AMK

AMKASYN

VARIABLE SPEED DRIVES

AMKASYN

Digital Inverters in Modular Construction

Supply Requirements
Installation
Cabling
AMKASYN drive systems AN, AZ, AW
AZ 05, AW 1,3/2,6 , ...

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Part-No.: 27852

AMK

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Contents

1 Installation of AMKASYN modules

1.1 General

Electrical cabinet:

The AMKASYN drive system is designed for installation in an enclosed switchgear cabinet.
Degree of protection for the modules: AN / AZ / AW: IP 00
AZ 05 / AW 1,3 ...: IP 20

The cabinet must be dry and dust-free.

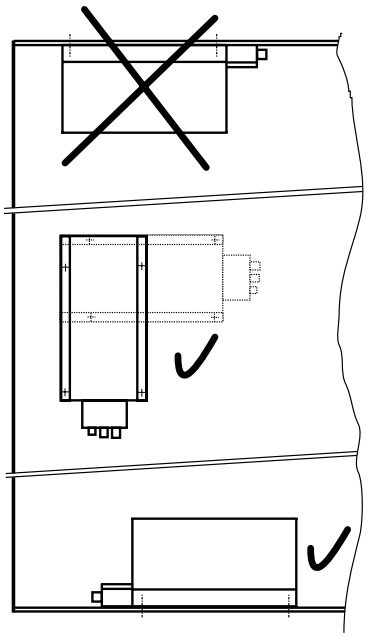
Mounting of the modules:

The AMKASYN modules are fastened vertically next to one another on the installation board in the control cabinet. Through the fixing screws a proper electrically conductive connection to the installation board (metallic bare, zinc-coated) must be ensured.

To guarantee sufficient air circulation, a clearance of at least 100 mm/4 in. must be maintained above and below the modules.

Brake resistor installation:

If a break resistor is used it must not be mounted in the inverter cooling air flow! The air around the brake resistor can reach a maximum of 200°C/392°F!



Der Bremswiderstand darf nicht überkopf hängend eingebaut werden (Wärmestau) !
Overhead mounting of the brake resistor is not permissible because of cooling requirements !

Ventilation/cooling of the electrical cabinet:

Dimensioning of cabinet ventilation depending on the installed module power (consider module power dissipation!).

For high ambient temperature a heat-exchanger unit is required for cabinet cooling.

Input power:

3 x 400V ± 10%, 50/60 Hz, symmetrical three-phase-line.

Earthing:

The ground potential (PE) serves as a reference point for the internal power supply and voltage monitoring.
Installation, connection and earthing must comply with the applicable regulations.
All housings of the invidual modules must be connected separately and in the shortest way with the ground bar (PE). For this we recommend installing a ground bar beneath the modules connected with the central ground point of the system.

Grounding must be made star-shaped from the central ground point within the overall system. In addition, the shortest possible PE connection must be made between the modules for EMC reasons.

For all alectromagnetic equipment of the overall system, the induction voltage occurring on switching must be limited by suitable protective circurity. The manufacturer of the switchgear will supply recommendations for optimum protective measures.

Requirements at the site of installation:

During storage, assembling, wiring, commissioning and during operation, the modules must be protected against the ingress of solid foreign particles!
Otherwise operational safety and function of the drive system cannot be ensured.

Type of module cooling:

Air cooling through fans installed in the modules.

Cooling air:

Temperature 0°C to max. 45°C/32°F to max. 113°F,
measured at the intake point of the module fans.
The supply air must be dry and free of electrically conductive dusts, fibres, gases and vapors which can endanger the functionality.

If necessary suitable filters must be installed or other protective arrangements must be used.

Air humidity:

20%...90% relative humidity of air is permissible.
No condensation!
Dropping condensate leads to severe damages in the modules!

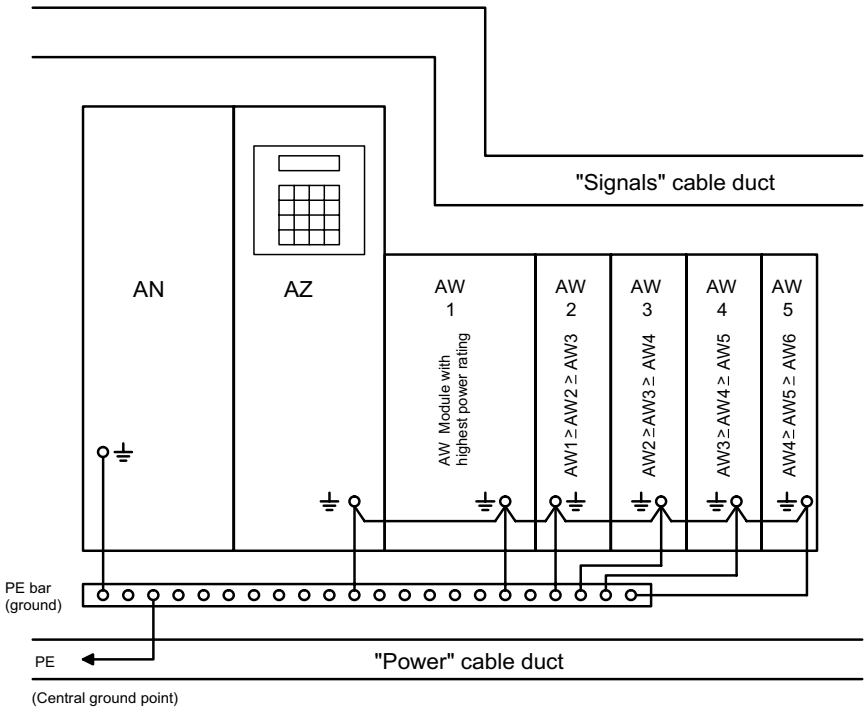
1.2 Arrangement of the modules

When the power supply module AN is used, it must be installed at the far left. The central module AZ is installed directly next to this. The individual inverter modules AW now follow in descending order acc. to power rating. A maximum of 8 inverter modules AW is permissible in one drive system.

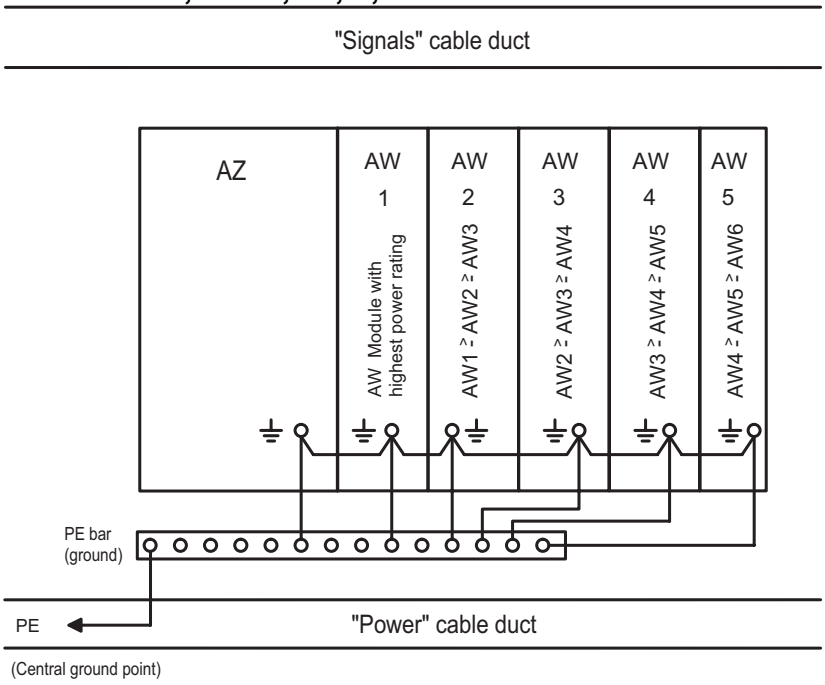
Each AW module has a rotary coding switch AWN. This must be set differently for each AW module by the customer before start-up. The numbers AWN1... max. AWN8 are allocated within a drive system depending upon the number of AW modules used. The AW module is addressed by the main processor in the central module under the set number.

On principle the inverter modules AW 1,3/2,6 , AW 2,5/5 , AW 4,5/9 also can be combined with the AW modules of the AMKASYN system with higher power. In this case a matched steel fixing bracket is available for installation of the small size AW modules. Through this all modules can be connected in the same plane.

Basic arrangement of the modules on the installation board
Series AN, AZ, AW



Basic arrangement of the modules on the installation board
Series AZ 05, AW 1,3/2,6 , ...



Wiring, cable laying

All motor cables and signal cables must consistently be separated (distance > 30 cm / 12“) within the installation.
All signal cables must go out of the AMKASYN modules in upward direction, all motor cables in downward direction.
Cable laying should use the shortest possible distance between inverter module and motor.
The motor cable must be brought directly out of the control cabinet using the shortest distance.

