SIEMENS

SIMATIC S7

Supplement to

C79000-Z7076-C623-02

Manual Package C7-623/624 (MLFB 6ES7 623-1AE00-8BA0) and Manual Package C7-626/626 DP (MLFB 6ES7 626-1AG00-8BA0)

| Control Systems | C7-623 C7-623/A C7-624 C7-626 C7-626/A C7-626 DP | (MLFB 6ES7 623-1AE01-0AE3) (MLFB 6ES7 623-1CE01-0AE3) (MLFB 6ES7 624-1AE01-0AE3) (MLFB 6ES7 626-1AG01-0AE3) (MLFB 6ES7 626-1CG01-0AE3) (MLFB 6ES7 626-2AG01-0AE3) |
|-----------------|---|--|
| | C/-020 DP | (MILFB 0ES/ 020-2AGUI-UAES) |

The control systems listed above have new functions and technical properties which are described in this supplement.

- 1. Section 1 of the supplement lists the technical properties and data for the special I/Os with which the C7-623/A and C7-626/A control systems are equipped.
- 2. Section 18 of the supplement is an extract from the manual *System Software for S7-300/400 System and Standard Functions* (hence the unusual number) and contains a description of the new communication functions for non-configured connections.
- 3. The execution times are listed in Appendix B of this supplement (an extract from the manual *S7-300 Programmable Controller, Hardware and Installation*). The execution times for the CPU 314 apply to the C7-623/624, and the execution times for the CPU 315/-2 DP apply to the C7-626/626 DP.

This supplement contains **additional information** about the products. If uncertainties arise, this information should be considered more up-to-date than the information in the manuals and catalogs.

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Disclaimer of Liability

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

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1 I/Os of the C7-623/A and C7-626/A Control Systems

1.1 Properties of the I/Os of the C7-623/A and C7-626/A Control Systems

Overview Chapters 1 to 4 of this addendum describe the differences between the two control systems C7-623/A and C7-626/A and the control systems C7-623 and C7-626. With the exception of the properties of the I/Os, the properties of the control systems described in the manuals of the C7-623 and C7-626 are as described in the manuals.

The following table contains an overview of the I/Os of the control systems.

| | C7-623, C7-624, C7-626, C7-626 DP | C7-623/A, C7-626/A |
|------------------|--|--|
| Digital I/Os | 16 digital inputs, 16 digital outputs | 16 digital inputs, 16 digital outputs |
| Analog I/Os | 4 analog inputs, 1 analog output | 4 analog inputs, 4 analog outputs |
| Universal inputs | 4 digital universal inputs | None |

1.1.1 Digital I/Os of the C7-623/A and C7-626/A

Pinout of the Digital Inputs and Digital Outputs

The pinout of the digital inputs and digital outputs is identical to the pinout of the C7-623 and C7-626 control systems. The digital universal inputs have been removed. The pins that were used on the C7-623 and C7-626 for the digital universal inputs are now used for additional analog outputs.

Technical Data of the Digital Inputs

The following table lists the technical data of the digital inputs.

| Data Specific to Digital Inpu | its | Data for Selecting a Sensor | | |
|------------------------------------|---------|---------------------------------|--------------------------------------|--|
| Number of inputs 16 | | Input voltage | | |
| Cable length | | • Rated value | 24 V DC | |
| • Unshielded | 600 m | • For Signal "1" | from 15 to 30 V | |
| • Shielded | 1000 m | • For Signal "0" | from -3 to 5 V | |
| Voltages, Currents, Potentia | ls | Input current | | |
| Rated load voltage L + | 24 V DC | • For signal "1" | max. 11.5 mA | |
| Number of simultaneously | 16 | Input delay time | | |
| controllable inputs | | • Selectable | no | |
| Isolation yes (optocoupler) | | • From "0" to "1" | typ./max. 3/4.8 ms | |
| • In groups of 16 | | • From "1" to "0" | typ./max. 3/4.8 ms | |
| Dielectric strength 500 V DC | | Input characteristic | According to | |
| Status, Interrupts, Diagnostics | | | DIN EN 61131–2 (IEC 1131, Part 2) | |
| Interrupts no | | Type of input according to | Type 2 | |
| Diagnostic functions no | | IEC 1131 | | |
| | | Connection to 2-wire BEROs | possible | |
| | | • Permitted zero-signal current | $\leq 2 \text{ mA}$ | |

