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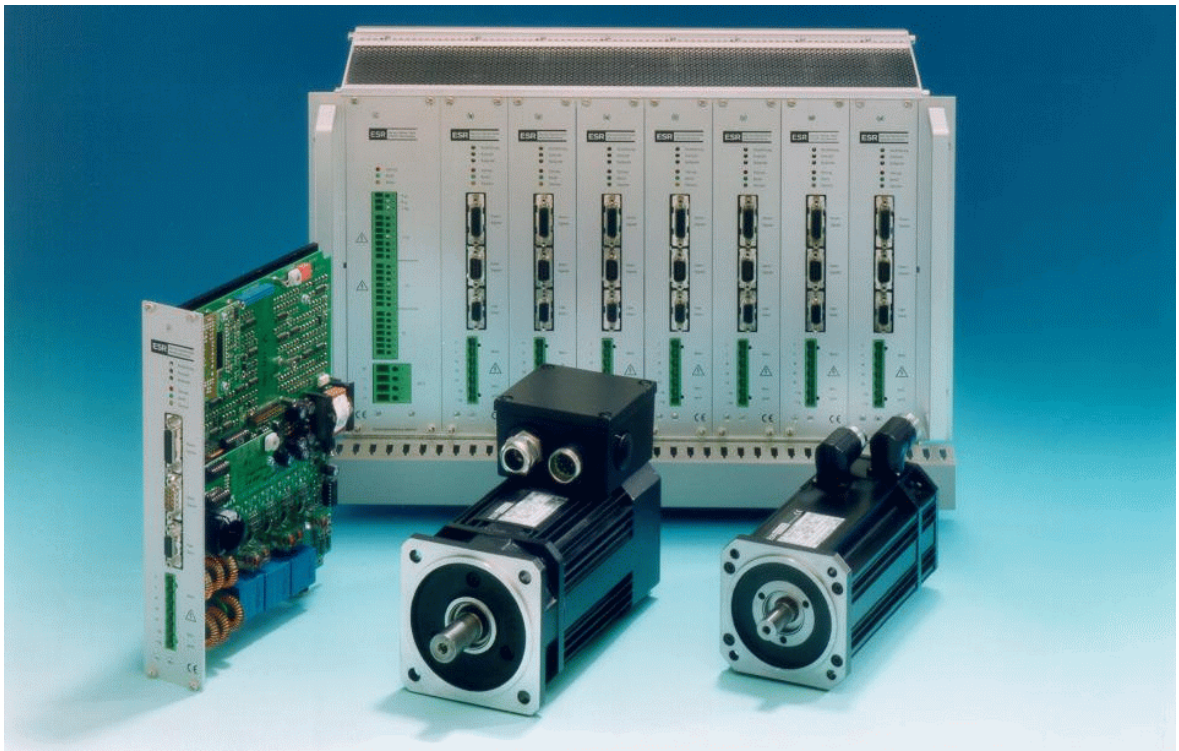
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MIDIDRIVE SERVO DRIVES

Analog AC servo drives with sinusoidal commutation
Servo amplifiers in compact or 19" design, 6 height units
Servo motors with high power density up to 12 Nm / 2.6 kW



Servo amplifiers in compact design BN 6669 (12 A) and BN 6663 (3 A), motors MR 4



Multi-axis servo amplifiers in 19" design (in this example: 7 axes, 1.5 .. 12 A), motors MR 4

Products, consulting and service

ESR drive packages consist of servo amplifiers, servo motors, position sensors, gear boxes and brakes. They are supplemented by power supply units (if not already built-in in the amplifier), connectors and cables (ready-assembled on request). All parts of the package are matched and have been tested as combinations. The delivery of the complete drive system from a single source guarantees smooth installation, reliable operation and definite system responsibility on the part of one single supplier.

Our service offer includes individual drive system determination. With our long-standing experience we support you at choosing the right servo drive for your application.

Applications

Positioning and feed movements with high dynamics and accuracy in

- Handling and assembly systems
- Optical discs production machinery
- Packaging machinery
- Textile machinery
- Plastics processing machines
- Coiling machines
- Flame cutting machinery
- Measuring and testing machinery
- Electronics production machinery
- ...

Main characteristics

Five power classes

Servo amplifier		Servo motor	
I_N	U_{Zk}	M_N	P_N
1.5 A	320 V	up to 0.5 Nm	up to 0.2 kW
3 A	320 V	up to 2 Nm	up to 0.4 kW
6 A	320 V	up to 5 Nm	up to 1.0 kW
9 A	320 V	up to 10 Nm	up to 2.0 kW
12 A	320 V	up to 12 Nm	up to 2.6 kW

Characteristics of the drive packages

- High quality drive packages consisting of amplifier, motor and accessories
- High dynamics because of motors with low weight-to-power ratio and controllers with highest dynamics
- Smooth running even at low speed because of sinusoidal commutation
- Encoder emulation with 16 selectable pulse numbers: 50 to 1024 pulses per revolution
- Holding control loop can make a brake superfluous: full torque at standstill without drift (optional)
- High safety: position sensor cable break detection
- Operation monitoring by fault signal in case of motor blocking
- Integrated EMC (CE marked) and detailed operating instructions
- Options for amplifier and motor for easy adaption to different applications

