ACCESSORIES FOR SERVO DRIVE SYSTEMS

MOTOR SUPPLY CABLES, ENCODER CONNECTION CABLES
READY-ASSEMBLED CABLES, CONNECTOR SETS
SHUNT RESISTORS, MOTOR CHOKES, LINE CHOKES

Products, Consultation, Service

ESR drive packages consist of servo drives, optionally with fieldbus interface and positioning control, and servo motors with or without gearboxes, completely with position sensors and, if required, brakes. They are supplemented by software and accessories. All parts of the packages are matching and have been tested as combinations. This delivery from a single source guarantees trouble-free commissioning, reliable operation, and a definite system responsibility on the part of only one supplier.

Our services include an individual drive system configuration. With many years of experience, we will be pleased to assist you at choosing the appropriate servo drive for your application.

Features of the ESR Accessories:

Specially selected accessories for servo applications with ESR servo drive systems

- Supply cables particularly suitable for moving drives and application in cable drag chains as well as for fixed installation
- EMC compatible design, shielding for interference-free operation and compliance with the CE directives
- Cables resistant against coolants and lubricants
- Wide operating temperature range
- UL certification

Motor Supply Cables (Power)

The motor supply cables can be used for connecting a motor (power) to the servo drive. The additional cores of the cables can be used e. g. for connecting a motor temperature sensor and/or a brake.

Motor Supply Cables Without Additional Cores

Motor Supply Cable	BN 8817	BN 8823	BN 8825	BN 8827
Type	AC			
Structure	4 single cores			
Cross-section (mm^2)	(4 × 1.5)	(4 × 2.5)	(4 × 4.0)	(4 × 6.0)
Color coding	gn/ye, 3 × bk (1, 2, 3)			
Conductor class	according to DIN VDE 0295, class 6			
Total shield	Cu braiding, tin-plated, coverage approx. 80%			
Outer sheath	polyurethane orange, RAL 2003, with imprint			
Outer diameter (max.)	10.4 mm	12.0 mm	13.5 mm	15.8 mm
Operating temperature – fixed installation – trailing use	–50 .. +80 ºC –30 .. +70 ºC			
Min. bending radius for single bending, fixed installation (approx.)	60 mm	70 mm	68 mm	92 mm
Min. bending radius for cont. altern. bending, trailing use (approx.)	100 mm	120 mm	122 mm	170 mm
Rated motor current up to approx.	12 A	20 A	25 A	35 A
Operating voltage	600/1,000 V		500/750 V	600/1,000 V
Test voltage power cores	4 kV		3 kV	4 kV
UL certification	yes			

Note: The technical specifications of the cables may vary. The data stated in this data sheet are values we can definitely meet. Please, contact us if you need cables with special features such as a particularly small outer diameter or a particularly low bending radius.

Please note the maximum cable lengths. For longer motor supply cables, a motor choke must be installed in the motor supply cable, if required. For further information see the operating instructions of the corresponding servo drive.

For connector sets with corresponding connectors, see page 8.

Ready-assembled cables are also available. For an overview of the cables to be used for the respective servo drive and the corresponding ready-assembled cables, see page 6 of this data sheet.

Motor Supply Cable With One Additional Pair of Cores, e. g. for Connecting a Motor Temperature Sensor or a Brake:

