Not assigned = 0 | 959 |

P 927 **Error in data record manager 2 module**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 5 active: Incompatible software | 960 |
| 1 | 1 = Error 6 active: Invalid boot source entry | 961 |
| 2 | 1 = Error 71 active: Illegal value in P 072 / P 074 in data record 1 | 962 |
| 3 | 1 = Error 72 active: Illegal value in P 072 / P 074 in data record 2 | 963 |
| 4 | 1 = Error 73 active: Illegal value in P 072 / P 074 in data record 3 | 964 |
| 5 | 1 = Error 74 active: Illegal value in P 072 / P 074 in data record 4 | 965 |
| 6 | 1 = Error 75 active: Illegal value in P 072 / P 074 in data record 5 | 966 |
| 7 | 1 = Error 76 active: Illegal value in P 072 / P 074 in data record 6 | 967 |
| 8 | 1 = Error 77 active: Illegal value in P 079 in data record 1 | 968 |
| 9 | 1 = Error 78 active: Illegal value in P 079 in data record 2 | 969 |
| 10 | 1 = Error 79 active: Illegal value in P 079 in data record 3 | 970 |
| 11 | 1 = Error 80 active: Illegal value in P 079 in data record 4 | 971 |
| 12 | 1 = Error 81 active: Illegal value in P 079 in data record 5 | 972 |
| 13 | 1 = Error 82 active: Illegal value in P 079 in data record 6 | 973 |
| 14 | 1 = Error 68 active: Data record change: Data record does not exist | 974 |
| 15 | 1 = Error 83 active: EEPROM write time exceeded | 975 |

P 928 **Error in data record manager 3 module (from S03.03)**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1 = Error 84 active: Primary data checksum error | 976 |
| 1 | 1 = Error 85 active: Checksum error, data record 1 | 977 |
| 2 | 1 = Error 86 active: Checksum error, data record 2 | 978 |
| 3 | 1 = Error 87 active: Checksum error, data record 3 | 979 |
| 4 | 1 = Error 88 active: Checksum error, data record 4 | 980 |
| 5 | 1 = Error 89 active: Checksum error, data record 5 | 981 |
| 6 | 1 = Error 90 active: Checksum error, data record 6 | 982 |
| 7 | Not assigned = 0 | 983 |
| 8 | Not assigned = 0 | 984 |
| 9 | Not assigned = 0 | 985 |
| 10 | Not assigned = 0 | 986 |
| 11 | Not assigned = 0 | 987 |
| 12 | Not assigned = 0 | 988 |
| 13 | Not assigned = 0 | 989 |
| 14 | Not assigned = 0 | 990 |
| 15 | Not assigned = 0 | 991 |

P 929 **Error in unassigned function blocks module (from S03.10)**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1= Error 94 active: P 657/P 658 parameter conflict | 992 |
| 1 | 1= Error 105 active: freely definable error, P 730 | 993 |
| 2 | Not assigned = 0 | 994 |
| 3 | Not assigned = 0 | 995 |
| 4 | Not assigned = 0 | 996 |
| 5 | Not assigned = 0 | 997 |
| 6 | Not assigned = 0 | 998 |
| 7 | Not assigned = 0 | 999 |
| 8 | Not assigned = 0 | 1000 |
| 9 | Not assigned = 0 | 1001 |
| 10 | Not assigned = 0 | 1002 |
| 11 | Not assigned = 0 | 1003 |
| 12 | Not assigned = 0 | 1004 |
| 13 | Not assigned = 0 | 1005 |
| 14 | Not assigned = 0 | 1006 |
| 15 | Not assigned = 0 | 1007 |

P 930 **Error in motor temperature monitoring module (from S03.10)**

| Bit | Description | DLink |
|---|---|---|
| 0 | 1= Error 96 active: Switch off temperatur channel 1<br>(Motor temperature ≥ P 543) | 1024 |
| 1 | 1= Error 97 active: Switch off temperatur channel 2<br>(Motor temperature ≥ P 546) | 1025 |
| 2 | 1= Error 98 active: Disconnection motor temperatur sensor channel 1 | 1026 |
| 3 | 1= Error 99 active: Disconnection motor temperatur sensor channel 2 | 1027 |
| 4 | 1= Error 100 active: Short circuit motor temperatur sensor channel 1 | 1028 |
| 5 | 1= Fehler 101 aktiv: Short circuit motor temperatur sensor channel 2 | 1029 |
| 6 | Not assigned = 0 | 1030 |
| 7 | Not assigned = 0 | 1031 |
| 8 | Not assigned = 0 | 1032 |
| 9 | Not assigned = 0 | 1033 |
| 10 | Not assigned = 0 | 1034 |
| 11 | Not assigned = 0 | 1035 |
| 12 | Not assigned = 0 | 1036 |
| 13 | Not assigned = 0 | 1037 |
| 14 | Not assigned = 0 | 1038 |
| 15 | Not assigned = 0 | 1039 |

## 5.34 Function description- Freely definable status word

P 950 **DLink selection for the freely definable status word P 966**

to

P 965 Here, the states of selected DLinks (= bits) can be copied into a 16-bit word in the desired sequence to allow the control to read in the converter state relevant to the machine during a read access.

P 950 defines the contents of bit '0' in parameter P 966

P 951 defines the contents of bit '1' in parameter P 966

P 952 defines the contents of bit '2' in parameter P 966

etc. to

P 965 defines the contents of bit '15' in parameter P 966

**Example**:

Bit '**0**' of parameter P 966 is to be set when the output of ramp generator A has reached the setpoint at the input.
Therefore enter the value **284** (= DL 284) in parameter **P 950**.

Bit '**12**' of parameter P 966 is to be set when the power unit temperature exceeds the limit value.
Therefore enter the value **54** (= DL 54) in parameter **P 962**.

| | | | |
|---|---|---|---|
| Range: | 0...1200 (DLink no.) | Save: | Primary data |
| Standard value: | 0 (LOW) | Modify: | Online |

P 966 **Freely definable status word**

16-bit-wide status word whose contents is defined with parameters P 950 to P 965. The freely definable status word is generated during the rest time and is therefore **no** real-time map of the converter state ! The freely definable status word is also mapped in ALink 213.

| | | | |
|---|---|---|---|
| Range: | | Save: | None |
| Standard value: | 0000hex | Modify: | By the converter |

## 5.35 Parameter description - System parameters

P 993 **Timing via AL 302**

Enters the number of the program module whose runtime is to be measured. Timing resolution: 0.8 µs. Display with parameter P 046 / P 047 and/or P 048 / P 049.

| | | | |
|---|---|---|---|
| Range: | 0...29 | Save: | |
| Standard value: | 0 | Modify: | Online |

P 994 **Minimum-value memory (AL 316)**

Minimum-value memory. Selects an ALink whose minimum value is transferred into ALink 316. A new measuring cycle can be started by a new entry in parameter P 994. Output of the value via one of the four analog outputs or via parameters P 046 / P 047 or P 048 / P 049.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 995 **Maximum-value memory (AL 317)**

Maximum-value memory. Selects an ALink whose maximum value is transferred into ALink 317. A new measuring cycle can be started by a new entry in parameter P 995. Output of the value via one of the four analog outputs or via parameters P 046 / P 047 or P 048 / P 049.

| | | | | |
|---|---|---|---|---|
| Range: | 0...330 | | Save: | Data record |
| Range: | 0...350 | from S03.03 | | |
| Standard value: | 0 (= 0 %) | | Modify: | Online |

P 996 **Parameter/ALink converter 1 (AL 300)**

Selects the parameter whose value is stored in ALink 300. Output of the value via one of the four analog outputs or via parameters P 046 / P 047 or P 048 / P 049. Can also be used for the cyclic transmission of a parameter (status word, for example). ALink 300 is updated during the program rest time and does not necessarily have to represent the state of the just-completed controller cycle.

| | | | |
|---|---|---|---|
| Range: | 1...999 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

P 997 **Parameter/ALink converter 2 (AL 301)**

Selects the parameter whose value is stored in ALink 301. Output of the value via one of the four analog outputs or via parameters P 046 / P 047 or P 048 / P 049. Can also be used for the cyclic transmission of a parameter (status word, for example). ALink 301 is updated during the program rest time and does not necessarily have to represent the state of the just-completed controller cycle.

| | | | |
|---|---|---|---|
| Range: | 1...999 | Save: | Data record |
| Standard value: | 1 | Modify: | Online |

P 998 **Selection memory location address**

Selects an internal address (memory cell) whose value is displayed in parameter P 999.

| | | | |
|---|---|---|---|
| Range: | hex | Save: | Primary data |
| Standard value: | FF1Chex | Modify: | Online |

P 999 **Memory location address contents**

Hex display of the contents of the address selected with P 998.

## 5.36 ALink list

**Scaling**

All standard-scaled signals are identified 'S' in the 'Scaling' column.
The scaling of all non-standard-scaled signals has been specified.

**Standard scaling**

| | |
|---|---|
| +100 % | corresponds to an internal value of +16384 |
| 0 % | corresponds to an internal value of 0 |
| -100 % | corresponds to an internal value of -16384 |

The following applies to the four analog output channels for standard scaling:

| | | |
|---|---|---|
| +100 % | correspond to | +10 V |
| 0 % | correspond to | 0 V |
| -100 % | correspond to | -10 V |

This applies only if the parameters assigned to the analog output channels are set as follows:

| | Offset | Scaling | Polarity |
|---|---|---|---|
| Analog channel 1 | P 462 = 0.00 % | P 463 = 1.000 | P 465 = 1 |
| Analog channel 2 | P 467 = 0.00 % | P 468 = 1.000 | P 470 = 1 |
| Analog channel 3 | P 472 = 0.00 % | P 473 = 1.000 | P 475 = 1 |
| Analog channel 4 | P 477 = 0.00 % | P 478 = 1.000 | P 480 = 1 |

**NOTE**

Any non-assigned ALinks have a value of 0 !

| ALink no. | Scaling | Description | From software release |
|---|---|---|---|
| 0 | S | Fixed value 0 % | |
| 1 | S | Fixed value +100 % | |
| 2 | S | Fixed value -100 % | |
| 3 | S | Value of parameter P 111) | |
| 4 | S | Inverted value of parameter P 111 | |
| 5 | S | BAPS setpoint 1 | |
| 6 | S | BAPS setpoint 2 | |
| 7 | S | BAPS setpoint 3 | |
| 8 | S | BAPS setpoint 4 | |
| 9 | S | BAPS setpoint 5 | |
| 10 | S | BAPS setpoint 6 | |
| 11 | S | BAPS setpoint 7 | |
| 12 | S | BAPS setpoint 8 | |
| 13 | | BAPS actual value 1 | |
| 14 | | BAPS actual value 2 | |
| 15 | | BAPS actual value 3 | |
| 16 | | BAPS actual value 4 | |
| 17 | | BAPS actual value 5 | |
| 18 | | BAPS actual value 6 | |
| 19 | | BAPS actual value 7 | |
| 20 | | BAPS actual value 8 | |
| 21 | S | USS protocol, setpoint 1 | |
| 22 | S | USS protocol, setpoint 2 | |
| 23 | | USS protocol, actual value 1 | |
| 24 | | USS protocol, actual value 2 | |
| 25 | S | Value at analog input 1<br>(terminal input signal at terminal X1: 17-18) | |
| 26 | S | Transfer value, analog input 1 | |

| ALink no. | Scaling | Description | From software release |
|---|---|---|---|
| 27 | S | Value at analog input 2<br>(terminal input signal at terminal X1: 19-20) | |
| 28 | S | Transfer value, analog input 2 | |
| 29 | S | Value at analog input 3<br>(terminal input signal at terminal X1: 21-22) | |
| 30 | S | Transfer value, analog input 3 | |
| 31 | S | Value at analog input 4<br>(terminal input signal at terminal X1: 23-24) | |
| 32 | S | Transfer value, analog input 4 | |
| 33 | S | Fixed setpoint 1 | |
| 34 | S | Fixed setpoint 2 | |
| 35 | S | Fixed setpoint 3 | |
| 36 | S | Fixed setpoint 4 | |
| 37 | S | Fixed setpoint 5 | |
| 38 | S | Fixed setpoint 6 | |
| 39 | S | Output, setpoint generator | |
| 40 | S | Output, motor potentiometer | |
| 41 | S | Transfer value, motor potentiometer | |
| 42 | S | Ramp generator A total setpoint | |
| 43 | S | Input, ramp generator A | |
| 44 | S | Output, ramp generator A | |
| 45 | S | Input/output difference, ramp generator A | |
| 46 | S | Input, ramp generator B | |
| 47 | S | Output, ramp generator B | |
| 48 | S | Input/output difference, ramp generator B | |
| 49 | | | |
| 50 | S | Speed controller total setpoint | |
| 51 | S | Setpoint at the speed controller input | |
| 52 | S | Output, down ramp for quick stop and main contactor off / controller disabled | |

| ALink no. | Scaling | Description | From software release |
|---|---|---|---|
| 53 | S | Motor EMF for armature voltage control | |
| 54 | S | Input, analog tachogenerator (actual value signal) | |
| 55 | S | Input, incremental encoder 1 (actual value signal) | |
| 56 | | | |
| 57 | S | Actual value at the speed controller after smoothing | |
| 58 | S | Positive absolute value, ALink 57 | |
| 59 | S | Actual value at speed controller after smoothing, with offset (P 267) | |
| 60 | S | Positive absolute value, ALink 59 | |
| 61 | S | Actual value at the speed controller with D component | |
| 62 | S | D component of the speed controller actual value | |
| 63 | S | Speed controller setpoint/actual value difference without D component | |
| 64 | S | Positive absolute value, ALink 63 | |
| 65 | S | Speed controller setpoint/actual value difference with D component | |
| 66 | S | Current setpoint after limiting | |
| 67 | S | Smoothed current setpoint | |
| 68 | S | Positive absolute value, active current limit | |
| 69 | S | Output, speed-dependent current limit | |
| 70 | S | Output, gear protection | |
| 71 | S | Speed controller output, P component | |
| 72 | S | Speed controller output, I component | |
| 73 | S | Preset value of speed controller I component (P 321) | |
| 74 | | Momentary speed-controller P-gain ($K_P$ = 1.00 $\rightarrow$ 61 mV at the analog output) | |
| 75 | | Momentary speed-controller integral-action time ($T_n$ = 100 ms $\rightarrow$ 61 mV at the analog output) | |
| 76 | S | Output of current setpoint integrator | |
| 77 | S | Rectifier output for current setpoint | 03.03 |

| ALink no. | Scaling | Description | From software release |
|---|---|---|---|
| 78 | S | Setpoint at the current controller input | |
| 79 | S | Actual value at the current controller input | |
| 80 | S | +/- actual armature current | |
| 81 | S | Setpoint/actual value difference at current controller input | |
| 82 | S | Positive absolute value, ALink 81 | |
| 83 | S | Output of current controller | |
| 84 | S | P component of current controller output | |
| 85 | S | I component of current controller output | |
| 86 | S | Output, current precontrol | |
| 87 | S | Input of armature control unit | |
| 88 | S | Coupler output of armature control unit | |
| 89 | S | Corrected coupler output of armature control unit | |
| 90 | S | Setpoint of EMF controller (field unit) | |
| 91 | S | Actual value of EMF controller (field unit) | |
| 92 | S | Setpoint/actual value difference at EMF controller (field unit) | |
| 93 | S | Positive absolute value, ALink 92 | |
| 94 | S | EMF controller output (field unit) | |
| 95 | S | P component of the EMF controller output (field unit) | |
| 96 | S | I component of the EMF controller output (field unit) | |
| 97 | S | Setpoint of field current controller | |
| 98 | S | Actual value of field current controller | |
| 99 | S | Setpoint/actual value difference at field current controller input | |
| 100 | S | Positive absolute value, ALink 99 | |
| 101 | S | Output of field current controller | |
| 102 | S | P component of field current controller output | |
| 103 | S | I component of field current controller output | |
| 104 | S | Coupler output of field power stage | |
| 105 | S | Unassigned PI controller total setpoint | |

| ALink no. | Scaling | Description | From software release |
|---|---|---|---|
| 106 | S | Setpoint at the unassigned PI controller input | |
| 107 | S | Actual value at the unassigned PI controller after smoothing | |
| 108 | S | Positive absolute value, ALink 107 | |
| 109 | S | Setpoint/actual value difference at unassigned PI controller (without D component) | |
| 110 | S | Positive absolute value, ALink 109 | |
| 111 | S | Actual value at the unassigned PI controller (with D component) | |
| 112 | S | Setpoint/actual value difference at unassigned PI controller with D component | |
| 113 | S | D component of the unassigned PI controller actual value | |
| 114 | S | Output of unassigned PI controller | |
| 115 | S | P component of the unassigned PI controller output | |
| 116 | S | I component of the unassigned PI controller output | |
| 117 | S | Output of unassigned adder 1 (P 111 active) | |
| 118 | S | Inverted output, unassigned adder 1 | |
| 119 | S | Positive absolute value of output of unassigned adder 1 | |
| 120 | S | Negative absolute value of output of unassigned adder 1 | |
| 121 | S | Output of unassigned adder 2 (P 111 active) | |
| 122 | S | Inverted output of unassigned adder 2 | |
| 123 | S | Positive absolute value of output of unassigned adder 2 | |
| 124 | S | Negative absolute value of output of unassigned adder 2 | |
| 125 | S | Output of unassigned adder 3 (P 111 active) | |
| 126 | S | Inverted output of unassigned adder 3 | |
| 127 | S | Positive absolute value of output of unassigned adder 3 | |
| 128 | S | Negative absolute value of output of unassigned adder 3 | |
| 129 | S | Output of unassigned adder 4 (P 111 active) | |
| 130 | S | Inverted output of unassigned adder 4 | |
| 131 | S | Positive absolute value of output of unassigned adder 4 | |
| 132 | S | Negative absolute value of output of unassigned adder 4 | |

| ALink no. | Scaling | Description | From software release |
|---|---|---|---|
| 133 | S | Adding input of unassigned multiplier 1<br>P 618 + P 619 = $\Sigma_1$ (P 111 active) | |
| 134 | S | Adding input of unassigned multiplier 1<br>P 620 + P 621 = $\Sigma_2$ (P 111 active) | |
| 135 | S | Output of unassigned multiplier 1: $\Sigma_1 \times \Sigma_2$ (P 111 active) | |
| 136 | S | Adding input at unassigned multiplier 2<br>P 622 + P 623 = $\Sigma_1$ (P 111 active) | |
| 137 | S | Adding input at unassigned multiplier 2<br>P 624 + P 625 = $\Sigma_2$ (P 111 active) | |
| 138 | S | Output of unassigned multiplier 2: $\Sigma_1 \times \Sigma_2$ (P 111 active) | |
| 139 | S | Adding input at unassigned divider 1<br>P 626 + P 627 = $\Sigma_1$ (P 111 active) | |
| 140 | S | Adding input at unassigned divider 1<br>P 628 + P 629 = $\Sigma_2$ (P 111 active) | |
| 141 | S | Output, unassigned divider 1: $\Sigma_1 \div \Sigma_2$ (P 111 active) | |
| 142 | S | Adding input at unassigned divider 2<br>P 630 + P 631 = $\Sigma_1$ (P 111 active) | |
| 143 | S | Adding input at unassigned divider 2<br>P 624 + P 625 = $\Sigma_2$ (P 111 active) | |
| 144 | S | Output of unassigned divider 2: $\Sigma_1 \div \Sigma_2$ (P 111 active) | |
| 145 | S | Output unassigned multiplier 1 (P111 active) | 03.10 |
| 146 | S | Output unassigned multiplier 2 (P111 active) | 03.10 |
| 147 | S | Output unassigned multiplier 3 (P111 active) | 03.10 |
| 148 | | | |
| 149 | | | |
| 150 | | | |
| 151 | | | |
| 152 | | | |
| 153 | S | Minimum value limiter, output with polarity | |
| 154 | S | Positive absolute value, ALink 153 | |

| ALink no. | Scaling | Description | From software release |
|---|---|---|---|
| 155 | S | Output of input signal formatter (P 111 active) | |
| 156 | S | Inverted input of absolute value generator 1 | |
| 157 | S | Positive absolute value of absolute value generator 1 | |
| 158 | S | Negative absolute value of absolute value generator 1 | |
| 159 | S | Inverted input of absolute value generator 2 | |
| 160 | S | Positive absolute value of absolute value generator 2 | |
| 161 | S | Negative absolute value of absolute value generator 2 | |
| 162 | S | Inverted input of absolute value generator 3 | |
| 163 | S | Positive absolute value of absolute value generator 3 | |
| 164 | S | Negative absolute value of absolute value generator 3 | |
| 165 | S | Inverted input of absolute value generator 4 | |
| 166 | S | Positive absolute value of absolute value generator 4 | |
| 167 | S | Negative absolute value of absolute value generator 4 | |
| 168 | S | Output of unassigned inverter 1 | |
| 169 | S | Output of unassigned inverter 2 | |
| 170 | S | Output of unassigned limiter | |
| 171 | S | Input/output difference of unassigned limiter (P 111 active) | |
| 172 | S | Inverted to ALink 171 (P 111 active) | |
| 173 | S | Output of unassigned dead band | |
| 174 | | | |
| 175 | | | |
| 176 | | | |
| 177 | | | |
| 178 | | | |
| 179 | | | |
| 180 | | | |
| 181 | | | |
| 182 | | | |

| ALink no. | Scaling | Description | From software release |
|---|---|---|---|
| 183 | | | |
| 184 | | | |
| 185 | | | |
| 186 | S | Output of unassigned filter 1 | |
| 187 | S | Output of unassigned filter 2 | |
| 188 | | | |
| 189 | | | |
| 190 | | | |
| 191 | | | |
| 192 | | | |
| 193 | | | |
| 194 | | | |
| 195 | S | Output of unassigned changeover switch 1 | |
| 196 | S | Output of unassigned changeover switch 2<br>(P 682 → P 111 not active, P 683 + P 684 → P 111 active) | |
| 197 | S | Output of unassigned changeover switch 3<br>(P 685 → P 111 not active, P 686 + P 687 → P 111 active) | |
| 198 | S | Output of unassigned changeover switch 4 | |
| 199 | S | Input signal of unassigned comparator | |
| 200 | S | Positive absolute value of ALink 199 | |
| 201 | S | Upper switch threshold of unassigned comparator (P 678) | |
| 202 | S | Lower switch threshold of unassigned comparator (P 678 – P 679) | |
| 203 | S | Unsmoothed speed controller actual value | 03.06 |
| 204 | S | Actual-speed positive absolute value for speed adjustment monitoring (F 47) | 03.06 |
| 205 | S | EMF-characteristics positive absolute value<br>for speed adjustment monitoring (F 47) | 03.06 |
| 206 | S | EMF compare signal<br>for speed adjustment monitoring (F 47) | 03.06 |
| 207 | | | |

| ALink no. | Scaling | Description | From software release |
|---|---|---|---|
| 208 | S | Speed controller output | 03.06 |
| 209 | S | Additional current setpoint | 03.06 |
| 210 | S | Current setpoint before limiting | 03.06 |
| 211 | | Momentary P-gain of the unassigned PI controller ($K_P$ = 1.00 → 61 mV at the analog output) | |
| 212 | | Momentary integral-action time of the unassigned PI controller ($T_n$ = 100 ms → 61 mV at the analog output) | |
| 213 | | Freely definable status word P 966 | |
| 214 | | | |
| 215 | S | Armature voltage, motor (100 % → value in P 073) | |
| 216 | S | EMF characteristics, not smoothed | |
| 217 | S | EMF characteristics, smoothed (30 ms at $f_{mains}$= 50 Hz) | |
| 218 | | Mains voltage of electronics supply (400 $V_{eff}$ → 16384) | |
| 219 | S | Computed armature power unit mains voltage | |
| 220 | | Motor $i^2t$ value (rated temperature =100 % → 2.5 V at analog output) | |
| 221 | | Power section temperature threshold (°C) | |
| 222 | S | Power input ($U_A \times I_A$) | |
| 223 | S | Power output (EMF × $I_A$) | |
| 224 | | Power unit temperature [°C] | 03.15 |
| 225 | S | Ixt value of the power unit monitoring | 03.20 |
| 226 | S | Current limit because of Ixt monitoring | 03.20 |
| 227 | | Overload period in s (read from power unit identifier) | 03.20 |
| 228 | | | |
| 229 | | | |
| 230 | | internal value P 071, 16384 ≙ 400 V | |
| 231 | | | |
| 232 | | Smoothed power unit voltage (30 ms at $f_{mains}$ = 50 Hz) | 03.10 |
| 233 | S | L × $di_{set}/dt$ (armature current)) | 03.03 |

| ALink no. | Scaling | Description | From software release |
|---|---|---|---|
| 234 | S | Smoothed power unit voltage for mains EMF computation (30 ms at $f_{mains}$ = 50 Hz) | |
| 235 | S | $I_{A_actual} \times R_A$ | |
| 236 | S | $U_A - I_{A_actual} \times R_A$ | |
| 237 | S | $L \times di_{actual}/dt$ (armature current)) | |
| 238 | S | $I_{A\ OFFs}$ ; 8192 ≙ the value set in parameter P 003 | |
| 239 | | Output of torque direction detector (0 % → TD1  50 % → TD2) | |
| 240 | | Second-pulse suppression (0 % → second-pulse suppression not active; 50 % → second-pulse suppression active) | |
| 241 | | EMF related to the mains voltage | |
| 242 | | arsin table value, correct polarity for current precontrol | |
| 243 | S | Intermittent-current limit related to mains voltage | |
| 244 | S | Table value of intermittent-current characteristic | |
| 245 | S | EMF precontrol value | |
| 246 | S | Current precontrol value (g) | |
| 247 | S | Current precontrol value (x) | |
| 248 | | Inductance constant for current precontrol $di_{set}/dt$ | |
| 249 | S | Control voltage difference at field coupler output | |
| 250 | S | EMF register (current precontrol) | |
| 251 | S | Current intermittent-current limit | 03.06 |
| 252 | | Internal, counted back tachometer voltage | 03.20 |
| 253 | | Inernal correction factor tachometer | 03.20 |
| 254 | | | |
| 255 | S | 16-bit analog input via option board 3.9817 | |
| 256 | | | |
| 257 | | $\alpha_G$ Armature current converter (internal value of parameter P 360, 16384 → 0° el.) | |
| 258 | | $\alpha_W$ Armature current converter (internal value of parameter P 361, -16384 → 180° el.) | |

| ALink no. | Scaling | Description | From software release |
|---|---|---|---|
| 259 | | $\alpha$ Armature current converter<br>(momentary firing angle in X.XX °el; display without decimal point) | |
| 260 | | $\alpha_G$ Field current converter<br>(internal value of parameter P 381, 16384 $\rightarrow$ 0° el) | |
| 261 | | $\alpha_W$ Field current converter<br>(internal value of parameter P 382, -16384 $\rightarrow$ 180° el.) | |
| 262 | | $\alpha$ Field current converter<br>(momentary firing angle in X.XX °el; display without decimal point) | |
| 263 | S | DAC code, analog tachogenerator | |
| 264 | S | DAC code, actual field current | |
| 265 | | Ext. ADC channel 1, analog input 1; not scaled | |
| 266 | | Ext. ADC channel 2, analog input 2; not scaled | |
| 267 | | Ext. ADC channel 3, analog input 3; not scaled | |
| 268 | | Ext. ADC channel 4, analog input 4; not scaled | |
| 269 | | Ext. ADC channel 5, field current; not scaled | |
| 270 | | Ext. ADC channel 6, armature voltage; not scaled | |
| 271 | | Ext. ADC channel 7, armature current, not scaled | |
| 272 | | Ext. ADC channel 8, analog tachogenerator, not scaled | |
| 273 | | µP ADC channel 1, spare, not scaled | |
| 274 | | µP ADC channel 2, power unit temperature 1, not scaled | |
| 275 | | µP ADC channel 3, (power unit temperature 2), not scaled | |
| 276 | | µP ADC channel 4, mains voltage of electronics supply,<br>not scaled | |
| 277 | | µP ADC channel 5, power unit identification of field, not scaled | |
| 278 | | µP ADC channel 6 (mains failure duration), not scaled | |
| 279 | | µP ADC channel 7, BKD/BKF identifier, not scaled<br>$BKD_{setpoint}$ 377 $BKD_{range}$ 307...439<br>$BKD_{setpoint}$ 683 $BKD_{range}$ 612...744 | |
| 280 | | µP ADC channel 8, spare, not scaled | |
| 281 | | Incremental encoder constant 1 | |
| 282 | | Scaling factor, incremental encoder 1 | |

| ALink no. | Scaling | Description | From software release |
|---|---|---|---|
| 283 | | Increments per scan, incremental encoder 1 | |
| 284 | | Counting interval, incremental encoder 1 (resolution 0.8 µs) | |
| 285 | | | |
| 286 | | | |
| 287 | | | |
| 288 | | | |
| 289 | | Armature firing pulse interval (resolution 0.8 µs) | |
| 290 | | Mains counter hardware | |
| 291 | | Mains counter software | |
| 292 | | Momentary mains block | |
| 293 | | Current control voltage block | |
| 294 | | Current firing pattern selection | |
| 295 | | Current firing pattern | |
| 296 | | Sync correction, field | |
| 297 | | Firing pulse interval<br>(armature 4166 → 60° el. at $f_{mains}$ = 50 Hz; \|actual - set\|) | |
| 298 | | Mains counter hardware (ALink 290) - Mains counter software (ALink 291) | |
| 299 | | | |
| 300 | | Parameter value 1 (parameter selected via P 996) | |
| 301 | | Parameter value 2 (parameter selected via P 997) | |
| 302 | | Momentary processing time of program module<br>(resolution 0.8 µs; selected with P 993) | |
| 303 | | Momentary processing time of controller-program (resolution 0.8 µs) | |
| 304 | | Milliseconds counter<br>(→ numerical value corresponds to ms → communication monitoring) | |
| 305 | | Max.processing time of controller program (resolution 0.8 µs) | |
| 306 | | Max. processing time of background program (resolution 0.8 µs) | |

| ALink no. | Scaling | Description | From software release |
|---|---|---|---|
| 307 | | Momentary processing time of background program (resolution 0.8 µs) | |
| 308 | | Unassigned development ALink (no fixed assignment) | |
| 309 | | | |
| 310 | | Threshold for speed adjustment (P 504) | |
| 311 | | Slave pointer, ramp generator A | |
| 312 | | Internal ALink required for data record manager | |
| 313 | | | |
| 314 | | | |
| 315 | | Contents of parameter P 999 | |
| 316 | | Minimum value of ALink x, selected with P 994 | |
| 317 | | Maximum value of ALink x, selected with P 995 | |
| 318 | | Zero-current time to intermittent-current limit (resolution 0.8 µs) | |
| 319 | | | |
| 320 | | | |
| 321 | | Software version (as per parameter P 035) | 03.03 |
| 322 | | Software type (as per parameter P 036) | 03.03 |
| 323 | | Software number<br>(For BKx 7000: 6.**1200** - only 1200 displayed !). | 03.03 |
| 324 | | Option board identification at interface BAPS 1 (X201) | 03.03 |
| 325 | | Option board software version<br>at interface BAPS 1 (X201) | 03.03 |
| 326 | | Option board software type<br>at interface BAPS 1 (X201) | 03.03 |
| 327 | | Option board software number<br>at interface BAPS 1 (X201) | 03.03 |
| 328 | | Option board identification at interface BAPS 2 (not available) | 03.03 |
| 329 | | Option board software version<br>at interface BAPS 2 (not available) | 03.03 |
| 330 | | Option board software type<br>at interface BAPS 2 (not available) | 03.03 |

| ALink no. | Scaling | Description | From software release |
|---|---|---|---|
| 331 | | Option board software number<br>at interface BAPS 2 (not available) | 03.03 |
| 332 | | Option board identification at interface BAPS 3 (not available) | 03.03 |
| 333 | | Option board software version<br>at interface BAPS 3 (not available) | 03.03 |
| 334 | | Option board software type<br>at interface BAPS 3 (not available) | 03.03 |
| 335 | | Option board software number<br>at interface BAPS 3 (not available) | 03.03 |
| 336 | | Option board identification see also at interface BAPS 4 (X200) | 03.03 |
| 337 | | Option board software version<br>at interface BAPS 4 (X200) | 03.03 |
| 338 | | Option board software type at interface BAPS 4 (X200) | 03.03 |
| 339 | | Option board software number<br>at interface BAPS 4 (X200) | 03.03 |
| 340 | | Power unit type, serial; 0: BKD 1: BKF | 03.04 |
| 341 | | Power unit current intensity code, serial | 03.04 |
| 342 | | | |
| 343 | | | |
| 344 | | Mains frequency in Hz | 03.10 |
| 345 | | Synchro filter correction value | 03.10 |
| 346 | | Motor temperature channel 1 [°C] (corresponds with parameter P 027) | 03.10 |
| 347 | | Motor temperature channel 2 [°C] (corresponds with parameter P 028) | 03.10 |
| 348 | | | |
| 349 | | | |
| 350 | | | |