1.3 Tightening torque of field-wiring terminals (AN / AZ / AW)

Terminal	Module	Tightening torque	
X03, X04	AN 10, AN 20, AN 40, AN 60 ***)**	0,8 Nm	7 lb-in
X21	AZ 10, AZ 20	0,8 Nm	7 lb-in
X52	AW 1,5/3 ... AW 14/24	0,8 Nm	7 lb-in
X01, X06	AN 10, AN 20 ***)**	1,8 Nm	16 lb-in
X22, X26	AZ 10, AZ 20	1,8 Nm	16 lb-in
X21	AZ 40, AZ 60	1,8 Nm	16 lb-in
X51	AW 20/30	1,8 Nm	16 lb-in
X52	AW 1,5/3 ... AW 20/30	1,8 Nm	16 lb-in
X01, X06	AN 40, AN 60 ***)**	3 Nm	26 lb-in
X22, X26	AZ 40, AZ 60	3 Nm	26 lb-in
X51, X52	AW 30/45, AW 40/60, AW 50/75	3 Nm	26 lb-in
X24, X25, X29 X30, X31, X32	AZ 10, AZ 20, AZ 40, AZ 60	0,8 Nm	7 lb-in
X54, X56, X58, X59	AW 1,5/3 ... AW 50/75	0,8 Nm	7 lb-in

***)** also valid for AN xxF

1.4 Practical Considerations for Drive Cabinet Assembly

According to the EMC-directive, the manufacturer and supplier of the complete machine is responsible for the adherence to the specified threshold values.

If these threshold values are not achieved in EMC-benchmark tests after an installation according to the instructions, then the following considerations can lower the interference level:

1. For optimum HF protection use copper braid to connect between central PE bar in the electrical cabinet and the mounting plate for the KU inverter.
2. Connect mounting plate and control cabinet housing with copper braid.
3. Connect control cabinet doors and housing with copper braid.
4. PE connection between control cabinet and machine base must be as short as possible and with sufficient cross section.
5. Good PE connection between motor housing and machine base must be ensured.
6. If the cable duct consists of several parts it must be electrically connected without separation. It must be connected at the start with the control cabinet housing and at the end with the motor housing/machine base.

2 Cabling

2.1 Modules cabling one with another

The modules are connected one with another on one hand by connectors and on the other by single wires and terminals. The cable ends with plugs on the inverter module AW are plugged in each case into the corresponding sockets of the preceding AZ or AW module.

Series AN / AZ / AW:
Generally the line voltage for the AZ module is brought in via terminals L1.2, L2.2, L3.2 (X26). At drive systems without power supply module AN, fuses, main contactor, specified line reactor and mains suppression filter must be procured and installed by the customer. Via external contactor and line reactor the supply voltage is fed through terminals X26 (L1.2, L2.2, L3.2). Supply for charging circuit and switched-mode power supply is fed through plug-in terminal block X25 (L1.1, L2.1, L3.1) on AZ module.

The fan voltage (230 V AC) is fed through socket X21. The mating connectors (X25: Phoenix GMSTB 2.5-7-ST with designation strip and X21: MOLEX female connector Type 5557 with crimp contacts 5556 PBTL) are supplied by AMK as Option 511: „AZ Connector Set“ AZ-ST1 (part-No. 44864). For supplier and exact specification and designation of the line reactor please contact AMK.

Series AZ 05, AW 1,3/2,6 , ...
The line voltage for the AZ 05 module is brought in via terminals L1, L2, L3 (X01). Fuses and main contactor must be procured and installed by the customer.

The connections for the DC-BUS voltage are made in the AZ module to the terminals UZP and UZN (DC-BUS X22). Each AW module has a red and blue wire connection with connector sleeve as well as the terminals UZP and UZN (DC-BUS X52). The red wire is connected in each case at the preceding module (AZ or AW) to terminal UZP (Positive), the blue wire to UZN (Negative).

Never loosen or tighten terminals under voltage!
After POWER OFF wait for discharge time longer than 3 minutes before working on the modules!

The signal cables are run through plug-in terminal blocks. To prevent confusion when plugging in, the plug connections are coded with riders at the defined places. Use extracting tool to unplug the PHOENIX plug-in terminal blocks. The extraction tool is fixed at the AZ module under the front cover (not available with AZ 05).

For the signal bus a ribbon cable is used. On delivery the terminating board AWA with the terminating resistors for the BUS is plugged into the socket connector X27 on the AZ module. This must be pulled out on installation and inserted in the free socket connector X57 of the last AW module arranged on the extreme right.

The socket connectors X27 on the AZ module and X57 on the AW modules are equipped laterally with two locking/ejecting clips each. Before the ribbon cable plug or the terminating board AWA is inserted, the locking clips must be raised slightly, then the plug carefully pushed in. The lock closes in this way and prevents inadvertent loosening of the connection. To loosen the plug connection, the two locking clips must be loosened by pressing to the left. Then the plug is lifted out from the socket connector.

Never push in or loosen plugs with force!
Extract or plug-in connectors or cards only if the system is voltage-free!

2.2 Cabling AMKASYN modules - machine

Important: The EC directive requires compliance with the EMC limits for plant/machinery as a whole. This can only be attained by compliance on the part of the machine manufacturer as well as the supplier:

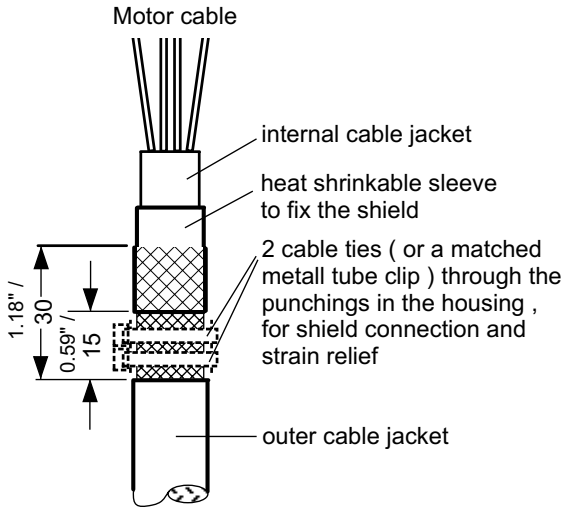
- **Single components must comply with EMC regulations**
- **Plant erection, installation, R.F.I. suppression and cabling must comply with EMC regulations**
- **Earthing and shielding in the whole plant must comply with EMC regulations.**

The modules must be installed immediately side by side. Extension of the DC-BUS connections and ribbon cable for the bus connection is not permissible!

1. The mains cable must be installed as close as possible to the power supply module AN (respectively to central module AZ 05.) The mains cabling in the control cabinet must be point-to-point.
2. Only for power supply modules ANxx (without line filter):
   External mains filters must be mounted as close as possible to the power supply module housing (distance smaller 10 cm / 4“). The cable between output of the mains filter and input X01 or X03 of the power supply module must be as short as possible (max. 1 m / 39,4“). For a connecting greater than 30 cm / 11,8“ shielded cable must be used. Cable shields must be connected at both ends, with under 5 cm / 2“ bare shield and without diminished cross section at the respective PE bolt or is to be put directly on the bare housing via a metal cable clamp.
   The mains cable to external filter must be installed separately from the cable at the filter output as well as from the motor cables and the cable to the external braking resistor (distance > 0,5 m / 19,7“).
3. **Motor Connection**
   For the motor connection a shielded cable must be used (YCY with shield of tin-plated copper braid).
   The shield must be connected to GROUND (PE) at the motor-end and also at the inverter-end (contact-area as large as possible).
   At the motor-end this is achieved by using an earthing cable gland which must be selected matched to the cable diameter. Without the earthing cable gland the cable shield must be collected wireshaped as short as possible (< 5 cm / 2“) within the motor terminal box and insulated by a heat-shrinkable sleeve. With a crimped cable lug at the end the shield is connected to the motor housing by the earthing screw in the terminal box.
   At the inverter end the cable shield is grounded on the AW housing:
   Remove the outer cable insulation to the required length for connection. Cut off cable shield to approx. 30 mm / 1,12“ length.
   Fix shield end with a heat-shrinkable sleeve so, that a clear shield border of approx.
   15 mm / 0,59“ length is achieved.
   Connect the cable cores to the terminals and the PE bolt.
   Fix the cable around the clear shield border with 2 cable ties (or with a matched metall tube clip) at the punchings on the front cover so that the shield is well connected with bare front sheet metall.

   Don’t damage cable shield / cable cores!
   A maximimum motor cable length of 100 m / 328 ft is permissible if the specified cable type and the conductor cross sections are used. The cable laying must be EMC compatible!

For a motor cable length of more than 20 m / 66 ft the cable shield should be connected to the machine base each 10 m / 33 ft or it is recommended to lay the motor cable in a metallic duct (cable conduit, flexible metal tube).



4. Brake resistor connection
For connection of the external brake resistor a shielded cable must be used.
The cable shield must be connected double ended to PE (contact area as large as possible), see 3.

5. All motor cables and signal cables must be separated (distance > 30 cm / 11,8“) within the installation. All signal cables must go out of the AMKASYN modules in upward direction, the motor cable in downward direction. Crossing of control and power cables must be made at right angles.
6. Cable laying should use the shortest possible distance between inverter module AW and motor. The motor cable must be brought directly out of the control cabinet using the shortest distance.
7. For all inductive components in an installation (relays, contactors, electromagnetic valves, ...) the switching induction voltage must be limited by supressor circuits. For proposals concerning suitable suppressor circuits ask manufacturer.
8. **Connection of signal cable shields within the AMKASYN system**

   Fundamentally the cable shield of signal cables (e.g. cables for analog inputs, I/O connections etc.) must be grounded single-ended at the AZ/AW end.

   Exception motor encoder cable:
   The cable shield must be connected to PE at <u>both</u> ends, connecting area as large as possible.

