The Bosch Servodyn D Drive System

Fully digital drive technology for decisively superior dynamic response and precision

SERVODYN-D

BOSCH Automation

Bosch automation experts are there for you

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Consistently modular – a reliable hedge against obsolescense

Bosch Servodyn D is the embodiment of a 100% digital design concept. Uniformly modular structures extend from the supply and drive modules all the way to the output amplifier circuits and microprocessor cards, endowing this new drive concept for synchronous and asynchronous motors with enhanced flexibility while simultaneously facilitating future updates, letting you adapt your system's technology to keep pace with advancing technology. 100% digital closed-loop control for all process levels and high cycle frequency maintain extreme precision and consistent performance, even in the face of temperature fluctuations and long-term wear.

Three options to choose from

Bosch offers Servodyn D in three different configurations: with compact-format mechanical components for standard performance ranges, with folding or plug-in mechanical units, and with integral module links for high-performance applications. These options can be variously combined to produce inexpensive units to satisfy specific individual needs.

Narrow stand-alone converters including supply unit, ballast switch, buffer circuit capacitors and axis converter in a single housing provide maximum performance at minimal cost for single-axis applications. The option of incorporating a DC link circuit facilitates optimal utilisation of ballast potential for braking. The „flat and narrow" book formats common to all versions fit in any control cabinet, even shallow compact units with an insertion depth of only 300 mm.

Projectable processor power, predictable communications

A range of processor cards is available for maintaining communications between the control circuit and drive unit. These cards are designed for use in all mechanical module versions.

SERCOS interface

The SERCOS interface copes easily with extreme performance demands. The specific advantages of this interface include real-time processing, interference-resistant fibre-optics communications and the ability to combine drive and control systems from different producers within single systems. The microprocessor card is equipped with a high-performance 32-bit signal processor for closed-loop digital control of position, rpm and current.

CAN data bus

Yet another cost-effective control option is provided by our own Bosch-developed CAN bus system. Available protocols include the Bosch CAN Protocol, already a successful veteran of years of use, along with the international CAN-open standard, allowing trouble-free integration of additional sensors and final-control elements within the bus system.

± 10 V analogue

Triggering circuits relying on nominal analogue command values of ± 10V are available for satisfying „classical" standard operating requirements. The corresponding microprocessor card features an ASIC for digital rpm and current control. This intelligent communications concept combines with a modular mechanical layout to allow configurations including various bus and interface systems for controlling a limited number of axes or for operating auxiliary axes with SPS.

Motion Control for standard positioning operations

We have opened the way to inexpensive decentralised design concepts by integrating the control functions within the drive system. Servodyn D's data-storage memory can accomodate up to 32 positioning command sets including end position, acceleration rate, deceleration and maximum velocity. This makes it possible to define precise point-to-point moition as well as absolute and incremental travel.

An array of options for feedback interrace

Graduated-response motor monitoring systems adapt measuring precision to fit the actual requirements.
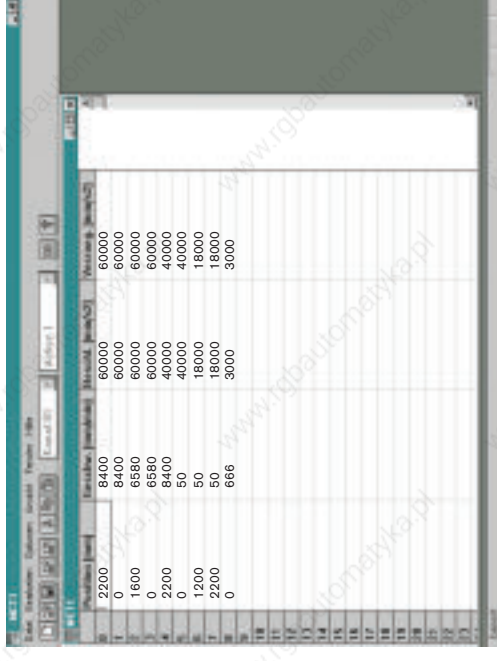
Therefore, Servodyn converters can employ various modules to interpret data from an extended range of sensory systems, while a special option card allows analogue output of travel measurements. In addition, converters with an analogue interface also include integrated encoder simulation as standard equipment.
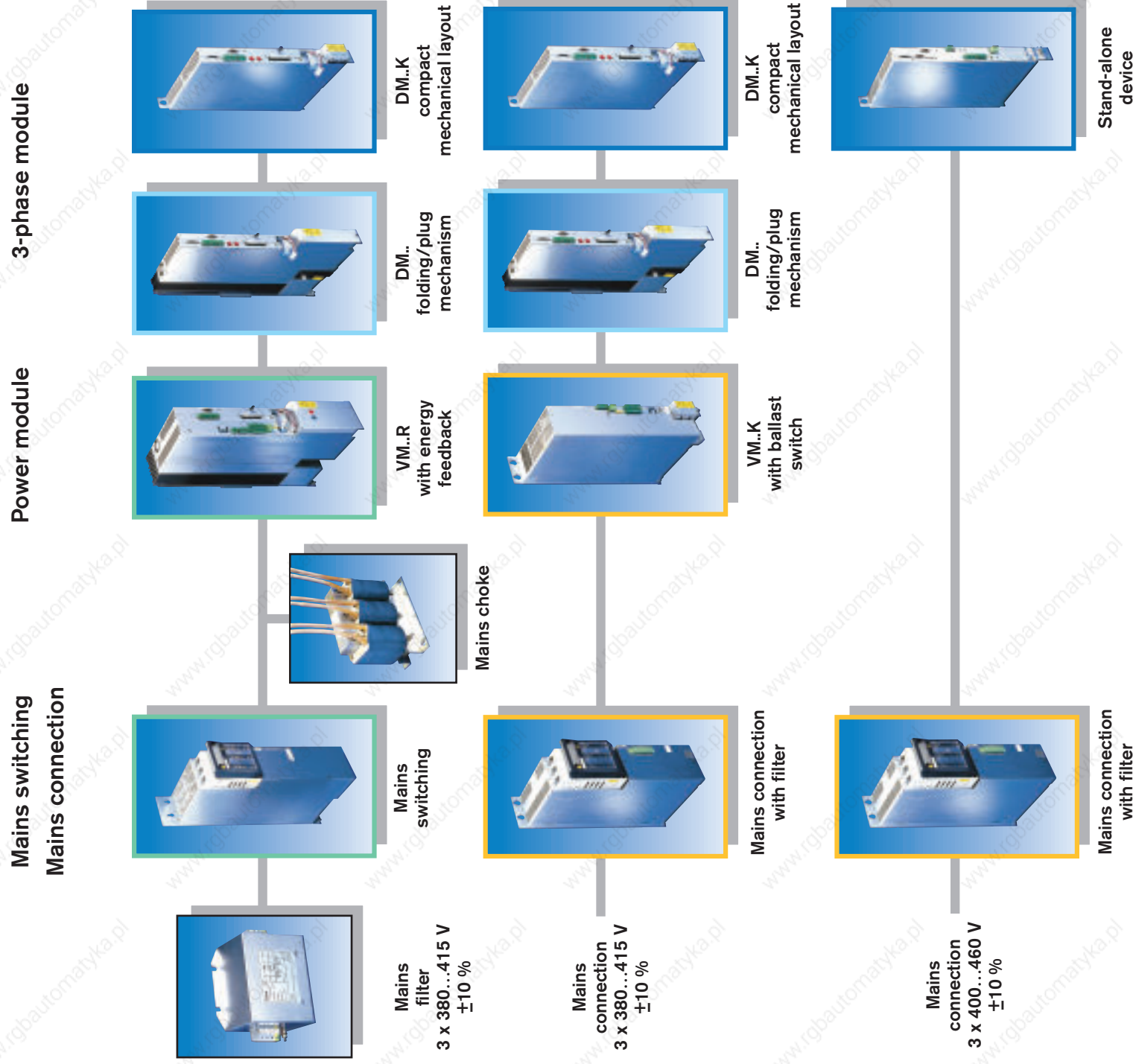
Electronic data plate