## 5.37 DLink list

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 0 | Fixed value 0 (LOW) | | | |
| 1 | Fixed value 1 (HIGH) | | | |
| 2 | HIGH: State 'ENABLED' (P 001 = 4, 5, 6 or 7) | P 100 | 0...2 | |
| 3 | HIGH: State 'MALFUNCTION'; (see also DL0083) | P 100 | 3 | |
| 4 | HIGH: State 'WARNING' (see also DL0087) | P 100 | 7 | |
| 5 | HIGH: Ramp generator setpoint reached (see also DL0284) | P 220 | 12 | |
| 6 | HIGH: $n > n_{max}$ (error 44, see also DL0864) | P 921 | 0 | |
| 7 | HIGH: $n > n_{min}$ (see also DL0314) | P 250 | 10 | |
| 8 | HIGH: $n > n_{x1}$ (see also DL0316) | P 250 | 12 | |
| 9 | HIGH: $n > n_{x2}$ (see also DL0317) | P 250 | 13 | |
| 10 | HIGH: $n > n_{x3}$ (see also DL0318) | P 250 | 14 | |
| 11 | HIGH: $n > n_{x4}$ (see also DL0319) | P 250 | 15 | |
| 12 | HIGH: Drift lock active (see also DL0360) | P 300 | 8 | |
| 13 | HIGH: $n_{actual} = n_{set}$ at the speed controller (see also DL0364) | P 300 | 12 | |
| 14 | HIGH: Unassigned comparator A < B (see also DL0564) | | | |
| 15 | HIGH: $i_a > i_{a_x1}$ (see also DL0392) | P 350 | 8 | |
| 16 | HIGH: $i_a > i_{a_x2}$ (see also DL0393) | P 350 | 9 | |
| 17 | HIGH: Current limit reached (see also DL0366) | P 300 | 14 | |
| 18 | HIGH: Speed controller output limit active (see also DL0367) | P 300 | 15 | |
| 19 | HIGH: Motor $i^2t$ monitoring (see also DL0068) | P 030 | 4 | |
| 20 | HIGH: Monitoring of heat sink temperature limit (see also DL0054) | P 020 | 6 | |
| 21 | HIGH: Actual field current < 50 % field current setpoint (including P 385; see also DL0424) | P 370 | 8 | |
| 22 | HIGH: Status 'READY TO OPERATE' (P 001 = 2, see also DL0080) | P 100 | 0 | |
| 23 | HIGH: Drive disabled (**inverted** with regard to DLink 2) | P 100 | 0...2 | 03.06 |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 24 | | | | |
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| 42 | | | | |
| 43 | | | | |
| 44 | Bit pattern from parameter P xxx (P 684 - P 686) | | | |
| 45 | Inverted with regard to DL0044 | | | |
| 46 | Bit pattern from parameter P yyy (P 687 - P 689) | | | |
| 47 | Inverted with regard to DL0046 | | | |
| 48 | LOW: Spare | P 020 | 0 | |
| 49 | LOW: Spare | P 020 | 1 | |
| 50 | LOW: Spare | P 020 | 2 | |
| 51 | Error in module power unit | P 020 | 3 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 52 | LOW: Spare | P 020 | 4 | |
| 53 | HIGH: Warning 13: Power unit temperature exceeded pre-warning threshold | P 020 | 5 | 03.15 |
| 54 | HIGH: Power unit temperature > limit value (limit value in ALink 221) | P 020 | 6 | |
| 55 | HIGH: Mains frequency ≥ threshold frequency (P 528) | P 020 | 7 | 03.10 |
| 56 | HIGH: Ixt threshold exceeded, current set value limited | P 020 | 8 | 03.20 |
| 57 | LOW: Spare | P 020 | 9 | |
| 58 | LOW: Spare | P 020 | 10 | |
| 59 | LOW: Spare | P 020 | 11 | |
| 60 | LOW: Spare | P 020 | 12 | |
| 61 | LOW: Spare | P 020 | 13 | |
| 62 | LOW: Spare | P 020 | 14 | |
| 63 | LOW: Spare | P 020 | 15 | |
| 64 | HIGH: Motor $I^2t$ monitoring switched on (P 078 unequal 0 min) | P 030 | 0 | |
| 65 | LOW: Spare | P 030 | 1 | |
| 66 | LOW: Spare | P 030 | 2 | |
| 67 | LOW: Spare | P 030 | 3 | |
| 68 | HIGH: Motor $I^2t$ value ≥ threshold (P 525) | P 030 | 4 | |
| 69 | LOW: Spare | P 030 | 5 | |
| 70 | LOW: Spare | P 030 | 6 | |
| 71 | LOW: Spare | P 030 | 7 | |
| 72 | LOW: Spare | P 030 | 8 | |
| 73 | LOW: Spare | P 030 | 9 | |
| 74 | LOW: Spare | P 030 | 10 | |
| 75 | HIGH: Motor $I^2t$ value ≥ 100 % | P 030 | 11 | |
| 76 | LOW: Spare | P 030 | 12 | |
| 77 | LOW: Spare | P 030 | 13 | |
| 78 | LOW: Spare | P 030 | 14 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 79 | LOW: Spare | P 030 | 15 | |
| 80 | HIGH: Ready | P 100 | 0 | |
| 81 | HIGH: Switched on | P 100 | 1 | |
| 82 | HIGH: Operation enabled | P 100 | 2 | |
| 83 | HIGH: Error (malfunction) | P 100 | 3 | |
| 84 | HIGH: Voltage disabled | P 100 | 4 | |
| 85 | HIGH: Quick stop | P 100 | 5 | |
| 86 | HIGH: Switch-on disabled | P 100 | 6 | |
| 87 | HIGH: Warning | P 100 | 7 | |
| 88 | HIGH: in freely definable status word (P 966). At least one bit set | P 100 | 8 | |
| 89 | HIGH: Communication source parameter P 121 not 0 | P 100 | 9 | |
| 90 | HIGH: Setpoint reached ($n_{actual}$ = $n_{set}$ at the speed controller) | P 100 | 10 | |
| 91 | LOW: Spare | P 100 | 11 | |
| 92 | LOW: Spare | P 100 | 12 | |
| 93 | LOW: Spare | P 100 | 13 | |
| 94 | Freely configurable status bit (see parameter P 104) | P 100 | 14 | |
| 95 | Freely configurable status bit (see parameter P 105) | P 100 | 15 | |
| 96 | Switch on | P 101 | 0 | |
| 97 | Disable voltage | P 101 | 1 | |
| 98 | Quick stop | P 101 | 2 | |
| 99 | Enable operation | P 101 | 3 | |
| 100 | LOW: Spare | P 101 | 4 | |
| 101 | LOW: Spare | P 101 | 5 | |
| 102 | LOW: Spare | P 101 | 6 | |
| 103 | Reset malfunction | P 101 | 7 | |
| 104 | LOW: Spare | P 101 | 8 | |
| 105 | LOW: Spare | P 101 | 9 | |
| 106 | LOW: Spare | P 101 | 10 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 107 | LOW: Spare | P 101 | 11 | |
| 108 | LOW: Spare | P 101 | 12 | |
| 109 | LOW: Spare | P 101 | 13 | |
| 110 | LOW: Spare | P 101 | 14 | |
| 111 | Write protection | P 101 | 15 | |
| 112 | HIGH: Communication enabled | P 128 | 0 | |
| 113 | LOW: Spare | P 128 | 1 | |
| 114 | LOW: Spare | P 128 | 2 | |
| 115 | LOW: Spare | P 128 | 3 | |
| 116 | Bit 0 of drive address (see also USS drive address P 120) | P 128 | 4 | |
| 117 | Bit 1 of drive address (see also USS drive address P 120) | P 128 | 5 | |
| 118 | Bit 2 of drive address (see also USS drive address P 120) | P 128 | 6 | |
| 119 | Bit 3 of drive address (see also USS drive address P 120) | P 128 | 7 | |
| 120 | Bit 4 of drive address (see also USS drive address P 120) | P 128 | 8 | |
| 121 | Bit 5 of drive address (see also USS drive address P 120) | P 128 | 9 | |
| 122 | Bit 6 of drive address (see also USS drive address P 120) | P 128 | 10 | |
| 123 | Bit 7 of drive address (see also USS drive address P 120) | P 128 | 11 | |
| 124 | LOW: Spare | P 128 | 12 | |
| 125 | LOW: Spare | P 128 | 13 | |
| 126 | LOW: Spare | P 128 | 14 | |
| 127 | LOW: Spare | P 128 | 15 | |
| 128 | HIGH: Message evaluation active | P 130 | 0 | |
| 129 | LOW: Spare | P 130 | 1 | |
| 130 | LOW: Spare | P 130 | 2 | |
| 131 | LOW: Spare | P 130 | 3 | |
| 132 | HIGH: No messages to own address received for longer than 1 s | P 130 | 4 | |
| 133 | HIGH: No messages on the bus for longer than 5 s | P 130 | 5 | |
| 134 | LOW: Spare | P 130 | 6 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 135 | HIGH: USS interface initialisation error | P 130 | 7 | |
| 136 | LOW: Reserved | P 130 | 8 | |
| 137 | LOW: Reserved | P 130 | 9 | |
| 138 | HIGH: Error during actual-value reading | P 130 | 10 | |
| 139 | HIGH: Error during setpoint writing | P 130 | 11 | |
| 140 | LOW: Spare | P 130 | 12 | |
| 141 | LOW: Spare | P 130 | 13 | |
| 142 | LOW: Spare | P 130 | 14 | |
| 143 | LOW: Spare | P 130 | 15 | |
| 144 | HIGH: Communication enabled (BAPS process data) | P 140 | 0 | |
| 145 | HIGH: Communication source $10_{hex}$ (control word not active) | P 140 | 1 | |
| 146 | LOW: Spare | P 140 | 2 | |
| 147 | LOW: Spare | P 140 | 3 | |
| 148 | HIGH: Communication initialised (BAPS cyclic data) | P 140 | 4 | |
| 149 | LOW: Spare | P 140 | 5 | |
| 150 | LOW: Spare | P 140 | 6 | |
| 151 | LOW: Spare | P 140 | 7 | |
| 152 | Option board messages | P 140 | 8 | |
| 153 | | P 140 | 9 | |
| 154 | | P 140 | 10 | |
| 155 | | P 140 | 11 | |
| 156 | | P 140 | 12 | |
| 157 | | P 140 | 13 | |
| 158 | | P 140 | 14 | |
| 159 | | P 140 | 15 | |
| 160 | HIGH: Communication enabled (BAPS demand data) | P 143 | 0 | |
| 161 | LOW: Spare | P 143 | 1 | |
| 162 | LOW: Spare | P 143 | 2 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 163 | LOW: Spare | P 143 | 3 | |
| 164 | LOW: Spare | P 143 | 4 | |
| 165 | LOW: Spare | P 143 | 5 | |
| 166 | LOW: Spare | P 143 | 6 | |
| 167 | LOW: Spare | P 143 | 7 | |
| 168 | LOW: Spare | P 143 | 8 | |
| 169 | LOW: Spare | P 143 | 9 | |
| 170 | LOW: Spare | P 143 | 10 | |
| 171 | LOW: Spare | P 143 | 11 | |
| 172 | LOW: Spare | P 143 | 12 | |
| 173 | LOW: Spare | P 143 | 13 | |
| 174 | LOW: Spare | P 143 | 14 | |
| 175 | LOW: Spare | P 143 | 15 | |
| 176 | Bit combinations<br>00 Data record manager ready for command<br>01 Data record manager executing command<br>10 Spare<br>11 Data record manager completed command | P 150 | 0 | |
| 177 | | | 1 | |
| 178 | LOW: Spare | P 150 | 2 | |
| 179 | HIGH: Error in data record manager (error code see P 155) | P 150 | 3 | |
| 180 | HIGH: Warning: Data record was not saved | P 150 | 4 | |
| 181 | LOW: Spare | P 150 | 5 | |
| 182 | LOW: Spare | P 150 | 6 | |
| 183 | LOW: Spare | P 150 | 7 | |
| 184 | HIGH: Data record 1 active | P 150 | 8 | |
| 185 | HIGH: Data record 2 active | P 150 | 9 | |
| 186 | HIGH: Data record 3 active | P 150 | 10 | |
| 187 | HIGH: Data record 4 active | P 150 | 11 | |
| 188 | HIGH: Data record 5 active | P 150 | 12 | |
| 189 | HIGH: Data record 6 active | P 150 | 13 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 190 | HIGH: Data record 7 active | P 150 | 14 | |
| 191 | LOW: Spare | P 150 | 15 | |
| 192 | LOW: Spare (P 180) | | | |
| 193 | LOW: Spare | | | |
| 194 | LOW: Spare | | | |
| 195 | LOW: Spare | | | |
| 196 | LOW: Spare | | | |
| 197 | LOW: Spare | | | |
| 198 | LOW: Spare | | | |
| 199 | LOW: Spare | | | |
| 200 | LOW: Spare | | | |
| 201 | LOW: Spare | | | |
| 202 | LOW: Spare | | | |
| 203 | LOW: Spare | | | |
| 204 | LOW: Spare | | | |
| 205 | LOW: Spare | | | |
| 206 | LOW: Spare | | | |
| 207 | LOW: Spare (P 180) | | | |
| 208 | Invert analog input 1 | P 181 | 0 | |
| 209 | Set analog input 1 to zero | P 181 | 1 | |
| 210 | Invert analog input 2 | P 181 | 2 | |
| 211 | Set analog input 2 to zero | P 181 | 3 | |
| 212 | Invert analog input 3 | P 181 | 4 | |
| 213 | Set analog input 3 to zero | P 181 | 5 | |
| 214 | Invert analog input 4 | P 181 | 6 | |
| 215 | Set analog input 4 to zero | P 181 | 7 | |
| 216 | LOW: Spare | P 181 | 8 | |
| 217 | LOW: Spare | P 181 | 9 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 218 | LOW: Spare | P 181 | 10 | |
| 219 | LOW: Spare | P 181 | 11 | |
| 220 | LOW: Spare | P 181 | 12 | |
| 221 | LOW: Spare | P 181 | 13 | |
| 222 | LOW: Spare | P 181 | 14 | |
| 223 | LOW: Spare | P 181 | 15 | |
| 224 | LOW: Spare (P 200) | | | |
| 225 | LOW: Spare (P 200) | | | |
| 226 | LOW: Spare (P 200) | | | |
| 227 | LOW: Spare (P 200) | | | |
| 228 | LOW: Spare (P 200) | | | |
| 229 | LOW: Spare (P 200) | | | |
| 230 | LOW: Spare (P 200) | | | |
| 231 | LOW: Spare (P 200) | | | |
| 232 | LOW: Spare (P 200) | | | |
| 233 | LOW: Spare (P 200) | | | |
| 234 | LOW: Spare (P 200) | | | |
| 235 | LOW: Spare (P 200) | | | |
| 236 | LOW: Spare (P 200) | | | |
| 237 | LOW: Spare (P 200) | | | |
| 238 | LOW: Spare (P 200) | | | |
| 239 | LOW: Spare (P 200) | | | |
| 240 | HIGH: Motor potentiometer enabled, LOW: Correction active | P 210 | 0 | |
| 241 | LOW: Spare | P 210 | 1 | |
| 242 | LOW: Spare | P 210 | 2 | |
| 243 | HIGH: Motor potentiometer error (P 213 / P 215 parameter conflict, for example) | P 210 | 3 | |
| 244 | HIGH: Motor potentiometer has reached upper limit | P 210 | 4 | |
| 245 | HIGH: Motor potentiometer has reached lower limit | P 210 | 5 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 246 | HIGH: Motor potentiometer UP command active | P 210 | 6 | |
| 247 | HIGH: Motor potentiometer DOWN command active | P 210 | 7 | |
| 248 | HIGH: Motor potentiometer ramp-up | P 210 | 8 | |
| 249 | HIGH: Motor potentiometer ramp-down | P 210 | 9 | |
| 250 | HIGH: Motor potentiometer ramp-up or -down | P 210 | 10 | |
| 251 | LOW: Spare | P 210 | 11 | |
| 252 | LOW: Spare | P 210 | 12 | |
| 253 | LOW: Spare | P 210 | 13 | |
| 254 | LOW: Spare | P 210 | 14 | |
| 255 | LOW: Spare | P 210 | 15 | |
| 256 | Motor potentiometer UP | P 211 | 0 | |
| 257 | Motor potentiometer DOWN | P 211 | 1 | |
| 258 | LOW: Spare | P 211 | 2 | |
| 259 | LOW: Spare | P 211 | 3 | |
| 260 | LOW: Spare | P 211 | 4 | |
| 261 | LOW: Spare | P 211 | 5 | |
| 262 | LOW: Spare | P 211 | 6 | |
| 263 | LOW: Spare | P 211 | 7 | |
| 264 | LOW: Spare | P 211 | 8 | |
| 265 | LOW: Spare | P 211 | 9 | |
| 266 | LOW: Spare | P 211 | 10 | |
| 267 | LOW: Spare | P 211 | 11 | |
| 268 | LOW: Spare | P 211 | 12 | |
| 269 | LOW: Spare | P 211 | 13 | |
| 270 | LOW: Spare | P 211 | 14 | |
| 271 | LOW: Spare | P 211 | 15 | |
| 272 | HIGH: Ramp generator A enabled | P 220 | 0 | |
| 273 | LOW: Spare | P 220 | 1 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 274 | LOW: Spare | P 220 | 2 | |
| 275 | HIGH: Error in ramp generator A module | P 220 | 3 | |
| 276 | HIGH: Ramp generator A output set to zero (quick ramp-down active) | P 220 | 4 | |
| 277 | HIGH: Ramp generator A stop active | P 220 | 5 | |
| 278 | HIGH: Ramp generator A, setpoint 0 setting active | P 220 | 6 | |
| 279 | HIGH: Quick stop or disable/stop deceleration ramp active (P 109 / P 110) | P 220 | 7 | |
| 280 | HIGH: Ramp generator A ramp-up active | P 220 | 8 | |
| 281 | HIGH: Ramp generator A ramp-down active | P 220 | 9 | |
| 282 | LOW: Reserved | P 220 | 10 | |
| 283 | LOW: Reserved | P 220 | 11 | |
| 284 | HIGH: Ramp generator A setpoint reached (output = input) | P 220 | 12 | |
| 285 | HIGH: Ramp generator A setpoint limit active | P 220 | 13 | |
| 286 | LOW: Spare | P 220 | 14 | |
| 287 | LOW: Spare | P 220 | 15 | |
| 288 | Select ramp generator A parameter set (LOW: Parameter set 1 / HIGH: Parameter set 2) | P 221 | 0 | |
| 289 | LOW: Spare | P 221 | 1 | |
| 290 | LOW: Spare | P 221 | 2 | |
| 291 | LOW: Spare | P 221 | 3 | |
| 292 | Ramp generator A output = 0 (quick ramp-down active) | P 221 | 4 | |
| 293 | Stop ramp generator A | P 221 | 5 | |
| 294 | Setpoint 0 at input of ramp generator A | P 221 | 6 | |
| 295 | Setpoint 0 at input of ramp generator B | P 221 | 7 | |
| 296 | Ramp generator B output = 0 (quick ramp-down active) | P 221 | 8 | |
| 297 | LOW: Spare | P 221 | 9 | |
| 298 | LOW: Spare | P 221 | 10 | |
| 299 | LOW: Spare | P 221 | 11 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 300 | LOW: Spare | P 221 | 12 | |
| 301 | LOW: Spare | P 221 | 13 | |
| 302 | LOW: Spare | P 221 | 14 | |
| 303 | LOW: Spare | P 221 | 15 | |
| 304 | HIGH: Actual value detector active | P 250 | 0 | |
| 305 | LOW: Spare | P 250 | 1 | |
| 306 | LOW: Spare | P 250 | 2 | |
| 307 | HIGH: Error in actual value detection | P 250 | 3 | |
| 308 | LOW: Spare | P 250 | 4 | |
| 309 | HIGH: Overspeed monitoring function has tripped (threshold: P 501) | P 250 | 5 | |
| 310 | LOW: Spare | P 250 | 6 | |
| 311 | LOW: Spare | P 250 | 7 | |
| 312 | LOW: Spare | P 250 | 8 | |
| 313 | LOW: Spare | P 250 | 9 | |
| 314 | HIGH: $n > n_{min}$ (threshold P 505, hysteresis P 506) | P 250 | 10 | |
| 315 | LOW: Spare | P 250 | 11 | |
| 316 | HIGH: $n > n_{x1}$ (threshold P 507, hysteresis P 508) | P 250 | 12 | |
| 317 | HIGH: $n > n_{x2}$ (threshold P 509, hysteresis P 510) | P 250 | 13 | |
| 318 | HIGH: $n > n_{x3}$ (threshold P 511, hysteresis P 512) | P 250 | 14 | |
| 319 | HIGH: $n > n_{x4}$ (threshold P 513, hysteresis P 514) | P 250 | 15 | |
| 320 | LOW: Spare | | | |
| 321 | LOW: Spare | | | |
| 322 | LOW: Spare | | | |
| 323 | LOW: Spare | | | |
| 324 | LOW: Spare | | | |
| 325 | LOW: Spare | | | |
| 326 | LOW: Spare | | | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 327 | LOW: Spare | | | |
| 328 | LOW: Spare | | | |
| 329 | LOW: Spare | | | |
| 330 | LOW: Spare | | | |
| 331 | LOW: Spare | | | |
| 332 | LOW: Spare | | | |
| 333 | LOW: Spare | | | |
| 334 | LOW: Spare | | | |
| 335 | LOW: Spare | | | |
| 336 | LOW: Spare | P 260 | 0 | |
| 337 | LOW: Spare | P 260 | 1 | |
| 338 | LOW: Spare | P 260 | 2 | |
| 339 | HIGH: Error in incremental encoder | P 260 | 3 | |
| 340 | LOW: Spare | P 260 | 4 | |
| 341 | LOW: Spare | P 260 | 5 | |
| 342 | LOW: Spare | P 260 | 6 | |
| 343 | LOW: Spare | P 260 | 7 | |
| 344 | HIGH: Frequency limit for encoder evaluation exceeded (warning 1) | P 260 | 8 | |
| 345 | LOW: Spare | P 260 | 9 | |
| 346 | LOW: Spare | P 260 | 10 | |
| 347 | LOW: Spare | P 260 | 11 | |
| 348 | LOW: Spare | P 260 | 12 | |
| 349 | LOW: Spare | P 260 | 13 | |
| 350 | LOW: Spare | P 260 | 14 | |
| 351 | LOW: Spare | P 260 | 15 | |
| 352 | Bit combinations<br>00 Speed controller disabled<br>01 Speed controller enabled<br>10 Spare<br>11 Current control (P 102 = -2) | P 300 | 0 | |
| 353 | | | 1 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 354 | LOW: Torque direction 1 requested,<br>HIGH: Torque direction 2 requested | P 300 | 2 | |
| 355 | HIGH: Error in speed controller | P 300 | 3 | |
| 356 | HIGH: Drive blocked (error 8) | P 300 | 4 | |
| 357 | HIGH: Speed-dependent current limit active for the speed controller | P 300 | 5 | |
| 358 | HIGH: Gear protection limit active for the speed controller | P 300 | 6 | |
| 359 | HIGH: External current limit active for the speed controller | P 300 | 7 | |
| 360 | HIGH: Drift lock active | P 300 | 8 | |
| 361 | HIGH: Speed controller input setpoint limit active | P 300 | 9 | |
| 362 | HIGH: Ixt limit limits the speed controller | P 300 | 10 | 03.20 |
| 363 | LOW: Speed controller output positive<br>HIGH: Speed controller output negative | P 300 | 11 | |
| 364 | HIGH: $n_{actual}=n_{set}$ at speed controller | P 300 | 12 | |
| 365 | HIGH: P 325 / P 326 limit active for the speed controller | P 300 | 13 | |
| 366 | HIGH: Current limit reached (LED H706) | P 300 | 14 | |
| 367 | HIGH: Speed controller output at the limit | P 300 | 15 | |
| 368 | Setpoint 0 at speed controller if HIGH | P 301 | 0 | |
| 369 | LOW: Spare | P 301 | 1 | |
| 370 | LOW: Spare | P 301 | 2 | |
| 371 | LOW: Spare | P 301 | 3 | |
| 372 | LOW: Spare | P 301 | 4 | |
| 373 | LOW: Spare | P 301 | 5 | |
| 374 | LOW: Spare | P 301 | 6 | |
| 375 | LOW: Spare | P 301 | 7 | |
| 376 | LOW: Spare | P 301 | 8 | |
| 377 | LOW: Spare | P 301 | 9 | |
| 378 | LOW: Spare | P 301 | 10 | |
| 379 | LOW: Spare | P 301 | 11 | |
| 380 | LOW: Spare | P 301 | 12 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 381 | LOW: Spare | P 301 | 13 | |
| 382 | LOW: Spare | P 301 | 14 | |
| 383 | LOW: Spare | P 301 | 15 | |
| 384 | HIGH: Armature current controller enabled | P 350 | 0 | |
| 385 | LOW: Reserved | P 350 | 1 | |
| 386 | LOW: Reserved | P 350 | 2 | |
| 387 | HIGH: Error in armature current controller | P 350 | 3 | |
| 388 | LOW: Reserved | P 350 | 4 | |
| 389 | LOW: Reserved | P 350 | 5 | |
| 390 | HIGH: Armature circuit $\alpha_W$ reached | P 350 | 6 | |
| 391 | HIGH: Armature circuit $\alpha_G$ reached | P 350 | 7 | |
| 392 | HIGH: $I_A > I_{Ax_1}$ threshold exceeded (threshold P 521, hysteresis P 522) | P 350 | 8 | |
| 393 | HIGH: $I_A > I_{Ax_2}$ threshold exceeded (threshold P 523, hysteresis P 524) | P 350 | 9 | |
| 394 | LOW: Spare | P 350 | 10 | |
| 395 | LOW: Spare | P 350 | 11 | |
| 396 | LOW: Spare | P 350 | 12 | |
| 397 | LOW: Spare | P 350 | 13 | |
| 398 | LOW: Spare | P 350 | 14 | |
| 399 | LOW: Spare | P 350 | 15 | |
| 400 | LOW: Spare | | | |
| 401 | LOW: Spare | | | |
| 402 | LOW: Spare | | | |
| 403 | LOW: Spare | | | |
| 404 | LOW: Spare | | | |
| 405 | LOW: Spare | | | |
| 406 | LOW: Spare | | | |
| 407 | LOW: Spare | | | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 408 | LOW: Spare | | | |
| 409 | LOW: Spare | | | |
| 410 | LOW: Spare | | | |
| 411 | LOW: Spare | | | |
| 412 | LOW: Spare | | | |
| 413 | LOW: Spare | | | |
| 414 | LOW: Spare | | | |
| 415 | LOW: Spare | | | |
| 416 | LOW: Field unit OFF HIGH: Field unit ON | P 370 | 0 | |
| 417 | LOW: Constant field HIGH: Field weakening | P 370 | 1 | |
| 418 | LOW: Spare | P 370 | 2 | |
| 419 | HIGH: Error in field unit | P 370 | 3 | |
| 420 | HIGH: Minimum field current setpoint reached | P 370 | 4 | |
| 421 | HIGH: Maximum field current setpoint reached | P 370 | 5 | |
| 422 | HIGH: Field circuit $\alpha_W$ reached | P 370 | 6 | |
| 423 | HIGH: Field circuit $\alpha_G$ reached | P 370 | 7 | |
| 424 | HIGH: Field current actual value < 50 % field current setpoint (after release time) | P 370 | 8 | |
| 425 | LOW: Spare | P 370 | 9 | |
| 426 | LOW: Spare | P 370 | 10 | |
| 427 | LOW: Spare | P 370 | 11 | |
| 428 | LOW: Spare | P 370 | 12 | |
| 429 | LOW: Spare | P 370 | 13 | |
| 430 | LOW: Spare | P 370 | 14 | |
| 431 | LOW: Spare | P 370 | 15 | |
| 432 | LOW: Spare | | | |
| 433 | LOW: Spare | | | |
| 434 | LOW: Spare | | | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 435 | LOW: Spare | | | |
| 436 | LOW: Spare | | | |
| 437 | LOW: Spare | | | |
| 438 | LOW: Spare | | | |
| 439 | LOW: Spare | | | |
| 440 | LOW: Spare | | | |
| 441 | LOW: Spare | | | |
| 442 | LOW: Spare | | | |
| 443 | LOW: Spare | | | |
| 444 | LOW: Spare | | | |
| 445 | LOW: Spare | | | |
| 446 | LOW: Spare | | | |
| 447 | LOW: Spare | | | |
| 448 | LOW: Reserved | P 400 | 0 | |
| 449 | LOW: Spare | P 400 | 1 | |
| 450 | LOW: Spare | P 400 | 2 | |
| 451 | HIGH: Error in binary inputs | P 400 | 3 | |
| 452 | LOW: Pulse inhibit - HIGH: Pulse enable (terminal) | P 400 | 4 | |
| 453 | LOW: Quick stop active - HIGH: Quick stop not active (terminal) | P 400 | 5 | |
| 454 | LOW: Disable controller - HIGH: Enable controller (terminal) | P 400 | 6 | |
| 455 | LOW: Main contactor OFF - HIGH: Main contactor ON (terminal) | P 400 | 7 | |
| 456 | HIGH: Digital input 1 has HIGH signal at terminal | P 400 | 8 | |
| 457 | HIGH: Digital input 2 has HIGH signal at terminal | P 400 | 9 | |
| 458 | HIGH: Digital input 3 has HIGH signal at terminal | P 400 | 10 | |
| 459 | HIGH: Digital input 4 has HIGH signal at terminal | P 400 | 11 | |
| 460 | HIGH: Digital input 5 has HIGH signal at terminal | P 400 | 12 | |
| 461 | HIGH: Digital input 6 has HIGH signal at terminal | P 400 | 13 | |
| 462 | HIGH: Digital input 7 has HIGH signal at terminal | P 400 | 14 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 463 | HIGH: Digital input 8 has HIGH signal at terminal | P 400 | 15 | |
| 464 | LOW: Spare | P 420 | 0 | |
| 465 | LOW: Spare | P 420 | 1 | |
| 466 | LOW: Spare | P 420 | 2 | |
| 467 | HIGH: Error in digital outputs | P 420 | 3 | |
| 468 | LOW: Spare | P 420 | 4 | |
| 469 | LOW: Spare | P 420 | 5 | |
| 470 | LOW: Spare | P 420 | 6 | |
| 471 | LOW: Spare | P 420 | 7 | |
| 472 | HIGH: Digital output 1 has HIGH signal at terminal | P 420 | 8 | |
| 473 | HIGH: Digital output 2 has HIGH signal at terminal | P 420 | 9 | |
| 474 | HIGH: Digital output 3 has HIGH signal at terminal | P 420 | 10 | |
| 475 | HIGH: Digital output 4 has HIGH signal at terminal | P 420 | 11 | |
| 476 | HIGH: Digital output 5 has HIGH signal at terminal | P 420 | 12 | |
| 477 | HIGH: Digital output 6 has HIGH signal at terminal | P 420 | 13 | |
| 478 | HIGH: Ready relay triggered | P 420 | 14 | |
| 479 | HIGH: Main contactor relay triggered | P 420 | 15 | |
| 480 | LOW: Spare | P 460 | 0 | |
| 481 | LOW: Spare | P 460 | 1 | |
| 482 | LOW: Spare | P 460 | 2 | |
| 483 | LOW: Spare | P 460 | 3 | |
| 484 | HIGH: Analog output 1 ON (P 465 unequal 0) | P 460 | 4 | |
| 485 | HIGH: Analog output 2 ON (P 470 unequal 0) | P 460 | 5 | |
| 486 | HIGH: Analog output 3 ON (P 475 unequal 0) | P 460 | 6 | |
| 487 | HIGH: Analog output 4 ON (P 480 unequal 0) | P 460 | 7 | |
| 488 | HIGH: Analog output 1, negative signal limit active | P 460 | 8 | |
| 489 | HIGH: Analog output 2, negative signal limit active | P 460 | 9 | |
| 490 | HIGH: Analog output 3, negative signal limit active | P 460 | 10 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 491 | HIGH: Analog output 4, negative signal limit active | P 460 | 11 | |
| 492 | HIGH: Analog output 1, positive signal limit active | P 460 | 12 | |
| 493 | HIGH: Analog output 2, positive signal limit active | P 460 | 13 | |
| 494 | HIGH: Analog output 3, positive signal limit active | P 460 | 14 | |
| 495 | HIGH: Analog output 4, positive signal limit active | P 460 | 15 | |
| 496 | LOW: Spare | | | |
| 497 | LOW: Spare | | | |
| 498 | LOW: Spare | | | |
| 499 | LOW: Spare | | | |
| 500 | LOW: Spare | | | |
| 501 | LOW: Spare | | | |
| 502 | LOW: Spare | | | |
| 503 | LOW: Spare | | | |
| 504 | LOW: Spare | | | |
| 505 | LOW: Spare | | | |
| 506 | LOW: Spare | | | |
| 507 | LOW: Spare | | | |
| 508 | LOW: Spare | | | |
| 509 | LOW: Spare | | | |
| 510 | LOW: Spare | | | |
| 511 | LOW: Spare | | | |
| 512 | HIGH: Motor temperature monitoring channel 1 active (P 541 = 1) | P 540 | 0 | 03.10 |
| 513 | HIGH: Motor temperature monitoring channel 2 active (P 544 = 1) | P 540 | 1 | 03.10 |
| 514 | LOW: Spare | P 540 | 2 | 03.10 |
| 515 | HIGH: Error in module motor temperature monitoring (F 96 to F 101) | P 540 | 3 | 03.10 |
| 516 | HIGH: Warning motor temperatur channel 1 active (W 11) | P 540 | 4 | 03.10 |
| 517 | HIGH: Warning motor temperatur channel 2 active (W 12) | P 540 | 5 | 03.10 |
| 518 | HIGH: Message threshold motor temperature channel 1 exceeded | P 540 | 6 | 03.20 |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 519 | HIGH: Message threshold motor temperature channel 2 exceeded | P 540 | 7 | 03.20 |
| 520 | LOW: Spare | P 540 | 8 | 03.10 |
| 521 | LOW: Spare | P 540 | 9 | 03.10 |
| 522 | LOW: Spare | P 540 | 10 | 03.10 |
| 523 | LOW: Spare | P 540 | 11 | 03.10 |
| 524 | LOW: Spare | P 540 | 12 | 03.10 |
| 525 | LOW: Spare | P 540 | 13 | 03.10 |
| 526 | LOW: Spare | P 540 | 14 | 03.10 |
| 527 | LOW: Spare | P 540 | 15 | 03.10 |
| 528 | LOW: Unassigned PI controller disabled<br>HIGH: Unassigned PI controller enabled | P 560 | 0 | |
| 529 | LOW: Spare | P 560 | 1 | |
| 530 | LOW: Spare | P 560 | 2 | |
| 531 | HIGH: Error in unassigned PI controller | P 560 | 3 | |
| 532 | HIGH: Controller output, positive limit active (P 577) | P 560 | 4 | |
| 533 | HIGH: Controller output, negative limit active (P 578) | P 560 | 5 | |
| 534 | HIGH: I component, positive limit active (P 575) | P 560 | 6 | |
| 535 | HIGH: I component, negative limit active (P 576) | P 560 | 7 | |
| 536 | HIGH: Unassigned PI controller setpoint limit active | P 560 | 8 | |
| 537 | LOW: Spare | P 560 | 9 | |
| 538 | LOW: Spare | P 560 | 10 | |
| 539 | LOW: Spare | P 560 | 11 | |
| 540 | LOW: Spare | P 560 | 12 | |
| 541 | LOW: Spare | P 560 | 13 | |
| 542 | LOW: Spare | P 560 | 14 | |
| 543 | LOW: Spare | P 560 | 15 | |
| 544 | LOW: Switch setpoint = 0 at unassigned PI controller | P 561 | 0 | |
| 545 | LOW: Disable unassigned PI controller | P 561 | 1 | |
| 546 | LOW: Deactivate I component at unassigned PI controller | P 561 | 2 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 547 | LOW: Spare | P 561 | 3 | |
| 548 | LOW: Spare | P 561 | 4 | |
| 549 | LOW: Spare | P 561 | 5 | |
| 550 | LOW: Spare | P 561 | 6 | |
| 551 | LOW: Spare | P 561 | 7 | |
| 552 | LOW: Spare | P 561 | 8 | |
| 553 | LOW: Spare | P 561 | 9 | |
| 554 | LOW: Spare | P 561 | 10 | |
| 555 | LOW: Spare | P 561 | 11 | |
| 556 | LOW: Spare | P 561 | 12 | |
| 557 | LOW: Spare | P 561 | 13 | |
| 558 | LOW: Spare | P 561 | 14 | |
| 559 | LOW: Spare | P 561 | 15 | |