Module housing with bare front plate:
Signal cabel connection via plug-in terminal block

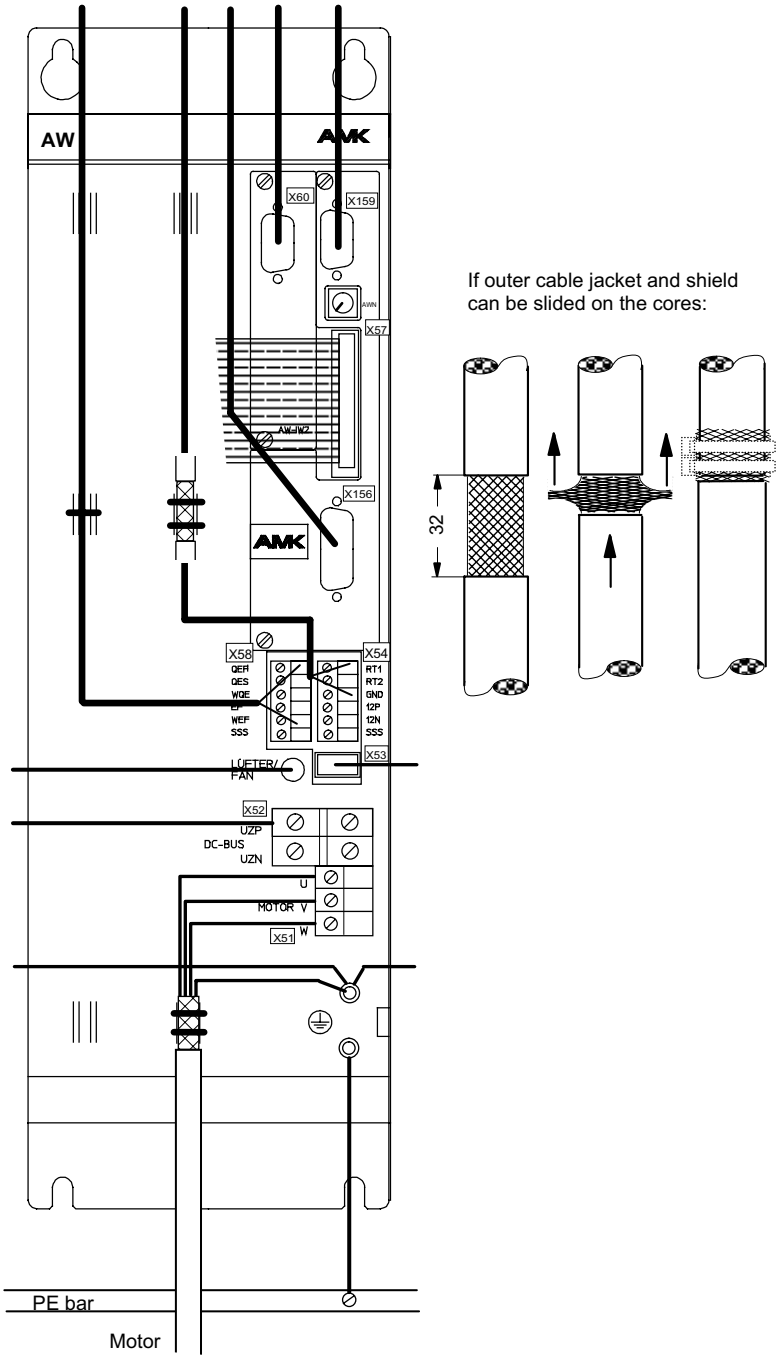
a) Lay cable to the associated connector.
b) Remove outer cable insulation at a length of approx. 32 mm / 1,26“ above one of the punchings at the front cover. Slide back outer cable insulation with shield and put shield over the cable jacket.

If outer cable insulation and shield can't be slided:
Remove outer cable insulation at a length of approx. 15 mm / 0,59“ above one of the punchings at the front cover.

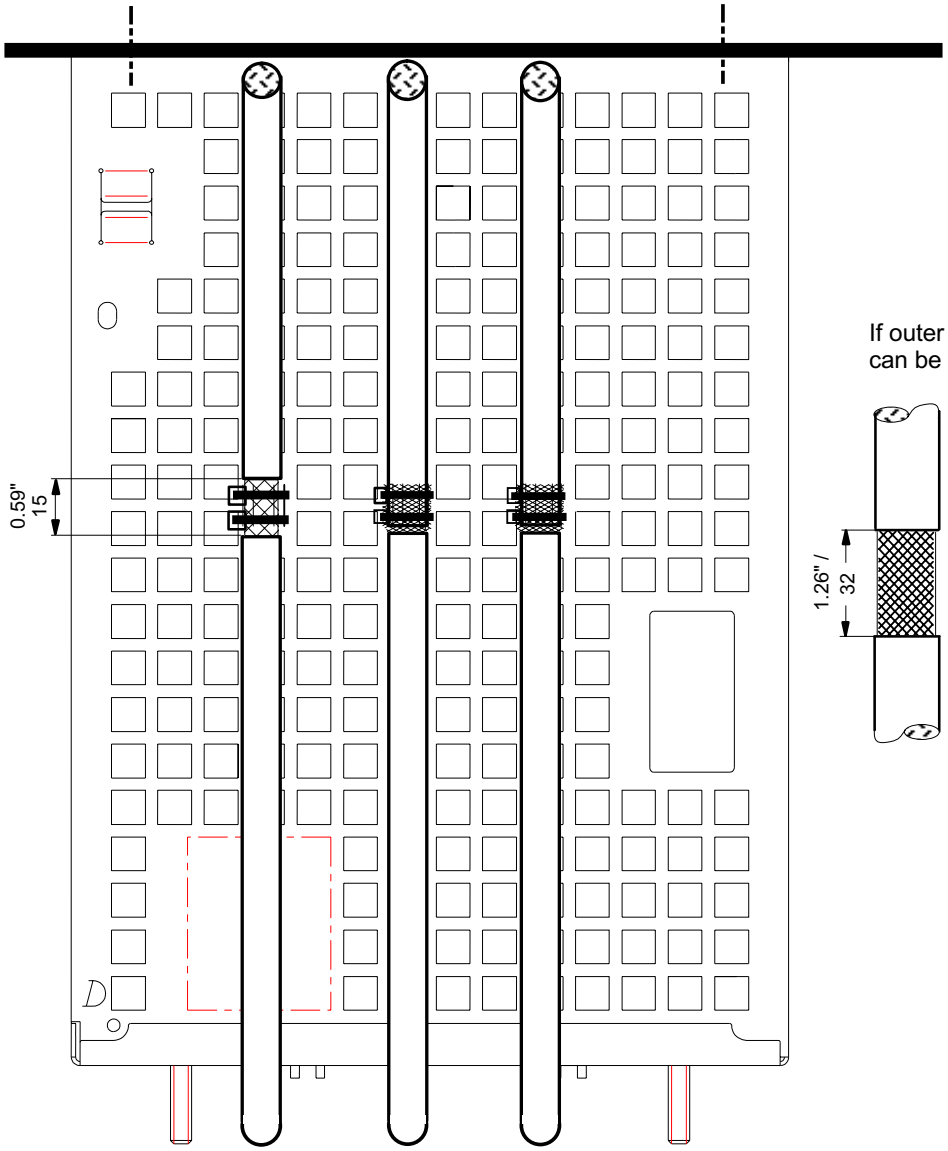
c) Connect the clear cable shield at this place to the housing (PE) with 2 cable ties through the punchings.
Don't damage cable shield / cable cores!

d) The shield of all used signal cables must be grounded in this way.

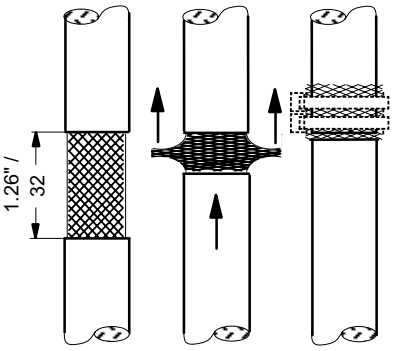
Series AN / AZ / AW



Series AZ 05, AW 1,3/2,6 , ...



If outer cable jacket and shield can be slided on the cores :



Cables with D-SUB connectors:

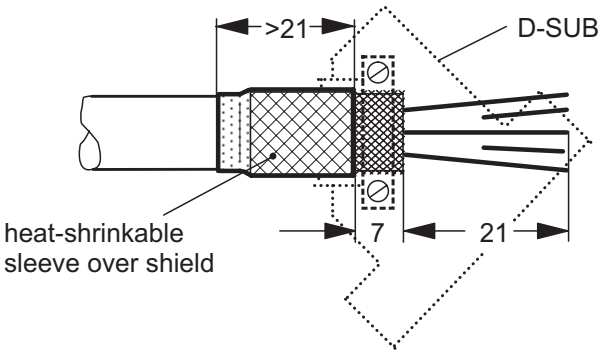
a) Metallized D-SUB housings with lateral cable outlet must be used.
Via the D-SUB housing the cable shield is grounded single-ended at the module end.