Technical Data of
the Digital OutputsThe following table lists the technical data of the digital outputs.

| Data Specific to Digital Outputs | | Data for Selecting an Actuator | |
|---|-------------------|--|-------------------------------|
| Number outputs 16 | | Output voltage | |
| | | • For signal "1" | L + (-0.8 V) |
| Cable length | | Output voltage | |
| Unshielded | 600 m | • For signal "1" | |
| Shielded | 1000 m | Rated value | 0.5 A |
| Voltages, Currents, Potentials | 5 | Permitted range | 5 mA0.5 A |
| Rated load voltage L + | 24 V DC | • For signal "0" (residual current) | max. 0.5 mA |
| Permitted range | 20.4 - 28.8 V | Lamp load | max. 5 W |
| Total current of the outputs (per group) | | Parallel connection of 2 outputs | |
| • up to 20 °C | 4 A | • For logic operation | Possible (only outputs |
| • up to 50 °C 2 A | | | in the same group) |
| Isolation | yes (optocoupler) | | |
| • In groups of | 8 | • For increased performance | Not possible |
| Dielectric strength | 500 V DC | Control of a digital input | yes |
| Status, Interrupts, Diagnostic | s | Switching frequency, max. | |
| Interrupts | no | • With resistive load/lamp load | 100 Hz |
| Diagnostic functions | no | • With inductive load | 0.5 Hz |
| | | Limit (internal) of the inductive off voltage to | 48 V |
| | | Short-circuit protection of the output | Yes, electronically switching |
| | | • Switching threshold | Approx. 1 A |

1.1.2 Analog I/Os of the C7-623/A and C7-626/A Control Systems

Pinout and Connection Diagram of the Analog Inputs The following diagram shows the pinouts and the connection diagram of the analog inputs.



Figure 1 Pinout and Connection Diagram of the Analog Inputs

Technical Data of the Analog Inputs

The following table lists the technical data of the analog inputs.

| Data Specific to Analog Inpu | ts | Data for Selecting a Sensor | | |
|---|----------------------------|---|--|--|
| Number of inputs | 4 | Input ranges (rated | | |
| Cable length, shielded | 200 m | ranges)/input resistance | | |
| Voltages, Currents, Potential | s | • Voltage | $\pm 10 \text{ V};$ /50 k Ω | |
| Isolation (analog I/Os to electronics) | yes | Current | $\pm 20 \text{ mA};$ /105.5 Ω | |
| Dielectric strength | 500 V DC | | $4 - 20 \text{ mA};$ /105.5 Ω | |
| Permitted potential difference | | Permitted input voltage for | Max. 30 V permanent, | |
| Between reference potential of the inputs | U _{CM} = DC 2,5 V | voltage input (destruction 38 V for max. 1 s limit) (pulse duty ratio 1) | | |
| Alx-M and M_{ANA} for signal = 0V | | Permitted input current for current input (destruction | 30 mA | |
| Analog Value Formation | | limit) | | |
| Measurement principle | Instantaneous value | Connection of signal sensors | | |
| • Cycle time (all channels) | 2 ms | • For voltage measurement | Possible | |
| Cycle time (per channel) | 0.5 ms | • For current measurement | | |
| Resolution in bits incl. S 12 (incl. overflow range) | | as 4-wire transducer as 2-wire transducer | Not directly possible | |
| Measurement ranges: | Measurement range | Status, Interrupts, Diagnostics | | |
| selected by connection to different pins | | Interrupts | | |
| Voltage $\pm 10V$ | | Hardware interrupt | | |
| Current | \pm 20mA, 4 to 20mA | as cyclic interrupt yes, selectable as cycle end interrupt yes, selectable | | |
| Noise Suppression, Error Lin | nits | Diagnostic interrupt yes, selectable | | |
| Noise voltage suppression | 10.15 | Diagnostic functions | ves selectable | |
| • Common mode noise $(U_{CM} < 1.0 \text{ V})$ | > 40 dB | Diagnostic information | yes | |
| Crosstalk between the inputs | > 60 dB | can be read out | | |
| Error limit (in entire | | Time intervals | yes, selectable | |
| temperature range, relative to input range) | | Wire break detection | In measuring range 4 to 20mA, selectable | |
| • Voltage ± 0.8 % | | | | |
| • Current | \pm 0.8 % | | | |
| Basic error limit (error limit at 25 °C, relative to the input range) | | | | |
| • Voltage $\pm 0.6\%$ | | | | |
| • Current | ± 0.6 % | | | |
| Reproducibility in settled state at 25 °C related to range | 0.05 % | | | |