| 560 | LOW: Spare | P 600 | 0 | |
| 561 | LOW: Spare | P 600 | 1 | |
| 562 | LOW: Spare | P 600 | 2 | |
| 563 | LOW: Spare | P 600 | 3 | |
| 564 | HIGH: Unassigned comparator output inverted to DLink 14 | P 600 | 4 | |
| 565 | LOW: Spare | P 600 | 5 | |
| 566 | LOW: Spare | P 600 | 6 | |
| 567 | LOW: Spare | P 600 | 7 | |
| 568 | Changeover switch 1 active (signal P 667 passed on) (feedback signal) | P 600 | 8 | |
| 569 | Changeover switch 2 active (signals P 669+P 670 passed on) (feedback signal) | P 600 | 9 | |
| 570 | Changeover switch 3 active (signal P 672*P 673 passed on) (feedback signal) | P 600 | 10 | |
| 571 | Changeover switch 4 active (signal P 674 passed on) (feedback signal) | P 600 | 11 | |
| 572 | LOW: Spare | P 600 | 12 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 573 | LOW: Spare | P 600 | 13 | |
| 574 | LOW: Spare | P 600 | 14 | |
| 575 | LOW: Spare | P 600 | 15 | |
| 576 | HIGH: Unassigned changeover switch 1 active (signal P 667 passed on) | P 601 | 0 | |
| 577 | HIGH: Unassigned changeover switch 2 active (signals P 669+P 670 passed on) | P 601 | 1 | |
| 578 | HIGH: Unassigned changeover switch 3 active (signal P 672*P 673 passed on) | P 601 | 2 | |
| 579 | HIGH: Unassigned changeover switch 4 active (signal P 674 passed on) | P 601 | 3 | |
| 580 | LOW: Spare | P 601 | 4 | |
| 581 | LOW: Spare | P 601 | 5 | |
| 582 | LOW: Spare | P 601 | 6 | |
| 583 | LOW: Spare | P 601 | 7 | |
| 584 | LOW: Spare | P 601 | 8 | |
| 585 | LOW: Spare | P 601 | 9 | |
| 586 | LOW: Spare | P 601 | 10 | |
| 587 | LOW: Spare | P 601 | 11 | |
| 588 | LOW: Spare | P 601 | 12 | |
| 589 | LOW: Spare | P 601 | 13 | |
| 590 | LOW: Spare | P 601 | 14 | |
| 591 | LOW: Spare | P 601 | 15 | |
| 592 | Output of digital delay element 1 (P 702 / P 703) | - | - | |
| 593 | Inverted DLink 592 | - | - | |
| 594 | Output of digital delay element 2 (P 704 / P 705) | - | - | |
| 595 | Inverted DLink 594 | - | - | |
| 596 | Output of digital delay element 3 (P 706 / P 707) | - | - | |
| 597 | Inverted DLink 595 | - | - | |
| 598 | Output of digital delay element 4 (P 708 / P 709) | - | - | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 599 | Inverted DLink 596 | - | - | |
| 600 | Output of gate 1 (AND / OR / XOR) (P 710-P 714) | - | - | |
| 601 | Inverted DLink 600 | - | - | |
| 602 | Output of gate 2 (AND / OR / XOR) (P 715-P 719) | - | - | |
| 603 | Inverted DLink 602 | - | - | |
| 604 | Output of gate 3 (AND / OR / XOR) (P 720-P 724) | - | - | |
| 605 | Inverted DLink 604 | - | - | |
| 606 | Output of gate 4 (AND / OR / XOR) (P 725-P 729) | - | - | |
| 607 | Inverted DLink 606 | - | - | |
| 608 | LOW: Spare | | | |
| 609 | LOW: Spare | | | |
| 610 | LOW: Spare | | | |
| 611 | LOW: Spare | | | |
| 612 | LOW: Spare | | | |
| 613 | LOW: Spare | | | |
| 614 | LOW: Spare | | | |
| 615 | LOW: Spare | | | |
| 616 | LOW: Spare | | | |
| 617 | LOW: Spare | | | |
| 618 | LOW: Spare | | | |
| 619 | LOW: Spare | | | |
| 620 | LOW: Spare | | | |
| 621 | LOW: Spare | | | |
| 622 | LOW: Spare | | | |
| 623 | LOW: Spare | | | |
| 624 | HIGH: Error in converter control module | P 900 | 0 | |
| 625 | LOW: Spare | P 900 | 1 | |
| 626 | LOW: Spare | P 900 | 2 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 627 | LOW: Spare | P 900 | 3 | |
| 628 | LOW: Spare | P 900 | 4 | |
| 629 | LOW: Spare | P 900 | 5 | |
| 630 | LOW: Spare | P 900 | 6 | |
| 631 | HIGH: Error in speed controller module | P 900 | 7 | |
| 632 | HIGH: Error in incremental encoder 1 evaluation module | P 900 | 8 | |
| 633 | HIGH: Error in data record manager module | P 900 | 9 | |
| 634 | LOW: Spare | P 900 | 10 | |
| 635 | HIGH: Error in operating system module | P 900 | 11 | |
| 636 | HIGH: Error in µP module | P 900 | 12 | |
| 637 | HIGH: Error in EMF module | P 900 | 13 | |
| 638 | HIGH: Error in power unit module | P 900 | 14 | |
| 639 | HIGH: Error in field unit module | P 900 | 15 | |
| 640 | HIGH: Error in motor potentiometer module | P 901 | 0 | 03.10 |
| 641 | HIGH: Error in digital outputs module | P 901 | 1 | 03.10 |
| 642 | HIGH: Error in actual value detector module | P 901 | 2 | 03.10 |
| 643 | HIGH: Error in reversing unit module | P 901 | 3 | 03.10 |
| 644 | HIGH: Error in power unit module | P 901 | 4 | 03.10 |
| 645 | HIGH: Error in digital inputs module | P 901 | 5 | 03.10 |
| 646 | HIGH: Error in analog inputs module | P 901 | 6 | 03.10 |
| 647 | HIGH: Error in armature current controller module | P 901 | 7 | 03.10 |
| 648 | HIGH: Error in data record manager 2 | P 901 | 8 | 03.10 |
| 649 | HIGH: Error in data record manager 3 | P 901 | 9 | 03.10 |
| 650 | HIGH: Error in module unassigned funktion blocks | P 901 | 10 | 03.10 |
| 651 | HIGH: Error in module motor temperature monitoring (F 96 to F 101) | P 901 | 11 | 03.10 |
| 652 | LOW: Spare | P 901 | 12 | |
| 653 | LOW: Spare | P 901 | 13 | |
| 654 | LOW: Spare | P 901 | 14 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 655 | LOW: Spare | P 901 | 15 | |
| 656 | HIGH: Warning 1 active P 261 / P 262 parameter conflict | P 902 | 0 | |
| 657 | HIGH: Warning 2 active<br>Data record save not completed | P 902 | 1 | |
| 658 | HIGH: Warning 3 active Power unit temperature exceeded | P 902 | 2 | |
| 659 | HIGH: Warning 4 active Data record not erased | P 902 | 3 | |
| 660 | HIGH: Warning 5 active P 072 / P 074 parameter conflict | P 902 | 4 | |
| 661 | HIGH: Warning 6 active Intermittent-current limit cannot be defined (at P 082 = 1) | P 902 | 5 | |
| 662 | HIGH: Warning 7 active Data record change not possible | P 902 | 6 | |
| 663 | HIGH: Warning 8 active Motor $i^2t$ tripped | P 902 | 7 | |
| 664 | HIGH: Warning 9 active Cannot erase boot data record | P 902 | 8 | |
| 665 | HIGH: Warning 10 active Cannot reset | P 902 | 9 | |
| 666 | HIGH: Warning motor temperature channel 1 active (W 11) | P 902 | 10 | 03.10 |
| 667 | HIGH: Warning motor temperature channel 2 active (W 12) | P 902 | 11 | 03.10 |
| 668 | HIGH: Warning 13 active: Pre-warning power unit temperature | P 902 | 12 | 03.15 |
| 669 | LOW: Spare | P 902 | 13 | |
| 670 | LOW: Spare | P 902 | 14 | |
| 671 | LOW: Spare | P 902 | 15 | |
| 672 | LOW: Spare | P 903 | 0 | |
| 673 | LOW: Spare | P 903 | 1 | |
| 674 | LOW: Spare | P 903 | 2 | |
| 675 | LOW: Spare | P 903 | 3 | |
| 676 | LOW: Spare | P 903 | 4 | |
| 677 | LOW: Spare | P 903 | 5 | |
| 678 | LOW: Spare | P 903 | 6 | |
| 679 | LOW: Spare | P 903 | 7 | |
| 680 | LOW: Spare | P 903 | 8 | |
| 681 | LOW: Spare | P 903 | 9 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 682 | LOW: Spare | P 903 | 10 | |
| 683 | LOW: Spare | P 903 | 11 | |
| 684 | LOW: Spare | P 903 | 12 | |
| 685 | LOW: Spare | P 903 | 13 | |
| 686 | LOW: Spare | P 903 | 14 | |
| 687 | LOW: Spare | P 903 | 15 | |
| 688 | HIGH: Error 1 active: BASS communication time monitoring | P 910 | 0 | |
| 689 | HIGH: Error 2 active: USS communication time monitoring | P 910 | 1 | |
| 690 | HIGH: Error 3 active: Cyclic data time monitoring | P 910 | 2 | |
| 691 | HIGH: Error 4 active: Demand data transmission time monitoring | P 910 | 3 | |
| 692 | LOW: Spare | P 910 | 4 | |
| 693 | LOW: Spare | P 910 | 5 | |
| 694 | LOW: Spare | P 910 | 6 | |
| 695 | LOW: Spare | P 910 | 7 | |
| 696 | HIGH: Error 91 active: Undefined field bus card status | P 910 | 8 | 03.04 |
| 697 | HIGH: Error 92 active: Field bus error | P 910 | 9 | 03.04 |
| 698 | HIGH: Error 93 active:<br>Field bus setpoint/actual-value configuration error | P 910 | 10 | 03.04 |
| 699 | LOW: Spare | P 910 | 11 | |
| 700 | LOW: Spare | P 910 | 12 | |
| 701 | LOW: Spare | P 910 | 13 | |
| 702 | LOW: Spare | P 910 | 14 | |
| 703 | HIGH: Error 7 active: Program branching error | P 910 | 15 | |
| 704 | LOW: Spare | P 911 | 0 | |
| 705 | HIGH: Error 8 active: Drive blocked | P 911 | 1 | |
| 706 | LOW: Spare | P 911 | 2 | |
| 707 | LOW: Spare | P 911 | 3 | |
| 708 | LOW: Spare | P 911 | 4 | |
| 709 | LOW: Spare | P 911 | 5 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 710 | LOW: Spare | P 911 | 6 | |
| 711 | LOW: Spare | P 911 | 7 | |
| 712 | LOW: Spare | P 911 | 8 | |
| 713 | LOW: Spare | P 911 | 9 | |
| 714 | LOW: Spare | P 911 | 10 | |
| 715 | LOW: Spare | P 911 | 11 | |
| 716 | LOW: Spare | P 911 | 12 | |
| 717 | LOW: Spare | P 911 | 13 | |
| 718 | LOW: Spare | P 911 | 14 | |
| 719 | LOW: Spare | P 911 | 15 | |
| 720 | HIGH: Error 9 active: Incremental encoder 1, scaling error | P 912 | 0 | |
| 721 | LOW: Spare | P 912 | 1 | |
| 722 | LOW: Spare | P 912 | 2 | |
| 723 | LOW: Spare | P 912 | 3 | |
| 724 | LOW: Spare | P 912 | 4 | |
| 725 | LOW: Spare | P 912 | 5 | |
| 726 | LOW: Spare | P 912 | 6 | |
| 727 | LOW: Spare | P 912 | 7 | |
| 728 | LOW: Spare | P 912 | 8 | |
| 729 | LOW: Spare | P 912 | 9 | |
| 730 | LOW: Spare | P 912 | 10 | |
| 731 | LOW: Spare | P 912 | 11 | |
| 732 | LOW: Spare | P 912 | 12 | |
| 733 | LOW: Spare | P 912 | 13 | |
| 734 | LOW: Spare | P 912 | 14 | |
| 735 | LOW: Spare | P 912 | 15 | |
| 736 | HIGH: Error 10 active:<br>EEPROM-to-RAM copy error | P 913 | 0 | |
| 737 | HIGH: Error 11 active: Damaged boot data record header | P 913 | 1 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 738 | HIGH: Error 12 active: Boot data record checksum error | P 913 | 2 | |
| 739 | HIGH: Error 13 active: Damaged primary data header | P 913 | 3 | |
| 740 | HIGH: Error 14 active: EEPROM too small | P 913 | 4 | |
| 741 | HIGH: Error 15 active: Error on data record save | P 913 | 5 | |
| 742 | HIGH: Error 57 active:<br>Ambiguous data record change source | P 913 | 6 | |
| 743 | HIGH: Error 58 active: EEPROM empty | P 913 | 7 | |
| 744 | HIGH: Error 59 active: Parameter error in data record 1<br>(write error/value) | P 913 | 8 | |
| 745 | HIGH: Error 60 active: Parameter error in data record 2<br>(write error/value) | P 913 | 9 | |
| 746 | HIGH: Error 61 active: Parameter error in data record 3<br>(write error/value) | P 913 | 10 | |
| 747 | HIGH: Error 62 active: Parameter error in data record 4<br>(write error/value) | P 913 | 11 | |
| 748 | HIGH: Error 63 active: Parameter error in data record 5<br>(write error/value) | P 913 | 12 | |
| 749 | HIGH: Error 64 active: Parameter error in data record 6<br>(write error/value) | P 913 | 13 | |
| 750 | HIGH: Error 65 active: Error in ROM data record (no. 7) | P 913 | 14 | |
| 751 | HIGH: Error 66 active: Primary data parameter error | P 913 | 15 | |
| 752 | HIGH: Error 16 active: Ambiguous converter type BKD/BKF (1-Q/4-Q) | P 914 | 0 | |
| 753 | HIGH: Error 17 active: Error ext. analog-digital converter | P 914 | 1 | |
| 754 | HIGH: Error 18 active: Unknown field power unit identification | P 914 | 2 | |
| 755 | HIGH: Error 19 active: Field connection error (AC) | P 914 | 3 | |
| 756 | HIGH: Error 20 active: Armature power unit connection error (AC) | P 914 | 4 | |
| 757 | HIGH: Error 21 active: CCW rotating field at armature power unit | P 914 | 5 | |
| 758 | HIGH: Error 22 active: Phase failure at armature power unit | P 914 | 6 | |
| 759 | LOW: Spare | P 914 | 7 | |
| 760 | LOW: Spare | P 914 | 8 | |
| 761 | LOW: Spare | P 914 | 9 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 762 | LOW: Spare | P 914 | 10 | |
| 763 | LOW: Spare | P 914 | 11 | |
| 764 | LOW: Spare | P 914 | 12 | |
| 765 | LOW: Spare | P 914 | 13 | |
| 766 | LOW: Spare | P 914 | 14 | |
| 767 | LOW: Spare | P 914 | 15 | |
| 768 | HIGH: Error 23 active: External bus error | P 915 | 0 | |
| 769 | HIGH: Error 24 active: Program address error | P 915 | 1 | |
| 770 | HIGH: Error 25 active: Data address error | P 915 | 2 | |
| 771 | HIGH: Error 26 active: Protected OPCODE | P 915 | 3 | |
| 772 | HIGH: Error 27 active: OPCODE error | P 915 | 4 | |
| 773 | HIGH: Error 28 active: Stack underflow | P 915 | 5 | |
| 774 | HIGH: Error 29 active: Stack overflow | P 915 | 6 | |
| 775 | HIGH: Error 30 active: External watchdog tripped | P 915 | 7 | |
| 776 | HIGH: Error 31 active: Internal watchdog tripped | P 915 | 8 | |
| 777 | HIGH: Error 32 active: RAM test error | P 915 | 9 | |
| 778 | HIGH: Error 70 active: Option board does not respond | P 915 | 10 | |
| 779 | LOW: Spare | P 915 | 11 | |
| 780 | LOW: Spare | P 915 | 12 | |
| 781 | LOW: Spare | P 915 | 13 | |
| 782 | LOW: Spare | P 915 | 14 | |
| 783 | LOW: Spare | P 915 | 15 | |
| 784 | HIGH: Error 33 active:<br>Parameter conflict P 071 / P 073 | P 916 | 0 | |
| 785 | HIGH: Error 34 active: Repeated negative actual armature current | P 916 | 1 | |
| 786 | HIGH: Error 52 active: Mains undervoltage | P 916 | 2 | |
| 787 | HIGH: Error 53 active: Overcurrent TD1 | P 916 | 3 | |
| 788 | HIGH: Error 54 active: Overcurrent TD2 | P 916 | 4 | |
| 789 | LOW: Spare | P 916 | 5 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 790 | LOW: Spare | P 916 | 6 | |
| 791 | LOW: Spare | P 916 | 7 | |
| 792 | LOW: Spare | P 916 | 8 | |
| 793 | LOW: Spare | P 916 | 9 | |
| 794 | LOW: Spare | P 916 | 10 | |
| 795 | LOW: Spare | P 916 | 11 | |
| 796 | LOW: Spare | P 916 | 12 | |
| 797 | LOW: Spare | P 916 | 13 | |
| 798 | LOW: Spare | P 916 | 14 | |
| 799 | LOW: Spare | P 916 | 15 | |
| 800 | HIGH: Error 35 active: No synchronisation | P 917 | 0 | |
| 801 | HIGH: Error 36 active: Firing pulse interval differs from specified value | P 917 | 1 | |
| 802 | LOW: Spare | P 917 | 2 | |
| 803 | HIGH: Error 38 active: Mains frequency < 45 Hz | P 917 | 3 | |
| 804 | HIGH: Error 39 active: Mains frequency > 65 Hz | P 917 | 4 | |
| 805 | HIGH: Error 55 active: Zero-current detector defective | P 917 | 5 | |
| 806 | LOW: Spare | P 917 | 6 | |
| 807 | LOW: Spare | P 917 | 7 | |
| 808 | LOW: Spare | P 917 | 8 | |
| 809 | LOW: Spare | P 917 | 9 | |
| 810 | LOW: Spare | P 917 | 10 | |
| 811 | LOW: Spare | P 917 | 11 | |
| 812 | LOW: Spare | P 917 | 12 | |
| 813 | LOW: Spare | P 917 | 13 | |
| 814 | LOW: Spare | P 917 | 14 | |
| 815 | LOW: Spare | P 917 | 15 | |
| 816 | HIGH: Error 40 active: Field current monitoring | P 918 | 0 | |
| 817 | HIGH: Error 69 active:<br>Field power unit differs from EEPROM value | P 918 | 1 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 818 | LOW: Spare | P 918 | 2 | |
| 819 | LOW: Spare | P 918 | 3 | |
| 820 | LOW: Spare | P 918 | 4 | |
| 821 | LOW: Spare | P 918 | 5 | |
| 822 | LOW: Spare | P 918 | 6 | |
| 823 | LOW: Spare | P 918 | 7 | |
| 824 | LOW: Spare | P 918 | 8 | |
| 825 | LOW: Spare | P 918 | 9 | |
| 826 | LOW: Spare | P 918 | 10 | |
| 827 | LOW: Spare | P 918 | 11 | |
| 828 | LOW: Spare | P 918 | 12 | |
| 829 | LOW: Spare | P 918 | 13 | |
| 830 | LOW: Spare | P 918 | 14 | |
| 831 | LOW: Spare | P 918 | 15 | |
| 832 | HIGH: Error 42 active: P 213 / P 215 parameter conflict | P 919 | 0 | |
| 833 | LOW: Spare | P 919 | 1 | |
| 834 | LOW: Spare | P 919 | 2 | |
| 835 | LOW: Spare | P 919 | 3 | |
| 836 | LOW: Spare | P 919 | 4 | |
| 837 | LOW: Spare | P 919 | 5 | |
| 838 | LOW: Spare | P 919 | 6 | |
| 839 | LOW: Spare | P 919 | 7 | |
| 840 | LOW: Spare | P 919 | 8 | |
| 841 | LOW: Spare | P 919 | 9 | |
| 842 | LOW: Spare | P 919 | 10 | |
| 843 | LOW: Spare | P 919 | 11 | |
| 844 | LOW: Spare | P 919 | 12 | |
| 845 | LOW: Spare | P 919 | 13 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 846 | LOW: Spare | P 919 | 14 | |
| 847 | LOW: Spare | P 919 | 15 | |
| 848 | HIGH: Error 43 active:<br>Shortcircuit/overload at a digital output | P 920 | 0 | |
| 849 | LOW: Spare | P 920 | 1 | |
| 850 | LOW: Spare | P 920 | 2 | |
| 851 | LOW: Spare | P 920 | 3 | |
| 852 | LOW: Spare | P 920 | 4 | |
| 853 | LOW: Spare | P 920 | 5 | |
| 854 | LOW: Spare | P 920 | 6 | |
| 855 | LOW: Spare | P 920 | 7 | |
| 856 | LOW: Spare | P 920 | 8 | |
| 857 | LOW: Spare | P 920 | 9 | |
| 858 | LOW: Spare | P 920 | 10 | |
| 859 | LOW: Spare | P 920 | 11 | |
| 860 | LOW: Spare | P 920 | 12 | |
| 861 | LOW: Spare | P 920 | 13 | |
| 862 | LOW: Spare | P 920 | 14 | |
| 863 | LOW: Spare | P 920 | 15 | |
| 864 | HIGH: Error 44 active: Overspeed | P 921 | 0 | |
| 865 | HIGH: Error 45 active:<br>Tachogenerator/encoder failure or armature circuit open | P 921 | 1 | |
| 866 | HIGH: Error 46 active:<br>Tachogenerator/encoder polarity reversed | P 921 | 2 | |
| 867 | HIGH: Error 47 active: Speed range error | P 921 | 3 | |
| 868 | LOW: Spare | P 921 | 4 | |
| 869 | LOW: Spare | P 921 | 5 | |
| 870 | LOW: Spare | P 921 | 6 | |
| 871 | LOW: Spare | P 921 | 7 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 872 | LOW: Spare | P 921 | 8 | |
| 873 | LOW: Spare | P 921 | 9 | |
| 874 | LOW: Spare | P 921 | 10 | |
| 875 | LOW: Spare | P 921 | 11 | |
| 876 | LOW: Spare | P 921 | 12 | |
| 877 | LOW: Spare | P 921 | 13 | |
| 878 | LOW: Spare | P 921 | 14 | |
| 879 | LOW: Spare | P 921 | 15 | |
| 880 | HIGH: Error 48 active: Torque change time exceeded | P 922 | 0 | |
| 881 | LOW: Spare | P 922 | 1 | |
| 882 | LOW: Spare | P 922 | 2 | |
| 883 | LOW: Spare | P 922 | 3 | |
| 884 | LOW: Spare | P 922 | 4 | |
| 885 | LOW: Spare | P 922 | 5 | |
| 886 | LOW: Spare | P 922 | 6 | |
| 887 | LOW: Spare | P 922 | 7 | |
| 888 | LOW: Spare | P 922 | 8 | |
| 889 | LOW: Spare | P 922 | 9 | |
| 890 | LOW: Spare | P 922 | 10 | |
| 891 | LOW: Spare | P 922 | 11 | |
| 892 | LOW: Spare | P 922 | 12 | |
| 893 | LOW: Spare | P 922 | 13 | |
| 894 | LOW: Spare | P 922 | 14 | |
| 895 | LOW: Spare | P 922 | 15 | |
| 896 | HIGH: Error 49 active: Armature power unit identification error | P 923 | 0 | |
| 897 | HIGH: Error 67 active:<br>Armature power unit identification differs from EEPROM value | P 923 | 1 | |
| 898 | HIGH: Error 102 active: Cable break temperature sensor power unit | P 923 | 2 | 03.15 |
| 899 | HIGH: Error 103 active: Short circuit temperature sensor power unit | P 923 | 3 | 03.15 |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 900 | HIGH: Power unit limit temperature exceeded (P112 = 1) | P 923 | 4 | 03.15 |
| 901 | LOW: Spare | P 923 | 5 | |
| 902 | LOW: Spare | P 923 | 6 | |
| 903 | LOW: Spare | P 923 | 7 | |
| 904 | LOW: Spare | P 923 | 8 | |
| 905 | LOW: Spare | P 923 | 9 | |
| 906 | LOW: Spare | P 923 | 10 | |
| 907 | LOW: Spare | P 923 | 11 | |
| 908 | LOW: Spare | P 923 | 12 | |
| 909 | LOW: Spare | P 923 | 13 | |
| 910 | LOW: Spare | P 923 | 14 | |
| 911 | LOW: Spare | P 923 | 15 | |
| 912 | HIGH: Error 50 active: Data record selection error | P 924 | 0 | |
| 913 | HIGH: Error 68 active: Data record does not exist | P 924 | 1 | |
| 914 | LOW: Spare | P 924 | 2 | |
| 915 | LOW: Spare | P 924 | 3 | |
| 916 | LOW: Spare | P 924 | 4 | |
| 917 | LOW: Spare | P 924 | 5 | |
| 918 | LOW: Spare | P 924 | 6 | |
| 919 | LOW: Spare | P 924 | 7 | |
| 920 | LOW: Spare | P 924 | 8 | |
| 921 | LOW: Spare | P 924 | 9 | |
| 922 | LOW: Spare | P 924 | 10 | |
| 923 | LOW: Spare | P 924 | 11 | |
| 924 | LOW: Spare | P 924 | 12 | |
| 925 | LOW: Spare | P 924 | 13 | |
| 926 | LOW: Spare | P 924 | 14 | |
| 927 | LOW: Spare | P 924 | 15 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 928 | HIGH: Error 51 active: Input current < 3.3 mA at 4 mA ... 20 mA | P 925 | 0 | |
| 929 | LOW: Spare | P 925 | 1 | |
| 930 | LOW: Spare | P 925 | 2 | |
| 931 | LOW: Spare | P 925 | 3 | |
| 932 | LOW: Spare | P 925 | 4 | |
| 933 | LOW: Spare | P 925 | 5 | |
| 934 | LOW: Spare | P 925 | 6 | |
| 935 | LOW: Spare | P 925 | 7 | |
| 936 | LOW: Spare | P 925 | 8 | |
| 937 | LOW: Spare | P 925 | 9 | |
| 938 | LOW: Spare | P 925 | 10 | |
| 939 | LOW: Spare | P 925 | 11 | |
| 940 | LOW: Spare | P 925 | 12 | |
| 941 | LOW: Spare | P 925 | 13 | |
| 942 | LOW: Spare | P 925 | 14 | |
| 943 | LOW: Spare | P 925 | 15 | |
| 944 | HIGH: Error 56 active:<br>Offset error armature current detector (> 50 mV) | P 926 | 0 | |
| 945 | HIGH: Error 41 active: P 072 out of range | P 926 | 1 | |
| 946 | HIGH: Error 37 active: Armature circuit open | P 926 | 2 | |
| 947 | LOW: Spare | P 926 | 3 | |
| 948 | LOW: Spare | P 926 | 4 | |
| 949 | LOW: Spare | P 926 | 5 | |
| 950 | LOW: Spare | P 926 | 6 | |
| 951 | LOW: Spare | P 926 | 7 | |
| 952 | LOW: Spare | P 926 | 8 | |
| 953 | LOW: Spare | P 926 | 9 | |
| 954 | LOW: Spare | P 926 | 10 | |
| 955 | LOW: Spare | P 926 | 11 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 956 | LOW: Spare | P 926 | 12 | |
| 957 | LOW: Spare | P 926 | 13 | |
| 958 | LOW: Spare | P 926 | 14 | |
| 959 | LOW: Spare | P 926 | 15 | |
| 960 | HIGH: Error 5 active: Incompatible software | P 927 | 0 | |
| 961 | HIGH: Error 6 active: Invalid boot source entry | P 927 | 1 | |
| 962 | HIGH: Error 71 active:<br>Illegal value in P 72 / P 74 in data record 1 | P 927 | 2 | |
| 963 | HIGH: Error 72 active:<br>Illegal value in P 72 / P 74 in data record 2 | P 927 | 3 | |
| 964 | HIGH: Error 73 active:<br>Illegal value in P 72 / P 74 in data record 3 | P 927 | 4 | |
| 965 | HIGH: Error 74 active:<br>Illegal value in P 72 / P 74 in data record 4 | P 927 | 5 | |
| 966 | HIGH: Error 75 active:<br>Illegal value in P 72 / P 74 in data record 5 | P 927 | 6 | |
| 967 | HIGH: Error 76 active:<br>Illegal value in P 72 / P 74 in data record 6 | P 927 | 7 | |
| 968 | HIGH: Error 77 active: Illegal value in P 79 in data record 1 | P 927 | 8 | |
| 969 | HIGH: Error 78 active: Illegal value in P 79 in data record 2 | P 927 | 9 | |
| 970 | HIGH: Error 79 active: Illegal value in P 79 in data record 3 | P 927 | 10 | |
| 971 | HIGH: Error 80 active: Illegal value in P 79 in data record 4 | P 927 | 11 | |
| 972 | HIGH: Error 81 active: Illegal value in P 79 in data record 5 | P 927 | 12 | |
| 973 | HIGH: Error 82 active: Illegal value in P 79 in data record 6 | P 927 | 13 | |
| 974 | HIGH: Error 68 active: Data record does not exist | P 927 | 14 | |
| 975 | HIGH: Error 83 active: EEPROM write time exceeded | P 927 | 15 | |
| 976 | HIGH: Error 84 active: Primary data checksum error | P 928 | 0 | 03.03 |
| 977 | HIGH: Error 85 active: Checksum error in data record 1 | P 928 | 1 | 03.03 |
| 978 | HIGH: Error 86 active: Checksum error in data record 2 | P 928 | 2 | 03.03 |
| 979 | HIGH: Error 87 active: Checksum error in data record 3 | P 928 | 3 | 03.03 |
| 980 | HIGH: Error 88 active: Checksum error in data record 4 | P 928 | 4 | 03.03 |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 981 | HIGH: Error 89 active: Checksum error in data record 5 | P 928 | 5 | 03.03 |
| 982 | HIGH: Error 90 active: Checksum error in data record 6 | P 928 | 6 | 03.03 |
| 983 | LOW: Spare | P 928 | 7 | |
| 984 | LOW: Spare | P 928 | 8 | |
| 985 | LOW: Spare | P 928 | 9 | |
| 986 | LOW: Spare | P 928 | 10 | |
| 987 | LOW: Spare | P 928 | 11 | |
| 988 | LOW: Spare | P 928 | 12 | |
| 989 | LOW: Spare | P 928 | 13 | |
| 990 | LOW: Spare | P 928 | 14 | |
| 991 | LOW: Spare | P 928 | 15 | |
| 992 | HIGH: Error 94 active:<br>(P 657 / P 658) parameter conflict | P 929 | 0 | 03.10 |
| 993 | HIGH: Error 105 active: freely definable error, P730 | P 929 | 1 | 03.15 |
| 994 | LOW: Spare | P 929 | 2 | |
| 995 | LOW: Spare | P 929 | 3 | |
| 996 | LOW: Spare | P 929 | 4 | |
| 997 | LOW: Spare | P 929 | 5 | |
| 998 | LOW: Spare | P 929 | 6 | |
| 999 | LOW: Spare | P 929 | 7 | |
| 1000 | LOW: Spare | P 929 | 8 | |
| 1001 | LOW: Spare | P 929 | 9 | |
| 1002 | LOW: Spare | P 929 | 10 | |
| 1003 | LOW: Spare | P 929 | 11 | |
| 1004 | LOW: Spare | P 929 | 12 | |
| 1005 | LOW: Spare | P 929 | 13 | |
| 1006 | LOW: Spare | P 929 | 14 | |
| 1007 | LOW: Spare | P 929 | 15 | |
| 1008 | HIGH: Bit 0 set in freely definable status word | P 966 | 0 | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 1009 | HIGH: Bit 1 set in freely definable status word | P 966 | 1 | |
| 1010 | HIGH: Bit 2 set in freely definable status word | P 966 | 2 | |
| 1011 | HIGH: Bit 3 set in freely definable status word | P 966 | 3 | |
| 1012 | HIGH: Bit 4 set in freely definable status word | P 966 | 4 | |
| 1013 | HIGH: Bit 5 set in freely definable status word | P 966 | 5 | |
| 1014 | HIGH: Bit 6 set in freely definable status word | P 966 | 6 | |
| 1015 | HIGH: Bit 7 set in freely definable status word | P 966 | 7 | |
| 1016 | HIGH: Bit 8 set in freely definable status word | P 966 | 8 | |
| 1017 | HIGH: Bit 9 set in freely definable status word | P 966 | 9 | |
| 1018 | HIGH: Bit 10 set in freely definable status word | P 966 | 10 | |
| 1019 | HIGH: Bit 11 set in freely definable status word | P 966 | 11 | |
| 1020 | HIGH: Bit 12 set in freely definable status word | P 966 | 12 | |
| 1021 | HIGH: Bit 13 set in freely definable status word | P 966 | 13 | |
| 1022 | HIGH: Bit 14 set in freely definable status word | P 966 | 14 | |
| 1023 | HIGH: Bit 15 set in freely definable status word | P 966 | 15 | |
| 1024 | HIGH: Error 96 active: Motor switch off temperature channel 1 reached (P 543) | P 930 | 0 | 03.10 |
| 1025 | HIGH: Error 97 active: Motor switch off temperature channel 2 reached (P 546) | P 930 | 1 | 03.10 |
| 1026 | HIGH: Error 98 active: Disconnection motor temperature sensor channel 1 | P 930 | 2 | 03.10 |
| 1027 | HIGH: Error 99 active: Disconnection motor temperature sensor channel 2 | P 930 | 3 | 03.10 |
| 1028 | HIGH: Error 100 active: Short circuit motor temperature sensor channel 1 | P 930 | 4 | 03.10 |
| 1029 | HIGH: Error 101 active: Short circuit motor temperature sensor channel 2 | P 930 | 5 | 03.10 |
| 1030 | LOW: Spare | P 930 | 6 | 03.10 |
| 1031 | LOW: Spare | P 930 | 7 | 03.10 |
| 1032 | LOW: Spare | P 930 | 8 | 03.10 |
| 1033 | LOW: Spare | P 930 | 9 | 03.10 |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 1034 | LOW: Spare | P 930 | 10 | 03.10 |
| 1035 | LOW: Spare | P 930 | 11 | 03.10 |
| 1036 | LOW: Spare | P 930 | 12 | 03.10 |
| 1037 | LOW: Spare | P 930 | 13 | 03.10 |
| 1038 | LOW: Spare | P 930 | 14 | 03.10 |
| 1039 | LOW: Spare | P 930 | 15 | 03.10 |
| 1040 | Status of bit 0 of the ALink selected with P 682 | | | |
| 1041 | Status of bit 1 of the ALink selected with P 682 | | | |
| 1042 | Status of bit 2 of the ALink selected with P 682 | | | |
| 1043 | Status of bit 3 of the ALink selected with P 682 | | | |
| 1044 | Status of bit 4 of the ALink selected with P 682 | | | |
| 1045 | Status of bit 5 of the ALink selected with P 682 | | | |
| 1046 | Status of bit 6 of the ALink selected with P 682 | | | |
| 1047 | Status of bit 7 of the ALink selected with P 682 | | | |
| 1048 | Status of bit 8 of the ALink selected with P 682 | | | |
| 1049 | Status of bit 9 of the ALink selected with P 682 | | | |
| 1050 | Status of bit 10 of the ALink selected with P 682 | | | |
| 1051 | Status of bit 11 of the ALink selected with P 682 | | | |
| 1052 | Status of bit 12 of the ALink selected with P 682 | | | |
| 1053 | Status of bit 13 of the ALink selected with P 682 | | | |
| 1054 | Status of bit 14 of the ALink selected with P 682 | | | |
| 1055 | Status of bit 15 of the ALink selected with P 682 | | | |
| 1056 | Status of bit 0 of the ALink selected with P 683 | | | |
| 1057 | Status of bit 1 of the ALink selected with P 683 | | | |
| 1058 | Status of bit 2 of the ALink selected with P 683 | | | |
| 1059 | Status of bit 3 of the ALink selected with P 683 | | | |
| 1060 | Status of bit 4 of the ALink selected with P 683 | | | |
| 1061 | Status of bit 5 of the ALink selected with P 683 | | | |