Characteristics of the servo amplifiers

- Compact or 19" design
- Easy wiring, all connections can be plugged in at the front
- High performance with compact dimensions thanks to use of surface mounting devices (SMD) and latest power transistors (IGBTs)
- Easy commissioning due to adjustable feedback, speed, offset. Current limit selectable with 16-position rotary switch.
- No re-adjustment necessary when the amplifier is replaced thanks to plug-in customer module with all setting components
- Easily adapted to non-standard applications with plug-in option modules
- Rapid acceleration, deceleration and reversing of the servo motor by momentary current increase to 2.4 times the rated current
- No noise with switching frequency well above audible range
- Control supply voltage fed either by the bus voltage or by external supply, e. g. to retain position information in an emergency stop
- Safe operation thanks to monitoring and protection circuit with fault memory for short-circuit, earth leakage, amplifier or motor overheating, motor blocking, resolver error, and voltage fault
- Amplifier and motor protected by adjustable current limit

- Safety with position sensor fault and open circuit monitoring
- Easy error diagnosis with LEDs for fault, ready and overload
- Load and speed monitoring with current and speed monitor outputs
- Also available adapted to motors of other manufacturers

Characteristics of the MR 4 servo motors

- Maintenance-free, since brushless
- High dynamics
- Wide speed range
- Degree of protection IP 65
- Insulation according to insulation class F, DIN VDE 0530, withstanding tropical conditions
- High power density through rotor with rare earth magnets
- Ball bearings with grease filling for 20,000 operating hours
- Integrated resolver for sinusoidal commutation
- Overtemperature protection by integrated PTC resistor
- Connection via connectors for position sensor and motor, terminal box for motors MR 42 or higher
- Self-cooling, on request forced-air cooling
- Design with flange according to DIN 42 677, installation position as required
- Form according to DIN IEC 34 part 7, IM B 5, IM B 35
- Bearing plates and housings made of high-quality light metal alloy
- Rotor dynamically balanced according to vibration severity grade R, on request S
- Standard shaft end without groove, special version possible, e. g. with keyway
- Special motors, e. g. short motors, hollow-shaft design available

Characteristics of the gear boxes

- Helical gears in standard design 1 : 6 to 1 : 129
- Planetary gears, one-, two or three-stage, low backlash on request, gear ratio 1 : 3 to 1 : 175
- Output torque up to 2400 Nm
- Special gears, e. g. worm gears or bevel gears, gears with hollow shafts

Design of the servo amplifiers

One PCA – basis for two designs

The MidiDrive servo amplifiers are designed in modern SM technology on a printed circuit assembly (PCA) in extended double euroboard format. The PCA has slots for the customer module and for further modules which can be installed as required. Based on this PCA the servo amplifiers are available in two different designs:

- compact design for installation in control cabinets, complete with power supply and integrated RFI-filter
- 19" design, 6 height units (262 mm) (7 height units with fan) for installation in control cabinets or 19" racks

Compact design

The MidiDrive amplifiers in compact design are installed in a sheet steel box together with the power supply as a compact unit. This design is used preferentially in case one or a few servo amplifiers have to be installed in a control cabinet.

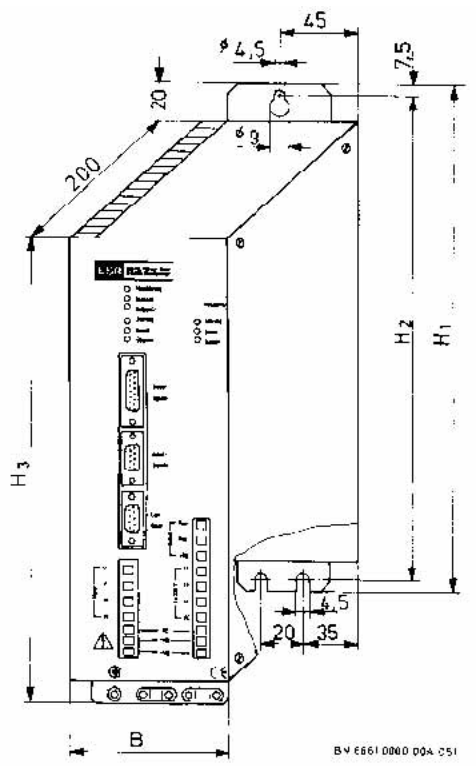
The amplifier has to be connected to 3 × 400 V or 3 × 480 V three-phase mains using an isolating transformer. The conformity to EMC limits according to EN 55011, class A and B, is realized through a built-in RFI-filter.

The devices for continuous currents of up to 6 A can be used with natural convection cooling, the devices for continuous currents of 9 A or higher have built-in fans fed by the internal voltages.