Motor Supply Cable	**BN 8820**	**BN 8824**	**BN 8826**	**BN 8828**
Type	AC			
Structure	4 single cores and 1 pair of cores			
Cross-section (mm^2)	(4 × 1.5 + (2 × 1.5))	(4 × 2.5 + (2 × 1.5))	(4 × 4.0 + (2 × 1.5))	(4 × 6.0 + (2 × 1.5))
Color coding	gn/ye, 3 × bk (U, VV, WWW); 1 × wh, 1 × bk			
Element shield	Cu cover, tin-plated			
Conductor class	according to DIN VDE 0295, class 6			
Total shield	Cu braiding, tin-plated, coverage approx. 80%			
Outer sheath	polyurethane orange, RAL 2003, with imprint			
Outer diameter (approx.)	12.9 mm	14.2 mm	15.3 mm	17.8
Operating temperature – fixed installation – trailing use	–50 .. +80 ºC –20 .. +60 ºC			
Min. bending radius for single bending, fixed installation (approx.)	81 mm	92 mm	102 mm	117 mm
Min. bending radius for cont. altern. bending, trailing use (approx.)	125 mm	140 mm	150 mm	195 mm
Rated current motor up to approx.	12 A	20 A	25 A	35 A
Operating voltage	600/1,000 V			
Test voltage power cores	4 kV			
Test voltage control cores	2 kV			
UL certification	yes			

Note: The technical specifications of the cables may vary. The data stated in this data sheet are values we can definitely meet. Please, contact us if you need cables with special features such as a particularly small outer diameter or a particularly low bending radius.

Please note the maximum cable lengths. For longer motor supply cables, a motor choke must be installed in the motor supply cable, if required. For further information see the operating instructions of the corresponding servo drive.

For connector sets with corresponding connectors, see page 8.

Ready-assembled cables are also available. For an overview of the cables to be used for the respective servo drive and the corresponding ready-assembled cables, see page 6 of this data sheet.

Motor Supply Cable With Two Additional Pairs of Cores, e. g. for Connecting a Motor Temperature Sensor and a Brake:

Motor Supply Cable	BN 8830	BN 8831	BN 8832	BN 8833	BN 8802
Type	AC				DC
Structure	4 single cores and 2 pairs of cores				
Cross-section (mm^2)	(4 × 1.5 + 2 × (2 × 0.75))	(4 × 2.5 + 2 × (2 × 1.0))	(4 × 4 + (2 × 1.0) + (2 × 1.5))	(4 × 6 + (2 × 1.0) + (2 × 1.5))	(4 × 1.0 + 2 × (2 × 0.75))
Color coding	gn/ye, 3 × bk (1, 2, 3); 2 × bk (5, 6), 2 × bk (7, 8)				
Element shield	Cu braiding, tin-plated				
Conductor class	according to DIN VDE 0295, class 6				
Total shield	Cu braiding, tin-plated, coverage approx. 80%%				
Outer sheath	polyurethane orange				
Outer diameter (approx.)	12.9 mm	15.4 mm	17.9 mm	18.5 mm	12.3 mm
Operating temperature – fixed installation – trailing use	–50 .. +80 ºC –20 .. +60 ºC				
Min. bending radius for single bending, fixed installation (approx.)	91 mm	108 mm	126 mm	129 mm	87 mm
Min. bending radius for cont. altern. bending, trailing use (approx.)	129 mm	154 mm	179 mm	184 mm	123 mm
Rated current motor up to approx.	12 A	20 A	25 A	35 A	8 A
Operating voltage	600/1,000 V				
Test voltage power cores	4 kV				
Test voltage control cores	2 kV				
UL certification	yes				

Note: The technical specifications of the cables may vary. The data stated in this data sheet are values we can definitely meet. Please, contact us if you need cables with special features such as a particularly small outer diameter or a particularly low bending radius.

Please note the maximum cable lengths. For longer motor supply cables, a motor choke must be installed in the motor supply cable, if required. For further information see the operating instructions of the corresponding servo drive.

For connector sets with corresponding connectors, see page 8.

Ready-assembled cables are also available. For an overview of the cables to be used for the respective servo drive and the corresponding ready-assembled cables, see page 6 of this data sheet.

Encoder Connection Cables

Encoder connection cables are used for connecting a motor position sensor to the servo drive. Cable BN 8818 should be used for connecting a resolver as well as for connecting incremental encoder signals (input or output encoder signals). When using a motor with resolver, the motor temperature sensor may also be connected with encoder connection cable BN 8818.