| DLink no. | Description | Parameter | Bit no. | From software release |
|---|---|---|---|---|
| 1062 | Status of bit 6 of the ALink selected with P 683 | | | |
| 1063 | Status of bit 7 of the ALink selected with P 683 | | | |
| 1064 | Status of bit 8 of the ALink selected with P 683 | | | |
| 1065 | Status of bit 9 of the ALink selected with P 683 | | | |
| 1066 | Status of bit 10 of the ALink selected with P 683 | | | |
| 1067 | Status of bit 11 of the ALink selected with P 683 | | | |
| 1068 | Status of bit 12 of the ALink selected with P 683 | | | |
| 1069 | Status of bit 13 of the ALink selected with P 683 | | | |
| 1070 | Status of bit 14 of the ALink selected with P 683 | | | |
| 1071 | Status of bit 15 of the ALink selected with P 683 | | | |
| 1072 | | | | |
| 1073 | | | | |
| 1074 | | | | |
| 1075 | | | | |
| 1076 | | | | |
| 7077 | | | | |
| 1078 | | | | |
| 1079 | | | | |
| 1080 | | | | |
| 1081 | | | | |
| 1082 | | | | |
| 1083 | | | | |
| 1084 | | | | |
| 1085 | | | | |

### 5.37.1 Description of DLinks (2...23)

**DLink 2** **State 'Enabled'**

The converter is in 'enabled' status P 001 = 4, 5, 6, 7). See also ▹State machine of the converter control◃ from page 72.

**DLink 3** **State 'Malfunction'**

The bit is in HIGH state if there is a malfunction. As soon as a malfunction occurs, the drive **starts to coast** and the ready relay drops out (contacts X2: 1, 2 and 3). Certain errors can be acknowledged externally (see P 101, ▹BKF7000 error list (P 037)◃ from page 424 and ▹Digital input functions DIF◃ from page 94).

The bit is in LOW status if there is no error (malfunction) present.

To output the signal LOW active (protection against wire breakage), use the associated parameter to reverse the polarity of the digital output used.

**DLink 4** **State 'Warning'**

The bit is in HIGH state if there is a warning present. Warnings do not affect the drive - it remains ready for operation. The ready relay remains picked-up. Warnings cannot be acknowledged externally. As soon as the condition triggering the warning is no longer present, the converter automatically revokes the signal.

The bit is in LOW status if there is no warning signal present.

**DLink 5** **Ramp generator setpoint reached**

Signal to indicate that the ramp generator output has reached the value applied to the input. The bit is in HIGH state if the ramp generator output equals the ramp generator input. The bit is in LOW state if ramp generator output and ramp generator input are not identical.

**DLink 6** **$n > n_{max}$**

The bit changes to HIGH status if the drive has reached the threshold set with parameter P 501. The drive **starts to coast**, and the ready-to-operate relay drops out. Error 44 is displayed.

The bit is in LOW state if the motor speed remains below the set threshold.

During optimisation, the overspeed monitoring threshold is internally set to 20 %. After completing optimisation, the original value is re-entered into parameter P 501.

**NOTE**

This is no redundant safety system as an assumption is made as to the motor speed from the actual speed determined by the converter.

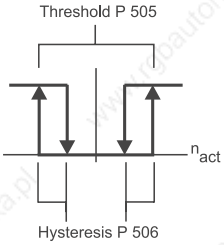
Monitoring requires an **error-free** tachogenerator or incremental encoder.

Operator safety guidelines must be observed !

**DLink 7** **$n > n_{min}$ signal (also LED H703)**

The bit changes to LOW state as soon as the motor falls below speed n = P 505 – P 506.

The bit changes to HIGH state as soon as the motor exceeds speed n = P 505.




If the value entered in parameter Hysteresis P 506 is higher than the threshold P 505, the lower switching threshold is set to 0.10 %.

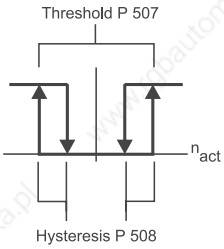
This signal also defines the limit which, once fallen short of, switches the drive from braking by quick stop or stop into the coasting state (drive disabled). See parameters P 107 to P 110.

**DLink 8** **$n > n_{x1}$ signal**

The following applies to the signal thresholds:

The bit changes to HIGH state as soon as the actual speed exceeds the value set with parameter P 507, in other words n > P 507.

The bit changes to LOW state as soon as the actual speed falls below the threshold set with parameter P 507 minus the hysteresis set in parameter P 508 , in other words at n < P 507 – P 508.




If the value entered in parameter Hysteresis P 508 is higher than the threshold P 507, the lower switching threshold is set to 0.10 %.

**DLink 9** **$n > n_{x2}$ signal**

The following applies to the signal thresholds:

The bit changes to HIGH state as soon as the actual speed exceeds the value set with parameter P 509, in other words n > P 509.
The bit changes to LOW state as soon as the actual speed falls below the threshold set with parameter P 509 minus the hysteresis set in parameter P 510 , in other words at n < P 509 – P 510.

If the value entered in parameter Hysteresis P 510 is higher than the threshold P 509, the lower switching threshold is set to 0.10 %.

For a diagram on the switching thresholds see DLink 8.

**DLink 10 $n > n_{x3}$ signal**

The following applies to the signal thresholds:

The bit changes to HIGH state as soon as the actual speed exceeds the value set with parameter P 511, in other words at n > P 511.

The bit changes to LOW state as soon as the actual speed falls below the threshold set with parameter P 511 minus the hysteresis set in parameter P 512 , in other words at n < P 511 – P 512.

If the value entered in parameter Hysteresis P 512 is higher than the threshold P 511, the lower switching threshold is set to 0.10 %.

For a diagram on the switching thresholds see DLink 8.

**DLink 11 $n > n_{x4}$ signal**

The following applies to the signal thresholds:

The bit changes to HIGH state as soon as the actual speed exceeds the value set with parameter P 513, in other words at n > P 513.

The bit changes to LOW state as soon as the actual speed falls below the threshold set with parameter P 513 minus the hysteresis set in parameter P 514 , in other words at n < P 513 – P 514.

If the value entered in parameter Hysteresis P 514 is higher than the threshold P 513, the lower switching threshold is set to 0.10 %.

For a diagram on the switching thresholds see DLink 8.

**DLink 12 Drift lock active**

The drift lock is active when **P 322 ≠ 0**, the actual speed has fallen below the threshold set with parameter P 323 **and** the speed setpoint has fallen below the threshold set with parameter P 324. It is inactive if **P 322 = 0**,**or** if at **P 322 ≠ 0** the actual speed exceeds the threshold set with parameter P 323 **or** the speed setpoint exceeds the threshold set with parameter P 324.

The bit adopts HIGH state when the drift lock is active.

The bit adopts LOW state when the drift lock is inactive.

The drift lock can become active only if parameter P 322 contains a value other than 0. At P 322 = 0, this bit is always in LOW state !

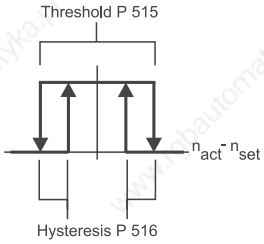
An active drift lock affects the speed controller feedback only, **the drive is not disabled !**

**DLink 13** **$n_{actual} = n_{set}$ signal at the speed controller**

The bit adopts HIGH state as soon as the difference between setpoint and actual value at the speed controller (ALink 60, actual value without D component !) falls below the value set with parameter P 515 minus the hysteresis P 516.

The bit adopts LOW state as soon as the difference between setpoint and actual value at the speed controller (ALink 64) exceeds the value set with parameter P 515.

If the value entered in parameter Hysteresis P 516 is higher than the threshold P 515, the lower switching threshold is set to 0.10 %.




**DLink 14** **Unassigned comparator A < B**

The bit adopts HIGH state if the difference between input 1 (=A) and input 2 (=B) becomes smaller than the threshold set with parameter P 678 minus the hysteresis specified with parameter P 679.

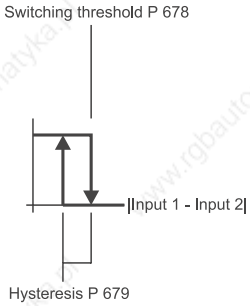
The bit adopts HIGH state as soon as |A – B| < P 678 – P 679 is reached.

The bit adopts LOW state if the difference between input 1 (=A) and input 2 (=B) becomes greater than the threshold set with parameter P 678.

The bit adopts LOW state as soon as |A – B| > P 678 is reached.

If the value entered in parameter Hysteresis P 679 is higher than the threshold P 678, the lower switching threshold is set to 0.10 %.

**Caution:** DLink 564 is inverted with regard to DLink 14 !



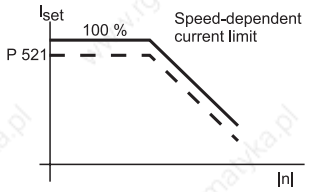
### DLink 15 $I_A > I_{Ax1}$ signal

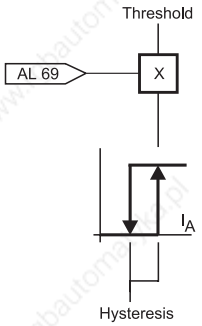
The following applies to the signal thresholds:

The bit adopts HIGH state as soon as the actual armature current exceeds the value set with parameter P 521, in other words $I_A$ > P 521.
The bit adopts LOW state as soon as the actual armature current falls below the threshold set with parameter P 521 minus the hysteresis set in parameter P 522 , in other words $I_A$ < P 521 – P 522.

The inputs are in percent of the set **converter** output current (P 072).

The value set with parameter P 521 is influenced by the output of the speed-dependent current limit (ALink 69). This does not apply to the hysteresis specified with parameter P 522:




If the value entered in parameter Hysteresis P 522 is higher than the threshold P 521, the lower switching threshold is set to 0.10 %.

### DLink 16 $I_A > I_{Ax2}$ signal

The following applies to the signal thresholds:

The bit adopts HIGH state as soon as the actual armature current exceeds the value set with parameter P 523, in other words $I_A$ > P 523.
The bit adopts LOW state as soon as the actual armature current falls below the threshold set with parameter P 523 minus the hysteresis set in parameter P 524 , in other words $I_A$ < P 523 – P 524.

The inputs are in percent of the set **converter** output current (P 072).

The value set with parameter P 523 is influenced by the output of the speed-dependent current limit (ALink 69). This does not apply to the hysteresis specified with parameter P 524.

If the value entered in parameter Hysteresis P 524 is higher than the threshold P 523, the lower switching threshold is set to 0.10 %.

For a diagram on the switching thresholds see DLink 15.

### DLink 17 Current limit reached signal (also LED H706)

The following applies to the signal thresholds:

The bit adopts HIGH state if the speed controller output limit is active **and** the actual armature current exceeds 95 % of the **current** limit value (active current limit).

The bit adopts LOW state as soon as the actual armature current falls below 89 % of the current limit value (active current limit), independent of whether the speed controller output limit is still active.

**DLink 18** **Speed controller output limit active** (speed controller at 'limit')

The bit adopts HIGH state if the speed controller output limit is active.

The bit adopts LOW state if the speed controller output limit is not active.

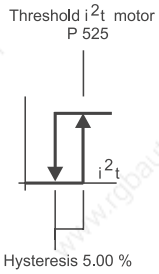
**DLink 19** **Motor $i^2t$ monitoring**

The monitoring function is **active** if **P078 ≠ 0min** was set, and inactive if P 078 = 0 min was specified. The bit is then always in LOW state.

P 078 ≠ 0 min:

The bit adopts HIGH state as soon as the calculated $i^2t$ value exceeds the threshold set with parameter P 525.

The bit adopts LOW state as soon as the calculated $i^2t$ value falls below the threshold set with parameter P 525 minus the fixed-set 5 % hysteresis.




An $i^2t$ value of 100 % is reached if the motor is continuously operated at the current set in parameter P 074 (= rated **motor** current).

Parameter P 031 displays the current $i^2t$ value, 100 % correspond to the motor rated temperature.

NOTE:
For the installation of UL 508C-conform machines: the motor $i^2t$ message must be evaluated by a master control, switching off the drive when the message is generated.

Time to trip of the $i^2t$ monitoring function on the condition that the max. armature current is flowing:

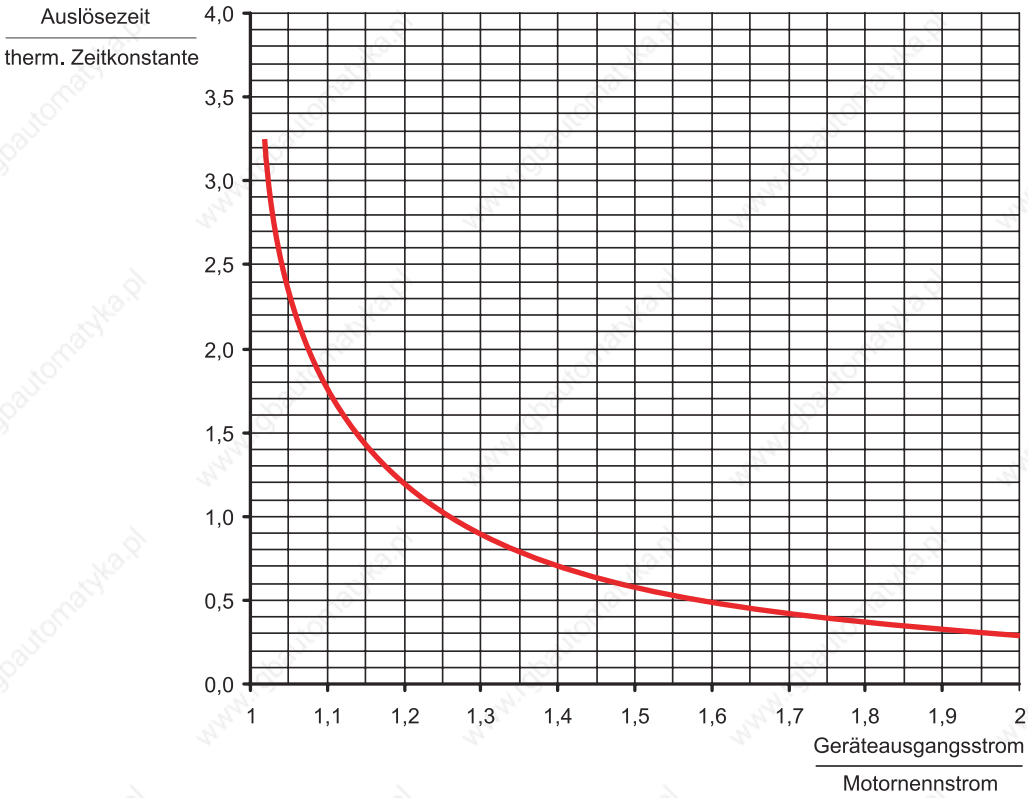



Illustration 76: Motor $i^2t$ monitoring - Threshold to trip of is 100 %

$$t[\text{min}] = -P\,078 \times \ln\left[1 - \frac{P\,525}{100\,\%} \times \left(\frac{P\,074}{P\,072} \times \frac{100}{\text{current limit}}\right)^2\right]$$

current limit: P 325 resp. P 326

The monitoring function is switched off internally while optimisation is active. The original state is re-established once optimisation has been completed.

**DLink 20 Heat sink temperature limit monitoring**

The value of the heat sink temperature limit is dependent on the power unit, available in ALink 221 and displayed in ° C.

The bit adopts HIGH state as soon as the heat sink temperature limit is exceeded.

The bit adopts LOW state as soon as the heat sink temperature drops below the temperature limit minus 3° C.

**DLink 21 Actual field current < 50 % field current setpoint**

The bit adopts HIGH state as soon as the actual field current drops below 50 % of the active field current setpoint.

The bit adopts LOW state as soon as the actual field current becomes >70 % of the active field current setpoint.