19" design

The MidiDrive servo amplifiers in 19" design are used in case several servo amplifiers have to be installed in a control cabinet or 19" rack (multi-axis application). Each 19" plug-in module servo amplifier is assigned to one axis. The amplifiers have to be fed by a 19" power supply plug-in module. Chassis with and without fans are available to accommodate several MidiDrive plug-in modules. The servo amplifiers in 19" design comprise the following components which can be supplied separately or as complete systems:

- servo amplifier as 19" plug-in module, 6 height units high, 10 units wide, front connection
- power supply as 19" plug-in module, 6 height units high, 14 units wide, for the supply of several amplifiers



Order number servo amplifier	Dimension (mm)			
	B	H_1	H_2	H_3
BN 6661, BN 6663, BN 6665	85	275	260	255
BN 6667, BN 6669	95	305	290	270

Fig. 1: Servo amplifier in compact design, mounting dimensions (mm)

- synchronization unit as 19" plug-in module, 6 height units high, 4 units wide, for synchronous running of two drives
- 19" chassis with fan, 7 height units high, for installation in 19" racks or for mounting on the control cabinet mounting plate, 84 units wide for up to 7 amplifier plug-in modules and 1 power supply, or 54 units wide for up to 4 amplifier plug-in modules and 1 power supply (other types, e. g. without fan, on request).

As with the compact design, the connection to 3 × 400 V or 3 × 480 V three-phase mains is carried out by using an isolating transformer. The RFI-filter for compliance with EMC limits in accordance with EN 55011, classes A and B, has to be connected externally.

The devices for continuous currents of up to 3 A can be used with natural convection cooling, the devices for continuous currents of 6 A or higher need fans as provided by the appropriate chassis.

Mains connection and options E0, E1

While the MidiDrive servo amplifiers in compact design have built-in power supplies, the MidiDrive servo amplifiers in 19" design require a special power supply. It can supply 2 to 7 amplifiers, depending on the power of the amplifiers.

The load factor gives the number of amplifiers that can be connected. You will find it in the technical specifications for the amplifiers, the power supplies and the mains transformers. The following applies:

- When all amplifiers are being operated simultaneously at full load, the sum of their load factors must not exceed the load factor of the power supply and the one of the mains transformer.
- When not all amplifiers are being operated simultaneously at full load, (which is frequently the case with servo drives), the total load factor is the sum of the load factors of the amplifiers being operated simultaneously.
- When amplifiers are operated under part load only, their load factors are reduced for purposes of the calculation in proportion to the part load.

Example:

- The BN 6674 MidiDrive amplifier has a load factor of 16, the BN 3180 power supply has a load factor of 75; this means that this power supply can run 4 of these amplifiers simultaneously at full load and still has plenty of reserve. For 4 of these amplifiers the transformer BN 3822 with a load factor of 75 has to be used as mains transformer.

The 19" plug-in module power supply BN 3180 is designed in the same way as the servo amplifiers. It contains the mains rectifier, the charging capacitors, the monitoring circuit, and the shunt regulator with a shunt resistor sufficient for common servo applications. Alternatively, an external shunt resistor can be connected.

The power supply has to be connected 3 × 400 V or 3 × 480 V three-phase mains by using an isolating transformer. For connection to other mains voltages special transformers are available.