Only for motor encoder connection:
Additionally the second end of the cable shield must be grounded via the encoder connector housing at the motor side !

b) Strip outer cable insulation at approx. 21 mm / 0,83“ length for a 9 pole D-SUB connector.

c) Turn shield back over the cable jacket.

d) Fix shield end with a heat-shrinkable sleeve so, that a clear shield border of approx. 7 mm / 0,28“ length is achieved.



e) Connect cable cores to D-SUB connector.

f) At the clear shield border the cable must be strain relieved with cable grip and screws, by this also grounding the shield through the D-SUB shell.

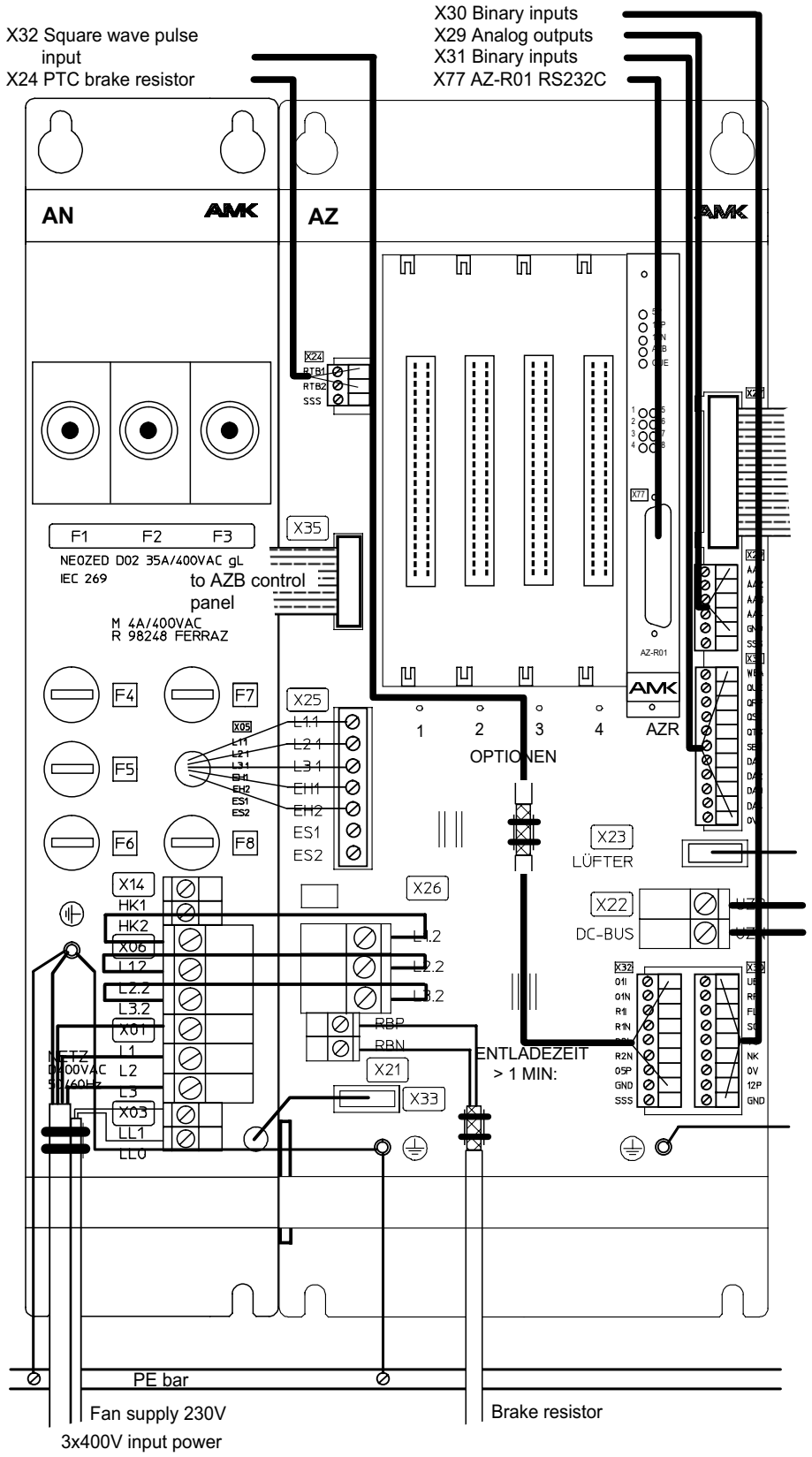
g) After inserting, the D-SUB connector must be safely secured with the socket through the 2 screws.

h) The fixing screws (below the card grip) for AZ option cards (if used) must always be tightened in order to guarantee the shielding effectiveness.

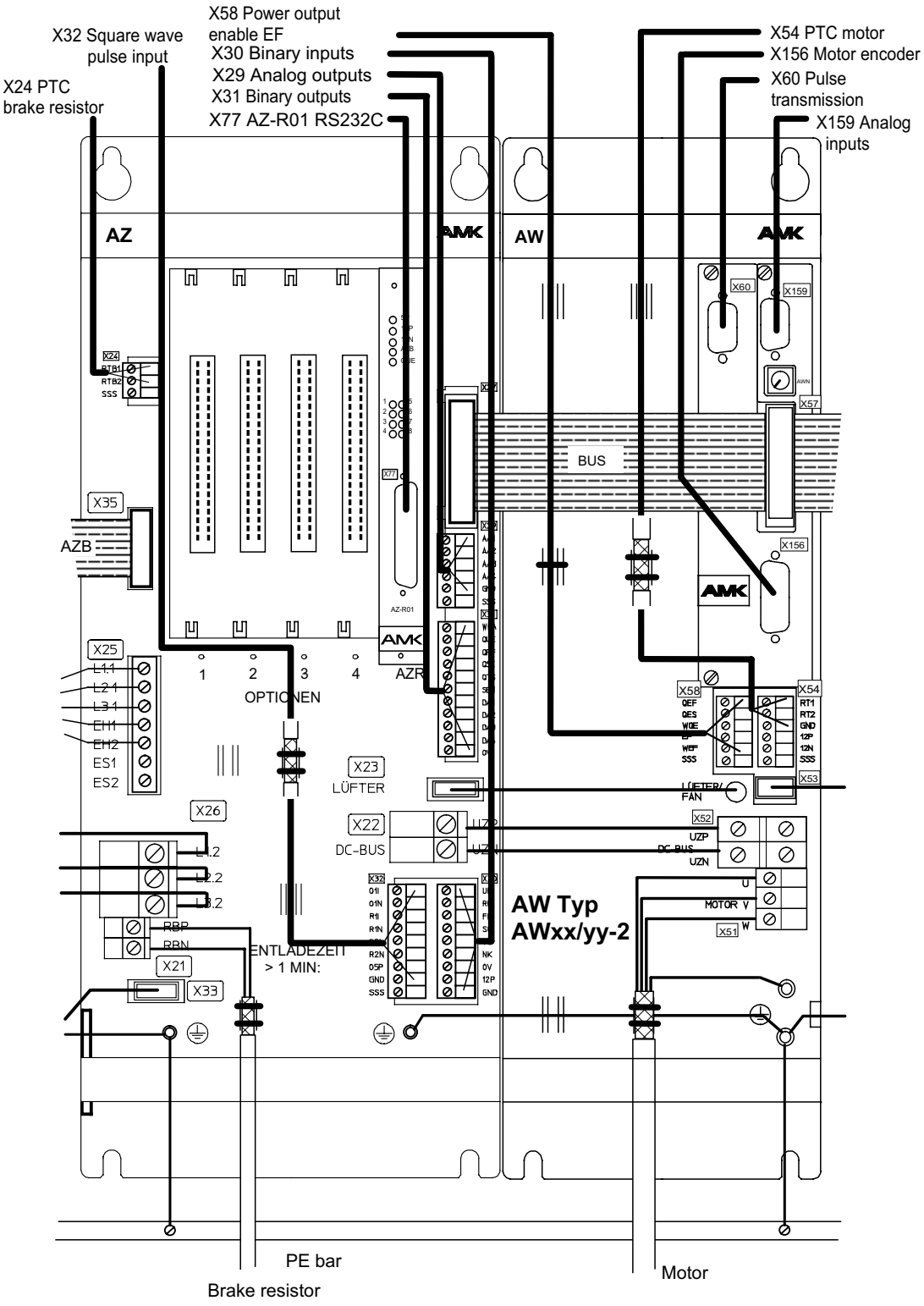
9. If shielded cables must be interrupted by connectors a continuous shield connection must be guaranteed by contacting the shield with all metallized connector housings. The shield may not be led via connector pins.

10. For cable entries into cabinets, earthing cable glands must be used. The cable shield is thus connected directly to the cabinet housing.