DLink 21 and DLink 424 assume HIGH state if the field unit is switched off with parameter P 372 !

**DLink 22 State 'Ready to operate'**

The converter is ready to switch on, i. e., it is at least in READY TO OPERATE state (2). The signal corresponds to bit 0 in the converter status word (P 100).

**DLink 23 Drive disabled**

The converter is in disabled state. The signal is inverted with regard to DLink 2.

## 5.38 List of digital input functions DIF

| DIF no. | Operation | Control word Bit no. | Description |
|---|---|---|---|
| 0 | | | Digital input switched off, DLink active |
| 1 | | | 1: Load data record 1 |
| 2 | | | 1: Load data record 2 |
| 3 | | | 1: Load data record 3 |
| 4 | | | 1: Load data record 4 |
| 5 | | | 1: Load data record 5 |
| 6 | | | 1: Load data record 6 |
| 7 | OR | P 101 Bit 7 | 1: Acknowledge error |
| 8 | OR | P 181 Bit 0 | 1: Negate analog input 1 |
| 9 | AND | P 181 Bit 1 | 1: Enable analog input 1 |
| 10 | OR | P 181 Bit 2 | 1: Negate analog input 2 |
| 11 | AND | P 181 Bit 3 | 1: Enable analog input 2 |
| 12 | OR | P 181 Bit 4 | 1: Negate analog input 3 |
| 13 | AND | P 181 Bit 5 | 1: Enable analog input 3 |
| 14 | OR | P 181 Bit 6 | 1: Negate analog input 4 |
| 15 | AND | P 181 Bit 7 | 1: Enable analog input 4 |
| 16 | OR | P 221 Bit 0 | 0: Ramp generator A parameter set 1 active<br>1: Ramp generator A parameter set 2 active |
| 17 | AND | P 221 Bit 6 | 1: Enable ramp generator A input (setpoint) |
| 18 | OR | P 221 Bit 5 | 1: Stop ramp generator A |
| 19 | AND | P 221 Bit 4 | 1: Enable ramp generator A output |
| 20 | OR | P 211 Bit 0 | 1: Motor potentiometer up ( + ) |
| 21 | OR | P 211 Bit 1 | 1: Motor potentiometer down ( - ) |
| 22 | AND | P 301 Bit 0 | 1: Enable speed controller setpoint (after addition) |
| 23 | OR | P 601 Bit 0 | Unassigned change-over switch 1 |
| 24 | OR | P 601 Bit 1 | Unassigned change-over switch 2 |
| 25 | OR | P 601 Bit 2 | Unassigned change-over switch 3 |
| 26 | AND | P 601 Bit 3 | Unassigned change-over switch 4 |
| 27 | AND | P 561 Bit 0 | 1: Unassigned controller : Enable setpoint (after addition) |
| 28 | AND | P 561 Bit 1 | 1: Unassigned controller : Enable controller |
| 29 | AND | P 561 Bit 2 | 1: Unassigned controller : Enable I-component |
| 30 | OR | | Multiplier 1 |
| 31 | OR | | Multiplier 2 |
| 32 | AND | P 221 Bit 7 | 1: Enable ramp generator B input (setpoint) |
| 33 | AND | P 221 Bit 8 | 1: Enable ramp generator B output |

### 5.38.1 Description of digital input functions DIF

**DIF 0** **Input switched off**

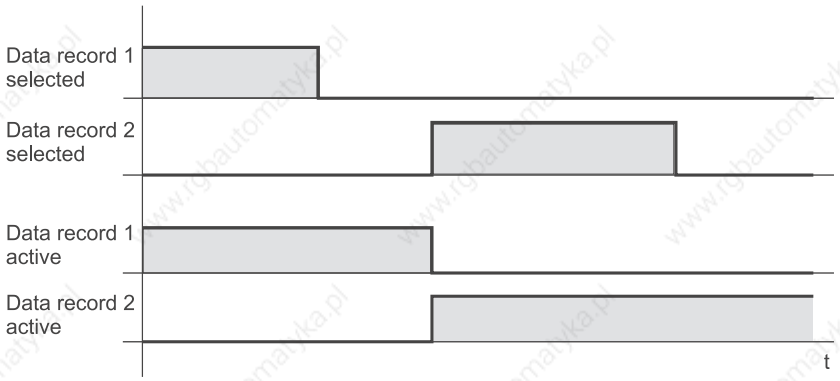
Associated switching input not active. The associated DLinks DL 456 to DL 463 are set/reset dependent on the signal level at the terminal, however.

| | |
|---|---|
| HIGH level at the terminal:: | DLink is '1'. |
| LOW level at the terminal: | DLink is '0'. |

**DIF 1** **Load data record 1** (Observe parameter P 152)

The system switches to data record 1 if this terminal is energised at +24 V. If several inputs are programmed for the function Data record change, only one input must be connected to +24 V. If more than one input is on +24 V, this leads to error message 50 after approx. 500 ms, to setting of bit no. 0 in parameter P 924, and the ready-to-operate relay drops out. The drive is disabled internally and **starts to coast**. The original data record remains the active data record.

If the voltage is switched off the terminal after a data record change, the data record last selected remains active until a new data record is loaded via a different input.




**WARNING**

The control must not write parameter P 152 if the converter has a bus link and if at least one switching input is programmed for data record change. In that case, not even data record selection via parameters P 157 and P 158 is permissible (data record selection integrity !). Writing one of the specified parameters regardless leads to error message 57, bit no. 6 is set in parameter P 913, and the ready-to-operate relay drops out. The drive is disabled internally and **starts to coast**.

Changing to a non-existent data record leads to error message 68, bit no.1 is set in parameter P 924, and the ready-to-operate relay drops out. The drive is disabled internally and **starts to coast**.

**WARNING**

This affects all parameters stored in the data records, including parameters that can only be set while the **drive is disabled** - **offline** setting. Parameters stored in the data records are identified **'DR'** in the column Memory location in the parameter list. The parameter description includes the note **'Save: Data record'.**

The system doesn't check the correctness of the values. Therefore it is vital to take care when editing the values - you have to ensure that a parameter set change entails no unintentional or dangerous statuses at the machine.

Parameter P 154 = 1 allows data record changes only while the drive is disabled.

**DIF 2** **Load data record 2** (Observe parameter P 152)

See DIF 1

**DIF 3** **Load data record 3** (Observe parameter P 152)

See DIF 1

**DIF 4** **Load data record 4** (Observe parameter P 152)

See DIF 1

**DIF 5** **Load data record 5** (Observe parameter P 152)

See DIF 1

**DIF 6** **Load data record 6** (Observe parameter P 152)

See DIF 1

**DIF 7** **Acknowledge error**

Edge-triggered ! A positive (LOW - HIGH) edge deletes any acknowledgeable errors present (see description of errors), and the ready-to-operate relay picks up again. A positive edge at the enable contact 'Main contactor ON' is required to enable the drive.

**DIF 8** **Negate analog input 1** (see ▷Illustration 35◁ on page 102)

A HIGH signal at the terminal inverts the digitized value (polarity reversal).

A LOW signal at the terminal does not affect the digitized value.

**DIF 9** **Set analog input 1 to zero** (see ▷Illustration 35◁ on page 102)

A HIGH signal at the terminal transfers the digitized value into ALink 26.

A LOW signal at the terminal does not transfer the digitized value into ALink 26, and a value '0' is written into ALink 26 independent of the input signal present.

**DIF 10** **Negate analog input 2** (see ▹Illustration 35◃ on page 102)

A HIGH signal at the terminal inverts the digitized value (polarity reversal).

A LOW signal at the terminal does not affect the digitized value.

**DIF 11** **Set analog input 2 to zero** (see ▹Illustration 35◃ on page 102)

A HIGH signal at the terminal transfers the digitized value into ALink 28.

A LOW signal at the terminal does not transfer the digitized value into ALink 28, and a value '0' is written into ALink 28 independent of the input signal present.

**DIF 12** **Negate analog input 3** (see ▹Illustration 36◃ on page 103)

A HIGH signal at the terminal inverts the digitized value (polarity reversal).

A LOW signal at the terminal does not affect the digitized value.

**DIF 13** **Set analog input 3 to zero** (see ▹Illustration 36◃ on page 103)

A HIGH signal at the terminal transfers the digitized value into ALink 30.

A LOW signal at the terminal does not transfer the digitized value into ALink 30, and a value '0' is written into ALink 30 independent of the input signal present.

**DIF 14** **Negate analog input 4** (see ▹Illustration 36◃ on page 103)

A HIGH signal at the terminal inverts the digitized value (polarity reversal).

A LOW signal at the terminal does not affect the digitized value.

**DIF 15** **Set analog input 4 to zero** (see ▹Illustration 36◃ on page 103)

A HIGH signal at the terminal transfers the digitized value into ALink 32.

A LOW signal at the terminal does not transfer the digitized value into ALink 32, and a value '0' is written into ALink 32 independent of the input signal present.

**DIF 16** **Ramp generator A parameter set** (see ▹Illustration 39◃ on page 106)

A HIGH signal at the terminal indicates that parameter set 2 (P 232 to P 237) is active at ramp generator A.

A LOW signal at the terminal indicates that parameter set 1 (P 226 to P 231) is active at ramp generator A.

**DIF 17** **Ramp generator A setpoint zero** (see ▹Illustration 39◃ on page 106)

A HIGH signal at the terminal passes the total setpoint (ALink 42) to the input of ramp generator A (ALink 43).

A LOW signal at the terminal does not pass the total setpoint (ALink 42) to the input of ramp generator A (ALink 43). A setpoint '0' is input at the ramp generator input; this value is also entered in ALink 43. The ramp generator output (ALink 44) follows the set ramp to 0 value.

**DIF 18** **Stop ramp generator A** (see ▹Illustration 39◃ on page 106)

A HIGH signal at the terminal interrupts the ramp-up and/or ramp-down process. The ramp generator output remains at its momentary level until the signal at the terminal is deactivated.

A LOW signal at the terminal does not affect the ramp generator. The ramp generator output changes at a setpoint change with the set ramp-up and/or ramp-down time.

**DIF 19** **Ramp generator A output zero** (deactivate quick ramp-down)
(see ▹Illustration 39◃ on page 106)

A HIGH signal at the terminal enables the ramp generator. The output follows the setpoint at the input with the set ramp-up and/or ramp-down time.

A LOW signal at the terminal sets the ramp generator output immediately to '0' without any delay (quick ramp-down). Any changes to the setpoint at the ramp generator input will then have no influence on its output. If the speed controller is supplied only one setpoint, and if this comes from ramp generator A, the drive is decelerated at the current limit to zero speed in this case. The controller will not be disabled ! The drive is still enabled !

As soon as a HIGH signal is switched to the terminal, the ramp generator will ramp up to the applied setpoint along the set ramp.

**DIF 20** **MP up** (see ▹Illustration 38◃ on page 105)

A HIGH signal at the terminal increases the motor potentiometer output (ALink 40) in the direction of positive values at the set ramp-up time (P 212). As soon as the output reaches the limit set with parameter P 213, the motor potentiometer output will not be further increased despite the HIGH signal.

A LOW signal at the terminal does not affect the motorised potentiometer output.

Simultaneous input of 'MP up' and 'MP down' (see DIF 21) does not change the motor potentiometer output !

**DIF 21** **MP down** (see ▹Illustration 38◃ on page 105)

A HIGH signal at the terminal decreases the motor potentiometer output (ALink 40) in the direction of negative values at the set ramp-down time (P 214). As soon as the output reaches the limit set with parameter P 215, the motor potentiometer output will not be further decreased despite the HIGH signal.

A LOW signal at the terminal does not affect the motor potentiometer output.

Simultaneous input of 'MP up' (see DIF 20) and 'MP down' does not change the motor potentiometer output !

**DIF 22** **Enable speed controller setpoint** (see ▹Illustration 43◃ on page 110)

A HIGH signal at the terminal passes the total setpoint (ALink 50) to the input of the speed controller (ALink 51).

A LOW signal at the terminal does not pass the total setpoint (ALink 50) to the input of the speed controller (ALink 51). A setpoint '0' is input at the speed controller; and this value is also entered in ALink 51. Although the drive returns to zero speed at the current limit, the controller is not disabled ! The drive is still enabled !

**DIF 23** **Unassigned changeover switch 1** (▹Illustration 57◃ on page 124)

A HIGH signal at the terminal transfers the ALink set with parameter P 667 into ALink 195.

A LOW signal at the terminal transfers the ALink set with parameter P 666 into ALink 195.

**DIF 24** **Unassigned changeover switch 2** (▹Illustration 57◃ on page 124)

A HIGH signal at the terminal transfers the total of the ALinks set with parameters P 669 and P 670 into ALink 196. The total is limited to the value set with P 111.

A LOW signal at the terminal transfers the ALink set with parameter P 668 into ALink 196.

**DIF 25** **Unassigned changeover switch 3** (▹Illustration 57◃ on page 124)

A HIGH signal at the terminal transfers the ALink set with parameter P 672 into ALink 197. Before entry into ALink 197, the selected value is multiplied with the value set in P 673 and then limited to the value set with P 111.

A LOW signal at the terminal transfers the ALink set with parameter P 671 into ALink 197.

**DIF 26** **Unassigned changeover switch 4** (▹Illustration 57◃ on page 124)

A HIGH signal at the terminal transfers the ALink set with parameter P 674 into ALink 198.

A LOW signal at the terminal scales the ALink set with parameter P 674 and then transfers it into ALink 197. The scaling factor is defined with parameter P 675 and ranges from 0.000 to 1.000.

**DIF 27** **Unassigned controller: Enable setpoint** (see ▹Illustration 52◃ on page 119)

A HIGH signal at the terminal passes the total setpoint (ALink 105) to the input of the unassigned PI controller (ALink 106).

A LOW signal at the terminal does not pass the total setpoint (ALink 105) to the input of the unassigned PI controller (ALink 106). A setpoint '0' is input at the unassigned PI controller; and this value is also entered in ALink 106.

**DIF 28** **Unassigned controller: Enable controller** (see ▹Illustration 52◃ on page 119)

**NOTE**

This function is effective only if parameter **P 579 is set to 2** !

A HIGH signal at the terminal enables the PI controller.

A LOW signal at the terminal disables the PI controller. Its output signal has a value 0 even if a value other than 0 was entered in parameter P 574 (Preset I component) ! The preset value is transferred into the I component when the controller is enabled. While the controller is disabled, the value of parameter P 574 is transferred into the current I component and is available in ALink 116.

**DIF 29** **Unassigned controller: Enable I component** (see ▹Illustration 52◃ on page 119)

A HIGH signal at the terminal enables the I component of the PI controller.

A LOW signal at the terminal disables the I component of the PI controller. The controller operates as a P controller.

**DIF 30** **Multiplier 1**

This module has one input and four outputs. The input signal can be taken from any of the 8 programmable digital inputs. Each of the four outputs is assigned a DIF function, so that one switching input can trigger up to four different events. One output of multiplier 1 can also be connected to the input of multiplier 2 to enable one input to execute up to seven actions.

**DIF 31** **Multiplier 2**

This module has one input and four outputs. The input signal can be taken from any of the 8 programmable digital inputs. Each of the four outputs is assigned a DIF function, so that one switching input can trigger up to four different events. The input of multiplier 2 can also be controlled by multiplier 1 (see DIF 28).

**NOTE**

The input of multiplier 1 must **not** be connected to the output of multiplier 2 as this would render **multiplier 1 ineffective!**

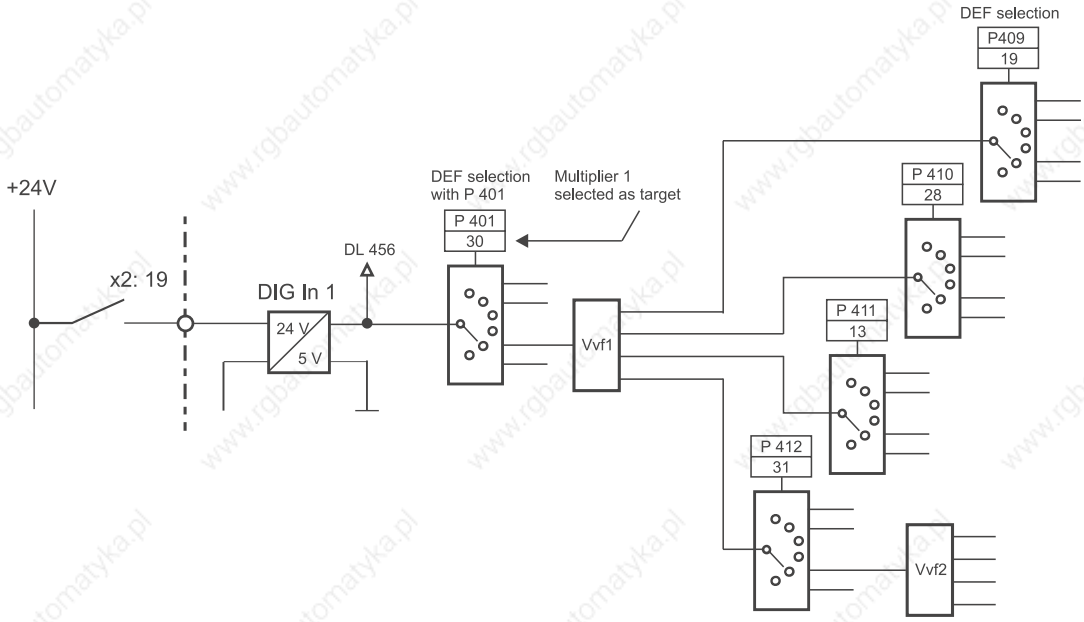



Illustration 77: Multiplier interconnection example

**DIF 32** **Enable ramp generator B input (setpoint)** (see ▹Illustration 40◃ on page 107)

A HIGH signal at the terminal passes the setpoint selected with parameter P 245 to the input of ramp generator B (ALink 46).

A LOW signal at the terminal does not pass the setpoint selected with parameter P 245 to the input of ramp generator B (ALink 46). A setpoint '0' is input at the ramp generator input; this value is also entered in ALink 46. The ramp generator output (ALink 47) follows the set ramp to 0 value.

**DIF 33** **Disable ramp generator B output** (deactivate quick ramp-down)
(see ▹Illustration 40◃ on page 107)

A HIGH signal at the terminal enables the ramp generator. The output follows the setpoint at the input with the set ramp-up and/or ramp-down time.

A LOW signal at the terminal sets the ramp generator output immediately to '0' without any delay (quick ramp-down). Any changes to the setpoint at the ramp generator input will then have no influence on its output. If the speed controller is supplied only one setpoint, and if this comes from ramp generator B, the drive is decelerated at the current limit to zero speed in this case. The controller will not be disabled ! The drive is still enabled !

As soon as a HIGH signal is switched to the terminal, the ramp generator will ramp up to the applied setpoint along the set ramp.

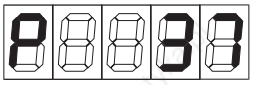
## 5.38 List of digital input functions DIF

# ERRORS AND WARNINGS

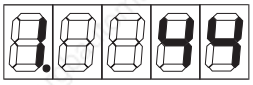
## 6.1 Error display at seven-segment display

The red LED H700 will be illuminated as soon as there is at least one error/one warning. The seven-segment display is switched on automatically, and the numbers of all existing errors are displayed one after the other. The display changes between parameter number P 037 and error numbers at intervals of about a second. The Mode key (M) is ineffective with this parameter !

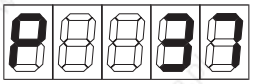
The display shows the parameter number first and then the number of the next error present and loops back to the first error number after displaying the last.



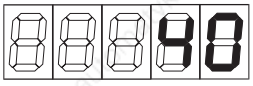
Parameter P 037, Error number



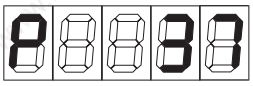
Displays the first error detected, identified by a preceding **1.**



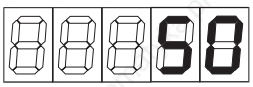
Error display parameter



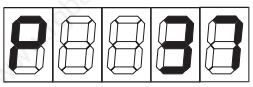
Displays the second detected error



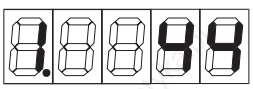
Error display parameter



Displays the third detected error



Error display parameter



The history buffer was read out completely once. The display loops back to the beginning, displaying the first detected error identified with the preceding **1.**

## 6.2 BKF7000 error list (P 037)

Error messages differ between acknowledgeable and non-acknowledgeable errors, the latter requiring a converter restart. Acknowledgeable errors may be acknowledged via digital input functions or via the control word (P101).

Non-acknowledgeable errors can be acknowledged from software release S03.10. In this case, the converter executes a reset when errors are acknowledged via digital input functions or control word. This characteristic can be set in parameter P106. See also description P106.

| Error no. | Error description | DLink |
|---|---|---|
| 1 | BASS communication time monitoring | 688 |
| 2 | USS communication time monitoring | 689 |
| 3 | Cyclic data time monitoring | 690 |
| 4 | Demand data time monitoring | 691 |
| **5** | **Incompatible software** | 960 |
| **6** | **Invalid boot source entry** | 961 |
| **7** | **Program branching error** | 703 |
| 8 | Drive blocked | 705 |
| **9** | **Incremental encoder 1, scaling error** | 720 |
| **10** | **EEPROM-to-RAM copy error** | 736 |
| **11** | **Damaged boot data record header** | 737 |
| **12** | **Boot data record checksum error** | 738 |
| **13** | **Damaged primary data header** | 739 |
| **14** | **EEPROM too small** | 740 |
| **15** | **Error on data record save** | 741 |
| **16** | **Ambiguous converter type BKD/BKF (1-Q/4-Q)** | 752 |
| 17 | Error ext. analog - digital converter | 753 |
| **18** | **Unknown field power unit identifier** | 754 |
| **19** | **Field connection error (AC)** | 755 |
| **20** | **Armature power unit connection error (AC)** | 756 |
| **21** | **CCW rotating field at armature power unit** | 757 |
| 22 | Phase failure at armature power unit | 758 |
| **23** | **Microprocessor error 1** | 768 |
| **24** | **Microprocessor error 2** | 769 |
| **25** | **Microprocessor error 3** | 770 |
| **26** | **Microprocessor error 4** | 771 |
| **27** | **Microprocessor error 5** | 772 |
| **28** | **Microprocessor error 6** | 773 |
| **29** | **Microprocessor error 7** | 774 |
| **30** | **External watchdog tripped** | 775 |

**Bold**: Errors are only acknowledgeable when P 106 = 2,
the converter executes then an internal reset.

| Error no. | Error description | DLink |
|---|---|---|
| **31** | **Internal watchdog tripped** | 776 |
| **32** | **RAM test error** | 777 |
| 33 | Parameter conflict (P 071 / P 073) | 784 |
| 34 | Repeated negative actual armature current | 785 |
| **35** | **No synchronisation** | 800 |
| **36** | **Firing pulse interval differs from specified value** | 801 |
| 37 | Armature circuit open ($\alpha = \alpha_G$ and $I_A$ < 10 % of setpoint) | 946 |
| **38** | **Mains frequency < 45 Hz** | 803 |
| **39** | **Mains frequency > 65 Hz** | 804 |
| 40 | Field current monitoring (actual field current < 50 % field current setpoint) | 816 |
| 41 | P 072 out of range | 945 |
| 42 | P 213 / P 215 parameter conflict | 832 |
| 43 | Shortcircuit/overload at a digital output | 848 |
| 44 | Overspeed (n > P 501) | 864 |
| 45 | Tachogenerator/encoder failure or armature circuit open (time to trip 12 scan cycles / 40 ms at 50 Hz) | 865 |
| 46 | Tachogenerator/encoder polarity reversed (time to trip 12 scan cycles / 40 ms at 50 Hz) | 866 |
| 47 | Speed range error (P 257) | 867 |
| 48 | Torque change time exceeded ( > 100 scans ) | 880 |
| **49** | **Unknown armature power unit identification (current)** | 896 |
| 50 | Data record selection error (digital input functions 1-6) | 912 |
| 51 | Input current < 3.3 mA at 4 mA to 20 mA | 928 |
| 52 | Mains undervoltage P 010 < 0.8 x P 070 | 786 |
| 53 | Overcurrent TD1 ($I_A$ > 2x P 072) | 787 |
| 54 | Overcurrent TD2 ($I_A$ > 2x P 072) | 788 |
| **55** | **Zero-current detector defective** | 805 |
| 56 | Offset error armature current detector > 50 mV | 944 |
| 57 | Ambiguous data record change source | 742 |
| **58** | **EEPROM empty** | 743 |
| **59** | **Parameter error in data record 1 (write error/value)** | 744 |
| **60** | **Parameter error in data record 2 (write error/value)** | 745 |
| **61** | **Parameter error in data record 3 (write error/value)** | 746 |
| **62** | **Parameter error in data record 4 (write error/value)** | 747 |
| **63** | **Parameter error in data record 5 (write error/value)** | 748 |
| **64** | **Parameter error in data record 6 (write error/value)** | 749 |
| **65** | **Error in ROM data record (no. 7)** | 750 |
| **66** | **Primary data parameter error** | 751 |
| **67** | **Armature power unit identification differs from EEPROM value** | 897 |
| 68 | Data record change: Data record does not exist | 913 |

**Bold**: Errors are only acknowledgeable when P 106 = 2,
the converter executes then an internal reset.

| Error no. | Error description | DLink |
|---|---|---|
| **69** | **Field power unit differs from EEPROM value** | 817 |
| **70** | **Option board does not respond** | 778 |
| **71** | **Illegal value in P 072 / P 074 in data record 1** | 962 |
| **72** | **Illegal value in P 072 / P 074 in data record 2** | 963 |
| **73** | **Illegal value in P 072 / P 074 in data record 3** | 964 |
| **74** | **Illegal value in P 072 / P 074 in data record 4** | 965 |
| **75** | **Illegal value in P 072 / P 074 in data record 5** | 966 |
| **76** | **Illegal value in P 072 / P 074 in data record 6** | 967 |
| **77** | **Illegal value in P 079 in data record 1** | 968 |
| **78** | **Illegal value in P 079 in data record 2** | 969 |
| **79** | **Illegal value in P 079 in data record 3** | 970 |
| **80** | **Illegal value in P 079 in data record 4** | 971 |
| **81** | **Illegal value in P 079 in data record 5** | 972 |
| **82** | **Illegal value in P 079 in data record 6** | 973 |
| **83** | **EEPROM write time exceeded** | 975 |
| **84** | **Primary data checksum error** | 976 |
| **85** | **Checksum error in data record 1** | 977 |
| **86** | **Checksum error in data record 2** | 978 |
| **87** | **Checksum error in data record 3** | 979 |
| **88** | **Checksum error in data record 4** | 980 |
| **89** | **Checksum error in data record 5** | 981 |
| **90** | **Checksum error in data record 6** | 982 |
| 91 | Undefined field bus card status | 696 |
| 92 | Field bus error | 697 |
| 93 | Field bus setpoint/actual value configuration error | 698 |
| 94 | P 657 / P 658 parameter conflict | 992 |
| 96 | Motor reached switch off temperature channel 1 ( motor temperature ≥ P543 ) | 1024 |
| 97 | Motor reached switch off temperature channel 1 ( motor temperature ≥ P546 ) | 1025 |
| 98 | Disconnection of motor temperature sensor channel 1 (X8:1 and X8:2 board 3.0043) | 1026 |
| 99 | Disconnection of motor temperature sensor channel 2 (X8:4 and X8:5 board 3.0043) | 1027 |
| 100 | Short circuit of motor temperature sensor channel 1 (X8:1 and X8:2 board 3.0043) | 1028 |
| 101 | Short circuit of motor temperature sensor channel 2 (X8:4 and X8:5 board 3.0043) | 1029 |
| 102 | Cable break temperature sensor power unit | 898 |
| 103 | Short circuit temperature sensor power unit | 899 |
| 104 | Power unit limit temperature exceeded (P112 = 1) | 900 |
| 105 | Error reaction freely definable error (P730 ≠ 0) | 993 |

**Bold**: Errors are only acknowledgeable when P 106 = 2,
the converter executes then an internal reset.

## 6.3 BKF7000 (P 039) Warning list

| Warning no. | Warning description | DLink |
|---|---|---|
| 1 | P 261 / P 262 parameter conflict: Incremental encoder 1 maximum frequency exceeded | 656 |
| 2 | Data record save not completed | 657 |
| 3 | Power unit temperature exceeded | 658/54 |
| 4 | Data record not erased | 659 |
| 5 | P 072 / P 074 parameter conflict: Current limits not reached/exceeded | 660 |
| 6 | Intermittent-current limit cannot be defined (optimisation) | 661 |
| 7 | Data record change not possible | 662 |
| 8 | Motor $i^2t$ tripped | 663 |
| 9 | Cannot erase boot data record | 664 |
| 10 | Cannot reset | 665 |
| 11 | Motor warning temperatur channel 1 reached (motor temperature ≥ P542) | 666 |
| 12 | Motor warning temperatur channel 2 reached (motor temperature ≥ P545) | 667 |
| 13 | Pre-warning limit temperature power unit | 668/53 |

## 6.4 Error description

Error messages differ between acknowledgeable and non-acknowledgeable errors, the latter requiring a converter restart. Acknowledgeable errors may be acknowledged via digital input functions or via the control word (P101).

Non-acknowledgeable errors can be acknowledged from software release S03.10. In this case, the converter executes a reset when errors are acknowledged via digital input functions and/or control word. This characteristic can be set in parameter P106. Also refer description P106.

**F 1** **BASS communication time monitoring** Error acknowledgeable

There was no communication during the period set with parameter P 123.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 2** **USS communication time monitoring** Error acknowledgeable

There was no communication during the period set with parameter P 123.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 3** **Cyclic communication time monitoring** Error acknowledgeable

There was no communication during the period set with parameter P 123.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 4** **Demand data time monitoring** Error acknowledgeable

There was no communication during the period set with parameter P 123.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 5** **Incompatible software** Error not acknowledgeable

The data stored in the EEPROM come from a software group which differ from the controller software.

This error message may occur after a software change, for example when the original software **07**.xx is replaced by software **08**.xx. In this case, the data stored in the EEPROM are no longer accessible.

This error may occur also, when the EEPROM is not total erased (e.g. the electronic supply is switched off during erasing procedure) or after erasure of the EEPROM and premature switching off of the electronic supply. After repeated erasure of the EEPROM (P 157) only errors F 6 and F 58 should remain.