Pinout and Connection Diagram of the Analog Outputs

The following diagram shows the pinout and the connection diagram of the analog outputs.



Figure 2 Pinout and Connection Diagram of the Analog Outputs

Technical Data of
the AnalogThe following table lists the technical data of the analog outputs.Outputs

| Data Specific to Analog Outputs | | Status, Interrupts, | |
|--|-----------------------|---|-------------------------|
| Number of outputs 4 | | Diagnostics | |
| Cable length, shielded | 200 m | Interrupts | |
| Voltages, Currents, Potential | s | Diagnostic interrupt | yes, selectable |
| Isolation | ves | Diagnostic functions | yes, selectable |
| Dielectric strength | 500 V DC | Diagnostic information can be read out | yes, group error |
| Measurement ranges: | Voltage or current | Data for Selecting an Actua | tor |
| Voltage | $\pm 10V$ | Output ranges (rated values) | ± 10 V |
| Current | \pm 20mA, 4 to 20mA | | \pm 20 mA |
| Analog Value Formation | | | From 4 to 20 mA |
| Resolution (incl. overflow | | Load resistance | |
| range) | | • For voltage outputs | min. 2 k Ω |
| • $\pm 10 \text{ V}; \times \ge 20 \text{ mA};$ | 12 bits incl. sign | • For current outputs | max. 500 Ω |
| 4 to 20 mA | | Capacitive load | max. 1 μF |
| Conversion time (all active | max. 4 ms | Inductive load | max. 1 mH |
| channels) | typ. 2 ms | Voltage output | |
| Settling time | | Short-circuit protection | Short-circuit proof yes |
| • For resistive load | 0.1 ms | Short-circuit current | approx. 25 mA |
| • For capacitive load | 3.3 ms | Current output | |
| • For inductive load | 0.5 ms | • Idle voltage | max. $\pm 15V$ |
| Replacement value | yes, selectable | Connecting actuators | |
| (one replacement value for all channels) | | • For voltage output 2-wire connection | possible |
| Noise Suppression, Limit Val | ues | • For current output 2-wire connection | possible |
| Crosstalk attenuation between outputs Error limit (in the entire | >40 dB | Destruction limits for voltages/currents applied externally | |
| temperature range, relative to the output range) | | • Voltage at the outputs against M _{ANA} | max. DC 20 V |
| • Voltage | \pm 0.8 % | Current | max. DC 40 mA |
| • Current | ± 1 % | | |
| Basic error limit (error limit at 25 °C relative to the output range) | | | |
| Voltage | \pm 0.5 % | | |
| Current | \pm 0.6 % | | |
| Output ripple (relative to the output range) | \pm 0.05 % | | |
| Reproducibility (in settled state at 25 °C relative to the output range) | ± 0.06 % | | |

1.2 Addressing the I/Os of the C7-623/A and C7-626/A Control Systems

| Addressing Digital | The following table shows the addressing of the digital I/Os. |
|--------------------|---|
| I/Os | |

| Digital I/Os | Address |
|-----------------|--------------|
| Digital inputs | I0.0 to I1.7 |
| Digital outputs | Q0.0 to Q1.7 |

Addressing the Analog I/Os

The following table the addressing of the analog I/Os.