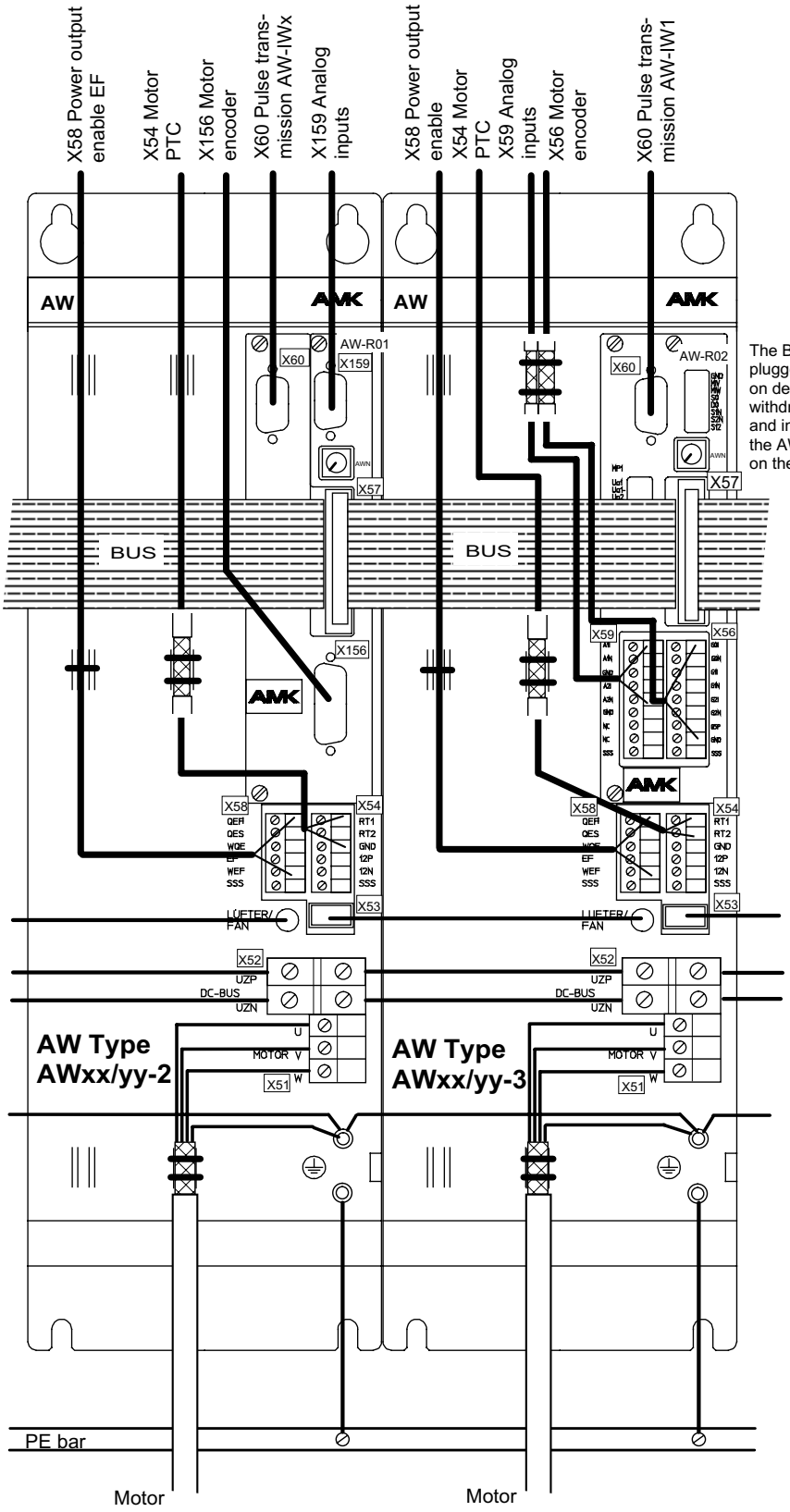
2.2.1 Cabling AN - AZ



2.2.2 Cabling AZ - AW

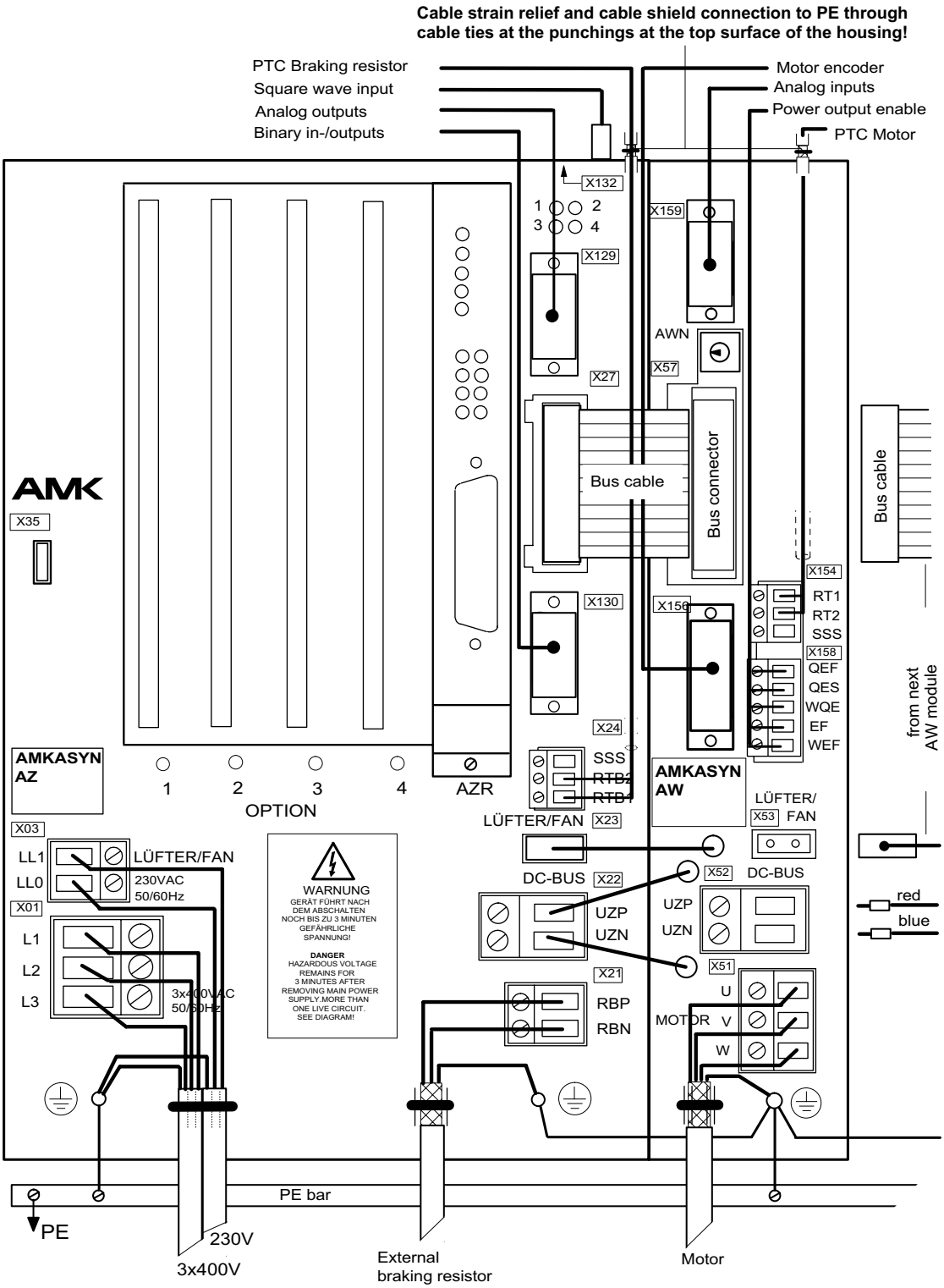


2.2.3 Cabling AW - AW



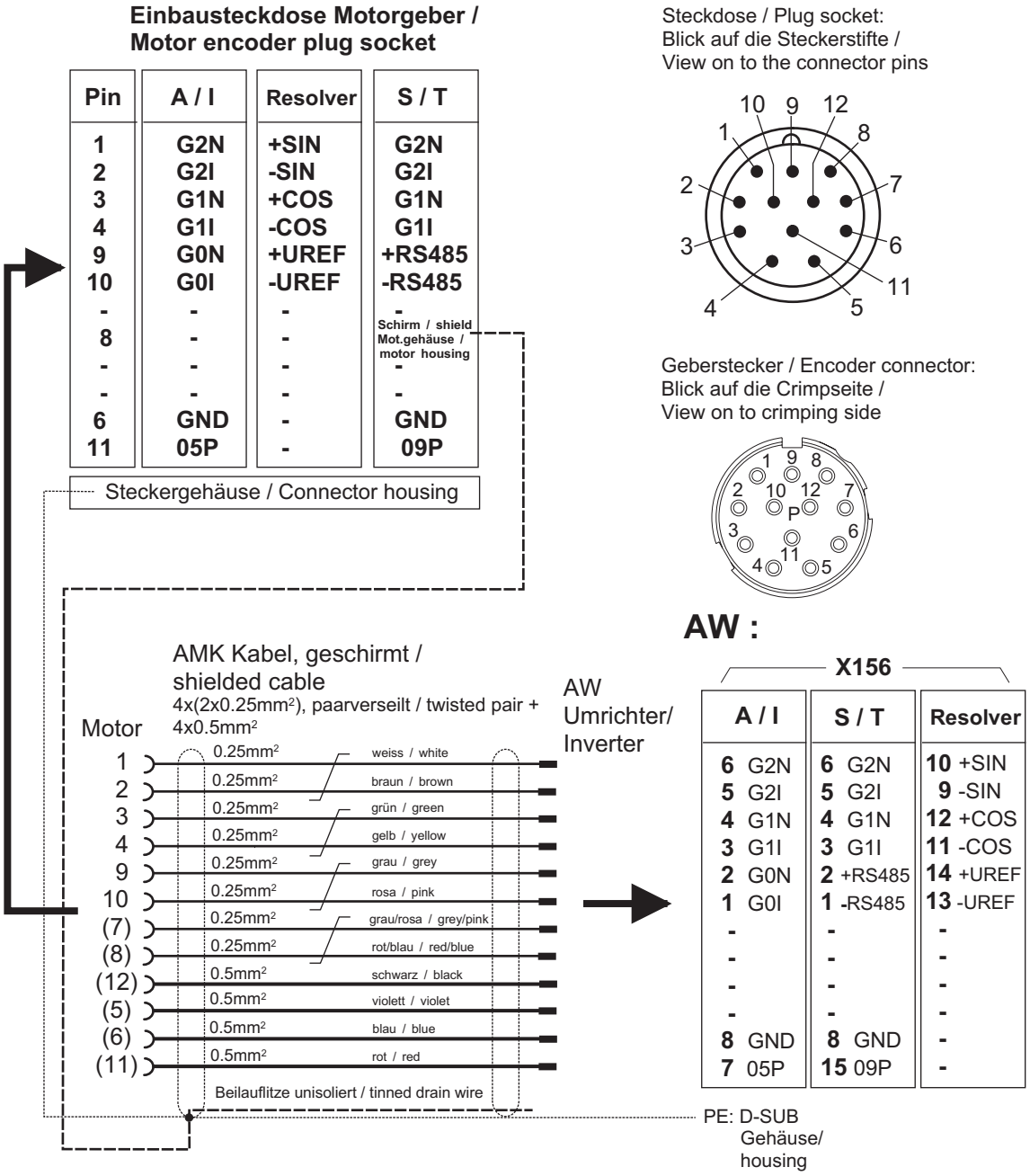
The BUS terminatingboard plugged into X27(AZ module) on delivery must be withdrawn on installation and inserted in X57 of the AW module arranged on the extreme right.