Read out and print the data records via a PC before changing software. The EEPROM then needs to be completely erased. This requires the following inputs:

P 157 = 0
P 157 = 8
P 157 = 25
P 157 = 0
P 157 = 1

Then wait until the lowest-value position becomes ”3', '7' or 'B' (P 150 = xxx3 , P 150 = xxx7 or P 150 = xxxB) in parameter P 150.

The erase takes approx. 55 s + n × 20 s, with n representing the number of programmed data records.

Enter the data records based on the printout, and save.

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 6** **Invalid boot source entry** Error not acknowledgeable

Parameter P 151 contains a value outside the permissible range from 1 to 6, or the specified data record does not exist. A value has not yet been entered here if parameter P 151 = 0.

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 7** **Program branching error** Error not acknowledgeable

**Drive starts to coast** **ready-to-operate relay drops out**

**F 8** **Drive blocked** Error acknowledgeable

The stall protection is **OFF** if parameter **P 517 = 0.0** s, and **ON** if parameter **P 517** ≠ **0.0** s.

The protection trips if the signal 'Current limit reached' is present continuously for the time set with parameter P 517 (LED H706 ON, refer DLink 17) and the speed is continuously lower than the threshold set with parameter P 505, minus the hysteresis set with P 506.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 9** **Incremental encoder 1, scaling error** Error not acknowledgeable

The scaling constant for actual value calculation was negative. Program not executed properly.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 10** **EEPROM-to-RAM copy error** Error not acknowledgeable

The programmed data records are copied from the EEPROM into the RAM after the electronics supply has been applied. Afterwards, the RAM data are compared to the EEPROM data. This compare has produced an error.

EEPROM defective. Program not executed properly.

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 11** **Damaged boot data record header** Error not acknowledgeable

The programmed data records are copied into the RAM after the electronics supply has been applied. The process detected a faulty header entry in the boot data record.

EEPROM defective.

Program not executed properly.

Hardware defect

**Drive starts to coast** **ready-to-operate relay drops out**

**F 12 Boot data record checksum error** Error not acknowledgeable

The programmed data records are copied into the RAM after the electronics supply has been applied. The checksum for the boot record differs from the one stored with the data record.

EEPROM defective

**Drive continues to coast** **ready-to-operate relay drops out**

**F 13 Damaged primary data header** Error not acknowledgeable

The programmed data records and the primary data (data stored outside a data record) are copied into the RAM after the electronics supply has been applied. The process detected a faulty header entry for the primary data.

EEPROM defective

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 14 EEPROM too small** Error not acknowledgeable

The EEPROM is too small for the data quantity to be stored (primary data or data record areas). Can occur only during a software update. Use new memory module with larger EEPROM.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 15 Error on data record save** Error not acknowledgeable

A verify error occurred during the programming of a data record. The EEPROM did not store the piece of data within the specified period of time. The data record will be identified as not programmed.

EEPROM defective

**Drive starts to coast** **ready-to-operate relay drops out**

**F 16 Ambiguous converter type BKD/BKF (1-Q/4-Q)** Error not acknowledgeable

There are two converter type identifiers, BKD (single-quadrant converter) or BKF (four-quadrant converter). The error message is displayed if the identifiers do not match. The check is performed during the boot process after the electronics supply has been applied. The parameter P 002 displays the analog identifier, but is not clear. The read value of the analog identifier is shown in AL 279.

Compare switch position S500/8 on board 3.9712 with type code BKF/BKD (see ▹Setting the power unit identification◃ from page 42).

Missing connection cable (X102) between control unit and power unit of converter sizes III and VI (750 A up to 2050 A).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 17 Error ext. analog - digital converter** Error acknowledgeable

At the analog - digital converter there is no status signal to indicate that the initiated conversion was completed within the specified period of time. The error message is displayed if the signal is missing for three successive conversions.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 18** **Unknown field power unit identifier** Error not acknowledgeable

The field power unit identifier is read in after the electronics supply has been applied. The identifier could not be assigned to any known power unit (rated current).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 19** **Field connection error** Error not acknowledgeable

The field power unit supply is checked after +24 V have been applied to switching input x2: 15, 'Main contactor ON'. The error message is displayed if there is no connection or in the case of a phase angle.

Disconnect the converter and connect the field power unit as per connection diagram. Since the reference signal is generated from the electronics supply, check this connection as well in accordance with the connection diagram.

**Drive continues to coast** **ready-to-operate relay drops out**

**F 20** **Armature power unit connection error (AC)** Error not acknowledgeable

The armature power unit supply is checked after +24 V have been applied to switching input x2: 15, 'Main contactor ON'. The error message is displayed if there is no connection or in the case of a phase angle.
Disconnect the converter and connect the armature power unit as per connection diagram. Since the reference signal is generated from the electronics supply, check this connection as well in accordance with the connection diagram.

**Drive continues to coast** **ready-to-operate relay drops out**

**F 21** **CCW rotating field at armature power unit** Error not acknowledgeable

The armature power unit supply is checked after +24 V have been applied to switching input x2: 15, 'Main contactor ON'. The process revealed a CCW rotating field.

Disconnect the converter and connect the armature power unit as per connection diagram.

**Drive continues to coast** **ready-to-operate relay drops out**

**F 22** **Phase failure at armature power unit** Error acknowledgeable

The armature power unit supply is checked continuously for phase failure after +24 V have been applied to switching input x2: 15, 'Main contactor ON'. The time to trip for this error message is 6 controller cycles (20 ms at a 50 Hz mains frequency).

**Drive starts to coast** **ready-to-operate relay drops out**

**F 23** **Microprocessor error 1** Error not acknowledgeable

Illegal bus access. Hardware defective.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 24** **Microprocessor error 2** Error not acknowledgeable

Illegal bus access. Program not executed properly.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 25** **Microprocessor error 3** Error not acknowledgeable

Illegal bus access. Program not executed properly.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 26** **Microprocessor error 4** Error not acknowledgeable

Hardware defective or improper program execution.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 27** **Microprocessor error 5** Error not acknowledgeable

Hardware defective or improper program execution.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 28** **Microprocessor error 6** Error not acknowledgeable

Improper program execution.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 29** **Microprocessor error 7** Error not acknowledgeable

Improper program execution.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 30** **External watchdog tripped** Error not acknowledgeable

Improper program execution. The external watchdog (monoflop) was not reset during the last 20 ms and thus the controller program was not processed properly.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 31** **Internal watchdog tripped** Error not acknowledgeable

Improper program execution. The internal watchdog was not reset during the last 40 ms and thus the controller program was not processed properly.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 32 RAM test error** Error not acknowledgeable

The RAM test is performed during the boot process after the supply voltage has been applied and covers all RAM cells. For this purpose, these are written with different patterns which are then read back. Any discrepancies between written and read values trip the error message.

Exchange memory module

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 33 Parameter conflict (P071 / P073)** Error acknowledgeable

The values entered in parameters P 071, 'Power unit supply (mains voltage)', and P 073, 'Motor armature voltage' indicate that the range has been exceeded.

The error message is tripped when the drive is enabled.

Single-quadrant (BKD) converters trigger the error message if the value in parameter P 073 is larger than 121% (140% from S 03.15) of parameter P 071.

$U_{armature} > 1.21 \times U_{power\ unit}$ $U_{armature} > 1{,}40 \times U_{power\ unit}$ (from S 03.15)

Four-quadrant (BKF) converters trigger the error message if the value in parameter P 073 is larger than 1.05 × value (1,15 x value from S 03.15) of parameter P 071.

$U_{armature} > 1.05 \times U_{power\ unit}$ $U_{armature} > 1{,}15 \times U_{power\ unit}$ (from S 03.15)

Check parameter settings in all programmed data records and correct when necessary, save.

**Drive continues to coast** **ready-to-operate relay drops out**

**F 34 Repeated negative actual armature current** Error acknowledgeable

This error message is triggered by eight successive controller cycles measuring an actual armature current of less than –2 %.

Hardware defective.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 35 No synchronisation** Error not acknowledgeable

The control unit is no longer synchronised.

There may be a loose contact in the electronics supply (check screw cap fit for screw-in fuses), or the hardware is defective.

Time to trip 6 mains periods plus the time set with parameter P 527.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 36 Firing pulse interval differs from specified value** Error not acknowledgeable

The firing pulse interval specified by the control unit and the measured pulse interval differ from each other by more than 320 µs. Time to trip 30 controller cycles.

Hardware defective.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 37 Armature circuit open** Error acknowledgeable

This error message is displayed if the control unit input is at the rectifier firing angle limit (P 360) for the time set with parameter P 519, and if during this time the actual armature current is smaller 10 % than the specified armature current setpoint.

Armature circuit fuse defective.

Armature circuit connection faulty (loose/no terminal connection).

Check the setting of the parameter for the rectifier firing angle limit P 360.

Check for mains undervoltage.

Check speed setting.

Check field current setting.

Check field weakening/constant field setting (P 255).

**Drive starts to coast** **ready-to-operate relay drops out**

**F 38 Mains frequency < 45 Hz** Error not acknowledgeable

**Drive starts to coast** **ready-to-operate relay drops out**

**F 39 Mains frequency > 65 Hz** Error not acknowledgeable

**Drive starts to coast** **ready-to-operate relay drops out**

**F 40 Field current monitoring** Error acknowledgeable

This error message is displayed once the actual field current falls by more than 50 % below the field current setpoint for the time set in parameter P 385. This error can be acknowledged only when the actual field current exceeds 70 % of the field current setpoint.

The error will not be deleted automatically if the field unit is switched off with parameter 372 while the error message is present. It can be acknowledged, however. In this case, the system signals Ready-to-operate only when the error is acknowledged.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 41 P072 out of range** Error acknowledgeable

The value in parameter P 072 must only adopt values within the range of 0.5×P 003 to 1.0×P 003. Parameter P 003 contains the maximum output current [A] of the power unit. The program entered 0.5 × the current displayed in parameter P 003 into parameter P 072.

This error message may occur after the memory module was exchanged.

Enter the correct value for parameter P 072 in the affected data records, and save.

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 42** **Parameter conflict (P213 / P215)** Error acknowledgeable

The values entered in parameters P 213 'Upper limit (motor potentiometer)' and P 215 'Lower limit (motor potentiometer)' result in a range overlap. The value in parameter P 215 is larger than that in parameter P 213. Parameter P 213 must contain the larger of the two values.

The error message is tripped when the drive is enabled.

Correct parameter setting and save.

**Drive continues to coast ready-to-operate relay drops out**

**F 43** **Shortcircuit/overload at a digital output** Error acknowledgeable

Hardware monitoring of the digital outputs at terminals x2: 5 to x2: 10.

Jumper W600 not fitted.

Jumper W600 fitted to B-C with no external 24 V supply at terminal x2: 4. External supply voltage outside specified limits (too low). External supply polarity reversed. Outputs will stay switched off until the error is acknowledged.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 44** **Overspeed (n > P501)** Error acknowledgeable

The speed has exceeded the value set in parameter P 501.

During optimisation, the threshold is reduced internally to 20 %, so that optimisation is aborted as soon as this speed is exceeded (due to the field circuit remanence). Once optimisation is completed, the original monitoring threshold will be restored.

**NOTE**

This is no redundant safety system as an assumption is made as to the motor speed from the actual speed determined by the converter.

Monitoring requires an **error-free** tachogenerator or incremental encoder.

Operator safety guidelines must be observed !

**Drive starts to coast** **ready-to-operate relay drops out**

**F 45** **Tachogenerator/encoder failure (time to trip 12 scan cycles/40 ms at 50 Hz)**
Error acknowledgeable

Tachogenerator/encoder line failure or line shortcircuit or no tachogenerator/encoder connection No encoder supply or encoder without second track.

This error message may occur also when the armature circuit is interrupted !

**Drive starts to coast** **ready-to-operate relay drops out**

**F 46 Tachogenerator/encoder polarity reversed** Error acknowledgeable

Swap armature, field or tachogenerator/encoder connection.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 47 Speed range error** Error acknowledgeable

The tachogenerator was not connected to the terminal X3: x corresponding to the tachogenerator range selected in parameter P 257. The system only detects a connection error that would lead to higher-than-set speeds (P 258).

This monitoring function is effective also if a pulse encoder is used for speed detection if an excessive speed was input (rated speed, P 262).

Possible further causes:

Armature current monitoring defect

Excessive field current

Parameter P 081 $N_{max}/N_{rated}$ set wrongly.

Tachogenerator/encoder link interrupted.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 48 Torque change time exceeded (>100 scans)** Error acknowledgeable

A torque change takes longer than specified with parameter P 518.

The cause for this is often that, in a weak mains, the armature current cannot be commutated within the set period of time. There may also be a hardware defect in the zero-current detector, or the inverter firing angle limit P 361 is set too low.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 49 Unknown armature power unit identification** Error not acknowledgeable

The power unit identifier is read during the boot process after the electronics supply has been applied. This error message is displayed if the value for the power unit type (BKD / BKF) is unknown in the software.

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 50 Data record selection not unique (dig. input function 1 - 6)** Error acknowledgeable

Only one data record must be selected via the programmable switching inputs (refer DIF 1 to DIF 6). If two or more data records are selected at the same time, the drive will be disabled after 150 controller cycles (500 ms at a 50 Hz mains frequency). No error message will be displayed if a contact overlap is eliminated within 150 controller cycles. The original data record remains active as long as the contacts overlap.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 51** **Input current < 3.3 mA at set value 4 to 20 mA** Error acknowledgeable

This error message is tripped immediately (without delay) as soon as the input current for the setpoint input falls below the value of 3.3 mA.

P 182 or P 186 set wrongly.

Wire breakage of setpoint line or connection polarity reversed.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 52** **Mains undervoltage P 010 < 0,8 x P 070** Error acknowledgeable

The measured voltage at the electronics supply is below the tripping threshold for four controller cycles. The tripping threshold is 80 % of the voltage rated value input with parameter P 070. Display of the measured voltage value in parameter P 010 in $V_{eff}$.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 53** **Overcurrent TD1 ($I_A$ > 2x P 072)** Error acknowledgeable

An armature current twice as high as the converter output current set with parameter P 072 has occurred.

Possible cause: coils without interference suppression in the switching cabinet (operating hour counter, contactors etc.)

**Drive starts to coast** **ready-to-operate relay drops out**

**F 54** **Overcurrent TD 2 ($I_A$ > 2x P 072)** Error acknowledgeable

An armature current twice as high as the converter output current set with parameter P 072 has occurred.

Possible cause: coils without interference suppression in the switching cabinet (operating hour counter, contactors etc.)

**Drive starts to coast** **ready-to-operate relay drops out**

**F 55** **Zero-current detector defective** Error not acknowledgeable

The zero-current signal is checked during the boot process after the electronics supply has been activated. The error message is displayed if a level other than zero-current is measured.

Hardware defect

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 56** **Offset error armature current detector > 50 mV** Error acknowledgeable

The offset averaged over 30 measurements is above 50 mV. The offset is measured continuously if terminal X2: 15 is not energised ('Main contactor ON' contact is open).

Hardware defect

**Drive continues to coast** **ready-to-operate relay drops out**

**F 57 Ambiguous data record change source** Error acknowledgeable

No data record must be selected via PC or existing bus link (writing one of parameters P 152, P 157, P 158) if at least one programmable switching input is programmed for data record change (DIF 1 to DIF 6). This error message is displayed if this happens regardless.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 58 EEPROM empty** Error not acknowledgeable

No data record has been generated yet. The preset values were loaded from the after the EEPROM electronics supply was switched on. This data record must now be adapted to machine requirements and be stored in a data record. Set the boot source P 151 to a stored data record. Switch electronics supply off and on again.

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 59 Parameter error in data record 1 (write error or value)** Error not acknowledgeable

The programmed data records are copied from the EEPROM into the RAM after the supply voltage has been switched on. The process revealed incorrect values. The number of the affected parameter is displayed in P 156.

Use parameter P 127 to change to data record 1 P 127 = 1. Correct the value and store data record 1 (P 153 = 1.1). LED H714 flashes during programming, and the lowest-value position in parameter P 150 changes to '3', '7' or 'B', P 150 = xxx3, P 150 = xxx7 or P 150 = xxxB. The electronics supply must be switched off and on again after programming.

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 60 Parameter error in data record 2 (write error or value)** Error not acknowledgeable

The programmed data records are copied from the EEPROM into the RAM after the supply voltage has been switched on. The process revealed incorrect values. The number of the affected parameter is displayed in P 156.

Use parameter P 127 to change to data record 2 P 127 =2. Correct the value and store data record 2 (P 153 = 2.2). LED H714 flashes during programming, and the lowest-value position in parameter P 150 changes to '3', '7' or 'B', P 150 = xxx3, P 150 = xxx7 or P 150 = xxxB. The electronics supply must be switched off and on again after programming.

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 61 Parameter error in data record 3 (write error or value)** Error not acknowledgeable

The programmed data records are copied from the EEPROM into the RAM after the supply voltage has been switched on. The process revealed incorrect values. The number of the affected parameter is displayed in P 156.

Use parameter P 127 to change to data record 3 P 127 = 3. Correct the value and store data record 3 (P 153 = 3.3). LED H714 flashes during programming, and the lowest-value position in parameter P 150 changes to '3', '7' or 'B', P 150 = xxx3, P 150 = xxx7 or P 150 = xxxB. The electronics supply must be switched off and on again after programming.

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 62** **Parameter error in data record 4 (write error or value)** Error not acknowledgeable

The programmed data records are copied from the EEPROM into the RAM after the supply voltage has been switched on. The process revealed incorrect values. The number of the affected parameter is displayed in P 156.

Use parameter P 127 to change to data record 4 P 127 = 4. Correct the value and store data set 4 (P 153 = 4.4). LED H714 flashes during programming, and the lowest-value position in parameter P 150 changes to '3', '7' or 'B', P 150 = xxx3, P 150 = xxx7 or P 150 = xxxB. The electronics supply must be switched off and on again after programming.

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 63** **Parameter error in data record 5 (write error or value)** Error not acknowledgeable

The programmed data records are copied from the EEPROM into the RAM after the supply voltage has been switched on. The process revealed incorrect values. The number of the affected parameter is displayed in P 156.

Use parameter P 127 to change to data record 5 P 127 = 5. Correct the value and store data set 5 (P 153 = 5.5). LED H714 flashes during programming, and the lowest-value position in parameter P 150 changes to '3', '7' or 'B', P 150 = xxx3, P 150 = xxx7 or P 150 = xxxB. The electronics supply must be switched off and on again after programming.

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 64** **Parameter error in data record 6** Error not acknowledgeable

The programmed data records are copied from the EEPROM into the RAM after the supply voltage has been switched on. The process revealed incorrect values. The number of the affected parameter is displayed in P 156.

Use parameter P 127 to change to data record 6 P 127 = 6. Correct the value and store data record 6 (P 153 = 6.6). LED H714 flashes during programming, and the lowest-value position in parameter P 150 changes to '3', '7' or 'B', P 150 = xxx3, P 150 = xxx7 or P 150 = xxxB. The electronics supply must be switched off and on again after programming.

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 65** **Error in ROM data record** Error not acknowledgeable

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 66 Primary data parameter error** Error not acknowledgeable

The primary data are copied from the EEPROM into the RAM after the supply voltage has been switched on. The process revealed incorrect values. The number of the affected parameter is displayed in P 156.

Correct the value of this parameter. The input value is also stored in the EEPROM. After programming - the lowest-value position in parameter P 150 changes to '3', '7' or 'B', P 150 = xxx3, P 150 = xxx7 or P 150 = xxxB - the electronics supply must be switched off and on again.

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 67 Armature power unit identific. differs from EEPROM value** Error not acknowledgeable

This error message may be displayed if an already programmed memory module or the processor board was exchanged. The data records in the EEPROM were programmed at a converter with a different rated output current. Parameter P 004 shows the converter current of the original converter, parameter P 003 that of the current one.

In the programmed data records, set parameters P 072 and P 074 in accordance with the motor requirements, and save !

**CAUTION**

Check whether the data stored in the EEPROM (data records and primary data) are suitable for the machine.

Then re-optimise (P 082 = 1).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 68 Data record does not exist** Error acknowledgeable

Writing parameter P 152 or a programmable switching input selected a non-existent data record. The original data record remains active.

Generate and save data record.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 69** **Field power unit differs from EEPROM value** Error not acknowledgeable

This error message may be displayed if an already programmed memory module or the processor board was exchanged. The data records in the EEPROM were programmed at a unit with a different field output current. Parameter P 007 shows the field current of the original converter, parameter P 006 that of the current one.

In the programmed data records, set parameters P 079 and P 080 in accordance with the motor requirements, and save !

**CAUTION**

Check whether the data stored in the EEPROM (data records and primary data) are suitable for the machine.

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 70** **Option board does not respond** Error not acknowledgeable

No handshake signal from the option board.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 71** **Illegal value in P 072 / P 074 in data record 1** Error not acknowledgeable

This error message may be displayed if an already programmed memory module or the processor board was exchanged. The data records in the EEPROM were programmed at a unit with a different rated output current. Parameter P 004 shows the converter current of the original converter, parameter P 003 that of the current one.

50 % of the detected (P 003) power unit current are entered in parameter P 072, and 50 % of the value of parameter P 072 for the rated motor current P 074.

Use P 127 to select data record 1, P 127 = 1, set parameters P 072 and P 074 in accordance with the motor requirements and save with an input of P 153=1.1 !

**CAUTION**

Check whether the data (data records and primary data) stored in the EEPROM are suitable for the machine (speed adjustment, constant field, field weakening etc.).

Then re-optimise (P 082 = 1).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 72 Illegal value in P 072 / P 074 in data record 2** Error not acknowledgeable

This error message may be displayed if an already programmed memory module or the processor board was exchanged. The data records in the EEPROM were programmed at a unit with a different rated output current. Parameter P 004 shows the converter current of the original converter, parameter P 003 that of the current one.

50 % of the detected (P 003) power unit current are entered in parameter P 072, and 50 % of the value of parameter P 072 for the rated motor current P 074.

Use P 127 to select data record 2, P 127 = 2, set parameters P 072 and P 074 in accordance with the motor requirements and save with an input of P 153=2.2 !

**CAUTION**

Check whether the data (data records and primary data) stored in the EEPROM are suitable for the machine (speed adjustment, constant field, field weakening etc.).

Then re-optimise (P 082 = 1).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 73 Illegal value in P 072 / P 074 in data record 3** Error not acknowledgeable

This error message may be displayed if an already programmed memory module or the processor board was exchanged. The data records in the EEPROM were programmed at a unit with a different rated output current. Parameter P 004 shows the converter current of the original converter, parameter P 003 that of the current one.

50 % of the detected (P 003) power unit current are entered in parameter P 072, and 50 % of the value of parameter P 072 for the rated motor current P 074.

Use P 127 to select data record 3, P 127 = 3, set parameters P 072 and P 074 in accordance with the motor requirements and save with an input of P 153=3.3 !

**CAUTION**

Check whether the data (data records and primary data) stored in the EEPROM are suitable for the machine (speed adjustment, constant field, field weakening etc.).

Then re-optimise (P 082 = 1).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 74** **Illegal value in P 072 / P 074 in data record 4** Error not acknowledgeable

This error message may be displayed if an already programmed memory module or the processor board was exchanged. The data records in the EEPROM were programmed at a unit with a different rated output current. Parameter P 004 shows the converter current of the original converter, parameter P 003 that of the current one.

50 % of the detected (P 003) power unit current are entered in parameter P 072, and 50 % of the value of parameter P 072 for the rated motor current P 074.

Use P 127 to select data record 4, P 127 = 4, set parameters P 072 and P 074 in accordance with the motor requirements and save with an input of P 153=4.4 !

**CAUTION**

Check whether the data (data records and primary data) stored in the EEPROM are suitable for the machine (speed adjustment, constant field, field weakening etc.).

Then re-optimise (P 082 = 1).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 75** **Illegal value in P 072 / P 074 in data record 5** Error not acknowledgeable

This error message may be displayed if an already programmed memory module or the processor board was exchanged. The data records in the EEPROM were programmed at a unit with a different rated output current. Parameter P 004 shows the converter current of the original converter, parameter P 003 that of the current one.

50 % of the detected (P 003) power unit current are entered in parameter P 072, and 50 % of the value of parameter P 072 for the rated motor current P 074.

Use P 127 to select data record 5, P 127 = 5, set parameters P 072 and P 074 in accordance with the motor requirements and save with an input of P 153=5.5 !

**CAUTION**

Check whether the data (data records and primary data) stored in the EEPROM are suitable for the machine (speed adjustment, constant field, field weakening etc.).

Then re-optimise (P 082 = 1).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 76 Illegal value in P 072 / P 074 in data record 6** Error not acknowledgeable

This error message may be displayed if an already programmed memory module or the processor board was exchanged. The data records in the EEPROM were programmed at a unit with a different rated output current. Parameter P 004 shows the converter current of the original converter, parameter P 003 that of the current one.

50 % of the detected (P 003) power unit current are entered in parameter P 072, and 50 % of the value of parameter P 072 for the rated motor current P 074.

Use P 127 to select data record 6, P 127 = 6, set parameters P 072 and P 074 in accordance with the motor requirements and save with an input of P 153=6.6 !

**CAUTION**

Check whether the data (data records and primary data) stored in the EEPROM are suitable for the machine (speed adjustment, constant field, field weakening etc.).

Then re-optimise (P 082 = 1).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 77 Illegal value in P 079 in data record 1** Error not acknowledgeable

This error message may be displayed if an already programmed memory module or the processor board was exchanged. The data records in the EEPROM were programmed at a unit with a different field output current. Parameter P 007 shows the field current of the original converter, parameter P 006 that of the current one.

The value (= rated field unit current) of the identified field power unit (P 006) is entered in parameter P 079.

Use P 127 to select data set 1, P 127 = 1, set parameter P 079 in accordance with the motor requirements and save with an input of P 153=1.1 !

**CAUTION**

Check whether the data (data records and primary data) stored in the EEPROM are suitable for the machine (speed adjustment, constant field, field weakening etc.).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 78** **Illegal value in 079 in data record 2** Error not acknowledgeable

This error message may be displayed if an already programmed memory module or the processor board was exchanged. The data records in the EEPROM were programmed at a unit with a different field output current. Parameter P 007 shows the field current of the original converter, parameter P 006 that of the current one.

The value (= rated field unit current) of the identified field power unit (P 006) is entered in parameter P 079.

Use P 127 to select data record 2, P 127 = 2, set parameter P 079 in accordance with the motor requirements and save with an input of P 153=2.2 !

**CAUTION**

Check whether the data (data records and primary data) stored in the EEPROM are suitable for the machine (speed adjustment, constant field, field weakening etc.).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 79** **Illegal value in P 079 in data record 3** Error not acknowledgeable

This error message may be displayed if an already programmed memory module or the processor board was exchanged. The data records in the EEPROM were programmed at a unit with a different field output current. Parameter P 007 shows the field current of the original converter, parameter P 006 that of the current one.

The value (= rated field unit current) of the identified field power unit (P 006) is entered in parameter P 079.

Use P 127 to select data record 3, P 127 = 3, set parameter P 079 in accordance with the motor requirements and save with an input of P 153=3.3 !

**CAUTION**

Check whether the data (data records and primary data) stored in the EEPROM are suitable for the machine (speed adjustment, constant field, field weakening etc.).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 80 Illegal value in P 079 in data record 4** Error not acknowledgeable

This error message may be displayed if an already programmed memory module or the processor board was exchanged. The data records in the EEPROM were programmed at a unit with a different field output current. Parameter P 007 shows the field current of the original converter, parameter P 006 that of the current one.

The value (= rated field unit current) of the identified field power unit (P 006) is entered in parameter P 079.

Use P 127 to select data record 4, P 127 = 4, set parameter P 079 in accordance with the motor requirements and save with an input of P 153=4.4 !

**CAUTION**

Check whether the data (data records and primary data) stored in the EEPROM are suitable for the machine (speed adjustment, constant field, field weakening etc.).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 81 Illegal value in P 079 in data record 5** Error not acknowledgeable

This error message may be displayed if an already programmed memory module or the processor board was exchanged. The data records in the EEPROM were programmed at a unit with a different field output current. Parameter P 007 shows the field current of the original converter, parameter P 006 that of the current one.

The value (= rated field unit current) of the identified field power unit (P 006) is entered in parameter P 079.

Use P 127 to select data record 5, P 127 = 5, set parameter P 079 in accordance with the motor requirements and save with an input of P 153=5.5 !

**CAUTION**

Check whether the data (data records and primary data) stored in the EEPROM are suitable for the machine (speed adjustment, constant field, field weakening etc.).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 82 Illegal value in P 079 in data record 6** Error not acknowledgeable

This error message may be displayed if an already programmed memory module or the processor board was exchanged. The data records in the EEPROM were programmed at a unit with a different field output current. Parameter P 007 shows the field current of the original converter, parameter P 006 that of the current one.

The value (= rated field unit current) of the identified field power unit (P 006) is entered in parameter P 079.

Use P 127 to select data record 6, P 127 = 6, set parameter P 079 in accordance with the motor requirements and save with an input of P 153=6.6 !

**CAUTION**

Check whether the data (data records and primary data) stored in the EEPROM are suitable for the machine (speed adjustment, constant field, field weakening etc.).

**Drive continues to coast** **ready-to-operate relay remains dropped out**

**F 83 EEPROM write time exceeded** Error acknowledgeable

A data record or an individual piece of data (primary data) could not be programmed within the specified time limit. Programming was aborted. The data record in question was identified as non-existent.

EEPROM defective.

Hardware defect

**Drive starts to coast** **ready-to-operate relay drops out**

**F 84 Primary data checksum error** Error not acknowledgeable

The primary data are copied into the RAM after the electronics supply has been applied. This process detected a checksum different from the one stored with the data.

EEPROM defective.

**Drive continues to coast** **ready-to-operate relay drops out**

**F 85 Checksum error in data record 1** Error not acknowledgeable

The programmed data records are copied into the RAM after the electronics supply has been applied. The checksum for data record 1 differs from the one stored with the data record.

EEPROM defective.

**Drive continues to coast** **ready-to-operate relay drops out**

**F 86 Checksum error in data record 2** Error not acknowledgeable

The programmed data records are copied into the RAM after the electronics supply has been applied. The checksum for data record 2 differs from the one stored with the data record.

EEPROM defective.

**Drive continues to coast** **ready-to-operate relay drops out**

**F 87 Checksum error in data record 3** Error not acknowledgeable

The programmed data records are copied into the RAM after the electronics supply has been applied. The checksum for data record 3 differs from the one stored with the data record.

EEPROM defective.

**Drive continues to coast** **ready-to-operate relay drops out**

**F 88 Checksum error in data record 4** Error not acknowledgeable

The programmed data records are copied into the RAM after the electronics supply has been applied. The checksum for data record 4 differs from the one stored with the data record.