Analog I/Os

ChannelAnalog Input AddressAnalog Output Address0PIW272PQW2721PIW274PQW2742PIW276PQW2763PIW278PQW278

1.3 Timing of the Analog I/Os of the C7-623/A and C7-626/A Control Systems

Analog Inputs

The timing of the analog inputs depends on the current parameter assignment of the analog I/Os (see Section 1.4). The duration of the measuring cycle depends on the number of activated analog input channels. Deactivated channels reduce the length of the measuring cycle.

The measuring cycle is the sum of the conversion times of the activated analog inputs.



Figure 3 Measuring Cycle when All Analog Input Channels are Activated



Figure 4 Measuring Cycle when Analog Input Channel 2 is Deactivated

Analog Outputs

The duration of the output cycle does **not** depend on the number of activated analog output channels. This is always constant and deactivated channels do not reduce the output cycle.

 $t_{output cycle} = 4 x t_{conversion time of a channel} = const.$



Figure 5 Output Cycle when All Analog Output Channels are Activated



Figure 6 Output Cycle when Analog Output Channel 2 is Deactivated

1.4 Assigning Parameters to the Analog I/Os of the C7-623/A and C7-626/A Control Systems

- ConfigurationYou configure your setup with STEP 7 V3.1.
You can extend the hardware catalog by reinstalling with an expansion
diskette. Later versions of STEP 7 already contain these device types.
- Hardware Interrupt

You can operate the inputs of the analog I/Os in three ways:

• Without hardware interrupt

A free measuring cycle of all activated channels without generating hardware interrupts.

| A/D conversion of the channels | |
|---|------------|
| | |
| Measuring cycle of all activated channels | |
| | → t |

Figure 7 Sequence of the Measurement with Four Analog Input Channels without Generating Hardware Interrupts

Hardware interrupt as a cyclic interrupt

Free measuring cycle of all activated channels with generation of a non measuring cycle-dependent hardware interrupt as a time interrupt with a selectable interrupt time.



Figure 8 Sequence of the Measurement with Four Analog Input Channels and Generation of Hardware Interrupts as Cyclic Interrupts

Hardware interrupt as cycle end interrupt

A measuring cycle with a selectable cycle time and generation of a hardware interrupt as a cycle end interrupt.





A hardware interrupt from the I/Os triggers the start of OB40 (hardware interrupt OB) on the C7 CPU. In this case, the process variable OB40_POINT_ADDR supplies the value DW#16#FFFFFFF.

Structure of the Parameter Data Records

If you want to reassign parameters during operation, you must check the validity and interdependency of the individual parameters in your program.

Incorrect value ranges for the parameters can lead to incorrect responses from the I/Os. The following table shows the structure of the parameter data records.

| DR | Byte | Bit | Default | What Can be Assigned | Meaning of the Bits |
|----|------|-------|---------|-----------------------------------|--|
| 0 | 0 | 0 | 0 | Enable diagnostics AI1 | 0=no 1=yes |
| | | 1 | 0 | Enable diagnostics AI2 | 0=no 1=yes |
| | | 2 | 0 | Enable diagnostics AI3 | 0=no 1=yes |
| | | 3 | 0 | Enable diagnostics AI4 | 0=no 1=yes |
| | | 4 | 0 | Enable diagnostics AO1 | 0=no 1=yes |
| | | 5 | 0 | Enable diagnostics AO2 | 0=no 1=yes |
| | | 6 | 0 | Enable diagnostics AO3 | 0=no 1=yes |
| | | 7 | 0 | Enable diagnostics AO4 | 0=no 1=yes |
| | 1 | 0 | 0 | Enable diagnostics wire break AI1 | 0=no, 1=yes (only for measuring range 4 to 20mA) |
| | | 1 | 0 | Enable diagnostics wire break AI2 | 0=no, 1=yes (only for measuring range 4 to 20mA) |
| | | 2 | 0 | Enable diagnostics wire break AI3 | 0=no, 1=yes (only for measuring range 4 to 20mA) |
| | | 3 | 0 | Enable diagnostics wire break AI4 | 0=no, 1=yes (only for measuring range 4 to 20mA) |
| | | 4 - 7 | 0H | reserved | |
| | 2 | | 00H | reserved | |