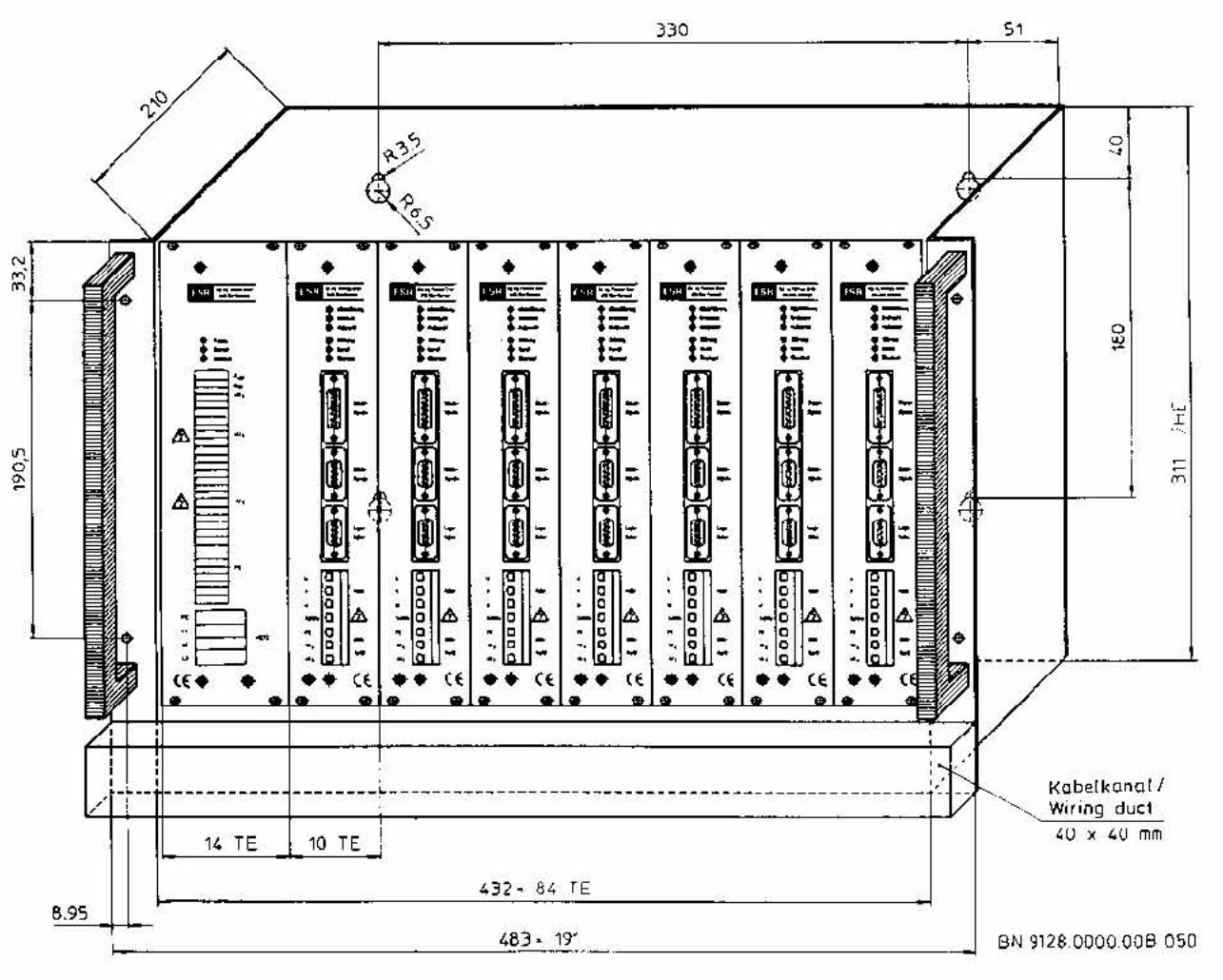


Fig. 2: Multi-axis servo amplifiers in 19" design; mounting dimensions (mm)

The standard mains transformers are designed for MidiDrive servo amplifiers in compact design and 19" design. The required power is calculated according to the load factors of the servo amplifiers.

Several servo amplifiers in compact design and several power supplies in 19" design can be connected to one mains transformer if permissible by the load factors of the servo amplifiers.

In 19" design, a RFI-filter for compliance with EMC limits in accordance with EN 55011, classes A and B, has to be switched behind the secondary winding of the mains transformer. The compact amplifier has a built-in RFI-filter, an external RFI-filter is not necessary.

The servo amplifier generates the internal low voltage for the control circuit from the bus voltage (standard version E0). If the control circuit should be active even with the bus or mains voltage switched off (e. g. in order to keep the position measurement alive), a variant of the servo amplifier can be used which has an input for the separate feeding of a supply voltage of 24 V DC (E1 option, without extra cost).

CE marking

The MidiDrive servo amplifiers meet the requirements of the EMC directive and the low voltage directive and thus bear the CE marking. The conformity to EMC limits according to EN 55011, class A and B, is realized through a built-in RFI-filter in case of the amplifiers in compact design and through an external RFI-filter which has to be switched be-

tween mains transformer and power supply in case of the devices in 19" design. The operating instructions explain the installation in detail. All MidiDrive servo amplifiers comply with the high immunity requirements in accordance with EN 50082 part 1 and 2.

Interfaces of the servo amplifiers

All connections can be plugged in at the front of the servo amplifiers in compact and 19" design. This allows a specially easy, clear, and low cost wiring. The trim potentiometers and the LEDs are also located at the front panel.

The following connectors are located at the front panel:
- motor and operating voltage (Combicon connector, 7-pin)
- control signals (SUB-D female connector, 15-pin)
- position sensor (resolver) (SUB-D female connector, 9-pin)
- encoder signals (encoder emulation, optional) (SUB-D male connector, 9-pin)

Easy controller adjustment with 3 trim potentiometers at the front panel:
- feedback
- speed
- offset

The operating mode of the servo amplifier is indicated by lighting up or blinking of 3 LEDs:
- ready
- overload
- fault

The operating mode of the power supply is indicated there by 3 LEDs:
- ready
- shunt
- fault

Functions of the servo amplifiers

Feedback control

MidiDrive servo amplifiers work with two control loops: the current control loop and the higher-level speed control loop. Since both control loops are realized in analog technology, the controller bandwidth is very high. The MidiDrive servo amplifier operates as current controller or as speed controller (with underlying current control loop) depending on the setting on the customer module (see below).

The servo amplifiers are designed for three-phase AC servo motors (permanent magnets in the rotor) with resolvers. The sinusoidal commutation provides smooth motor running even with low speeds and high dynamics.

Customer module

The set-up elements and the components for the application-specific controller settings are located on the plug-in customer module. When an amplifier is replaced, the customer module can be transferred to the new amplifier. By this the controller settings are kept and readjustment is not necessary (except offset).