EEPROM defective.

**Drive continues to coast** **ready-to-operate relay drops out**

**F 89 Checksum error in data record 5** Error not acknowledgeable

The programmed data records are copied into the RAM after the electronics supply has been applied. The checksum for data record 5 differs from the one stored with the data record.

EEPROM defective.

**Drive continues to coast** **ready-to-operate relay drops out**

**F 90 Checksum error in data record 6** Error not acknowledgeable

The programmed data records are copied into the RAM after the electronics supply has been applied. The checksum for data record 6 differs from the one stored with the data record.

EEPROM defective.

**Drive continues to coast** **ready-to-operate relay drops out**

**F 91 Undefined field bus card status** Error acknowledgeable

**Drive starts to coast** **ready-to-operate relay drops out**

**F 92 Field bus error** Error acknowledgeable

Faulty bus link between master (control) and option board on the converter.

Master (control) not transmitting.

Bus cable between control and option board defective or incontinuous.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 93 Field bus setpoint/actual-value configuration error** Error acknowledgeable

Error occurs when booting the converter. The number of the setpoints and/or actual values entered in option board parameters P 768 to P 799 differs from the number defined in the higher-level control.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 94** **P657 / P658 parameter conflict (from S03.10)** Error acknowledgeable

The values entered in parameters P 657, 'Positive limit, limiter', and P 658, 'Negative limit, limiter', result in a range overlap. The value in parameter P 658 is larger than that in parameter 657. Parameter P 657 must contain the larger of the two values.

The error message is tripped when the drive is enabled.

Correct parameter setting and save.

**Drive continues to coast** **ready-to-operate relay drops out**

**F 96** **Motor temperature reached shut-off temperature 1 (channel 1)** Error acknowledgeable

Active when P 541 = 1

The motor temperature reached or exceeded the value set in parameter P 543 (sensor connection X8:1 and X8:2 on board LP 3.0043).

From software S03.14 this error is also generated, when the option board is not available or the connection X212 is missing (when P541=1).

**Drive starts to coast** **ready-to-operate relay drops out**

**F 97** **Motor temperature reached shut-off temperature 2 (channel 2)** Error acknowledgeable

Active when P 544 = 1

The motor temperature reached or exceeded the value set in parameter P 546 (sensor connection X8:4 and X8:5 on board LP 3.0043).

From software S03.14 this error is also generated, when the option board is not available or the connection X212 is missing (when P541=1).

**Drive starts to coast** **ready-to-operate relay drops out**

**F 98** **No connection motor temperature sensor 1 (channel 1)** Error acknowledgeable

Active when P 541 = 1

The resistance between the connections X8:1 and X8:2 on board 3.0043 is higher than 2700 Ω, it is assumed, that the sensor cables are broken.

Check the connections in the motor connection box (TM+ and TM-) and on the board 3.0043 (X8:1 and X8:2)

Disconnect temperature sensor and check with ohmmeter.

Typical resistance:

| | |
|---|---|
| 0 °C | 500 Ω |
| +25 °C | 600 Ω |
| +50 °C | 720 Ω |
| +100 °C | 1000 Ω |
| +150 °C | 1300 Ω |

**Drive starts to coast** **ready-to-operate relay drops out**

**F 99** **Cable broken of motor temperature sensor 2 (channel 2)** Error acknowledgeable

Active when P 544 = 1

The resistance between the connections X8:4 and X8:5 on board 3.0043 is higher than 2700 Ω, it is assumed, that the sensor cables are broken.

Check the connections in the motor connection box (TM+ and TM-) and on the board 3.0043 (X8:4 and X8:5)

Disconnect temperature sensor and check with ohmmeter.
Typical resistance of the sensor: see description error F 98.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 100** **Short circuit of motor temperature sensor 1 (channel 1)** Error acknowledgeable

Active when P 541 = 1

The resistance between the connections X8:1 and X8:2 on board 3.0043 is lower than 132 Ω, a short circuit of the sensor cables is assumed.

Check sensor cables with regard to insulation fault.

Disconnect temperature sensor and check with ohmmeter.
Typical resistance of the sensor: see description error F 98.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 101 Short circuit of motor temperature sensor 2 (channel 2)** Error acknowledgeable

Active when P 544 = 1

The resistance between the connections X8:4 and X8:5 on board 3.0043 is lower than 132 Ω, a short circuit of the sensor cables is assumed.

Check sensor cables with regard to insulation fault.

Disconnect temperature sensor and check with ohmmeter.
Typical resistance of the sensor: see description error F 98.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 102 Cable break temperature sensor power unit (from S 03.15)** Error acknowledgeable

Threshold unit size I and II: +120 °C, without hysteresis

Threshold unit size III and IV: -26 °C, without hysteresis

**Drive starts to coast** **ready-to-operate relay drops out**

**F 103 Short circuit temperature sensor power unit (from S 03.15)** Error acknowledgeable

Threshold unit size I and II: -38 °C, without hysteresis

Threshold unit size III and IV: +120 °C, without hysteresis

**Drive starts to coast** **ready-to-operate relay drops out**

**F 104 Power unit temperature limit reached (from S 03.15)** Error acknowledgeable

Error message only generated when P 112 = 1. The valid temperature threshold is available in ALink 221. At the same time the warning W3 is generated (W3 is also active when P 112 = 0), the error message is without hysteresis.

**Drive starts to coast** **ready-to-operate relay drops out**

**F 105 Error reaction freely definable error (from S 03.15)** Error acknowledgeable

The event (DLink) selected with parameter P 730 is detected.

**Drive starts to coast** **ready-to-operate relay drops out**

## 6.5 Warning description

**W 1 Speed input incremental encoder 1 to high**

The specified frequency limit of 200 kHz was exceeded on entering parameters P 261, 'Increments of incremental encoder 1' and P 262, 'Max. speed, incremental encoder 1'. Entry of the number of increments (P 261) calculates the speed taking into account the frequency limit and enters this value in parameter P 262.

The input will be corrected by the drive !

To acknowledge the warning, re-enter the speed taking into account the frequency limit.

**W 2 Data record save not completed**

A command to save the data record was entered although a previous save has not been completed yet. The data record last selected was not saved. A data record is fully programmed as soon as the lowest-value position in parameter P 150 changes to '3' ,'7' or 'B', P 150 = xxx3 P 150 = xxx7 or P 150 = xxxB.

To acknowledge the warning, reprogram the rejected data record after the previous data record has been processed.

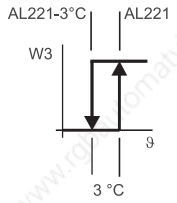
**W 3 Power unit temperature exceeded**

The heat sink temperature has exceeded the permitted temperature limit. The temperature limit is dependent on current intensity and converter type (BKD / BKF). The value is available in ALink 221 and specified in °C.

Operation may be continued for max. 5 mins before the drive must be switched off. The measure must be taken by the operator. The warning is deleted as soon as the heat sink temperature falls by 3 °C below the limit value.

Occurs also if unit size I/II has a cable break to its temperature sensor,
display in P 025 = +159 °C.

Occurs also if unit size III/IV has a short circuit on its temperature sensor cable,
display in P 025 = +124 °C.




**W 4 Data record not erased**

An attempt was made to erase the currently selected data record. This is not possible. EEPROM data record erases are effective only for a data record that is currently not in use.

**W 5 P 072 / P 074 parameter conflict**

The values entered in parameters P 072, 'Maximum converter current', and P 074, 'Rated motor current', result in a range overlap.

The warning is displayed if, when the drive is enabled, the value in parameter P 074 is larger than the value of parameter P 072 or smaller than 50% P 072. The following applies:

$0.5 \times P\ 072 \leq P\ 074 \leq P\ 072$

Correct parameter setting and save.

**W 6 Intermittent-current limit cannot be defined**

The message is displayed during optimisation P 082 = 1 if the intermittent-current limit cannot be defined because of a value larger than 100 %. 100 % corresponds to the value of the maximum converter output current, programmed with parameter P 072. The reason for this is that the armature circuit inductance is insufficient for the settings.

Check whether the motor can be operated at a higher current for the duration of the optimisation run. If so, optimise at the higher current (increase value in parameter P 072). After optimisation, set the current limits with parameters P 325 and P 326 in a way not to exceed the permissible motor current during operation.

**W 7 Data record change not possible**

A data record change was requested while the drive was enabled (parameter P 152 or programmed switching contact) although the setting of parameter P 154 permits data record changes only while the drive is disabled. The original data record remains active.

**W 8 Motor $i^2t$ tripped**

The monitoring function trips as soon as the calculated i2t value exceeds the threshold set with parameter P 525. The drive does not start to coast. The motor can be operated for another 5 minutes max. before the operator must disable the drive.

Possible causes:

Parameter P 525 set too low.

Therm. time constant parameter P 078 set too low.

Motor operated on overcurrent for too long.

**W 9 Cannot erase boot data record**

An attempt was made to erase the boot data record. This is not possible. Only a data record not entered as a boot source in parameter P 151 can be erased in the EEPROM.

**W 10 Cannot reset**

The reset (DIF 7 and P 106) cannot be executed as EEPROM activities have not been completed.

**W 11 Motor warning temperature channel 1 reached**

Active when P 541 = 1

The motor temperature reached or exceeded the value set in parameter P 542 (sensor connection X8:1 and X8:2 on board LP 3.0043).

The warning is removed when the temperature is P 542 - 5 °C.

**W 12 Motor warning temperature channel 2 reached**

Active when P 541 = 1

The motor temperature reached or exceeded the value set in parameter P 545 (sensor connection X8:4 and X8:5 on board LP 3.0043).

The warning is removed when the temperature is P 545 - 5 °C.

**W 13 Power unit temperature has reached the pre-warning limit (from S 03.15)**

The pre-warning is activated when the power unit´s temperature is

$\vartheta$ = limit temperature + 10 °C.

The pre-warning is deleted when the power unit´s temperature is lower than

$\vartheta$ = Grenztemperatur + 13 °C.

The value of the valid power unit´s limit temperature is stored in ALink 221.

# APPENDIX A - ABBREVIATIONS

| | |
|---|---|
| **7S** | seven segments |
| **ADC** | Analog-digital-converter |
| **ADR** | Slave-Adress, USS |
| **aG** | Rectifier firing angle limit |
| **AL** | Analog Link = analog connection signal |
| **ALink** | Analog Link = analog connection signal |
| **aW** | Inverter firing angle limit |
| **BAPS** | Baumüller Antriebe parallel interface |
| **BASS** | Baumüller Antriebe serial interface |
| **BCC** | Block Check Character (XOR relation of all characters) |
| **Bsa** | Reference potential analog |
| **Bsd** | Reference potential digital |
| **Bse** | Reference potential external |
| **CCW** | counterclockwise |
| **CD** | Controller disabled |
| **CE** | Controller enable |
| **CR** | Command and response identification, USS |
| **CW** | clockwise |
| **D content** | differential part of signal |
| **DIF** | digital input function |
| **DL** | Digital Link = Digital link signal |
| **DLink** | Digital Link = Digital link signal |
| **DR** | data record, i.e.one of the 6 data records |

| | |
|---|---|
| **DRNo** | Data record number |
| **DT1 element** | D element with first order time delay |
| **EMF** | Electromotive force |
| **FRD** | Final rounding, DOWN |
| **FRU** | Final rounding, UP |
| **IND** | Index, USS |
| **IRD** | Initial rounding, DOWN |
| **IRU** | Initial rounding, UP |
| **KP** | Adaptation signal |
| **LGT** | Message length, USS |
| **MC** | Main contactor |
| **MP** | Motorpotentiometer |
| **PCD** | Process Data, USS |
| **PCO** | Parameter code |
| **PCV** | Parameter coded value, USS |
| **PD** | primary data, i.e. data not saved in one of the 6 data records |
| **PI** | Proportional Integral |
| **PNU** | Parameter-No., USS |
| **PU** | Pulse enable |
| **QS** | Deactivate quick stop |
| **QS** | Quick stop |
| **S** | Software (Example S03.03) |
| **STX** | Start of Text, USS |
| **TD** | Ramp-down time |
| **TD** | torque direction |
| **Tn** | Integral-action time |
| **TU** | Ramp-up time |
| **ZK** | Option board |

# APPENDIX B - USS PROTOCOL

**NOTE**

The USS protocol is a registered Siemens AG trademark.

The USS protocol interface allows a communication between master and slave using a fixed message length.

## B.1 Data transmission and security

(layers 1 and 2 of the ISO/OSI model)

The following applies for data transmission and security:

- The mode is strictly half-duplex.
- The protocol is a master/slave protocol with bus capability, with the external processor always assuming the master and the drives always assuming the slave function.
- The message length is fixed and cannot be changed online.
- All messages must be transmitted unbroken, i. e. without gaps. No acknowledge and repeat messages are required due to the strictly cyclic message exchange.
- The transmission framework for the individual characters is defined as follows:
  1 start bit, 8 data bits, 1 parity bit (even parity), 1 stop bit.

The start character of each message (master and slave messages) is the ASCII character STX = 02hex in combination with a preceding 33 -bit transmission break. All other characters in the message are code-independent.

Different data security measures achieve a Hamming distance of d = 4, which means that, per message, there must be at least 4 bit errors at defined locations within the message before a faulty message is no longer recognised as such.

| STX | LGT | ADR | Net data block with n-characters | BCC |
|---|---|---|---|---|

Illustration 78: Message structure

with

STX: Start of Text (02hex)

LGT: Message length 2 - 254 bytes (excluding STX and LGE, but including ADR and BCC)

ADR: Slave address 0 - 31; 32: Broadcast message, = 64: Mirror message

BCC: Block Check Character (XOR relation of all characters)

### B.1.1 Transmission procedure

The start character STX (02hex) alone does not suffice to identify the beginning of a message as this bit combination may also occur right in the middle of the message, in the net data block, for example. This is the reason for the 33-bit transmission break before master and slave messages. Only an STX received with a preceding transmission break identifies a valid message start. The half-duplex mode (either transmission or reception only at any one time) always ensures this start break in error-free operation.

The definition of the start break makes it a prerequisite that this break time must never occur between two characters within a message. For this reason, all messages must be transmitted unbroken, i. e., without gap.

Each drive responds only after it has received a complete and error-free message sent to its own address.

The reasons why a slave does not answer a master message with a response message may be as follows:

- The slave is not switched on yet.
- The slave received a faulty message.
- The communication line is interrupted or faulty.

As a rule, a slave responds to each master message after a short processing period. The sequence involving several slaves is shown in the diagram below:

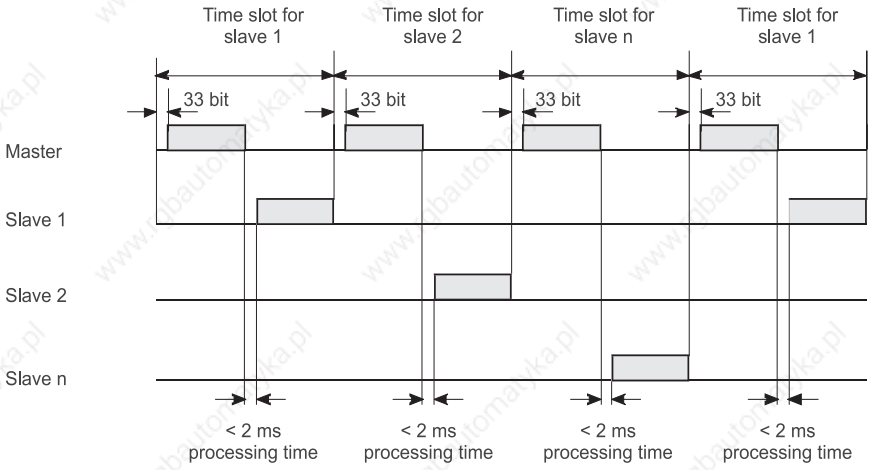



Illustration 79: 2-wire and 4-wire mode (half-duplex)

### B.1.2 Net data block structure

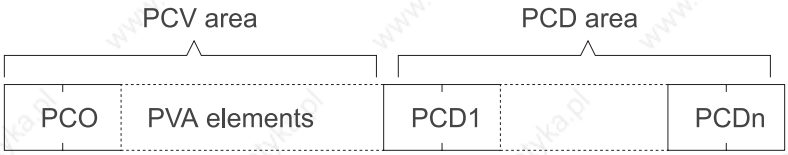
The net data block is divided into two areas:

- PCV area (parameter code value)
- PCD area (process data)

The **PCV area** assists in the exchange of parameters between two communication partners, i. e., in the reading and writing of parameter values and reading of the parameter description.

The **PCD area** contains the signals required for automation:
Master-to-slave control word and setpoints
Slave-to-master status word and actual values

Both areas together form the net data block. This structure applies for the command message (master ⇒ slave) as well as for the response message (slave ⇒ master).




**PCO:** Parameter code (PCO) identifies and initiates commands and responses on parameter processing and is always one word long (= 16 bit).

**PVA element:** Parameter value, with extension or other operating data as required. The number of PVA elements may also be 0 if PCD data only are to be transmitted in the net data block.

**PCD1-PCDn:** Process data (control/status word and setpoints/actual values). The required setpoints and actual values are transmitted in this area. Its length must always be agreed between drive and control.
The number of PCD elements may also be 0 if PCV data only are to be transmitted in the net data block.

Depending on the direction of transmission, the control or status word must always be transmitted in PCD1. The setpoints or actual values are transmitted in the subsequent process data PCD2 to PCDn.

### B.1.3 Bus addresses

The bus addresses are set with the help of parameter P 120 KOM Drive address. Address 32 is the broadcast address.

### B.1.4 Mirror message

The bus master can request a mirror message from the slave. The master sends a message to the respective slave, which differs from a normal message only in that bit no. 7 is set in the address byte ADR.

The slave returns this message to the master immediately as response message on receipt.

The mirror message can be used to check proper functioning of the data transmission between master and slave. This is advantageous during step-by-step commissioning or for error location in the bus system, for example.

### B.1.5 Broadcast message

A broadcast message is a master message addressed to all slaves at the same time. It differs from a normal master message only in that the address byte ADR contains address 32 (bit no. 5 = 1).

Broadcast messages receive no slave response, and the master does not expect any response messages.

The net data are processed as follows:

- Setpoints in the PCD area are not accepted.
- Commands in the PCV area are not processed.
- The control word in PCD1 is linked with its mask in PVA1 so that only those bits in the drive control word are refreshed that are set to '1' in the mask. The bits masked '0' are not refreshed and retain the original status.

The broadcast mode is possible only if PCV number > 3 and PCD number > 1. The command code must be set to 0 ('No command').

The control word is accepted unmasked if PCV number = 0 is set.

### B.1.6 Structure of the PCV area

The structure of the PCV area is always the same in terms of the sequence of its elements and differs in its standard structure only in the number of its parameter values (PVA).

The parameter Number of PCV elements (USS) (P 133) allows the PCV area to be set with a fixed length (3 or 4 words).

Set a PCV number = 0 if no PCV area is required in the net data block, so that no parameterisation is possible via this interface.

### B.1.6.1 PCV area at fixed message length

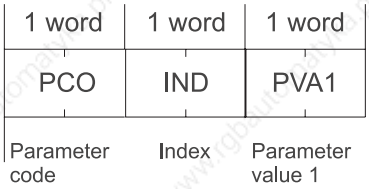



Illustration 80: Standard structure for parameter values as word size (PCV number = 3)

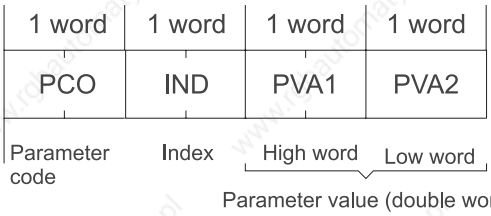



Illustration 81: Standard structure for parameter values as double word size (PCV number = 4)

This applies for both the command as well as for the response message.

### B.1.6.2 Description of the individual PCV elements

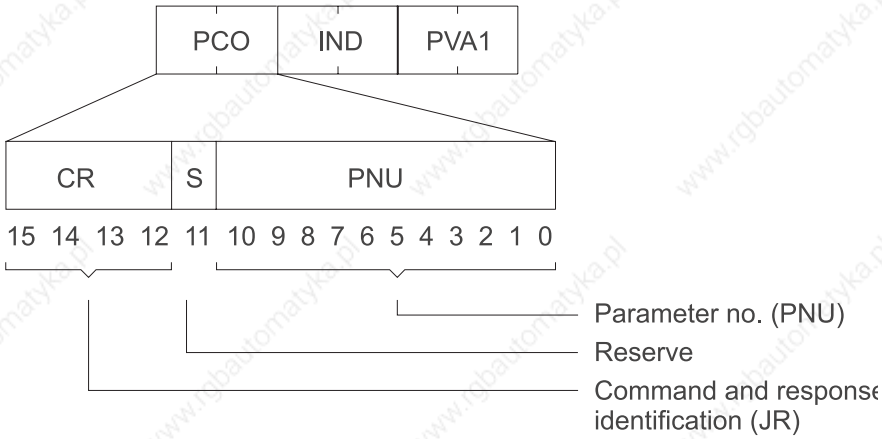



Illustration 82: Parameter code (PCO)

### B.1.6.3 Command and response code

All commands passed from the master to the slave are encrypted in the command code. The slave processes the command and words the associated response which is then encrypted (CR) and passed on to the master. The CR is defined in such a way that a command or a response is clearly defined by the PCO (CR+PNU), and, in addition to that, for certain commands/ responses also by the index word IND.

Command code (master ⇒ slave)

| Bit no. | | | | Function | Description |
|---|---|---|---|---|---|
| 15 | 14 | 13 | 12 | | |
| 0 | 0 | 0 | 0 | No command | No command for the PCV interface |
| 0 | 0 | 0 | 1 | Request PVA | Requesting a PVA |
| 0 | 0 | 1 | 0 | Change PVA (word) | Writing a PVA word (16 bit) |
| 0 | 0 | 1 | 1 | Change PVA (double word) | Writing a PVA double word (32 bit) |
| 0 | 1 | 0 | 0 | Request PDE element | Reading an element from the parameter description (PDE) IND specifies the element to be read. |

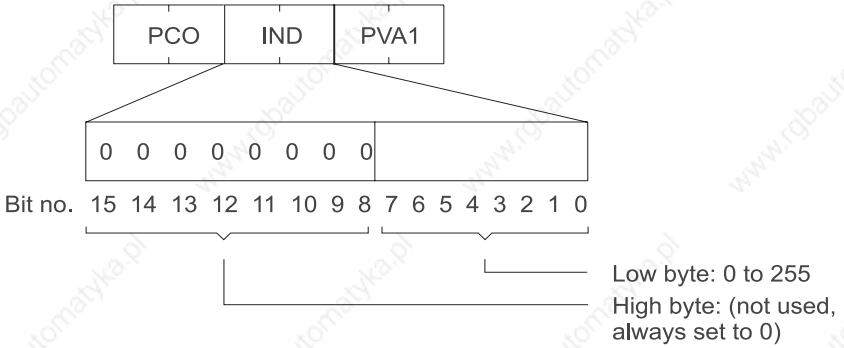
Response code (slave ⇒ master)

| Bit no. | | | | Function | Description |
|---|---|---|---|---|---|
| 15 | 14 | 13 | 12 | | |
| 0 | 0 | 0 | 0 | No response | No response |
| 0 | 0 | 0 | 1 | Transmit PVA (word) | Transmitting a PVA word (16 bit) |
| 0 | 0 | 1 | 0 | Transmit PVA (double word) | Transmitting a PVA double word (32 bit) |
| 0 | 0 | 1 | 1 | Transmit PDE element | Transmitting an element from the parameter description (PDE) IND specifies the element to be transmitted. |
| 0 | 1 | 1 | 1 | Cannot execute command | Error code in PVA, see also error list |

Relationship between transmitted command and associated response

| Command code | | | | | Response code | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Code | | | | Function | Code | | | | Function |
| 15 | 14 | 13 | 12 | | 15 | 14 | 13 | 12 | |
| 0 | 0 | 0 | 0 | No command | 0 | 0 | 0 | 0 | No response |
| 0 | 0 | 0 | 1 | Request PVA | 0<br>0 | 0<br>0 | 0<br>1 | 1<br>0 | Transmit PVA (word)<br>Transmit PVA (double word) |
| 0 | 0 | 1 | 0 | Change PVA (word) | 0 | 0 | 0 | 1 | Transmit PVA (word) |
| 0 | 0 | 1 | 1 | Change PVA (double word) | 0 | 0 | 1 | 0 | Transmit PVA (double word) |
| 0 | 1 | 0 | 0 | Request PDE element | 0 | 0 | 1 | 1 | Transmit PDE element |

### B.1.6.4 Significance of the IND field (index)




The index is used for writing and reading the parameter description.

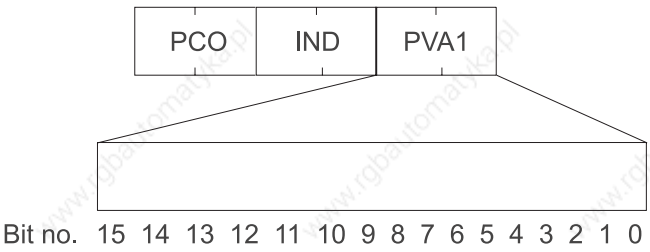
In all other cases, the index is carried as 'zero word' in the message, i. e., all bits are set to 0.

The above significance of the IND field (index) is valid only in combination with the Request PDE (parameter description element) command codes. In this command, the value in IND must be used to further define which element is to be read from the parameter description.

PBE elements

| Value | Description |
|---|---|
| 1 | Parameter attribute |
| 2 | Parameter info |
| 5 | Parameter minimum value |
| 6 | Parameter maximum value |

### B.1.6.5 Parameter value PVA




PVA contents is dependent on the command passed on, and/or the associated response, respectively.
PCV length for word sizes always 3 words (PCO, IND and PVA)
PCV length for double word sizes always 4 words (PCO, IND and PVA1 and PVA2))

### B.1.6.6 Error code list

The slave acknowledges any commands that cannot be executed with the response code 'Cannot execute command' and transfers the associated error code in the parameter value (PVA).

| Code | Description |
|---|---|
| 0 | Impermissible PNU |
| 1 | Parameter cannot be changed |
| 2 | MIN/ MAX limit |
| 3 | Faulty IND |
| 4 | No array |
| 5 | Wrong data type |
| 6 | Setting not permitted |
| 7 | Description element cannot be changed |
| : | : |
| 100 | Reserved |
| 101 | Unspecified error |
| 102 | Service not implemented |
| 103 | Parameter format too big for PCV area |
| 104 | PDE element does not exist |

### B.1.6.7 Command/response processing

Command/response processing describes the chronological and functional data transmission sequence for the PCV interface between master and slaves.

- The master must only ever pass one command to a slave and must wait for the associated response code. The master must repeat its command while it is waiting for the response code.
- The command/response must be transmitted complete within one message.
- Any change to the command means a new command which must be acknowledged with the associated response! The command code 'No command' is answered with the response code 'No command'!
- The command 'No response' must be emitted if no information is required from the PCV interface during cyclic operation.
- If the periods between cyclic message sequence and response transmission in the system are large, the slave continues transmitting the response for the 'old command' during the transition phase between 'old' and 'new' commands until the 'new command' is detected and the associated response prepared.
- For responses including parameter values, the slave always responds with the current value when repeating the response messages.
- Upon initial communication between master and slave, the slave can only respond with the code 'No response' during the transition phase in which a response is prepared in the system.
- The master must react accordingly if it does not receive a response code pertaining to the command from the contacted slave.
- The slave does not expect acknowledgement from the master as to whether the response was received.
- Identifying the response to a command in the master:
  The master identifies the correct response in the response message by logically checking response code, parameter number, index and value.

- Identifying a new command in the slave:
  Each command the master passes on after receiving a valid response to the old command is identified as a new one.
- If the master transmits a broadcast message, the slaves must not send a response message to the master in reply to this broadcast message.

### B.1.6.8 Reading parameter attribute feedback

When reading the parameter attribute via the command Request PDE, the controller feeds back the attribute information in the element PVA2 in a special code. The individual bits are described in the table below.

| Bit | Description | Definition | Comments |
|---|---|---|---|
| 0 - 1 | Data length of an element in bytes | 00 1 Byte<br>01 2 Byte<br>10 4 Byte<br>11 8 Byte | |
| 2 -3 | Data type of an element | 00 SIGNED<br>01 UNSIGNED<br>10 FLOAT | Integer with sign<br>Integer without sign<br>Floating-point number |
| 4 - 5 | Number of elements | 00 FIXED<br>01 VARIABLE | One element<br>variable number of elements |
| 6 - 7 | Element type | 00 DATA<br>01 COMMAND | |
| 8 - 11 | Display format | 0000 BIN<br>0001 DEC<br>0010 HEX<br>0100 NORM<br>0101 FIX<br>0110 SCI<br>0111 ENG<br>1000 ASCII | Binary<br>decimal<br>Hexadecimal<br>Floating point without exponent<br>Floating point with fixed exponent<br>Floating point, scientific<br>Floating point, technical<br>ASCII character |
| 12 - 15 | Positions after comma | 0000 0<br><br>1111 15 | No positions after comma<br><br>15 positions after comma |

### B.1.6.9 Reading parameter info feedback

When reading the parameter information via the command Request PDE, the controller feeds back further information on the parameter in the element PVA. Since this information is available in 32-bit format, it can be read only if the PCV area is set for double word transmissions (PCV number = 4). This information, too, is bit-coded. For a description see table below.

| Bit | Description | Definition | Comments |
|---|---|---|---|
| 0 – 2 | Write protection | 000 UNPROTECTED<br>011 PROTECTED | Not protected<br>Write-protected |
| 3 – 4 | Save mode | 00 NONSTORE<br>01 STORE DR<br>10 STORE ZD | Parameter value is not stored.<br>Parameter value is stored in data record.<br>Parameter value is stored in primary data. |
| 5 – 11 | Not assigned | | |
| 12 – 15 | Decimal weighting factor | 0 ≙ $10^0$<br>1 ≙ $10^1$<br>2 ≙ $10^2$<br>3 ≙ $10^3$<br>4 ≙ $10^4$ | For the conversion from internal scaling to output values |
| 16 – 32 | Assessment factor | 16Bit UNSIGNED | For the conversion from internal scaling to output values |

Conversion from internal representation to output values is performed automatically by the converter for PCV communication if so set in parameter P 131, USS mode.