The converter's IGBT amplifier circuit and the attached motor each contain an integrated EEPROM – used to store the required operating data. The drive-control microprocessor automatically adapts the closed-loop motion control's operating parameters to reflect the system's combination of motor and module. Rapid identification of drive system components eases service and maintenance.

Reliability through redundance

The redundant safety concept provides a reliable backup to monitor the drive system during set-up operations, without the need for a second direct monitoring system. The motion-control system achieves full compliance with EN 954-1 by incorporating all of the functions defined in Category 3, making additional monitoring devices unnecessary. Extensive security functions covering such areas as voltage, current, temperature, short-circuit and grounding protection are all incorporated. The resulting high level of system reliability ensures trouble-free operation with cable lengths of up to 100 m, even without additional electronic devices.

Motion Control

SERCOS interface

CAN databus

Operating features

Interface/bus system	Functions	SF Series Servo motors — Single-Turn Absolute (STG), Multi-Turn Absolute (MTG)	SR series Servo motors — Resolver	DU series asynchronous 3-phase motors — Single-Turn Absolute (STG)	Standard asyncronous 3-phase motors with high frequency spindles — Sensorless	Modular motors with high-frequency spindles — Toothed rotor sensor	Linear motors — LC 181 Length code monitoring system
SERCOS interface	Closed-loop RPM control · Position control with high-resolution interpolation · Position specification	●		●		●	●
CAN bus	Closed-loop RPM control · Position control with high-resolution interpolation	●	●	●		●	
Analogue interface ± 10 V	Closed-loop RPM control · Force control	●	●	●		●	
Analogue interface ± 10 V	Open-loop RPM control				●		
24 V input/output	Motion Control: 32-point position control	●	●	●		●	

Motor versions — Feedback systems

Bosch Servodyn D: Configuration

3-phase module · Power module · Mains switching / Mains connection

- DM..K compact mechanical layout
- DM.. folding/plug mechanism
- VM..R with energy feedback
- Mains choke
- Mains switching
- Mains filter 3 x 380...415 V ±10 %

- DM..K compact mechanical layout
- DM.. folding/plug mechanism
- VM..K with ballast switch
- Mains connection with filter
- Mains connection 3 x 380...415 V ±10 %

- Stand-alone device
- Mains connection with filter
- Mains connection 3 x 400...460 V ±10 %

System overview

Bosch Servodyn D: SF and SR servo motors

Standard features
- IM 5B layout
- Smooth shaft
- Vibration rating N
- Protection Class IP67, without flange
- Electronic data plate

Options
- Shaft with key and keyway
- Flange seal
- Vibration ratings R, S
- Holding brake
- Externally cooled versions
- Various revolution rates

Motor type	Sensor type	Precision level	Resolution
SF	Single-turn (STG)	± 20 angular seconds	8 mio. incr./R
	Optional Multi-turn (MTG)		
SR	Resolver	± 10 angular minutes	8192 lincr./R

S ☐ – A 2 0026 060 – 10 000

Brushless servomotor with sine-wave EMF
- Design index
- Size
- Stationary torque as per table
- RPM mode
  e.g., 060 → n_N = 6000 min⁻¹
- Optionen: 10 = Standard configuration
  smooth shaft, without counterplug
  14 = Standard configuration with motion brake
  (refer to motor manual for additional information)
- Version
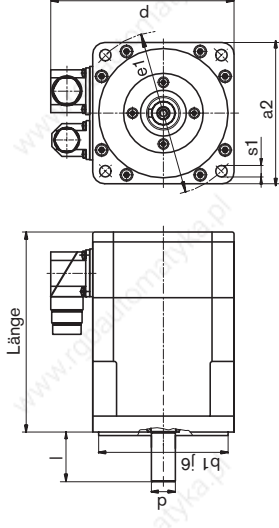
Legend:
- ☐ = S1, cycle frequency 2 kHz
- (light) = S1, cycle frequency up to 4 kHz
- (dark) = S1, cycle frequency up to 8 kHz