| DR | Byte | Bit | Default | What Can be Assigned | Meaning of the Bits |
|----|------|-----|---------|--|--|
| | 3 | | 00H | reserved | |
| 1 | 0 | 0 | 0 | Enable diagnostic interrupt for module | 0=no, 1=yes |
| | | 12 | 00 | Enable hardware interrupt | 00= no 01= as cyclic interrupt (only when byte 5 <> 01H) 10= as cycle end interrupt (only when byte 5 <> 01H) |
| | | 37 | 00000 | reserved | |
| | 1 | 03 | 9 | AI1 measuring range | 0=channel deactivated 3=4 to 20 mA (only if meas. type=current) $4=\pm 20$ mA (only if meas. type=current) $9=\pm 10$ V (only if meas. type=voltage) |
| | | 45 | 01 | AI1 measurement type | 00=channel deactivated, 01=voltage, 10=current |
| | | 0/ | 00 | reserved | |
| | 2 | 03 | 9 | AI2 measuring range | 0=channel deactivated 3=4 to 20 mA (only if meas. type=current) $4=\pm 20$ mA (only if meas. type=current) $9=\pm 10$ V (only if meas. type=voltage) |
| | | 45 | 01 | AI2 measurement type | 00=channel deactivated, 01=voltage, 10=current |
| | | 67 | 00 | reserved | |
| | 3 | 03 | 9 | AI3 measuring range | 0=channel deactivated 3=4 to 20 mA (only if meas. type=current) $4=\pm 20$ mA (only if meas. type=current) $9=\pm 10$ V (only if meas. type=voltage) |
| | | 45 | 01 | AI3 measurement type | 00=channel deactivated, 01=voltage, 10=current |
| | | 67 | 00 | reserved | |
| | 4 | 03 | 9 | AI4 measuring range | 0=channel deactivated 3=4 to 20 mA (only if meas. type=current) $4=\pm 20$ mA (only if meas. type=current) $9=\pm 10$ V (only if meas. type=voltage) |
| | | 45 | 01 | AI4 measurement type | 00=channel deactivated, 01=voltage, 10=current |
| | | 6/ | 00 | reserved | |
| | 5 | | 00H | Cycle time | 00H=16ms, 01H=1ree (approx. 2ms), 06H=3ms, 07H=3.5 ms, 08H= 4 ms, to 1FH=15.5 ms |
| | 6 | 03 | 9 | AO1 output range | 0=channel deactivated 3=4 to 20 mA (only if output type=current) $4=\pm 20$ mA (only if output type=current) $9=\pm 10$ V (only if output type=voltage) |
| | | 45 | 01 | AO1 output type | 00=channel deactivated, 01=voltage, 10=current |
| | | 67 | 00 | AO1 reaction to CPU STOP | 00=switch to no voltage/current 01=retain last value 10=set replacement value (bytes 10, 11) |