- These scaling functions are:
  - For write accesses:

$$\text{internal value} = \text{external value} \frac{\text{Assessment factor}}{10^{\text{Weighting}}}$$

  - For read accesses:

$$\text{external value} = \text{internal value} \bullet \frac{10^{\text{Weigthting}}}{\text{Assessment factor}}$$

### B.1.7 Structure of the PCD area

The structure of the PCD area is always the same in terms of the sequence of its elements (= words) and differs in its standard structure only in the number of transmitted setpoints/actual values.

It comprises max. 3 words and min. 0 words, i. e., there is no PCD area in the net data block.

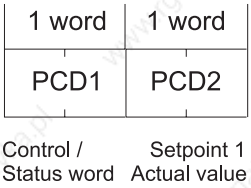



Illustration 83: Standard structure at 1 setpoint/actual value (PCD number = 2):

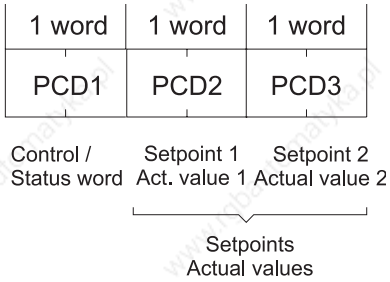



Illustration 84: Standard structure at 2 setpoints/actual values (PCD number = 3):

#### B.1.7.1 Description of the individual PCD elements

Control word and status word

The significance of the bits in control word and status word is described in the converter control under parameters Control word (P 101) and Status word (P 100).

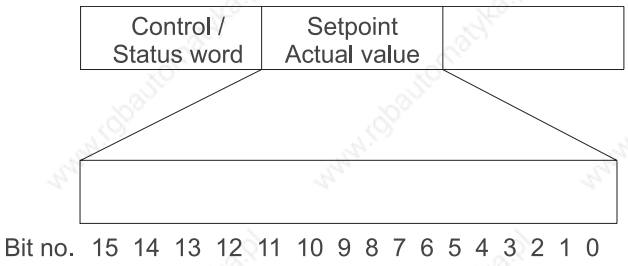



Illustration 85: Setpoints/actual values

Transmission of internally scaled setpoints and actual values, see also ▹ALink◃ from page 85.

## B.2 Bus system commissioning (fixed message length)

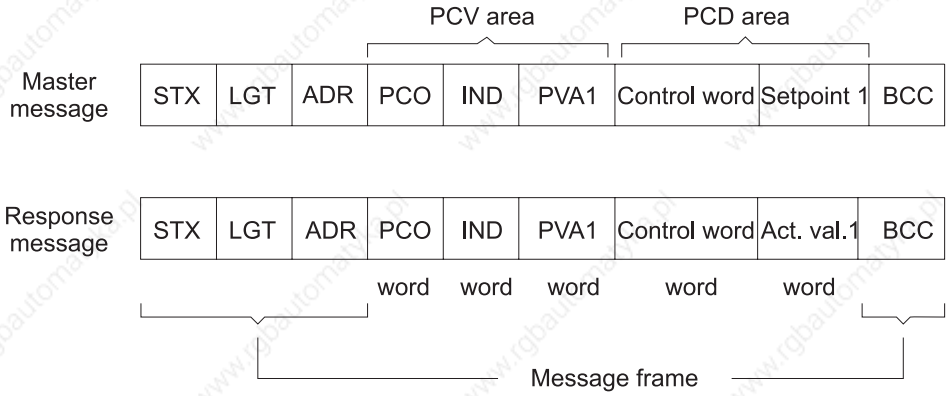
The following applies for commissioning communication with USS protocol interface at fixed message length:

- The following applies for communication between master and slave:
  Command and response messages have the same length, i. e., same length in terms of PCV and PCD areas.
- This length must be fixed-set prior to initial bus system commissioning and must not be modified during operation.
- A fixed message length means a fixed net data block size.
- The net data block size is set via two parameters, Number of PCV elements (USS)(P 133), and Number of PCD elements (USS) (P 134).
- If the master passes on a command that would entail a response exceeding the set PCV area size, this command is acknowledged with the response code 'Cannot execute command'. The command 'Request PVA double word' cannot be executed at PVA number = 3, for example.
- The commands the master is expected to pass on must be defined before setting the net data block size. Then this must be taken as the basis to define the PCV area size. In other words, if double word processing is envisaged, the PCV area must be set to 4 words as a rule prior to initial commissioning, even if word processing prevails.

**Sample messages:**

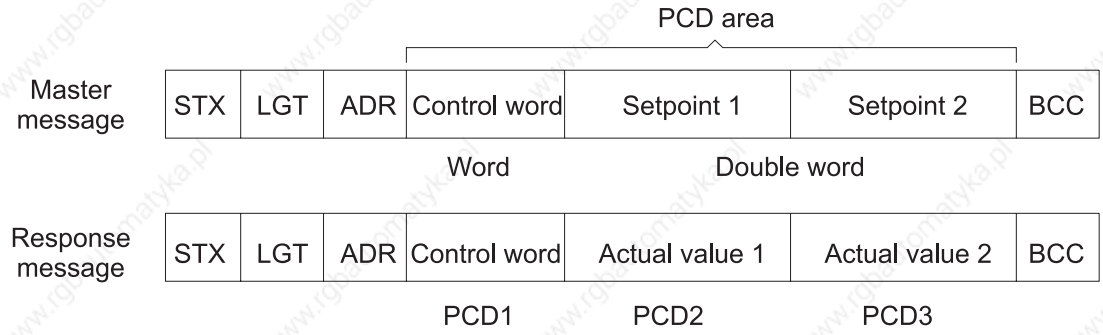
**Example 1**: PCV number = 3, PCD number = 2

Allows parameterisation of word parameters and transmission of 1 setpoint and actual value.



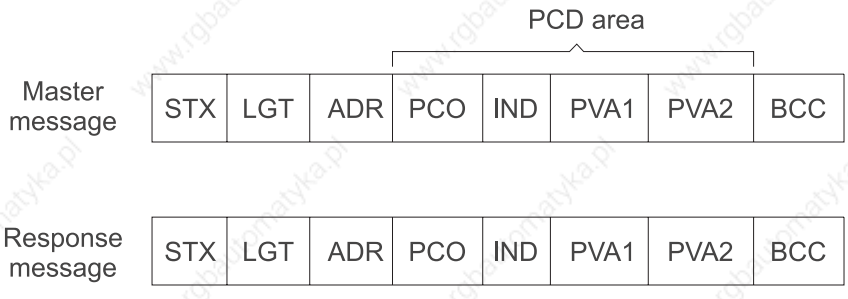

**Example 2**: PCV number = 0, PCD number = 3

Allows transmission of 1 and 2 setpoints and actual values. Does not allow parameterisation via PCV area.




**Example 3**: PCV number = 4, PCD number = 0

Allows parameterisation of word and double word parameters. Does not allow setpoint specification and drive control.



C

# APPENDIX C - DECLARATION OF CONFORMITY/ MANUFACTURER UL-CERTIFICATION

## C.1 Declaration of conformity

# EG-Konformitätserklärung

**Declaration of conformity**

gemäß EG-Richtlinie 72/23/EG (Niederspannung) vom 19.02.1973
geändert durch: 93/68/EWG vom 22.07.1993

in accordance with EC directive 72/23/EG (low voltage) dated 19.02.1973
changed by: 93/68/EWG dated 22.07.1993

**Stromrichtergerät / Converter**
**BKD 6/ ...7000 BKF 12/ .... 7000 (BKxXX / XXXX / XXX-XXX / X XX XX XX 0X)**

Das obige Gerät wurde entwickelt und konstruiert sowie anschließend gefertigt in Übereinstimmung mit o.g. EG-Richtlinie und u.g. Normen in alleiniger Verantwortung von:
the unit specified above was developed and constructed as well as manufactured in accordance with the above mentioned directive and the standards mentioned below under liability of:

**Baumüller Nürnberg GmbH, Ostendstr. 80 - 90, D-90482 Nürnberg**

Berücksichtigte Normen - standards complied with:

| Norm / standard | |
|---|---|
| EN 50178 | Ausrüstung von Starkstromanlagen mit elektrischen Betriebsmitteln<br>Electronic equipment for use in power installations |
| EN 60204-1 | Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen<br>Safety of machinery - Electrical equipment of machines |
| EN 60529 | Schutzarten durch Gehäuse (IP Code)<br>Degrees of protection provided by enclosures (IP Code) |
| HD 625.1 51 | Isolationskoordination für elektrische Betriebsmittel in Niederspannungsanlagen<br>Insulation coordination for equipment within low-voltage systems |

Nürnberg,12.04.2005

Andreas Baumüller
Geschäftsführer
Head Division

ppa. Dr. Peter Heidrich
Entwicklungsleiter
Head of development

## C.2 Declaration of manufacturer

# EG-Herstellererklärung

**Declaration of manufacturer**

gemäß EG-Richtlinie 98/37/EG (Maschinen) vom 22.06.1998
geändert durch: 98/79/EG vom 27.10.1998

in accordance with EC directive 98/37/EG (machinery) dated 22.06.1998
changed by: 98/79/EC dated 27.10.1998

**Stromrichtergerät / Converter**
**BKD 6/ ...7000 BKF 12/ .... 7000 (BKxXX / XXXX / XXX-XXX / X XX XX XX 0X)**

Das obige Gerät wurde entwickelt und konstruiert sowie anschließend gefertigt in Übereinstimmung mit o.g. EG-Richtlinie und u.g. Normen in alleiniger Verantwortung von:
The unit specified above was developed and constructed as well as manufactured in accordance with the above mentioned directive and the standards mentioned below under liability of:

**Baumüller Nürnberg GmbH, Ostendstr. 80 - 90, D-90482 Nürnberg**

Berücksichtigte Normen - standards complied with:

| Norm / standard | |
|---|---|
| EN 60204-1 | Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen<br>Safety of machinery - Electrical equipment of machines |

In seiner Funktion als Sicherheitsbauteil garantieren wir folgende Sicherheitsfunktion des Gerätes - in its function as safety part we guaranty the following safety function of the unit:

**Momentenfreischaltung des Antriebs - momentum disconnection of the drive**

Die Inbetriebnahme der Maschine, in die dieses Gerät eingebaut wird, ist untersagt bis die Konformität der Maschine mit der obengenannte Richtlinie erklärt ist.
The machinery into which this unit is to be incorporated must not be put into service until the machinery has been declared in conformity with the provisions of the directive mentioned above.

Nürnberg, 12.04.2005

14/4/05

Andreas Baumüller
Geschäftsführer
Head Division

ppa. Heidrich 12.4.2005

ppa. Dr. Peter Heidrich
Entwicklungsleiter
Head of development

## C.3 UL-certification

UL is a mark of conformity, which is assigned from **U**nderwriters **L**aboratories Inc. (www.ul.com), an American company. The UL-certification is not statutory regulated, but takes place voluntarily.
In order to be allowed to mark equipments and components with the UL-mark of confomity, tests must have to be done, which are attended and documentated by an UL-inspector. Only if all necessary tests have been passed and regular product monitoring at the production process of the equipment or the components has been passed without objections, the UL-mark of conformity may be attached to the equipment under test.
Line filters of the company Baumüller Nürnberg GmbH are checked in accordance of the UL-standard UL 508C (UL-Standard for Safety for Power Conversion Equipment) and are recorded under the category control number NMMS. The product- and test description is recorded under file-no. E179860.

Only if all necessary tests have been completely carried out the Ⓤ-mark may be attached to the equipments or components. If single tests have not already taken place at the manufacturer´s, but are carried out not until at the user´s, then only the -mark may be attached.
With products of the Baumüller Nürnberg GmbH all tests are already completed at the UL-certification process, so that they may be marked with the Ⓤ-mark.

In case with the UL-certification process also standards of the CSA(**C**anadian **S**tandard **A**ssociation) are considered, then instead of the Ⓤ- or -mark the c Ⓤ or c us -mark may be attached to the product.
With products of the company Baumüller GmbH the CSA-standard Norm C 22.2 was considered, that´s why they are marked with the c Ⓤ-mark.

If products of Baumüller Nürnberg GmbH are mounted into an UL-certified installation, then certain application-, mounting- and installation notices must be considered, which are upon the functioning of the device. We have marked these notes in the manual with „UL 508C ...“. Only if you follow these notes and apply to them you may go by it, that the installation has been mounted UL-conform.

**An UL-certification was only made for the units size I and $II_x$ including the 650 A units**

# APPENDIX D - TECHNICAL DATA

## D.1 Armature converter

| | |
|---|---|
| Frequency (mains) | 45 ... 65 Hz |
| Rated direct voltage (acc. to DIN 40030)<br>BKF (4Q)<br>BKD (1Q) | Connection voltage 400 V~ [1]<br>420 V<br>470 V |
| Rated direct voltage (acc. to DIN 40030)<br>BKF (4Q)<br>BKD (1Q) | Connection voltage 500 V~ [1]<br>520 V<br>600 V |
| Rated currents $I_A$ size I | 30 A, 50 A, 80 A, 100 A, 140 A, 200 A |
| Rated currents $I_A$ size IIa | 240 A (only BKF), 340 A |
| Rated currents $I_A$ size IIb | 450 A, 550 A, 650 A, 700 A |
| Rated currents $I_A$ size IIc | BKD (1Q): 800 A, 950 A |
| Rated currents $I_A$ size III [2] | BKD (1Q): 750 A, 920 A, 1100A<br>BKF (4Q): 850A |
| Rated currents $I_A$ size IV [2] | BKD (1Q): 1550 A, 1750 A, 2050 A<br>BKF (4Q): 1250 A, 1400 A, 1650 A |
| Dynamic overload | 1.2 x $I_A$ for 20 ms using devices size I and size II |
| Setting range | 0,5 .. 1,0 x $I_A$ |
| Power supply unit connection voltage | 340V~ ... 550V~ |
| Operating temperature range<br>Sizes I, IIa, IIb<br><br>Sizes III, IV | <br>For internal ventilation: up to 100 A converter 0...45 °C<br>For external ventilation: up to 140 A converter 0...40 °C<br>0...35 °C |
| At temperatures up to 55 °C | Rated direct current reduction of 1 % per °C |
| At H > 1000 m ams | Rated direct current reduction of 10 % per 1000 m |
| Storage and transport temperature | -30...+70 °C |
| Humidity rating acc. to DIN 40440 | Sizes I, IIa, IIb : F  Sizes III, IV : E |
| | IP 00 |

1) The specified rated direct voltage can no longer be reached if these rated connection voltages are fallen short of by more than 10%.

2) Operating temperature range: 0 ... 35°C

Max. reachable output voltage of the converter (rectifier mode) in dependence on the mains voltage and the rectifier firing angle $\alpha_G$ (without paying regard to the commutation and pre-connected inpedance):

$$U_{di\alpha_G} = \frac{3 \cdot \sqrt{2}}{\pi} \cdot U_{mains} \cdot \cos(\alpha_G)$$

with $\alpha_G$ = set value of parameter P 360

## D.2 Field current converter

| | 340 V~... 550 V~ |
|---|---|
| Frequency (mains) | 45 ... 65 Hz |
| Rated direct voltage (acc. to DIN 40030) | Connection voltage 400 V~ 1)<br>310 V |
| Rated direct voltage (acc. to DIN 40030) | Connection voltage 500 V~ 1)<br>390 V ~ |
| Rated direct current field $I_E$ (dependent on the rated current $I_A$ of the respective converter) | $I_A \leq 100$ A : 1,5 A - 3 A - 6 A -12 A<br>$I_A > 100$ A : 1,5 A - 3 A - 6 A - 12 A - 24 A |
| | 0,2 .. 1,0 x $I_A$ |

1) The specified rated direct voltage can no longer be reached if these rated connection voltages are fallen short of by more than 10%.

Max. reachable output voltage of the field current converter (rectifier mode) in dependence on the mains voltage and the rectifier firing angle $\alpha_G$ (without paying regard to the commutation and pre-connected inpedance):

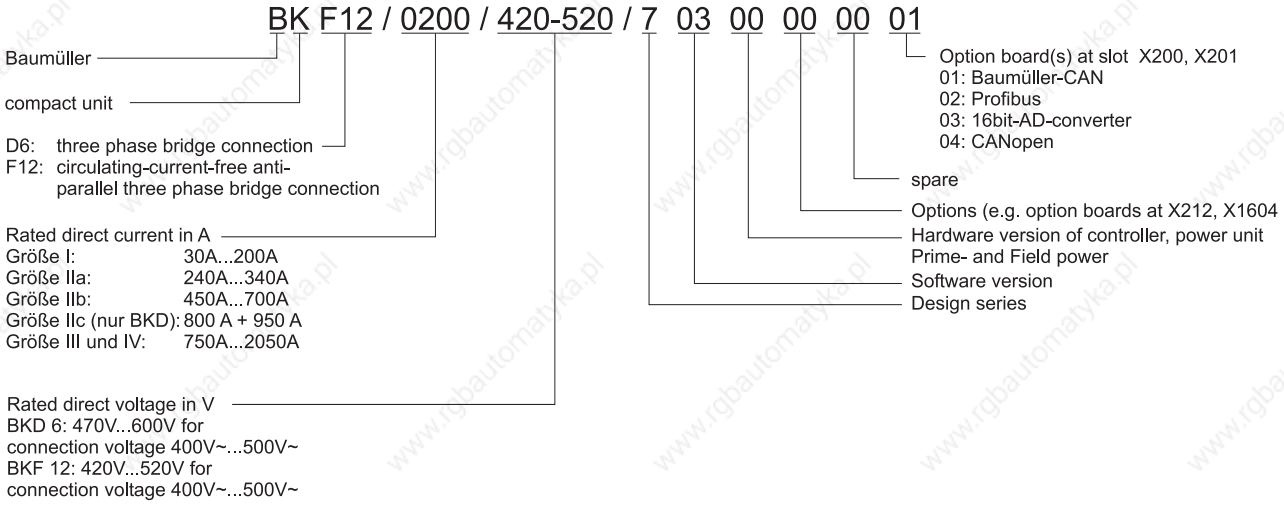
$$U_{di\alpha_G} = \frac{2 \cdot \sqrt{2}}{\pi} \cdot U_{mains} \cdot \frac{1 + \cos(\alpha_G)}{2}$$

with $\alpha_G$ = set value of parameter P381

## D.3 Converter ventilators

| Converter | Number | Voltage | Frequency | Power | Current/ ventilator |
|---|---|---|---|---|---|
| 140 A | 2 | 230 V / 1~ | 50 Hz<br>60 Hz | 19 W<br>18 W | 0,12 A<br>0,11 A |
| 200 A | 2 | 230 V / 1~ | 50 Hz<br>60 Hz | 19 W<br>18 W | 0,12 A<br>0,11 A |
| 240 A | 1 | 230 V / 1~ | 50 Hz<br>60 Hz | 40 W<br>42 W | 0,25 A<br>0,26 A |
| 340 A | 1 | 230 V / 1~ | 50 Hz<br>60 Hz | 40 W<br>42 W | 0,25 A<br>0,26 A |
| 450 A | 1 | 230 V / 1~ | 50 Hz<br>60 Hz | 190 W<br>200 W | 0,84 A<br>0,88 A |
| 550 A | 1 | 230 V / 1~ | 50 Hz<br>60 Hz | 190 W<br>200 W | 0,84 A<br>0,88 A |
| 650 A | 1 | 230 V / 1~ | 50 Hz<br>60 Hz | 190 W<br>200 W | 0,84 A<br>0,88 A |
| 700 A | 1 | 230 V / 1~ | 50 Hz<br>60 Hz | 190 W<br>200 W | 0,84 A<br>0,88 A |
| 750 A | 1 | 230 V / 1~ | 50 Hz<br>60 Hz | 140 W | 0,62 A |
| 800 A | 1 | 230 V / 1~ | 50 Hz<br>60 Hz | 190 W<br>200 W | 0,84 A<br>0,88 A |
| 850 A | 1 | 230 V / 1~ | 50 Hz<br>60 Hz | 140 W | 0,62 A |
| 920 A | 1 | 230 V / 1~ | 50 Hz<br>60 Hz | 140 W | 0,62 A |
| 950 A | 1 | 230 V / 1~ | 50 Hz<br>60 Hz | 190 W<br>200 W | 0,84 A<br>0,88 A |
| 1100 A | 1 | 230 V / 1~ | 50 Hz<br>60 Hz | 140 W | 0,62 A |
| 1250 A | 1 | 400 V / 3~ | 50 Hz<br>60 Hz | 550 W<br>790 W | 1,20 A<br>1,45 A |
| 1400 A | 1 | 400 V / 3~ | 50 Hz<br>60 Hz | 550 W<br>790 W | 1,20 A<br>1,45 A |
| 1550 A | 1 | 400 V / 3~ | 50 Hz<br>60 Hz | 550 W<br>790 W | 1,20 A<br>1,45 A |
| 1650 A | 1 | 400 V / 3~ | 50 Hz<br>60 Hz | 550 W<br>790 W | 1,20 A<br>1,45 A |
| 1750 A | 1 | 400 V / 3~ | 50 Hz<br>60 Hz | 550 W<br>790 W | 1,20 A<br>1,45 A |
| 2050 A | 1 | 400 V / 3~ | 50 Hz<br>60 Hz | 550 W<br>790 W | 1,20 A<br>1,45 A |

## D.4 Type code


BK F12 / 0200 / 420-520 / 7 03 00 00 00 01
Baumüller
compact unit
D6: three phase bridge connection
F12: circulating-current-free anti-parallel three phase bridge connection
Rated direct current in A
Größe I: 30A...200A
Größe IIa: 240A...340A
Größe IIb: 450A...700A
Größe IIc (nur BKD): 800 A + 950 A
Größe III und IV: 750A...2050A
Rated direct voltage in V
BKD 6: 470V...600V for connection voltage 400V~...500V~
BKF 12: 420V...520V for connection voltage 400V~...500V~
Option board(s) at slot X200, X201
01: Baumüller-CAN
02: Profibus
03: 16bit-AD-converter
04: CANopen
spare
Options (e.g. option boards at X212, X1604
Hardware version of controller, power unit Prime- and Field power
Software version
Design series

# APPENDIX E - OPTION BOARD MOTOR TEMPERATURE MONITORING

An option board (3.0043) is available for motor temperature monitoring. Two indepentent measurement channels are implemented. The temperature sensor type KTY84 (PTC) must be used. Don't confuse the poles when connection the temperature sensor. The electrical connection to the controller board 3.9711D is done via a 20-pin cable. It connects the plug X212 of board 3.9711D and the plug X212 of board 3.0043.

## E.1 Assumption

**ATTENTION**

This option board can only be used from controller board 3.9711D.

The setting parameter necessary for the temperature monitoring are available from software version 3.10.

Both plug-in jumpers W700 and W701 must be in position A-B.

## E.2 Connecting the measurement sensors (LP 3.0043)

Measurement channel 1:

X8:1 Anode connection of temperature sensor (connection TM+ in motor connection box)

X8:2 Cathode connection of temperature sensor (connection TM- in motor connection box)

X8:3 Free ground connection (electronic ground)

Measurement channel 2:

X8:4 Anode connection of temperature sensor (connection TM+ in motor connection box))

X8:5 Cathode connection of temperature sensor (connection TM- in motor connection box)

X8:6 Free ground connection (electronic ground)

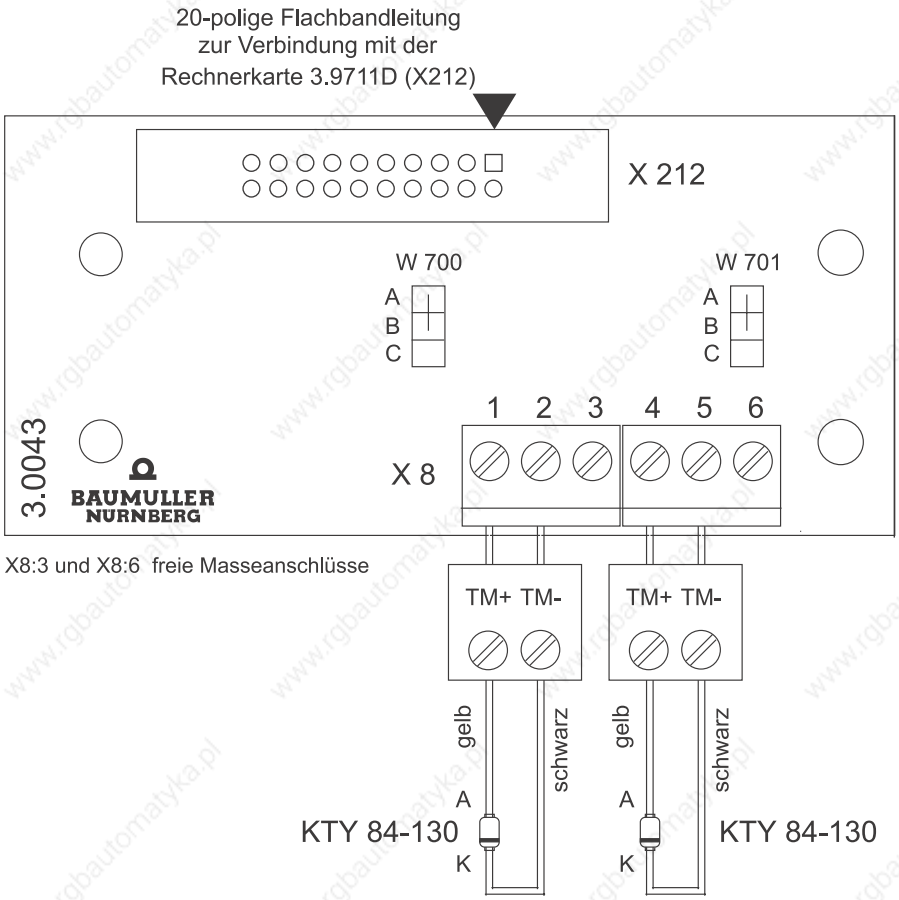



Illustration 86: Option board 3.0043 motor temperature monitoring

## E.3 Temperature sensor

Use sensors type KTY 84-130 for temperature monitoring.

Note the direction of installation.

The cathode ring of measurement channel 1 must be connected with terminal X8:2!

The anode ring of measurement channel 2 must be connected with terminal X8:5!

**CAUTION**

When confusing the poles of the temperature sensor, the resistance of the sensor is decreased when the temperature is higher than 100 °C with further increasing temperature. The temperature monitoring of the motor is in this case above 100 °C inefficient.

If the connection between board 3.9711 and board 3.0043 is missing, an error message is generated in software version 3.14 and higher, when the temperature monitoring is activated (P 541 = 1 and / or P 544 = 1).

### E.3.1 Connection of the option board

**Connection of the option board for motor temperature monitoring**

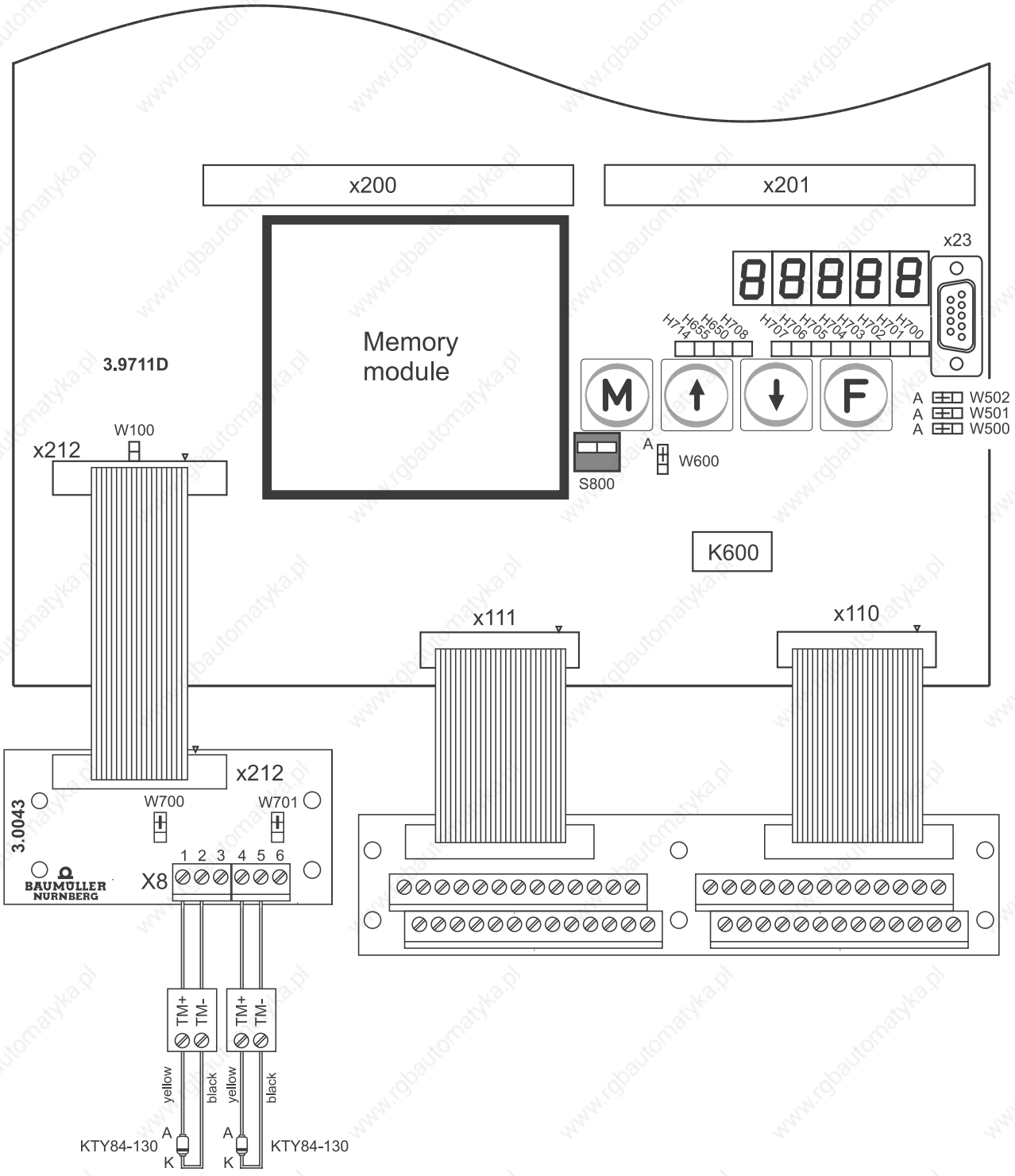



Illustration 87: Connection option board 3.0043

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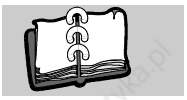

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**be in motion**

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