Monitoring and protective circuits

Built-in monitoring and protective circuits protect servo amplifier and motor against damage even in extreme situations and switch off the drive in case of a fault. The circuits monitor:
- amplifier output for short circuit and earth fault
- amplifier overheating
- motor overheating
- position sensor signals for open circuit and short circuit of one or more resolver leads
- motor blocking for more than approx. 2 seconds
- faulty voltages

If one of these faults occur, the drive is stopped immediately. The fault is stored, displayed, and signalled. Missing or low operating voltage also leads to a fault. This fault is not stored, the drive will continue operation as soon as the operating voltage is sufficient again.

Speed and current can be traced and monitored using two analog outputs speed monitor and current monitor.

Adaptation using modules

Using pluggable modules and auxiliary units the MidiDrive servo amplifiers can be adapted to different applications. In addition to the customer module which is always fitted (see above) the following modules are available optionally:
- polarity module

- add-on module
- encoder module
- function module

See the servo amplifier type code on page 16 for an overview of the available modules.

Auxiliary units can be used for more complex applications, e. g.

- auxiliary unit for axis synchronization (only for 19" design)

The following sections describe the modules and the auxiliary unit in detail.

Polarity modules P1, P2

The levels of the switched inputs and outputs can be adapted to different controller types using the polarity module. There are two possibilities for the signal polarity of the servo amplifier's switched inputs and outputs:

- switch to neutral or
- switch to plus

Especially programmable logic controllers (PLC) switch to plus, usually to a control voltage of +24 V, and the loads are on neutral.

The servo amplifiers described here are available for both polarities of the input and output signals. In the standard version, the output transistors switch to neutral and the input loads to plus. The PLC-compatible version (P1 or P2 option) has a plug-in polarity module which reverses the switch directions of the inputs and outputs.

Add-on modules Z1, Z2, Z4

The standard version of the MidiDrive servo amplifier (Z0 option) has no add-on module, as it is not necessary for operation. Additional circuits for extra features, e. g.

- two direction-dependent limit switches acting like brakes
- setpoint ramp
- stall monitoring by "Motor standstill" output
- input for current reduction
- input for speed direction reversal

are integrated on a pluggable add-on module (Z1, Z2, Z4 option), see the servo amplifier type code on page 16 for further details.

Encoder modules G1 .. G4

The encoder module can be added for generating encoder signals. It digitally analyzes the resolver signals and outputs encoder signals corresponding to the pulses of an incremental encoder (two pulses shifted by 90° and index pulse). Thus no incremental encoder is needed on the motor. Using a rotary switch, one of the following 16 pulse numbers (incremental encoder pulses per revolution) can be selected:

- 128, 256, 512, 1024,
- 50, 100, 200, 250, 500, 1000,
- 60, 90, 180, 360, 720, 900

Other pulse numbers are also available on request. The pulses are generated by 5 volts line drivers (RS 422 compatible; G1 and G3 options). A version with 24 volts pulse output is also available (G2 and G4 options). With the G3 and G4 options the index pulse can be shifted in 256 steps within one motor revolution.

If the control circuit of the MidiDrive servo amplifier is fed by an external 24 V power supply (E1 option, details see section "Mains connection and options E0, E1", page 4), the position information is saved even when the bus voltage is switched off.

The pulse output can be used for connecting positioning controls as well as digital tachometers for monitoring the motor speed.

Function modules

Various functions, including customer-specific functions, can be implemented on the function module. The standard function modules "Holding function" and "Field weakening mode" are described in the following.

Function module F1 "Holding function"

The "Holding function" module allows the motor to stop without drift at full stall torque, which is normally not feasible with common analog servo drives. When the "Hold" input is turned on, a holding control loop closed via the resolver is activated and holds the motor digitally in the position it was in at the time of the hold command. The resolution of the holding control loop is 4096 increments per revolution. If the hold command is given while the motor is still turning, the internal holding control loop stores the position of the motor at the time of the command. It returns the motor to this position as long as it has overrun the position by less than

one complete revolution because of inertia. This allows easy positioning solutions.

In many cases the holding control loop can render a holding brake unnecessary, which is often used to hold the motor. A brake is only necessary where safety aspects require its use.

Function module F2 “Field weakening mode”

With the “Field weakening mode” module the attainable speed of the motor can be increased by some 10% beyond the rated speed at reduced torque. The increase of the speed is achieved by a phase shift of the motor current at higher speed.

Auxiliary unit for axis synchronization

For synchronizing two MidiDrive servo drives an auxiliary unit is available in 19" design. It measures the difference in angle between a master and a slave axis and generates a correction signal for the amplifier of the slave axis. The drives thus run at synchronized angles and hence at precisely the same speed. By continuous feedback control and adding a signal proportional to the speed of the master axis the angular accuracy is high even at high change of speed.

The synchronization unit only needs the speed setpoint as input. From this, the unit generates the signals necessary to control the two axes. It is fed by the amplifiers’ power supplies.

If an adjustable warning threshold is exceeded a warning signal is set, if the maximum permissible angular error of approx. 180° is exceeded a fault signal is set and the drives are disabled in case of a fault.

For special applications up to 5 outputs are available which switch according to the position of the master axis. The standard values for the switching ranges are stored in an EPROM. Application-specific values can be programmed here as well.