2.2.4 Cabling AZ 05 - AW ...



2.2.5 Motor encoder connection

2.2.5.1 Connector pin assignment motor encoder



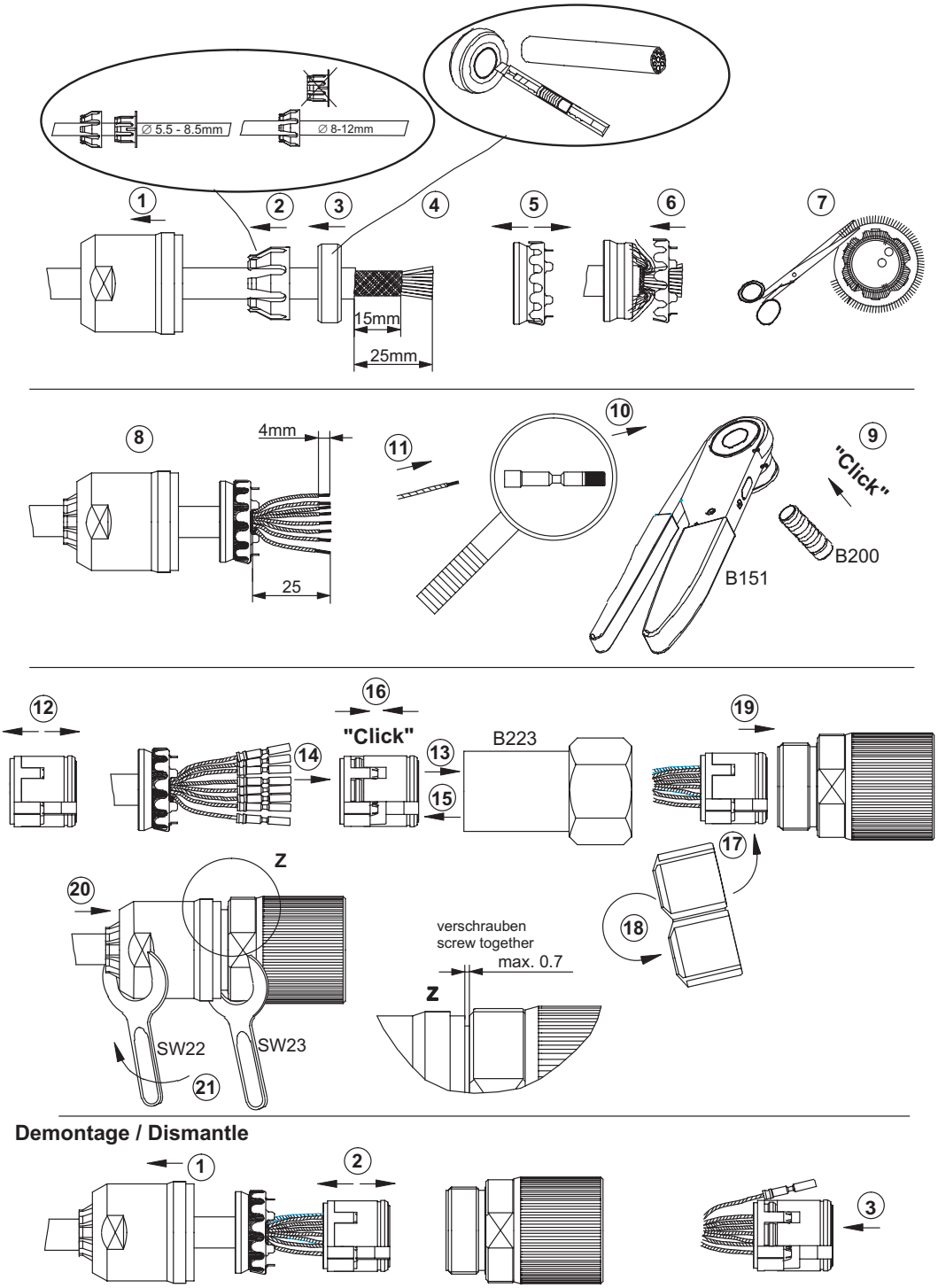
For all encoder types:
The shield of the encoder cable must be grounded at both ends: At the motor through the circular connector housing, at the inverter through the metallized D-SUB connector shell !

Maximum cable length: 100 m [328ft] (for E / F type encoder presently 25m [82ft] !)

The encoder connector set consisting of the circular connector and 12 sleeve inserts can be ordered from AMK.

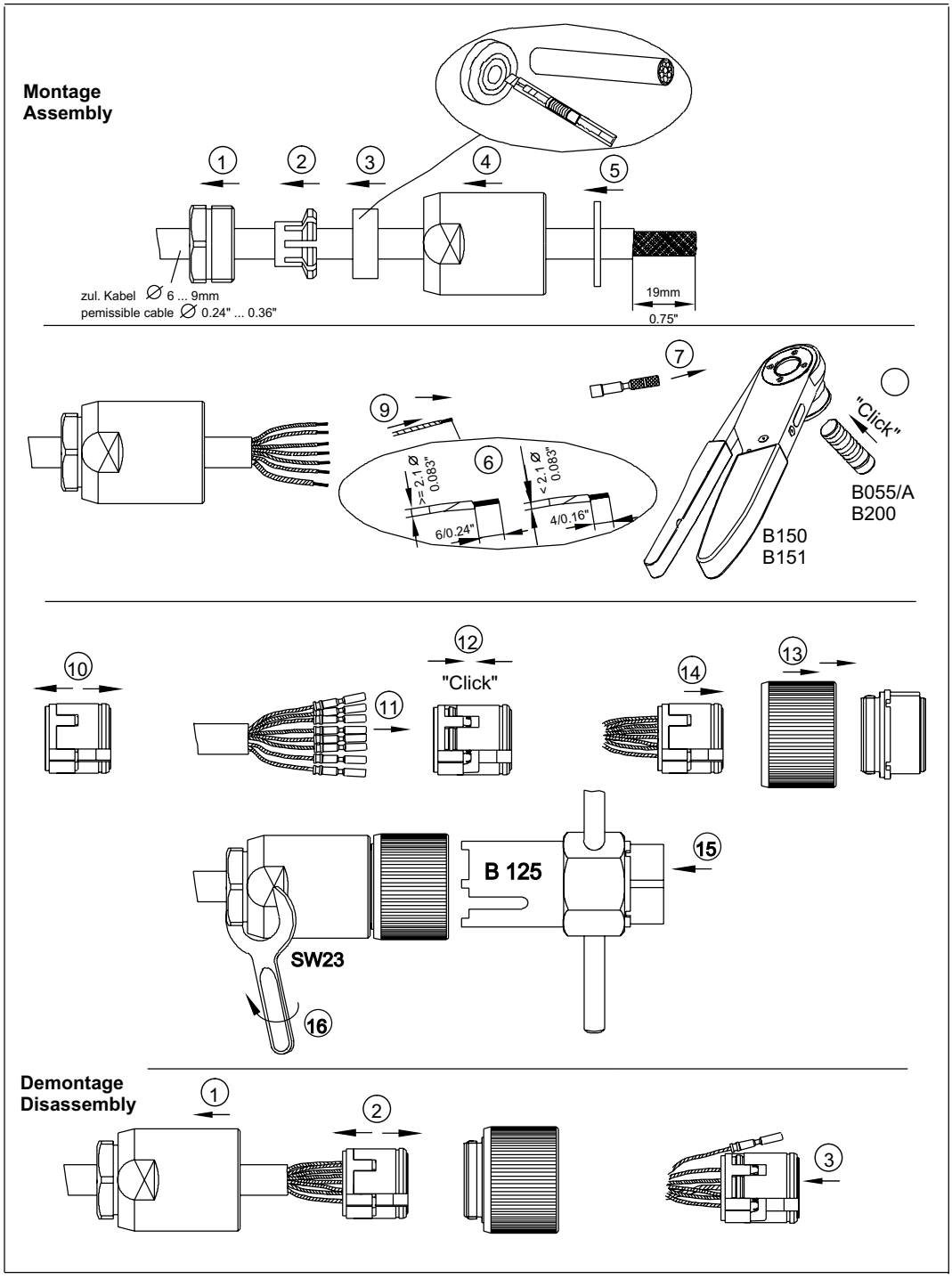
2.2.5.2 Assembling encoder plug

Straight plug: Type S PN A 12S FR ON 169 00 C6
Angled plug: Type S PH D 12S FR ON 096 00 A1