SF and SR servo motors	Rated rotation speed n_N [min⁻¹]	Stationary torque M_0 [N·m]	Stationary current I_0 [A eff]	Shaft Ø d k5 x l [mm]	a2 [mm]	b1 [mm]	e1 [mm]	s1 [mm]	Length without brake [mm]	Length with brake [mm]	Height P [mm]	Inertia with sensor J [10⁻⁴ kgm²]	Brake M_{Br} [Nm]	Brake I_{Br} [A]	Brake J_{Br} [10⁻⁴ kgm²]	Motor Mass [kg]	Brake Mass [kg]	Plug size / Wire cross section
SF(R)-A5.0250.020 / SF(R)-A5.0460.020 / SF(R)-A5.0700.020	2000	24 / 46 / 70	11 / 21 / 35	32 x 58	190	180	215	13,5	300 / 383 / 483	345 / 428 / 528	240	83 / 166 / 257	56	1,5	45	24 / 35 / 50	5,2	1,25 / 4 x 1,5 / 1,25 / 4 x 4,0 / 1,5 / 4 x 10
SF(R)-A2.0013.030 / SF(R)-A2.0020.030 / SF(R)-A2.0026.030 / SF(R)-A2.0041.030	3000	1,3 / 2,0 / 2,6 / 4,1	0,9 / 1,3 / 1,7 / 2,7	14 x 30	100	95	115	8,5	186 / 198 / 208 / 233	206 / 217 / 229 / 253	142	2 / 3 / 4 / 6	3,5	0,7	1,1	4,0 / 5,5 / 6,2 / 7,1	0,7	1 / 4 x 1,5
SF(R)-A3.0042.030 / SF(R)-A3.0068.030 / SF(R)-A3.0093.030		4,2 / 6,5 / 9,3	3,0 / 4,8 / 6,6	19 x 40	116	110	130	9	223 / 255 / 287	262 / 294 / 326	156	7 / 11 / 16	8,0	0,8	1,2	7,0 / 9,0 / 12,0	0,7	1 / 4 x 1,5
SF(R)-A4.0091.030 / SF(R)-A4.0125.030 / SF(R)-A4.0172.030 / SF(R)-A4.0230.030		10 / 12 / 17 / 23	6,8 / 9,1 / 13 / 16	24 x 50	142	130	165	11,5	246 / 277 / 309 / 341	293 / 324 / 356 / 388	180	21 / 30 / 40 / 54	18	1	9	13 / 16 / 19 / 25	1,7	1 / 4 x 1,5 / 1 / 4 x 1,5 / 1 / 4 x 1,5 / 1 / 4 x 2,5
SF(R)-A5.0250.030 / SF(R)-A5.0460.030 / SF(R)-A5.0700.030		25 / 46 / 70	18 / 33 / 47	32 x 58	190	180	215	13,5	300 / 383 / 483	345 / 428 / 528	240	83 / 166 / 257	56	1,5	45	24 / 35 / 50	5,2	1,25 / 4 x 4,0 / 1,5 / 4 x 10 / 1,5 / 4 x 16
SR -A0.0002.060 / SR -A0.0004.060 / SR -A0.0008.060 / SR -A0.0009.060	6000	0,2 / 0,4 / 0,8 / 0,9	0,4 / 0,8 / 1,3 / 2,0	9 x 20	55	40	63	5,5	126 / 141 / 156 / 171	160 / 175 / 190 / 205	90	0,06 / 0,09 / 0,15 / 0,18	1	0,5	0,068	1 / 1,2 / 1,3 / 1,6	0,18	1/4 x 1,5
SR -A1.0008.060 / SR -A1.0012.060 / SR -A1.0016.060 / SR -A1.0023.060		0,8 / 1,2 / 1,6 / 2,3	1,3 / 2,0 / 2,4 / 3,4	11 x 23	70	60	75	5,5	156 / 176 / 196 / 236	200 / 220 / 240 / 280	102	0,43 / 0,63 / 0,83 / 1,20	2	0,4	0,12	1,4 / 1,9 / 2,1 / 2,6	0,21	1/4 x 1,5
SF(R)-A2.0013.060 / SF(R)-A2.0020.060 / SF(R)-A2.0026.060 / SF(R)-A2.0041.060		1,3 / 2,0 / 2,7 / 4,1	1,7 / 2,7 / 3,5 / 5,6	14 x 30	100	95	115	8,5	186 / 198 / 208 / 233	206 / 217 / 229 / 253	142	2 / 3 / 4 / 6	3,5	0,7	1,1	4,0 / 5,5 / 6,2 / 7,1	0,7	1 / 4 x 1,5
SF(R)-A3.0042.060 / SF(R)-A3.0068.060 / SF(R)-A3.0093.060		4,2 / 6,8 / 9,3	6,0 / 10 / 14	19 x 40	116	110	130	9	223 / 255 / 287	262 / 294 / 326	156	7 / 11 / 16	8,0	0,8	1,2	7,0 / 9,0 / 12,0	0,7	1 / 4 x 1,5 / 1 / 4 x 1,5 / 1 / 4 x 2,5
SF(R)-A4.0091.060 / SF(R)-A4.0125.060 / SF(R)-A4.0172.060 / SF(R)-A4.0230.060		9,1 / 12 / 17 / 22	14 / 17 / 26 / 25	24 x 50	142	130	165	11,5	246 / 277 / 309 / 341	293 / 324 / 356 / 388	191	21 / 30 / 40 / 54	18	1	9	13 / 16 / 19 / 25	1,7	1,25 / 4 x 2,5 / 1,25 / 4 x 2,5 / 1,25 / 4 x 6,0 / 1,25 / 4 x 6,0

Motor/module combinations for maximum continuous load factors

Module types (columns): DM..4K, DM..8K, DM..15K, DM..30K, DM..30A, DM..45A, DM..85B, DM..140D, DS..15K

System overview

Bosch Servodyn D:
DU asynchronous 3-phase motors

Standard features

- IM B35 layout
- Size 180 in IM B3
- Smooth shaft
- Vibration severity rating R
- Flange alignment precision rating N
- Protection Class IP 54
- STG absolute value encoder
- Temperature monitored by 2 NTC sensors
- Electronic data plate
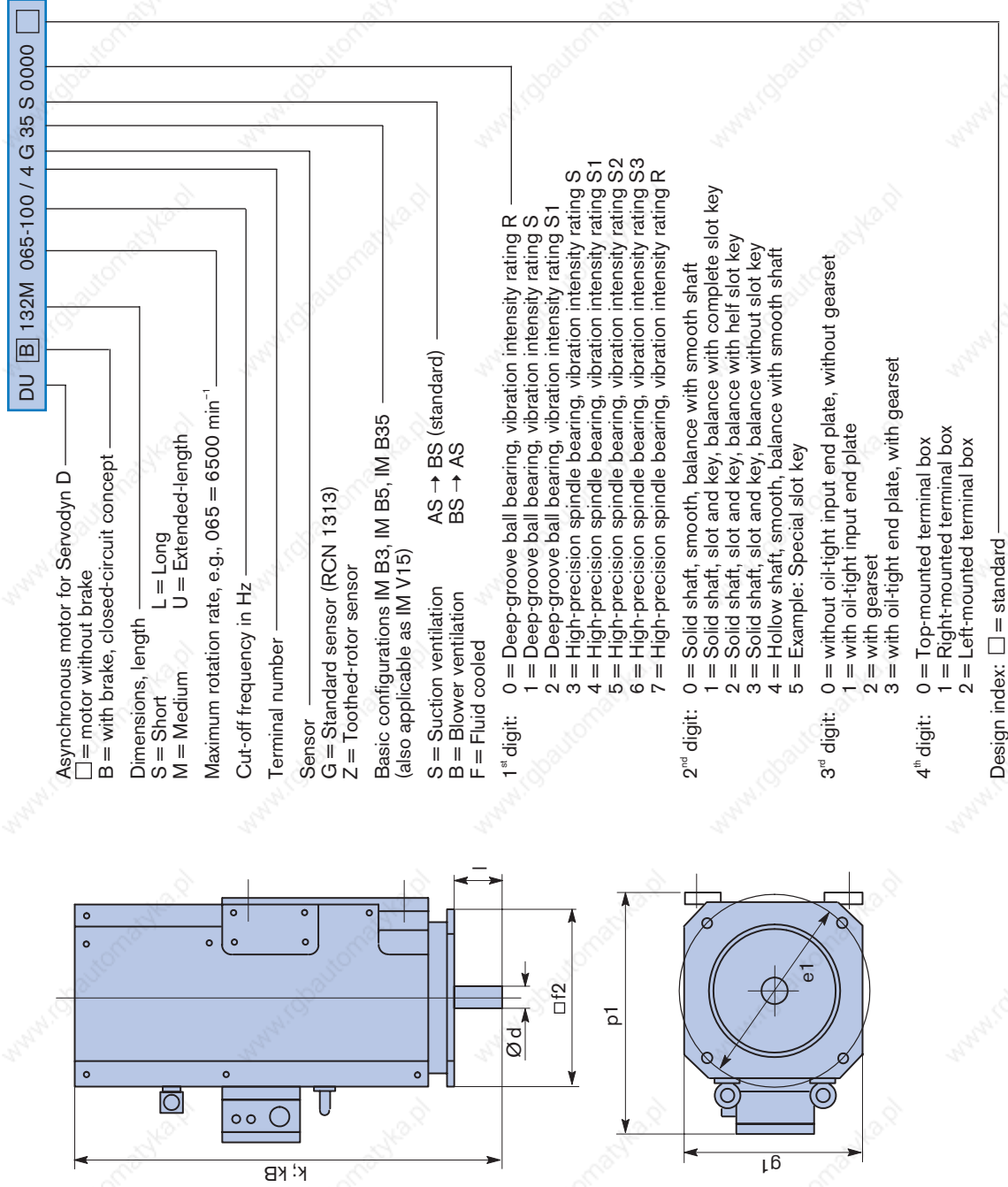- Top-mounted terminal box rotates 4 x 90