The synchronization unit is available as a 19" plug-in module and is installed in a chassis together with the amplifiers in 19" design.

Overview on functions and characteristics

Control

Speed control or current control (selectable on the customer module), sinusoidal commutation (resolver as motor position sensor and speed sensor)

- additional with Z1 option: adjustable ramps 7 msec .. 70 msec per volt setpoint step
- additional F1 option: holding control loop (stop with stall torque without drift)
- additional F2 option: field weakening mode for speed control

Current limiting

I^2t circuit, peak current approx. 2.4 times continuous current. Current limit adjustable in 16 steps with rotary switch

- additional Z2 option: current limit adjustable via analog input

Monitoring and protecting

Safe operation thanks to monitoring and protection circuit with fault memory for short-circuit, earth leakage, amplifier or motor overheating, motor blocking, resolver error, and voltage fault

Analog inputs

Setpoint ±10 V (speed or current) via differential amplifier

- additional Z2 option: current limit 0 .. +10 V

Analog outputs

Speed monitor ±7 V for maximum speed, current monitor ±10 V for maximum peak current

Switching inputs

“Controller enable” (with Z1, Z2 options: braking), “Reset fault”;

- additional Z1 option: 2 limit switches (direction-dependent, acting like brakes)
- additional Z2 option: “Setpoint reversal”
- additional F1 option: “Hold” (stop with stall torque without drift)

Input levels

all inputs switch to neutral

- P1, P2 options: all inputs PLC compatible, switch to +24 V

Switching outputs

“Fault signal” (P2 option: ready), “Overload”

- additional Z1, Z2 options: “Motor standstill” or “Power circuit ready”

Output levels

all outputs switch to neutral

- P1, P2 options: all outputs PLC compatible, switch to +24 V

Position output

19" design: “Position” (12 bit TTL), for axis synchronization

Encoder emulation with 16 selectable pulse numbers

- G1 option: 5 V push-pull, fixed index pulse
- G2 option: 24 V signals, fixed index pulse
- G3 option: 5 V push-pull, adjustable index pulse
- G4 option: 24 V signals, adjustable index pulse

Trim potentiometer

“Feedback”, “Speed”, “Offset”

- additional F1 option: “Holding control loop feedback”

LEDs

“Ready”, “Overload”, “Fault”

Accessories

- Motor and resolver/encoder connection cables
  – shielded connection cables for connection of the motor and resolver, also ready-assembled cable sets on request
- Connector sets
  – comprising the matching SUB-D male or female connectors with screwable metallized housings and the Combicon female connectors
- Motor chokes
  – for motor cable lengths of more than 7 m
- Chassis for devices in 19" design
  – 84 or 54 width units wide, with fan, 7 height units; other variants on request

  Ready-assembled multi-axis servo amplifiers are available using these chassis.
- RFI-filter for devices in 19" design
  – for conformity to EMC limits according to EN 55011, class A and B. Note: the servo amplifiers in compact design already have built-in RFI filters.

The tables starting from page 13 give an overview on the accessories.

Drive packages (selection), most important technical specifications

Motor frame size DIN/IEC	Motor order number	Speed (r.p.m.)	Rated torque (Nm)	Stall torque (Nm)	Peak torque (Nm)	Shaft power (kW)	Amplifier order number
	MR 4030-U3-N60-L0..	6000	0.3	0.4	1.1	0.2	BN 6661
	MR 4045-U3-N60-L0..	6000	0.5	0.6	1.2	0.3	BN 6670
45	MR 4104-U3-N60-L0..	6000	0.5	0.7	2.2	0.3	BN 6663
	MR 4108-U3-N50-L0..	5000	1.0	1.4	3.2	0.5	BN 6672
	MR 4204-U3-N30-L0..	3000	2.1	2.1	7.3	0.7	BN 6665
63	MR 4212-U3-N20-L0..	2000	5.2	5.2	12.4	1.2	BN 6674
	MR 4206-U3-N60-L0..	6000	2.8	3.2	7.6	1.8	BN 6667
	MR 4212-U3-N30-L0..	3000	4.8	4.9	11.6	1.5	BN 6676
	MR 4308-U3-N20-L0..	2000	9.7	9.9	22.0	2.0	
80	MR 4306-U3-N30-L0..	3000	6.5	7.0	13.3	2.0	BN 6669
	MR 4312-U3-N20-L0..	2000	12.3	12.7	20.3	2.6	BN 6678
	MR 4316-U3-N30-L0..	3000	7.5	7.6	13.1	4.6	

In addition to the motors listed above, there are a number of further motors available. The rated torque refers to the rated speed given above. Higher torque is reached at a lower speed. We would be ready to assist you in choosing the most favorable combination for your particular application. We shall be pleased to calculate and configure the drive system in cooperation with the customer.