Other motor position sensors can be connected to the digital servo drives, as well. For connecting Sincos (Hiperface) encoders (option -R2 in the servo drive type code), encoder connection cable BN 8821 should be used. Encoder connection cable BN 8829 is suitable for connecting a high-resolution Heidenhain ERN 1185 or ERN 1387 encoder (option -R3) or an EnDat encoder (option -R4). With these encoders, the motor temperature sensor has to be connected via the motor supply cable.

Encoder Connection Cable	**BN 8818**	**BN 8821**	**BN 8829**
Suitable for	resolver, incremental encoder signals	Sincos (Hiperface) encoder	high-resolution incremental encoder, EnDat encoder
Structure	4 pairs of cores: (4 × 2 × 0.25 mm^2)	4 pairs of cores and 2 single cores: (4 × 2 × 0.25 mm^2 + 2 × 0.5 mm^2)	4 pairs of cores and 8 single cores: (4 × 2 × 0.14 mm^2 + (4 × 0.14 mm^2) + (4 × 0.5 mm^2)
Color coding	rd-bu, gy-pk, gn-ye, wh-bn	gn-bn, gy-pk, bu-vt, rd-bk; wh, bn	rd-bk, gy-pk, ye-vt, bn-gn; bu/bk, gn/bk, rd/bk, ye/bk; wh, bu, wh/gn, bn/gn
Total shield	Cu strand, tin-plated, coverage approx. 85%	Cu strand, tin-plated, coverage approx. 80%	Cu braiding, tin-plated, coverage approx. 85%
Outer sheath	polyurethane green or orange		
Outer diameter (approx.)	7.6 mm	8.8 mm	8 mm
Operating temperature – fixed installation – trailing use	 –50 .. +90 °C 0 .. +80 ºC	 –50 .. +80 ºC 0 .. +80 ºC	 –40 .. +80 ºC –10 .. +80 ºC
Min. bending radius for single bending, fixed installation (approx.)	38 mm	44 mm	40 mm
Min. bending radius for cont. altern. bending, trailing use (approx.)	76 mm	85 mm	100 mm
Operating voltage	300 V	300 V	on request
Test voltage	1.5 kV	1.5 kV	on request
UL certification	yes		

For connector sets with corresponding connectors, see page 8.

Ready-assembled cables are also available. For an overview of the cables to be used for the respective servo drive and the corresponding ready-assembled cables, see page 6 of this data sheet.

Assignment of Servo Drives to Connection Cables and Ready-Assembled Cables

The following tables provide an overview of the cables to be used for the respective servo drive and the corresponding ready-assembled cables.

Standard Types Motor Supply Cables (Power):