Options

- Higher IP 55 protection class rating (IEC 34-5)
- Shaft with key and keyway
- Oil-tight input end plate
- Higher rotation rates
- Vibration severity ratings S, S1, S2, S3 as defined in DIN VDE 0530-14 (not available with holding brake)
- High-precision flange alignment rating R
- Holding brake
- Side-mounted terminal box

Motor type	Sensor type	Precision	Resolution
DU	Single-turn (STG)	± 20 angular seconds	8 mil. incr./R

- ■ = S1, cycle frequency 4 kHz
- ■ = S1, cycle frequency 4 kHz or 8 kHz
- ● = S6-60 %, cycle frequency 4 kHz
- ● = S6-60 %, cycle frequency 4 kHz or 8 kHz
- ◀ = S6-40 %, cycle frequency 4 kHz
- ◀ = S6-40 %, cycle frequency 4 kHz or 8 kHz

Type code: DU │B│ 132M 065-100 / 4 G 35 S 0000 □

Asynchronous motor for Servodyn D
□ = motor without brake
B = with brake, closed-circuit concept

Dimensions, length
S = Short   L = Long
M = Medium   U = Extended-length

Maximum rotation rate, e.g., 065 = 6500 min⁻¹

Cut-off frequency in Hz

Terminal number

Sensor
G = Standard sensor (RCN 1313)
Z = Toothed-rotor sensor

Basic configurations IM B3, IM B5, IM B35 (also applicable as IM V15)
S = Suction ventilation
B = Blower ventilation
F = Fluid cooled

1st digit:
0 = Deep-groove ball bearing, vibration intensity rating R
1 = Deep-groove ball bearing, vibration intensity rating S
2 = Deep-groove ball bearing, vibration intensity rating S1
3 = High-precision spindle bearing, vibration intensity rating S1
4 = High-precision spindle bearing, vibration intensity rating S1
5 = High-precision spindle bearing, vibration intensity rating S2
6 = High-precision spindle bearing, vibration intensity rating S3
7 = High-precision spindle bearing, vibration intensity rating R

2nd digit:
0 = Solid shaft, smooth, balance with smooth shaft
1 = Solid shaft, slot and key, balance with complete slot key
2 = Solid shaft, slot and key, balance with half slot key
3 = Solid shaft, slot and key, balance without slot key
4 = Hollow shaft, smooth, balance with smooth shaft
5 = Example: Special slot key

3rd digit:
0 = without oil-tight input end plate, without gearset
1 = with oil-tight input end plate
2 = with gearset
3 = with oil-tight end plate, with gearset

4th digit:
0 = Top-mounted terminal box
1 = Right-mounted terminal box
2 = Left-mounted terminal box

Design index: □ = standard

AS → BS (standard)
BS → AS

Dimensional table

Size	DU asynchronous 3-phase motors	Shaft Ø d x l [mm]	Flange f 2 [mm]	Flange e 1 [mm]	Length k [mm]	Length kB [mm]	Width g 1 [mm]	Height p 1 [mm]	Inertia J [10⁻³ kg m²]	Mass [kg]
90	90 L	28 x 60	160	165	523	590	185	257	5,55	37
100	100 M	38 x 80	190	215	610	685	208	277	18,4	53
	100 L				675	750			24,2	64
	100 U				740	815			29,1	73
132	132 S	42 x 110	260	300	720	816	276	356	82,7	115
	132 M				770	866			101	133
	132 L				820	916			119	144
160	160 S	55 x 110	316	350	910	977	327	428	251	230
	160 M				975	1042			304	265
	160 L				1040	1107			356	295

Motor/module combination table

Size	DU asynchronous 3-phase motor	Nominal rated power P_N [kW]	Rotation rate range n_N·n_max [min⁻¹]	Nominal rated torque M_N [Nm]	Nominal rated torque I_N [A]	DM. 30K	DM. 30A	DM. 45A	DM. 85B	DM. 140D
90	90 L	4,2	1800 – 9000 (15000)	22	11	●■				
100	100 M	6,6	1800 – 9000 (15000)	35	15,5	●■	◀●■	◀●●■		
	100 L	9,0		48	20		●■	●●■		
	100 U	12		63,5	25		■	◀●■		
132	132 S	15	1500 – 6500 (12000)	95,5	29			◀●■	◀◀●●■■	◀●●■
	132 M	18,5		118	37				◀◀●●■■	◀◀●●■■
	132 L	22		140	42				◀●●■	◀◀●●■■
160	160 S	30	1500 – 6000 (12000)	191	51					◀●■
	160 M	37		235	63					◀●●■
	160 L	45		286	76					◀●■

Bosch Servodyn D: 3-phase modules

System overview

General specifications

Operating temperature	0 to +45 °C / 0 to +55 °C with derating
Storage temperature	−25 to +70 °C
Protection rating	IP 20 as defined in EN 60 529
Climate class	3K3 as defined in EN 60721, no condensation
Installation height	≤ 1000 m above sea level; derating up to 3000 m above sea level

Maximum current band width

Current — Maximum current — Rated current — Max. continuous load (C.L.) — Max. peak load (P.L.)