Servo amplifiers in compact design, most important technical specifications

Servo amplifier order number (compact design)	BN 6661	BN 6663	BN 6665	BN 6667	BN 6669
Rated AC side voltage * (50 .. 60 Hz)	3 × 230 V AC (+10%)				
Minimum mains voltage	3 × 120 V AC				
Bus voltage	320 V DC (min. 160 V DC, max. 420 V DC)				
Rated current (rms value)	1.5 A	3 A	6 A	9 A	12 A
Maximum peak current (crest value)	5 A	10 A	20 A	30 A	30 A
Current limiting adjustable from... to...	0.4..1.5 A	0.8..3 A	1.5..6 A	2.3..9 A	3..12 A
Load factor (in conjunction with mains transformer)	4	8	16	24	32
Integration time of the I^2t circuit at max. peak current	approx. 2 s				
Maximum continuous braking power	50 W				
Pulse braking power	1200 W at 2% switch-on duration, 2 sec				
Setpoint value	±10 V at 20 kΩ				
Operating range of speed trimmer	1 : 7				
Switching frequency / current ripple	16 kHz / 32 kHz				
Auxiliary voltage outputs	+15 V and –15 V (±10%), max. load 10 mA each				
For option E1: external control circuit supply	24 V DC –15+25%, 0.2 A				
Climatic category (DIN EN 50178) operation / storage / transport	3K3 / 1K4 / 2K3				
Permissible ambient temperature in continuous operation	50 °C				
Width	85 mm			95 mm	
Height (without/with mounting straps)	240 / 275 mm			270 / 305 mm	
Depth (without connectors)	200 mm				
Weight	3.5 kg			4.0 kg	

* via isolating transformer to 3 × 400 V or 3 × 480 V AC

Servo amplifiers in 19" design, most important technical specifications

Servo amplifier order number (19" design)		BN 6670	BN 6672	BN 6674	BN 6676	BN 6678
Rated AC side voltage * (50 .. 60 Hz)		3 × 230 V AC (+10%)				
Minimum mains voltage		3 × 120 V AC				
Bus voltage		320 V DC (min. 160 V DC, max. 420 V DC)				
Rated current (rms value)		1.5 A	3 A	6 A	9 A	12 A
Maximum peak current (crest value)		5 A	10 A	20 A	30 A	30 A
Current limiting adjustable from... to...		0.4..1.5 A	0.8..3 A	1.5..6 A	2.3..9 A	3..12 A
Load factor (in conjunction with mains transformer)		4	8	16	24	32
Integration time of the I^2t circuit at max. peak current		approx. 2 s				
Setpoint value		±10 V at 20 kΩ				
Operating range of speed trimmer		1 : 7				
Switching frequency / current ripple		16 kHz / 32 kHz				
Auxiliary voltage outputs		+15 V and –15 V (±10%), max. load 10 mA each				
For option E1: external control circuit supply		24 V DC –15+25%, 0.2 A				
Climatic category (DIN EN 50178) operation / storage / transport		3K3 / 1K4 / 2K3				
Permissible ambient temperature in continuous operation	without fan	50 °C	40 °C	not permissible		
	with fan	55 °C	55 °C	50 °C	45 °C	40 °C
Width		10 width units (50.8 mm)				
Height		6 height units (262 mm)				
Depth (without connectors)		195 mm				
Weight		1.3 kg				

* via isolating transformer to 3 × 400 V or 3 × 480 V AC, power supply BN 3180 required additionally

Accessories

Description	Order number
Cable sets (ready-assembled motor and resolver/encoder connection cable)	on request
Motor connection cable, 4 cores, cross-section 1.5 mm^2, shield	BN 8817
Motor connection cable, 4 cores, cross-section 2.5 mm^2, shield	BN 8823
Connection cable for motor with brake, 4 × 1.5 mm^2 + 2 × 1 mm^2, shield	BN 8820
Connection cable for motor with brake, 4 × 2.5 mm^2 + 2 × 1 mm^2, shield	BN 8824
Resolver/Encoder connection cable, 8 cores, twisted pair, shield	BN 8818
Motor choke with terminals and enclosure, for cable length 7 to 25 m, up to 10 A	BN 3845.2258
Motor choke with terminals and enclosure, for cables longer than 25 m, up to 12 A	BN 3857.2311
Connector set for MidiDrive servo amplifier	
• in compact design without encoder module option	ST 6660
• in compact design with encoder module option	ST 6661
• in 19" design without encoder module option	ST 6612
• in 19" design with encoder module option	ST 6613
Synchronization unit (19" plug-in module)	BN 1455.2353
Connector set for 2 MidiDrive amplifiers and one synchronization unit	EV 1455
Ferrite ring for interference suppression of supply cables	BN 3859
RFI-filter for 19" amplifiers, 16 A	BN 3841.2302
RFI-filter for 19" amplifiers, 36 A	BN 3856.2309
Shield connection plate	BN 8659