| DR | Byte | Bit | Default | What Can be Assigned | Meaning of the Bits |
|----|-------|-----|---------|---|--|
| | 7 | 03 | 9 | AO2 output range | 0=channel deactivated 3=4 to 20 mA (only if output type=current) $4=\pm 20$ mA (only if output type=current) $9=\pm 10$ V (only if output type=voltage) |
| | | 45 | 01 | AO2 output type | 00=channel deactivated, 01=voltage, 10=current |
| | | 67 | 00 | AO2 reaction to CPU STOP | 00=switch to no voltage/current 01=retain last value 10=set replacement value (bytes 10, 11) |
| | 8 | 03 | 9 | AO3 output range | 0=channel deactivated 3=4 to 20 mA (only if output type=current) $4=\pm 20$ mA (only if output type=current) $9=\pm 10$ V (only if output type=voltage) |
| | | 45 | 01 | AO3 output type | 00=channel deactivated, 01=voltage, 10=current |
| | | 67 | 00 | AO3 reaction to CPU STOP | 00=switch to no voltage/current 01=retain last value 10=set replacement value (bytes 10, 11) |
| | 9 | 03 | 9 | AO4 output range | 0=channel deactivated 3=4 to 20 mA (only if output type=current) $4=\pm 20$ mA (only if output type=current) $9=\pm 10$ V (only if output type=voltage) |
| | | 45 | 01 | AO4 output type | 00=channel deactivated, 01=voltage, 10=current |
| | | 67 | 00 | AO4 reaction to CPU STOP | 00=switch to no voltage/current 01=retain last value 10=set replacement value (bytes 10, 11) |
| | 10,11 | | 0000H | Replacement value for AO1, AO2, AO3 and AO4 (only effective if the bits 6 to 7 have the value 10 in bytes 6, 7, 8 and 9) | |

1.5 Diagnostic Data of the Analog I/Os C7-623/A and C7-626/A Control Systems

| Structure of the | The diagnostic area consists of the following: | | |
|------------------|--|--|--|
| Diagnostic Area | • Data record 0: standard diagnostic bytes (bytes 0 to 3) | | |
| | • Data record 1: channel-specific diagnostic bytes (when diagnostics is enabled) | | |
| | Bytes 4 to 7 channel information, bytes 8 to 11 channel-specific diagnostic information of the analog inputs | | |
| | - Bytes 12 to 15: Channel information of the analog outputs | | |
| | The following table shows the structure of the diagnostic area and the meaning of the individual entries. | | |

| Byte | Bit | Meaning | Explanation | Range of | |
|------|-------------|--|---|----------|--|
| | | | | Values | |
| 0 | 0 | Module fault | 1 = Error occurred, $0 =$ all OK | 0 1 | |
| | 1 | Internal error | 1 = Watchdog, EPROM or RAM error | 0 1 | |
| | 2 | External error | 1 = External auxiliary voltage outage or fault at an analog output or analog output | 0 1 | |
| | 3 | Channel error | At least one of the two channel vectors (bytes 7, 15) $<> 0$ | 0 1 | |
| | 4 | Reserved | | 0 | |
| | 5 | Reserved | | 0 | |
| | 6 | Parameters not assigned to module | Initial status (parameters have the default values) and not a module fault (bit $0.0 = 0$) | 0 1 | |
| | 7 | Incorrect parameters | 1 = Channel-specific parameter assignment error (bit 8.0 or bit 9.0 or bit 10.0 or bit 11.0 set or byte 15 <> 0) or module-specific parameter assignment error | 0 1 | |
| 1 | 03 | Module class | SM type class | 5H | |
| | 4 | Channel-specific diagnostic information conforming with the system | Yes | 1 | |
| | 57 | Reserved | | 000 | |
| 2 | 02 | Reserved | | 000 | |
| | 3 | Watchdog responded | With bit 0.1 *) **) | 0 1 | |
| | 47 | Reserved | | 0H | |
| 3 | 0 | Reserved | | 0 | |
| | 1 | Reserved | | 0 | |
| | 2 | EEPROM error | Serial check EEPROM, with bit 0.1 *) **) | 0 1 | |
| | 3 | RAM error | | 0 1 | |
| | 47 Reserved | | | 0H | |
| | | Channel-specific | e diagnostic entries | | |
| 4 | | Channel type AI of the following channel-specific diagnostic information | | | |
| 5 | | Number of analog inputs on the module | | | |
| 6 | | Number of diagnostic bits per channel | | 8 | |
| 7 | | Channel vector for AI channel group | | 1 | |
| | 0 | At least one diagnostic entry for AI1 | 0 = no, 1 = yes | 0 1 | |
| | 1 | At least one diagnostic entry for AI2 | 0 = no, 1 = yes | 0 1 | |
| | 2 | At least one diagnostic entry for AI3 | 0 = no, 1 = yes | 0 1 | |
| | 3 | At least one diagnostic entry for AI4 | 0 = no, 1 = yes | 0 1 | |
| | 47 | Reserved | | 0H | |
| 8 | | Channel-specific diagnostic byte AI1 | · · · · · · · · · · · · · · · · · · · | | |
| | 0 | Parameter error in parameters for channel | $0 = no, 1 = yes^{-\gamma}$ | 0 1 | |
| | 13 | Reserved | | 000 | |
| | 4 | Software "wire break" | 0 = no, 1 = yes (only with 4 to 20mA) | 0 1 | |
| | 5 | Reserved | | 0 | |
| | 6 | Below measuring range | 0 = no, 1 = yes (underflow) | 0 1 | |
| | 7 | Above measuring range | 0 = no, 1 = yes (overflow) | 0 1 | |