DMA 140 D 1101 – D

3-phase module

Maximum current at f_S = 2 kHz (refer to chart for specific data)

Module width: A = 50 mm, B = 100 mm, D = 200 mm, K = compact-format mechanical unit

1st digit: Interfaces
- 1 = SERCOS interface
- 2 = Customer interface
- 3 = Analogue with 12 bit resolution
- 4 = Analogue with 16 bit resolution
- 5 = 24 V control signals
- 7 = CAN bus
- 8 = 10 bit analogue, U/f performance curve

2nd digit: Sensor interface
- 0 = No sensor interface
- 1 = Absolute value sensor (STG, MTG)
- 2 = Toothed rotor sensor or STG or MTG
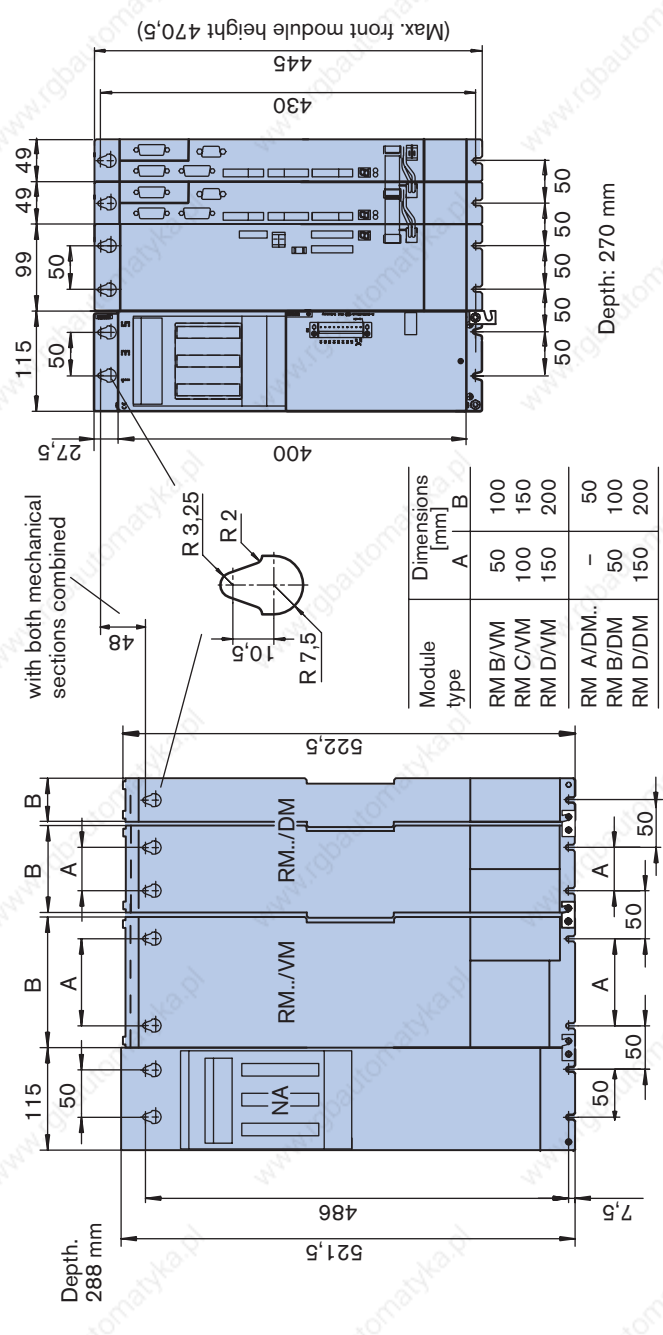- 3 = Resolver

3rd digit: Auxiliary functions
- 0 = None
- 1 = Single-axis positioning

4th digit: Versions
- 1 = Standard

Module data

	DM.4K PL	DM.4K CL	DM.8K PL	DM.8K CL	DM..15K PL	DM..15K CL	DM.30K PL	DM.30K CL	DM.30A PL	DM.30A CL	DM..45A PL	DM..45A CL	DM..85B PL	DM..85B CL	DM..140D PL	DM..140D CL
Module type	DM.4K		DM.8K		DM..15K		DM.30K		DM.30A		DM..45A		DM..85B		DM..140D	
DC link voltage	670 VDC, regulated															
f_S = 2 kHz — Maximum current [A_{eff}]	7,3	6,6	11	10	18	17	34	25	35	30	53	43	98	74	141	118
f_S = 2 kHz — Rated current [A_{eff}]	2,0	4,7	3,0	7,1	6,5	13	7,8	18	11	21	12	27	27	55	50	101
f_S = 4 kHz — Maximum current [A_{eff}]	6,6	6,4	10	9,6	18	15	29	21	35	28	51	39	86	64	141	106
f_S = 4 kHz — Rated current [A_{eff}]	1,4	4,0	2,1	5,7	4,9	11	5,8	14	8,9	18	10	23	22	47	42	87
f_S = 8 kHz (ab Werk) — Maximum current [A_{eff}]	6,6	4,7	10	7,1	15	11	22	14	32	23	44	31	63	44	117	84
f_S = 8 kHz (ab Werk) — Rated current [A_{eff}]	0,8	2,5	1,1	3,6	2,9	7,4	3,6	9,7	5,1	12	6,1	15	12	31	25	60
RPM adjustment range	1 : 4 000 000															
Current demand with 24 V module supply [A]	0,89		0,89		0,89		1,03		1,23		1,32		1,35		1,58	
Max. power dissipation at f_S = 4 kHz [W]	96,5		96,5		121		156		180		220		380		700	
Mass [kg]	6,0		6,0		6,0		6,0		7,3		7,3		11,5		19,3	
Module width [mm]	50		50		50		50		50		50		100		200	
Back wall modules	not required for DM..K								for DM modules with SERCOS interface							
Type	(−)[1]		(RMA/DM8)[1]		(RMA/DM.15K)[1]		(RMA/DM 30)[1]		RMA/DM 30		RMA/DM 45		RMB/DM		RMD/DM	
Number of fans									1		2		2		2	
in cold module technology	(RMA/DMC)												RMB/DMC		RMD/DMC	
PM Personality Module	for DM modules with SERCOS interface															

[1] Specification for DM..A

f_S = cycle frequency

For direct-measurement systems

For direct-measurement systems rotative/linear	OM 01 – D	OM 02 – D	OM 03 – D
Input signals	Sine-wave current signals 7...16 µAp-p	Square-wave signals with RS 422 line driver	Sine-wave voltage signals 1Vp-p, EnDat interface
Measurement system voltage/current supply		5 V/max. 300 mA	
Max. input frequency	50 kHz	1 MHz	600 kHz
Pulse multiplication factor	20	4	4096

For rapid analogue outputs	OM 04 – D
Output signals, programmable	4 analogue outputs with 12 bit resolution, voltage range ± 10 V, 100 W

Dimensions

NV, VM…K and DM..K
(Max. front module height 470,5)
445 — 430 — 49, 49 — 99 — 50 50 50 50 50 — 115 — 50 — 27,5 — 400 — Depth: 270 mm