Servo Drive	Assembled Cable Order Number	Cable	With Additional Cores for ...
Digital Servo Drives			
TrioDrive D/xS			
BN 6755-R1 .. BN 6758-R1	EV 6756.4520.01	BN 8817	–
BN 6755-R1 .. BN 6758-R1	EV 6756.4672.01-BR	BN 8820	Brake
BN 6755-Rx .. BN 6758-Rx*	EV 6756.4676.01	BN 8820	Motor temperature sensor
BN 6755-Rx .. BN 6758-Rx*	EV 6756.4680.01-BR	BN 8830	Brake and motor temp. sensor
MidiDrive D/xS			
BN 6745-R1 .. BN 6747-R1	EV 6741.3103.01	BN 8817	–
BN 6745-R1 .. BN 6747-R1	EV 6741.3104.01-BR	BN 8820	Brake
BN 6745-Rx .. BN 6747-Rx*	EV 6741.3434.01	BN 8820	Motor temperature sensor
BN 6745-Rx .. BN 6747-Rx*	EV 6741.4385.01-BR	BN 8830	Brake and motor temp. sensor
BN 6748-R1	EV 6748.4925.01	BN 8823	–
BN 6748-R1	on request	BN 8824	Brake
BN 6748-Rx*	EV 6748.4965.01	BN 8824	Motor temperature sensor
BN 6748-Rx*	on request		Brake and motor temp. sensor
BN 6749-R1	on request		–
BN 6749-R1	on request		Brake
BN 6749-Rx*	on request		Motor temperature sensor
BN 6749-Rx*	on request		Brake and motor temp. sensor
TrioDrive D			
BN 6751-R1 .. BN 6753-R1	EV 6651.3671.01	BN 8817	–
BN 6751-R1 .. BN 6753-R1	EV 6651.3823.01-BR	BN 8820	Brake
BN 6751-Rx .. BN 6753-Rx*	EV 6751.3622.01	BN 8820	Motor temperature sensor
BN 6751-Rx .. BN 6753-Rx*	EV 6751.3893.01-BR	BN 8830	Brake and motor temp. sensor
MidiDrive D			
BN 6741-R1 .. BN 6743-R1	EV 6741.3103.01	BN 8817	–
BN 6741-R1 .. BN 6743-R1	EV 6741.3104.01-BR	BN 8820	Brake
BN 6741-Rx .. BN 6743-Rx*	EV 6741.3434.01	BN 8820	Motor temperature sensor
BN 6741-Rx .. BN 6743-Rx*	EV 6741.4385.01-BR	BN 8830	Brake and motor temp. sensor
MaxiDrive			
BN 6721-R1 .. BN 6723-R1	EV 6700.2639.01	BN 8817	–
BN 6721-R1 .. BN 6723-R1	EV 6700.2656.01-BR	BN 8820	Brake
BN 6721-Rx .. BN 6723-Rx*	EV 6700.3961.01	BN 8820	Motor temperature sensor
BN 6721-Rx .. BN 6723-Rx*	on request	BN 8830	Brake and motor temp. sensor
BN 6724-R1 .. BN 6725-R1	on request	BN 8823	
BN 6724-R1 .. BN 6725-R1	on request	BN 8824	Brake
BN 6724-Rx .. BN 6725-Rx*	on request	BN 8824	Motor temperature sensor
BN 6724-Rx .. BN 6725-Rx*	on request		Brake and motor temp. sensor

* other -R option ... except for -R1

Other ready-assembled power cables (e. g. with choke) on request.

Servo Drive	Assembled Cable Order Number	Cable	With Additional Cores for ...
Analog Servo Drives			
TrioDrive A			
BN 6651 .. BN 6653	EV 6651.3671.01	BN 8817	–
BN 6651 .. BN 6653	EV 6651.3823.01-BR	BN 8820	Brake
MidiDrive A			
BN 6681 .. BN 6683	EV 6741.3103.01	BN 8817	–
BN 6681 .. BN 6683	EV 6741.3104.01-BR	BN 8820	Brake
BN 6684 .. BN 6685	EV 6685.4941.01	BN 8823	–
BN 6684 .. BN 6685	on request	BN 8824	Brake
Multi-Axis Servo System			
TrioDrive C			
BN 6621 .. BN 6623	EV 6651.3671.01	BN 8817	–
BN 6621 .. BN 6623	EV 6651.3823.01-BR	BN 8820	Brake
MidiDrive C			
BN 6626 .. BN 6628	EV 6741.3103.01	BN 8817	–
BN 6626 .. BN 6628	EV 6741.3104.01-BR	BN 8820	Brake
BN 6629 .. BN 6630	EV 6685.4941.01	BN 8823	–
BN 6629 .. BN 6630	on request	BN 8824	Brake

* other -R option ... except for -R1

Other ready-assembled power cables (e. g. with choke) on request.