| Byte | Bit | Meaning | Explanation | Range of Values | |
|------|-----|--|---------------------------------------|--------------------|--|
| 9 | | Channel-specific diagnostic byte AI2 | | | |
| | 0 | Parameter error in parameters for channel | $0 = no, 1 = yes^{(*)}$ | 0 1 | |
| | 13 | Reserved | | 000 | |
| | 4 | Software "wire break" | 0 = no, 1 = yes (only with 4 to 20mA) | 0 1 | |
| | 5 | Reserved | | 0 | |
| | 6 | Below measuring range | 0 = no, 1 = yes (underflow) | 0 1 | |
| | 7 | Above measuring range | 0 = no, 1 = yes (overflow) | 0 1 | |
| 10 | | Channel-specific diagnostic byte AI3 | | | |
| | 0 | Parameter error in parameters for channel | $0 = no, 1 = yes^{(*)}$ | 0 1 | |
| | 13 | Reserved | | 000 | |
| | 4 | Software "wire break" | 0 = no, 1 = yes (only with 4 to 20mA) | 0 1 | |
| | 5 | Reserved | | 0 | |
| | 6 | Below measuring range | 0 = no, 1 = yes (underflow) | 0 1 | |
| | 7 | Above measuring range | 0 = no, 1 = yes (overflow) | 0 1 | |
| 11 | | Channel-specific diagnostic byte AI4 | | | |
| | 0 | Parameter error in parameters for channel | $0 = no, 1 = yes^{(*)}$ | 0 1 | |
| | 13 | Reserved | | 000 | |
| | 4 | Software "wire break" | 0 = no, 1 = yes (only with 4 to 20mA) | 0 1 | |
| | 5 | Reserved | | 0 | |
| | 6 | Below measuring range | 0 = no, 1 = yes (underflow) | 0 1 | |
| | 7 | Above measuring range | 0 = no, 1 = yes (overflow) | 0 1 | |
| 12 | | Channel type AO of the following channel-specific diagnostic information | | | |
| 13 | | Number of analog outputs on the module | | | |
| 14 | | Number of diagnostic bits per channel | | | |
| 15 | | Channel vector for channel group AO | | | |
| | 0 | Group error in AO1 | 0 = no, 1 = yes | 0 1 | |
| | 1 | Group error in AO2 | 0 = no, 1 = yes | 0 1 | |
| | 2 | Group error in AO3 | 0 = no, 1 = yes | 0 1 | |
| | 3 | Group error in AO4 | 0 = no, 1 = yes | 0 1 | |
| | 47 | Reserved | | 0H | |

*) Analog inputs are reset until the module or channel is functional again (exception: when a wire break check is selected with the measurement type <> 4 to 20mA) AI = 7FFFH.

**) Analog output is reset until the module or channel is functional again. AO = 0V | 0mA