NA and back-mount modules for VM…B, C, D et DM…A, B, D
with both mechanical sections combined
R 3,25 — R 2 — R 7,5 — 48 — 10,5 — 522,5 — RM../DM — RM../VM — NA — 115 — 50 — 486 — 521,5 — 7,5 — Depth: 288 mm

Module type	Dimensions [mm] A	B
RM B/VM	50	100
RM C/VM	100	150
RM D/VM	150	200
RM A/DM..	–	50
RMB/DM	50	100
RM D/DM	150	200

System overview

Bosch Servodyn D: Power modules

Explanation of type code

RM A / DM [30] – D

Back-mounted version
Module width: A = 50 mm, B = 100 mm, C = 200 mm
Version:
- VM = for VM
- DM = for DM
- □ = for all modules of module width
- 8 = for use with DM8
- 30 = for use with DM8...DM30
- 45 = for use with DM8...DM45
- C = cold-module technology
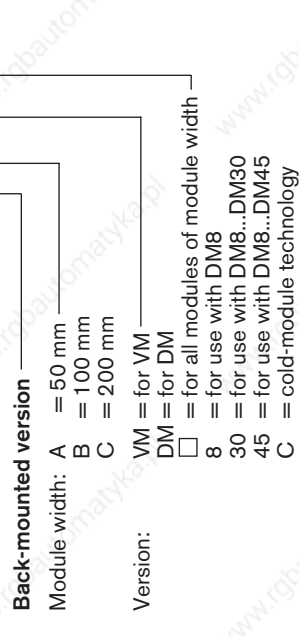
NAA 70 / 1 – D

Grid activation module
For VM with same type size
1 = Standard
2 = with auxiliary filter

NVA 20 / 1 F – D

Grid wiring module
For VM with same type size
1st digit: 1 = for one VM
2nd digit: F = with grid filter

NE 70 / A 1 – D

Power choke
For VM with same type size
1st digit: A = standing, without cover
2nd digit: 1 = reinforced version

VMA 70 C R 001 – D

Power module
Max. rated current at $\vartheta_U = 45°C$
Module width: B = 100 mm, C = 150 mm, D = 200 mm, K = compact-format mechanical unit
R = Sine-wave feedback
B = Internal ballast resistor
E = External ballast resistor
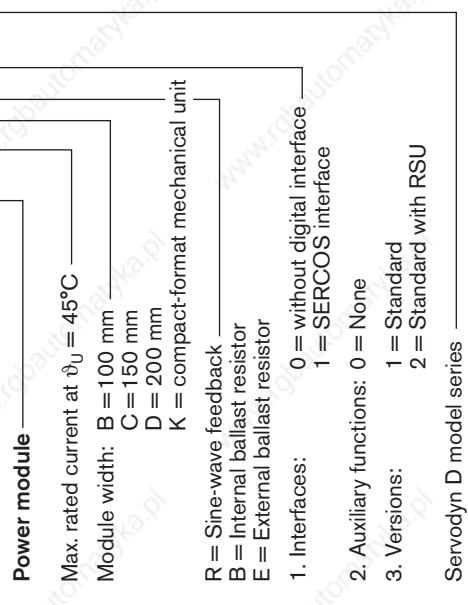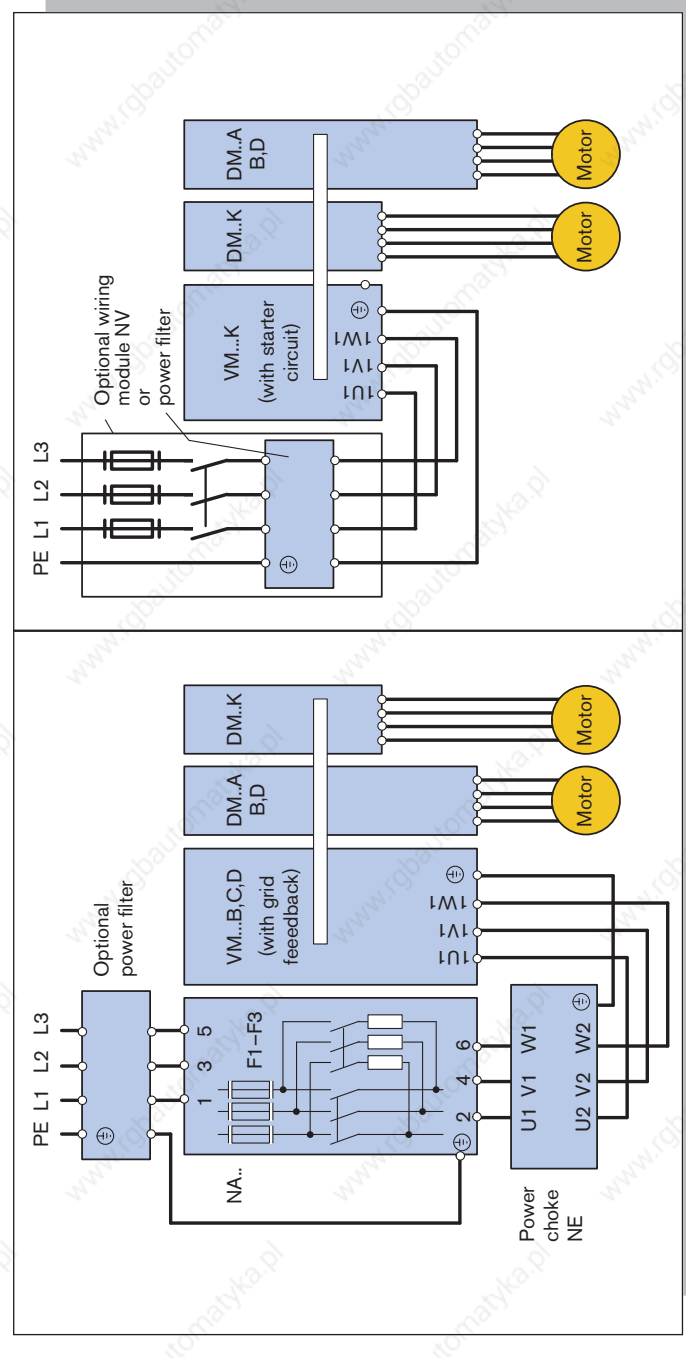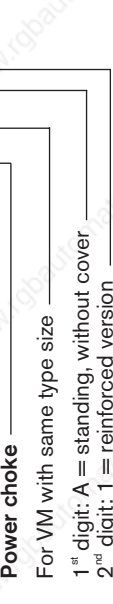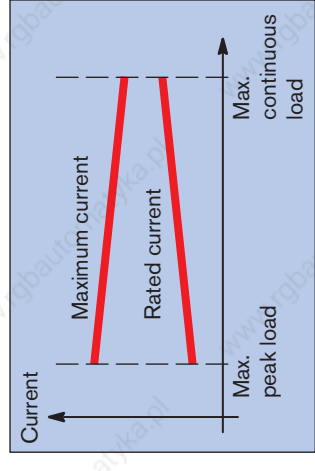1. Interfaces: 0 = without digital interface, 1 = SERCOS interface
2. Auxiliary functions: 0 = None
3. Versions: 1 = Standard, 2 = Standard with RSU
Servodyn D model series