Standard Types Encoder Connection Cables:

Servo Drive	Ready-Assembled Cable Order Number	Cable
Digital Servo Drives		
TrioDrive D/xS, MidiDrive D/xS, TrioDrive D, and MidiDrive D		
BN 6751-R1 .. BN 6758-R1 and BN 6741-R1 .. BN 6749-R1	EV 6741.3103.02	BN 8818
BN 6751-R2 .. BN 6758-R2 and BN 6741-R2 .. BN 6749-R2	EV 6741.3645.02-S1	BN 8821
BN 6751-R3 .. BN 6758-R3 and BN 6741-R3 .. BN 6749-R3	EV 6751.3622.02-S2	BN 8829
BN 6751-R4 .. BN 6758-R4 and BN 6741-R4 .. BN 6749-R4	EV 6700.3961.02-S3	BN 8829
MaxiDrive		
BN 6721-R1 .. BN 6725-R1	EV 6612.1886.02	BN 8818
BN 6721-R2 .. BN 6725-R2	EV 6700.2506.02-S1	BN 8821
BN 6721-R3 .. BN 6725-R3	EV 6751.3622.02-S2	BN 8829
BN 6721-R4 .. BN 6725-R4	EV 6700.3961.02-S3	BN 8829
Analog Servo Drives		
TrioDrive A and MidiDrive A		
BN 6651 .. BN 6653 and BN 6681 .. BN 6685	EV 6612.1886.02	BN 8818
Multi-Axis Servo Dystem		
TrioDrive C and MidiDrive C		
BN 6621 .. BN 6623 and BN 6626 .. BN 6630	on request	various

Connector Sets

If you prefer assembling the connection cables yourself, original connector sets are available containing the corresponding connectors for ESR servo drives and servo power modules. The following overview shows the connectors contained in the respective connector set.

Servo Drive	Connector Set Order Number	Connectors Contained		
Digital Servo Drives				
TrioDrive D/xS BN 6755 .. BN 6758	ST 6755.0000.00	Motor (power) Motor position sensor	Mains 24 V	Digital I/O
	ST 6755.0000.02	Motor (power) Mains	24 V Digital I/O	
	ST 6755.0000.01	Mains	Digital I/O	24 V
	ST 6730.0000.01	COM1		
TrioDrive D/AS	ST 6745.0000.03	Analog I/O	Encoder signals	
TrioDrive D/CS	ST 6756.4538.01	RJ45 connector with terminal resistor for CANopen®		
MidiDrive D/xS BN 6745 .. BN 6747	ST 6745.0000.00	Motor (power) Motor position sensor	Mains 24 V	Digital I/O
	ST 6745.0000.02	Motor (power) Mains	24 V Digital I/O	
	ST 6745.0000.01	Mains	Digital I/O	24 V
	ST 6730.0000.01	COM1		
BN 6748 .. BN 6749	ST 6749.0000.00	Motor (power) Motor position sensor	Mains 24 V	Digital I/O DC-bus/shunt
	ST 6749.0000.02	Motor (power) Mains	24 V Digital I/O	DC-bus/shunt
	ST 6749.0000.01	Mains 24 V	Digital I/O DC-bus/shunt	
	ST 6730.0000.01	COM1		
MidiDrive D/AS	ST 6745.0000.03	Analog I/O	Encoder signals	
MidiDrive D/CS	ST 6756.4538.01	RJ45 connector with terminal resistor for CANopen®		
TrioDrive D BN 6751 .. BN 6753	ST 6750.0000.00	Motor (power)/mains Motor position sensor	Digital I/O Analog I/O	24 V/BTB
	ST 6750.3509.00	24 V/BTB	Digital I/O	Analog I/O
	ST 6750.3804.00	24 V/BTB	Digital I/O	
	ST 6730.0000.02	Encoder signals		
	ST 6730.0000.01	COM1		
MidiDrive D BN 6741 .. BN 6743	ST 6740.0000.00	Motor (power) Motor position sensor	Mains 24 V/BTB	Digital I/O Analog I/O
	ST 6740.3034.00	Mains 24 V/BTB	Digital I/O Analog I/O	
	ST 6730.0000.02	Encoder signals		
	ST 6730.0000.01	COM1		
MaxiDrive BN 6721 .. BN 6725	ST 6710.0000.00	Motor (power) Motor position sensor Mains	DC-bus 24 V	Digital I/O Control signals
	ST 6730.0000.04	Motor position sensor		
	ST 6730.0000.01	COM1 and COM2		