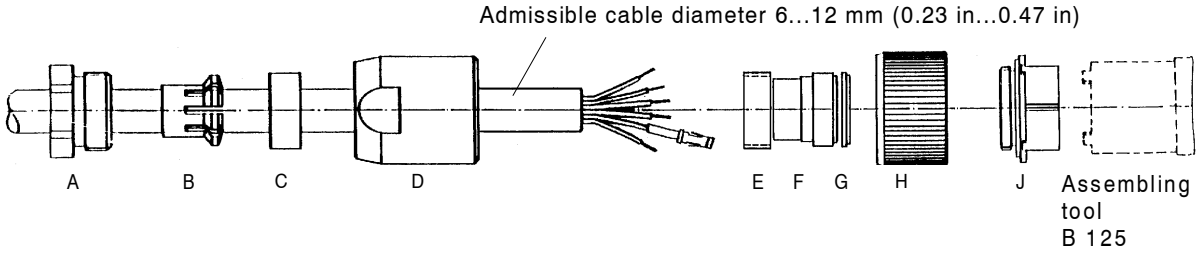
Motor encoder connector assembly (former connector type)

Type S PB A 12S FR (Interconnectron) (Not for new applications !)



After connector assembling check if the protective measures on the connector are effective (acc. to EN 60204-1, VDE 0113 part 1).

Motor encoder connector assembly (former connector type) (Not for new applications !)



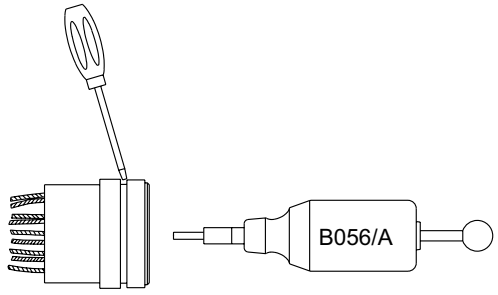
Assembling and crimping tools from: Interconnectron GmbH, Postfach 14 65, 94454 Deggendorf, Tel.: 0991 / 25012-0

Assembly:

1. Adapt cable seal (C) to cable diameter. Slide cable gland and connector housing (parts A to E) over the cable.
2. Dismantle cable 19 mm (0.75 in). Strip single wires 6,5 mm (0,25 in).
3. Crimp contact tubes (AMK part No. 16415) with crimping tool (M 22520/1-01) and positioner (SH 462) respectively crimping tool (M 22520/2-01) and positioner (B 055). In exceptional cases, the crimp contact tubes also can be soldered to the wires.
4. Slide the crimped contacts into the insulating body (F, G) till they are locked into place.
5. Fix contact insert sleeve (J) on assembling tool B125 or any applicable tool and slide coupling ring (H) on (J). Insert distance bush (E) on insulating body (F, G) and slide all together into contact insert sleeve (J). Screw in connector housing (D) and tighten with approx. 5 Nm (3,7 lb-ft).
6. For cable strain relief (parts A, B, C) tighten cable gland (A).

After connector assembling check if the protective measures on the connector are effective (acc. to EN 60204-1, VDE 0113 Part 1).

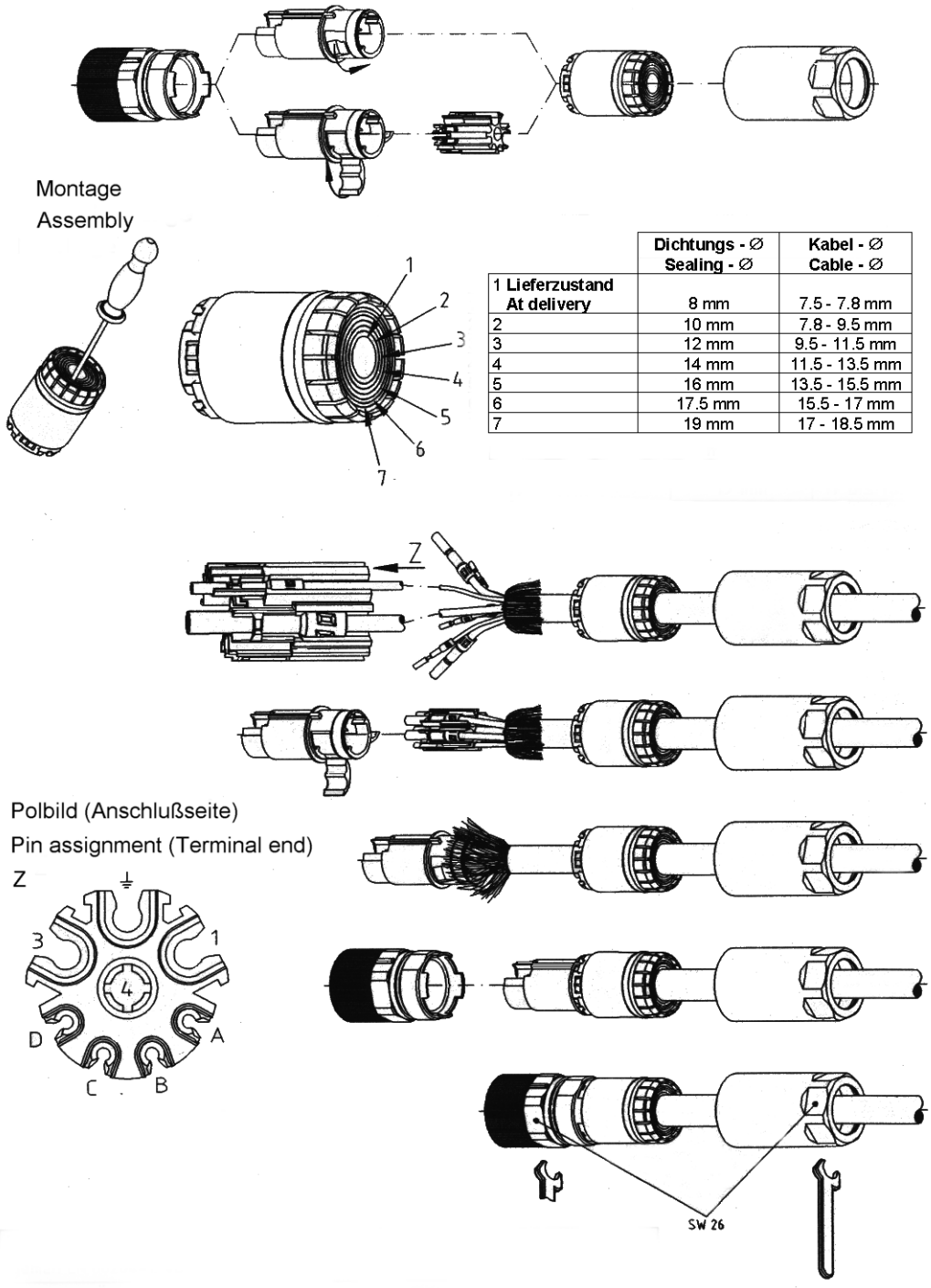
Disassembling:



1. Loosen cable clamp (A, B, C). Unscrew connector housing (D) with assembling tool (B125) or other applicable tool and separate it from contact insert sleeve (J).
2. Slide insulating body (F) backwards through contact insert sleeve (J).
3. Take off cover (G) from insulating body (F) with screw driver (size 1).
4. Detach contacts with detaching tool B056 out of insulating body (F) from mating side.
5. Remove contact tubes out of insulating body from cable side.

2.2.6 Motor connector assembly

Type LPLA 08L FR FO 213 00A1

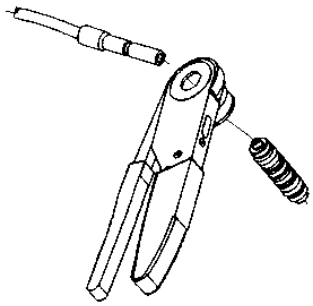


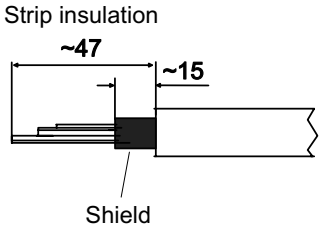
	Dichtungs - ∅ Sealing - ∅	Kabel - ∅ Cable - ∅
1 **Lieferzustand** **At delivery**	8 mm	7.5 - 7.8 mm
2	10 mm	7.8 - 9.5 mm
3	12 mm	9.5 - 11.5 mm
4	14 mm	11.5 - 13.5 mm
5	16 mm	13.5 - 15.5 mm
6	17.5 mm	15.5 - 17 mm
7	19 mm	17 - 18.5 mm

After connector assembling check if the protective measures on the connector are effective (acc. to EN 60204-1, VDE 0113 Part 1).