PM VMA / 0 00 – D

Personality module
VM = Power module
SM = Synchronous drive motors
FO = for regulated asynchronous drive motors
OS = without software
0 = Standard
Special customer-specific version

Circuit diagrams (right)

Diagram 1: PE L1 L2 L3 — Optional wiring module NV or power filter — VM...K (with starter circuit) — 1U1 1V1 1W1 — DM.K / DM.A B,D — Motor / Motor

Diagram 2: PE L1 L2 L3 — Optional power filter — NA.. — F1–F3 — VM..B,C,D (with grid feedback) — 1U1 1V1 1W1 — U1 V1 W1 / U2 V2 W2 — Power choke NE — DM.A B,D / DM.K — Motor / Motor

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Module type	Unit	VM.K with ballast switch	VM.B, C, D, with mains-friendly feedback		
		VM..20K	VM..35B	VM..70C	VM..90D
Main voltage supply	V AC	3 x 380 … 415 ±10 %, 48 … 62 Hz			
Rated voltage	V AC	400, 50 Hz			
DC link voltage	V DC	670, regulated			
Rated current I_N (grid) at $\vartheta_U = 45°C$	A	23	34	66	80
Rated power P_N at $\vartheta_U = 45°C$	kW	16	24	47	57
Peak power	kW	20	34,6	70	97
Ballast resistance		intern	extern	–	–
Max. braking energy, single application	Ws	6500	59000	–	–
Max. continuous braking force	W	400	1000	–	–
Current draw from 24 V supply	A	24 V DC based on DIN 19 240			
		1,0	2,3	2,7	3,1
Max. power dissipation	W	220	460	800	970
Mass	kg	15,0	11,1	14,3	
Module width	mm	100	150	150	200
Back-mount types		not required	RMB/VM	RMC/VM	RMD/VM
with cold-module technology		–	RMB/VMC	RMC/VMC	RMD/VMC
PM Personality Module		not required	PM VM		
Power connection via		NV 20 mains filter	NA..35	NA..70	NA..90
Rated power at $\vartheta_U = 45°C$	kW	24	24	47	62
Mass	kg	10,6	8,4	8,4	8,4

Power choke NE		not required	NE 35	NE 70	NE 70/1	NE 90
Rated power at $\vartheta_U = 45°C$	kW	–	24	41,7	47	62
Inductance	mH	–	1,0	0,7	0,7	0,4
Max. power dissipation	W	–	150	200	210	350
Mass	kg	–	15	23	25	47

Frequency converters

Power range up to 45 kW

High-performance frequency converters with compact mechanicals and either folding and plug connectors are available for motors with outputs extending up to 45 kW.

Rotation rate control up to 1 kHz

A programmable rotation rate/cycle frequency performance program makes it possible to run not only standard motors, but also high-frequency spindles at up to 60,000 rpm without sensor feedback.

Modular or stand-alone layout

Servodyn D frequency converters rated at up to 4 kW are available in stand-alone housings. The modular units are suitable for combination with all supply and 3-phase modules in the Servodyn D range.

□ = S1, 2 kHz cycle frequency
▨ = S1, cycle frequency up to 4 kHz
■ = S1, cycle frequency up to 8 kHz

Motor			Frequency converter								
Power rating [kW]	Size	Current rating type [A]	DM..4K	DM..8K	DM..15K	DM..30K	DM..30A	DM..45A	DM..85B	DM..140D	DS..15K
0,25–0,37	71	1,1	■	■							■
0,55–0,75	80	2,0	■	■							■
1,1	90	2,8	▨	■	■						■
1,5	90	3,7	▨	▨	■						■
2,2	100	5,2		□	■	■					■
3,0	100	7,0			■	■					■
4,0	112	9,0			▨	■					▨
5,5	132	12			□	▨					
7,5	132	16				□	■	■			
11	160	22					■	▨			
15	160	30					▨				
18,5	180	37							■		
22	180	44							■		
30	200	59							▨	■	
37	225	73								■	
45	225	88								▨ □	

Prefabricated wiring harnesses

All wiring for connecting motors and sensor systems is suitable for drag chain conveyor systems.

Motor wiring
Prefabricated with plugs and/or wiring insulator caps, according to converter terminal configuration. Available with optional comprehensive shielding.

Sensor wiring:
Prefabricated with motor plug and D-sub plug for connecting converter. With comprehensive shielding.

Technical features

- Outer sleeve PUR 11Y (polyurethane) corresponding to DIN 0250, Section 818
- Colour blue, similar to RAL 5010, with embossed Bosch Order No.
- Bending radius at – 30 to + 60 °C with permanent fixed routing: 7 x external diameter; flexible routing: 12 x external diameter

All wiring is suitable for drag chain operation at:
- acceleration $\leq$ 5 m/s^2
- velocity $\leq$ 100 m/min

Dimensions: 450 / 430 / 400 / 49 / 49 / 49 / 27,5 / 50 — Depth: 270 mm

PE L1 L2 L3 — Power filter — DS..K — Motor

Bosch Servodyn D: Stand-alone converter

General specifications

Operating temperature	0 to + 45 °C; 0 to + 55 °C with derating
Storage temperature	–25 to +70 °C
Protection rating	IP 20 as defined in EN 60 529
Climate class	3K3 as defined in EN 60721, no condensation
Installation height	$\leq$ 1000 m above sea level; derating up to 3000 m above sea level

Maximum current band width

Current — Maximum current — Rated current — Max. continuous load — Max. peak load

3-phase current module

DS 15 K 1101 – D

- Maximum current at f_S = 2 kHz (refer to chart for specific data)
- Module width: K = Compact mechanical unit
- 1st digit: Interfaces
  - 1 = SERCOS interface
  - 2 = Customer interface
  - 3 = Analogue with 12 bit resolution
  - 4 = Analogue with 16 bit resolution
  - 5 = 24 V control signals
  - 7 = CAN bus
  - 8 = 10 bit analogue, U/f performance curve
- 2nd digit: Sensor interface
  - 0 = No sensor interface
  - 1 = Absolute value sensor (STG, MTG)
  - 2 = Toothed rotor sensor or STG or MTG
  - 3 = Resolver
- 3rd digit: Auxiliary functions
  - 0 = None
  - 1 = Single-axis positioning
- 4th digit: Versions
  - 1 = Standard