Servo Drive	Connector Set Order Number	Connectors Contained		
Analog Servo Drives				
TrioDrive A BN 6651 .. BN 6653	ST 6650.0000.00	Mains/motor (power) Motor position sensor	24 V Control signals	
	ST 6651.0000.00	Mains/motor (power) Motor position sensor	24 V Control signals	Encoder signals
	ST 6651.3653.00	24 V	Control signals	Encoder signals
	ST 6650.3652.00	24 V	Control signals	
MidiDrive A BN 6681 .. BN 6685	ST 6680.0000.00	Motor (power) Motor position sensor	Mains 24 V	Control signals
	ST 6681.0000.00	Motor (power) Motor position sensor	Mains 24 V	Control signals Encoder signals
	ST 6681.3849.00	Mains 24 V	Control signals Encoder signals	
	ST 6680.3881.00	Mains	24 V	Control signals
Multi-Axis Servo System				
TrioDrive C BN 6621 .. BN 6623	ST 6620.0000.00	Mains/motor (power)	24 V	Control signals
	ST 6620.3976.00	24 V	Control signals	
MidiDrive C BN 6626 .. BN 6630	ST 6625.0000.00	Motor (power) Mains	24 V Control signals	
	ST 6625.3992.00	Mains	24 V	Control signals
DC Servo Drives				
UnoDrive BN 6540	ST 6540.0000.00	Motor (power) Speed generator	Operating voltage Control signals	
DC Compact BN 6508	ST 6508.3850.00	Motor (power)	Control signals	Mains
	ST 6508.3851.00	Mains		

Shunt Resistors

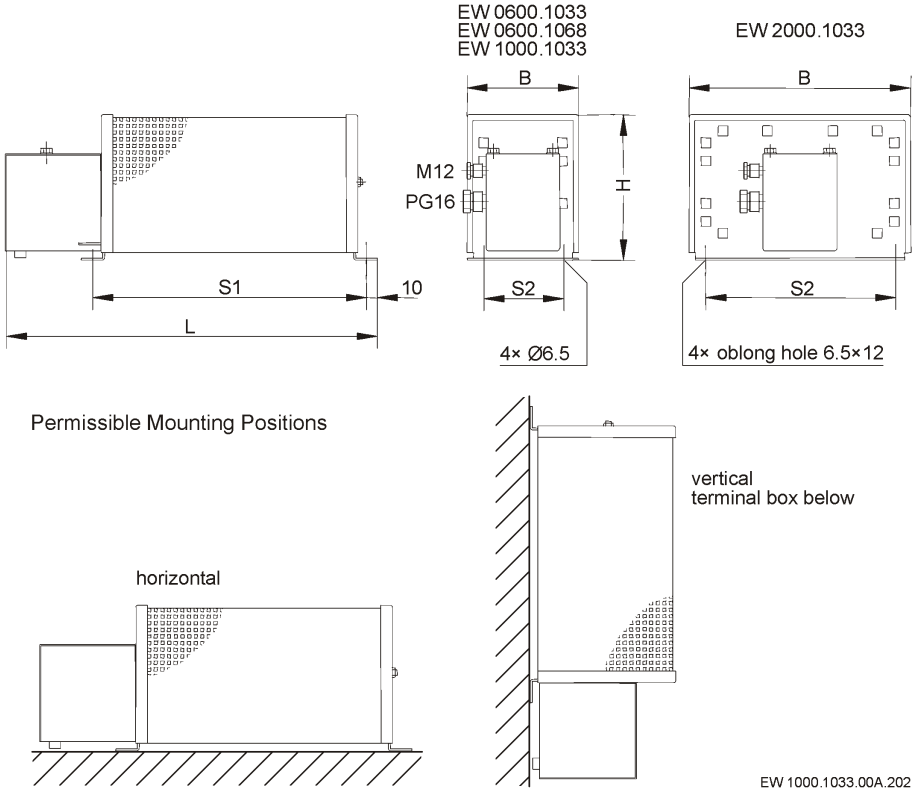
If the braking power of your application exceeds the values stated in the technical specifications of the respective servo drives, an external shunt resistor will be required for operating the ESR servo drives. In these cases, the external shunt resistors described in this data sheet can be used. The external shunt resistors are supplied ready for installation and connection in a zinc-plated sheet metal housing (IP20) with terminals. The shield is connected via the metallic PG gland.