19" chassis

Description	Order number
Chassis, empty, for installation in 19" racks, mounting flanges and handle at the front (see fig. 2, page 5)	
• for up to 7 MidiDrive servo amplifiers and 1 power supply, 7 units high, 84 width units wide, with fans	BN 8650.2361
• for up to 7 MidiDrive servo amplifiers and 1 power supply, 6 units high, 84 width units wide, without fans	BN 8650.0001
Chassis, empty, for installation on mounting plates, mounting flanges at the back, no handles	
• for up to 7 MidiDrive servo amplifiers and 1 power supply, 7 units high, 84 width units wide, with fans	BN 8656.2756
• for up to 4 MidiDrive servo amplifiers and 1 power supply, 7 units high, 54 width units wide, with fans	BN 8656.1996
• for up to 7 MidiDrive servo amplifiers and 1 power supply, 6 units high, 84 width units wide, without fans	BN 8656.2772
• for up to 4 MidiDrive servo amplifiers and 1 power supply, 6 units high, 54 width units wide, without fans	BN 8656.2771
Customer-specific chassis	on request

Power supply 19" design, technical specifications

Power supply 19" design order number	BN 3180.1206
Rated AC side voltage * (50 .. 60 Hz)	3 × 230 V AC +10% (min. 3 × 120 V)
For bus voltage	320 V DC
Load factor	75
Maximum continuous braking power	50 W
Peak braking power	1200 W at 2% switch-on duration, 2 sec
Width	14 units (71 mm)
Height	6 height units (262 mm)
Depth (without connectors)	195 mm
Weight	1.3 kg

* via isolating transformer to 3 × 400 V or 3 × 480 V AC

Mains transformers, technical specifications

Transformer order number	BN 3816	BN 3818	BN 3820	BN 3822
Mains connection (primary) *	3 × 400 V AC			
Output voltage	3 × 230 V AC			
Load factor (power supply dimensioning)	12	25	35	75
Rated output	1.2 kVA	2.5 kVA	3.5 kVA	7.5 kVA
Line-side fuses (primary)	3 × 4 A T	3 × 6 A T	3 × 10 A T	3 × 16 A T
Matching RFI-filter **	BN 3841.2302			BN 3856.2309
Length	200 mm	240 mm	260 mm	340 mm
Width	123 mm	155 mm	150 mm	194 mm
Height	175 mm	205 mm	225 mm	284 mm
Weight	14 kg	25 kg	31 kg	63 kg

* other voltages, e. g. 3 × 480 V AC, on request

** required only with 19" design

MidiDrive servo amplifier type code

Example ⇨ BN 6663.2537-N2-K4-Z1-P1-G1-F0-E1-S0

⇩

63

Design
- 6x compact device
- 7x 19" plug-in module

Continuous output current
- 61, 70 output current 1.5 A_{rms}
- 63, 72 output current 3 A_{rms}
- 65, 74 output current 6 A_{rms}
- 67, 76 output current 9 A_{rms}
- 69, 78 output current 12 A_{rms}

2537

Assembly code (Bauvorschrift, BV)
Assembly code (BV): Company-internal coding is given for various feature combinations. The BV specification need not be given if all other features are given and the customer-specific fittings are described. “6663-N2-K4-Z1-P1-G1-E1” would be sufficient for the above example.

N2

Power supply
- N0 no power supply, external power supply BN 3180.1206 needed (standard with 19" design)
- N2 power supply, 3-phase 3 × 230 V (standard with compact design)

K4

Controller switching (customer module and jumpers)
- K0 none (device not ready for operation)
- K1 2-pole-pair motor, speed control 3,500 min^{-1}
- K2 2-pole-pair motor, speed control 7,000 min^{-1}
- K3 2-pole-pair motor, current control
- K4 3-pole-pair motor, speed control 3,500 min^{-1}
- K5 3-pole-pair motor, speed control 7,000 min^{-1}
- K6 3-pole-pair motor, current control
- KA 3-pole-pair motor, speed control 10,500 min^{-1}
- KB 3-pole-pair motor, speed control 14,000 min^{-1}
- KK customer-specific

Z1

Additional equipment through add-on modules
- Z0 none (standard)
- Z1 limit switch, ramp, controller inhibit braking
- Z2 external current limiting, rotation reversal
- Z4 limit switch, P+I/I-lim., controller inhibit braking
- ZK customer-specific

P1

Input/output polarity (polarity module)
- P0 switching towards zero (standard)
- P1 PLC-compatible, “fault” output
- P2 PLC-compatible, “ready” output
- PK customer-specific

G1

Additional equipment through encoder modules
(incremental encoder emulation)
- G0 no pulse outputs (standard)
- G1 pulse outputs, 5 V push-pull signals RS 422
- G2 pulse outputs, 24 V
- G3 pulse outputs, with index pulse shift, 5 V push-pull signals RS 422
- G4 pulse outputs, with index pulse shift, 24 V
- GK customer-specific

F0

Additional equipment through function modules
- F0 none (standard)
- F1 holding control loop
- F2 field weakening operation
- FK customer-specific

E1

Supply of control circuit (cannot be refitted)
- E0 internal supply from DC-bus (standard)
- E1 through external 24 V, e. g. for position retention

S0

Special equipment (customization)
- S0 none (standard)
- S2 reinforced terminals (20 A)
- SK customer-specific, explained by text

The facts given in this data sheet are for information only and are no guarantee of properties. We reserve the right to make changes without notice.

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