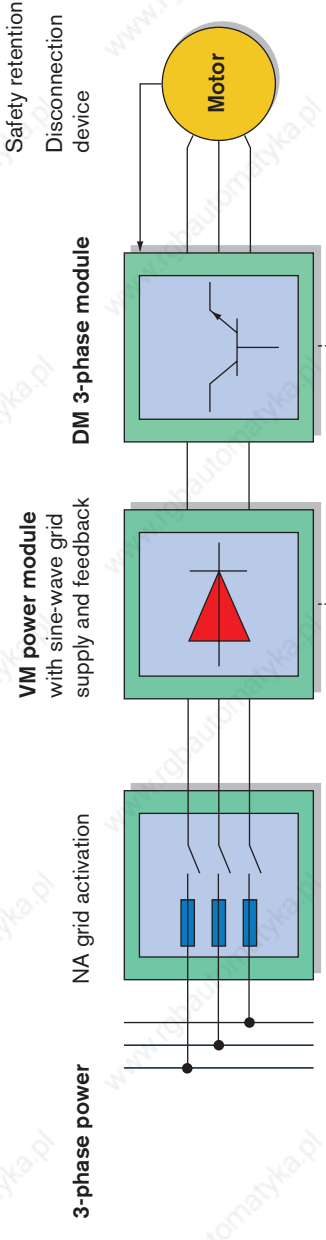| Module type	Unit	DS..15K	
Mains supply	V AC	3 x 400 … 460 ± 10 % 48 … 62 Hz	
Rated voltage	V AC	400, 50 Hz	
		max. peak load	max. cont. load
f_S = 2 kHz (ϑ_U = 45 °C)			
Maximum current	A_{eff}	17	15
Rated current	A_{eff}	7,2	14
f_S = 4 kHz (ϑ_U = 45 °C)		max. peak load	max. cont. load
Maximum current	A_{eff}	17	14
Rated current	A_{eff}	6,0	11
f_S = 8 kHz (ϑ_U = 45 °C)		max. peak load	max. cont. load
Maximum current	A_{eff}	15	11
Rated current	A_{eff}	4,4	8,5
RPM adjustment range		1 : 4 000 000	
Rated power at ϑ_U = 45 °C	kW	3,5	
Peak power	kW	6,0	
Ballast resistor		internal	
Max. braking energy, single application	Ws	1000	
Max. Dauerbremsleistung	W	100	
Current draw from 24 V power supply	A	24 V DC based on DIN 19 240 max. 1,4 according to type	
Max. power dissipation at f_S = 4 kHz	W	120	
Mass	kg	5,9	
PM Personality Module		with SERCOS interface only	
Optional grid connection with		NV 20	
Rated power at ϑ_U = 45 °C	kW	24	
Mass	kg	10,6	

RSU Redundant Security Monitoring

Servodyn D allows you to install machine protection equipment of the kind defined in

EN 954-1   Category III together with
EN 12415   (security, rotating machinery)
EN 12417   (security in operations centres)
EN 60204-1 (machine equipment and security requirements)

with no supplementary modifications.

Requirements:

- VM,B,C,D power module with inverse grid voltage and RSU
- NA grid activation module
- DM..K, A, B, D 3-phase power module with SERCOS interface

3-phase power   NA grid activation

VM power module
with sine-wave grid supply and feedback

DM 3-phase module

Safety retention
Disconnection device

Motor

- Integrated EMERGENCY OFF switching unit
- Connection and monitoring for an operating-mode selection switch
- Connection and monitoring for a process-release sensor
- Integrated grid monitor to compensate for single and multi-phase power failures
- Integrated control and monitoring for door security lock mechanism

- Monitoring of maximum rotation rate
- Integrated rpm monitor for special operations
- Monitoring for stationary mode and set-up rpm

17

Bosch Servodyn D:
Getting started, DSS-D Service System

The DSS Service System is a PC program with the following performance features:

- Drive system parameter definition
- Parameter archives
- Software download
- Operating data display
- Access to status and diagnosis information
- Command value generator
- Oscillographic display
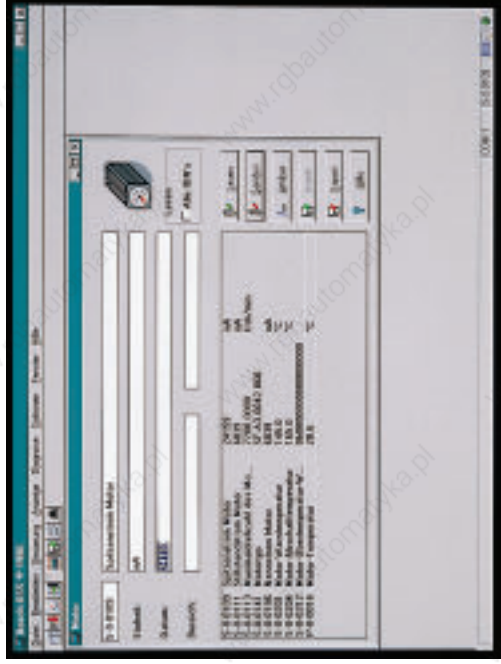
Abb. 1: Motor parameters
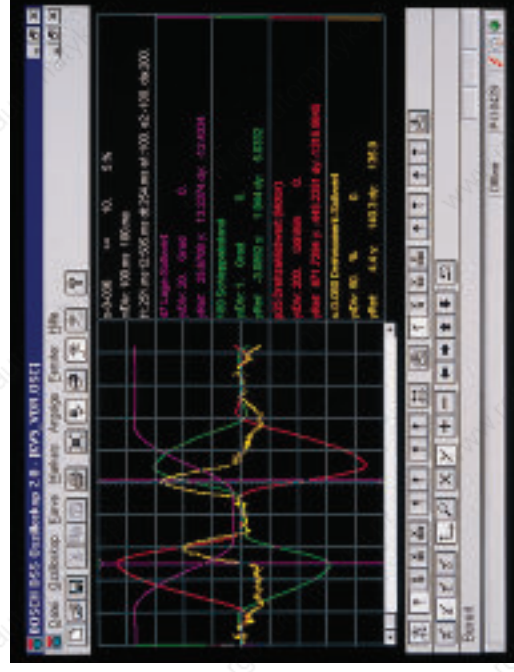
Requirements:

- IBM compatible PC
- Operating system Windows Version 3.1 / 3.11 / 95 or higher
- 4 MB working memory
- 15 MB free hard disk capacity
- Unused COM interface

The system furnishes access to the following individual functions:

- BUS master parameters
- Parameters for BUS initialization
- Parameters for optimizing controller performance
- Motor parameters, refer to Fig. 1
- Sensor parameters
- Operating data
- Oscilloscope function, refer to Fig. 2
- Display of static and dynamic module status
- Parameters for motion-control functions, refer to Fig. 3

Abb. 2: Oscilloscope

Abb. 3:
Motion Control
User interface

16