For temperature monitoring, a thermo switch is installed opening the contactor in case of overtemperature (> 180 °C). This contactor must be integrated in the coil circuit of the mains contactor by the customer.

It must not be integrated in the load circuit of the shunt resistor.

Special Features

- Cemented wirewound tubular fixed resistor
- One- and two-tubes design
- Degree of protection IP20 if mounted on an appropriate surface
- With side-panels and perforated cover
- Fixing parallel to mounting surface
- Connections wired on terminals in attached terminal box
- With PG16 or M12 cable gland
- Protected against access to hazardous parts
- Wall mounting or mounting on control cabinet

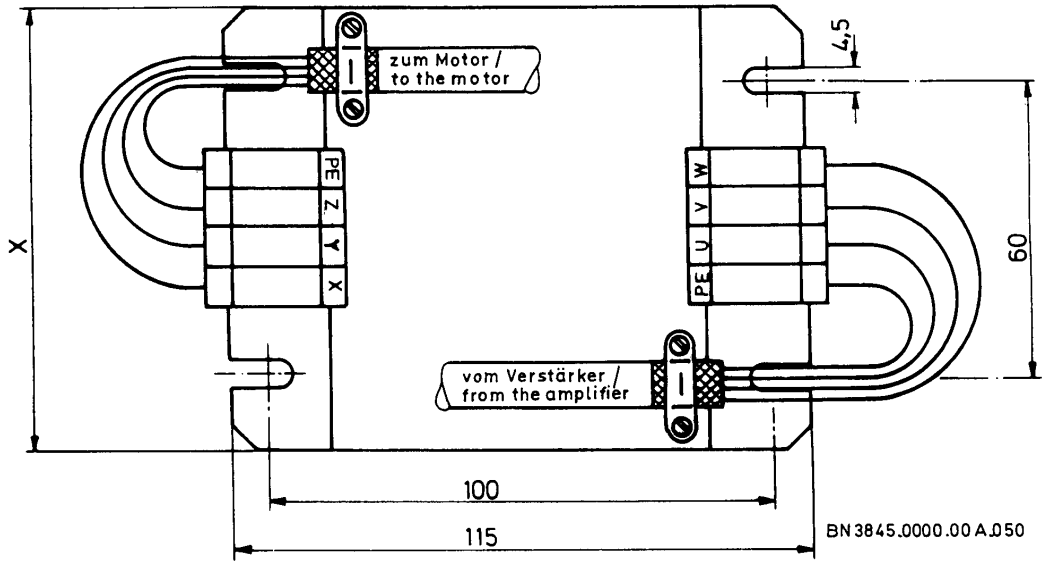


Type	Loading Capacity	Resistance	Dimensions (mm)				
			L	B	H	S1	S2
EW 0600.1033	600 W	33 Ω	549	92	120	428 430	64 80
EW 0600.1068	600 W	68 Ω	549	92	120	428 430	64 80
EW 1000.1033	1000 W	33 Ω	749	92	120	628 630	64 80
EW 2000.1033	2000 W	33 Ω	749	185	120	626 630	150

Motor Chokes

Depending on the cable length, a motor choke (triple choke) is required. This is motor choke BN 3845.2258 or BN 3857.2311. The motor chokes reduce the leakage currents by limiting the du/dt values, thereby, they also reduce the radiation emissions via the cables. Under full load, the motor chokes can reach an operating temperature of more than 100 °C. For an adequate heat dissipation, they must be ventilated sufficiently and screwed on a metal plate.

Both motor chokes are supplied ready for installation and connection in a zinc-plated sheet metal housing (IP20) with terminals and shield connection clamps.



Dimensions	Distance X	Housing Height
BN 3845.2258	90 mm	40 mm
BN 3857.2311	130 mm	45 mm

Internal Choke	Input	Output
1	U	X
2	V	Y
3	W	Z

The pins PE are connected to each other and to the housing.

Technical Specifications:

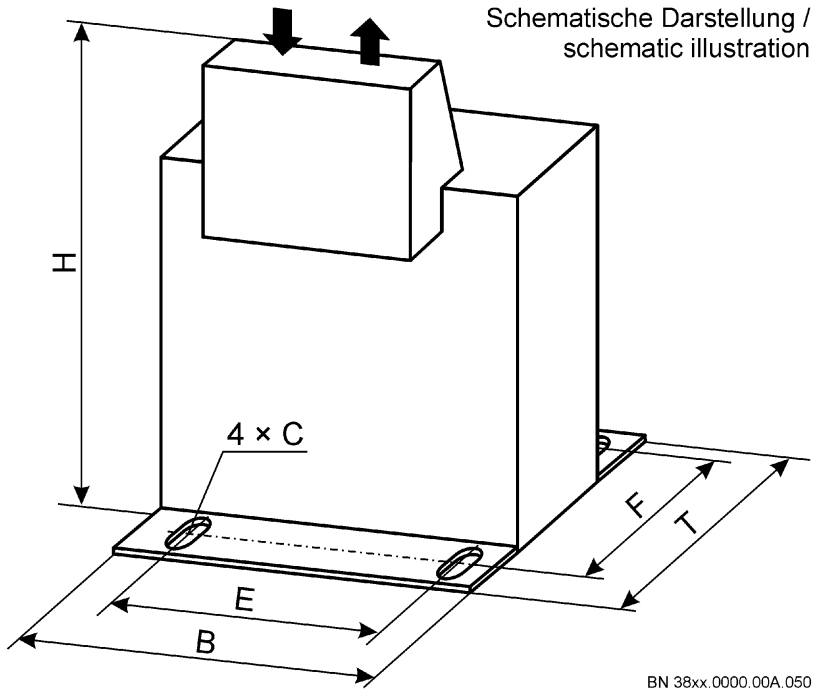
Motor Choke (Triple Choke)	BN 3845.2258	BN 3857.2311
Application *	for medium line lengths	for higher line lengths
Permissible current (crest value)	10 A	12 A
Inductance	3 × 0.8 mH	3 × 0.9 mH
Power dissipation ** – at 8 kHz switching frequency – at 16 kHz switching frequency	 25 W 40 W	 35 W 50 W
Design	partially compensated triple choke	3 single chokes
	in sheet metal housing with terminals and shield connection clamps	
Degree of protection	IP20	

* For information on line lengths and the use of chokes, please see the operating instructions of the corresponding servo drive.

** in rated operation with maximum permissible cable length

Line Chokes

For operation in particularly low-resistance industrial mains with a short-circuit current higher than 5 kA, a line choke must be installed as a protection against mains voltage interferences, overvoltage, and voltage fluctuations.



For ESR servo drives with single-phase mains connection (230 V~):

Type	Supply Current Up To	Inductance	Dimensions (mm)					
			B	T	H	E	F	C
BN 3875.3293	6 A	5 mH	66	60	98	50	46	M4

For ESR servo drives with three-phase mains connection (3×400/480 V):

Type	Supply Current Up To	Inductance	Dimensions (mm)					
			B	T	H	E	F	C
BN 3891	3 × 8 A	3.66 mH	125	83	115	100	45	M 4
BN 3892	3 × 20 A	1.47 mH	155	76	140	130	56	M 6
BN 3893	3 × 40 A	0.74 mH	190	85	160	170	57	M 6

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