Recommended tools for cable connection in the motor connector.

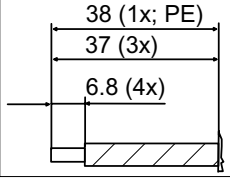
Tools can be ordered from: HYPERTAC GmbH, Post box 14 65
D-94454 Deggendorf, phone: +49-991-25012-0





Power	
Contact No.	020.331.1020
Crimping tool	B 179
Positioner	B 252
Contact assignment	1, ⏚ , 3, 4

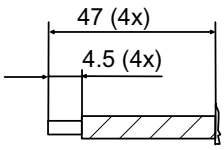
Cable stripper length



Colour ring positioner	Cross section	Crimping tool
Yellow	0.75 mm²	2
	1.0 mm²	2
	1.5 mm²	3
	2.5 mm²	4

Signal	
Contact No.	020.256.1020
Crimping tool	B 151
Positioner	B 200
Contact assignment	A, B, C, D

Cable stripper length



Colour ring positioner	Cross section	Crimping tool
------	0.14 mm²	2
	0.24 mm²	3
	0.34 mm²	4
	0.5mm²	5
	0.75 mm²	5
	1.0 mm²	6

AMK Pin assignment

Cable LiY C Y			
Pin		Pin	
⏚	PE	A	TH
1	U	B	TH
4	V	C	BR +
3	W	D	BR 0V

2.3 AMKASYN - Cable types, cable shield connection

Series AN / AZ / AW

For shielded cables use cable with tin-plated copper braid.

Module/ card	Connecting point	Cable type	Shield connection unilateral	Shield connection bilateral	Remark
AWxx	X51	4-core, shielded		x	Motor cable
	X56	4 x 2 twisted pair, shielded		x	A/I type encoder
	X156	4 x 2 twisted pair, shielded		x	A/I type encoder Resolver
		4 x 2 twisted pair, shielded		x	T/S type encoder **3)**
	X54/X154	2-core, shielded	AW		Motor PTC
	X58/X158	non-shielded	-	-	EF, QEF
	X59/X159	twisted pair, shielded	AW		Analog inputs
AW-IWx	X60	4 x 2 twisted pair, shielded		x	Pulse transmission **2)**
AZxx	X21	2-core, shielded		x	ext. brake resistor
	X24	2-core, shielded	AZ		PTC - ext. brake resistor
	X25	3-core, non-shielded	-	-	Supply SMPS
	X26	3-core, non-shielded	-	-	Charge circuit AN
	X33	2-core, non-shielded	-	-	Fan
	X29/X129	shielded (max. 5 cores *)	AZ		Analog outputs
	X30/X130	shielded (max. 7 cores *)	AZ		Binary inputs
	X31	shielded (max. 11 cores *)	AZ		Binary outputs **1)**
	X32/X132	4 x 2 twisted pair, shielded		x	Square wave input **2)**
AZ-R01	X77	2 x 2 twisted pair, shielded		x	RS232C,RS422
AZ-EA8	X80	shielded (max. 19 cores *)	AZ-EA8		**1)**
AZ-EA24	X81/82	shielded (max. 25 cores *)	AZ-EA24		**1)**
AZ-IG1	X78/79	12 x 2 twisted pair, shielded *		x	**2)**
AZ-PSx	X72	2 x 2 twisted pair, shielded		x	RS422
AZ-K02	X72	2 x 2 twisted pair, shielded		x	RS422
AZ-MC1	X72	2 x 2 twisted pair, shielded		x	RS422
AB-K02	X9-X72	2 x 2 twisted pair, shielded		x	RS422
AB-110	X200-X77	2 x 2 twisted pair, shielded		x	RS422
Motor	Fan	non-shielded	-	-	
	Brake	non-shielded	-	-	

* Max. required core number on evaluation of all signals

1) see page 25
2) see page 25
3) see page 25

AMKASYN - Cable types, cable shield connection

Series AZ 05, AW 1,3/2,6 , ...

For shielded cables use cable with tin-plated copper braid.

Module/ card	Connec-ting point	Cable type	Shield connec-tion unilateral at	Shield connec-tion bilateral at	Remark
AWxx	X51	4-core, shielded		x	Motor connect-ion cable
	X156	4 x 2, shielded, twisted pair		x	I/A type encoder, Resolver
		4 x 2, shielded, twisted pair		x	T/S encoder **3)**
	X154	2-core, shielded		x	Motor PTC
	X158	non-shielded	-	-	EF, QEF
	X159	shielded, twisted pair	AW		Analog inputs
AW-IWx	X60	4 x 2, shielded, twisted pair		x	Pulse transmission
AZ 05	X21	2-core, shielded		x	ext. braking resistor
	X24	2-core, shielded	AZ		Protect. RB
	X23	2 wires, non-shielded	-	-	Fan
	X29	shielded (max. 5 cores*)	AZ(D-SUB)		Analog outputs
	X30	shielded (max. 9 cores*)	AZ(D-SUB)		Binary inputs
	X132	4 x 2, shielded, twisted pair		x	Pulse input **2)**
AZ-R01	X77	2 x 2, shielded, twisted pair		x	RS232C,RS422
AZ-EA8	X80	shielded (max. 19 cores*)	AZ-EA8		**1)**
AZ-EA24	X81/82	shielded (max. 25 cores*)	AZ-EA24		**1)**
AZ-IG1	X78/79	12 x 2, shielded, twisted pair*		x	**2)**
AZ-PSx	X72	2 x 2, shielded, twisted pair		x	RS422
AZ-K02	X72	2 x 2, shielded, twisted pair		x	RS422
AZ-MC1	X72	2 x 2, shielded, twisted pair		x	RS422
AB-K02	X9-X72	2 x 2, shielded, twisted pair		x	RS422
AB-110	X200-X77	2 x 2, shielded, twisted pair		x	RS422
Motor	Fan	non-shielded	-	-	
	Brake	non-shielded	-	-	

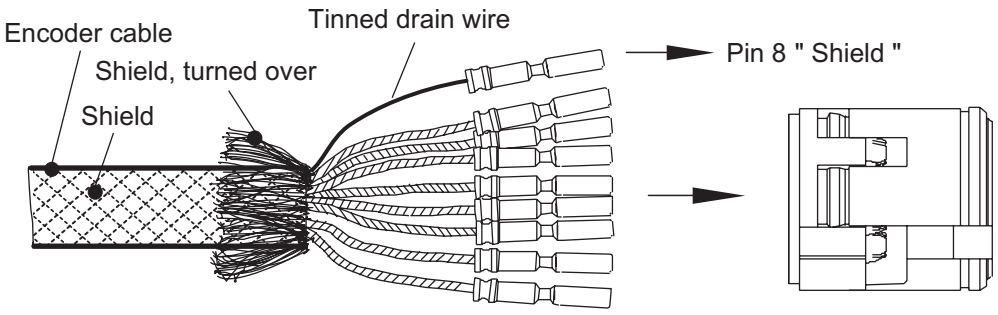
* Max. required core number on evaluation of all signals

1) see page 25
2) see page 25
3) see page 25

1) For connections to the AZ binary outputs and the I/O cards, shielded cables must be used. The cable shield must be connected single-ended at X31 or X80, X81, X82. If a single shielded cable cannot be used for the complete length, a shielded cable of 2,5 m / 8,5 ft must be connected to an interface element. Afterwards single cables without shield can be used.

2) If the AW-IWx option card (pulse transmission) is used as the signal source, the shield of the interconnection cable must be connected at both ends within the AMKASYN system: At AW-IWx end on the metallized D-SUB-connector shell and at AZ end at the square wave pulse input X32 on the AZ housing or when using optional card AZ-IG1 on the metallized D-SUB-connector shell.
   If the square wave signal is supplied by an external source, the cable shield must be connected single-ended at the front panel (contact area as large as possible) of the AZ module or on the respective D-SUB housing.

3) The T/S type encoder housing is insulated from the motor frame.
   The T/S type encoder housing is grounded via the shield of the enoder cable. For this the cable shield must be connected to pin 8 of the encoder connector. Internally pin 8 of the encoder socket at the motor is connected to the encoder housing.



The shield of the motor encoder cable must be grounded at both ends !

3 EMC compatibility

3.1 General

Frequency converters generate radio frequency interference (R.F.I.) voltages due to their fundamental method of operation. R.F.I. suppression filters limit these interference levels to the maximum legal permissible values. Optimum functioning of these filters can only be achieved by installation, cabling, earthing and shielding according to the correct EMC standard.

Legal requirements
The European directive of November 1992 and the standard EN 50178 „Electronic equipment for use in electrical power installations and their assembly into electrical power installations“ require the R.F.I. suppression/test standard EN 55011 to be used for emitted radio interference.

Industrial applications must comply with class A limits of the test standard EN 55011 according to the basic standard EN 550081-1. The AMKASYN power supply modules with integrated mains suppression filter (ANxxF) guarantee the compliance with class A limits of the standards.

The standard AMKASYN power supply modules (ANxx) require external mains suppression filters in order to comply with class A limits of the standards (see table below).

In order to achieve the B R.F.I. suppression, additional filter components must be installed. Details are available on request.

Units must also meet noise immunity demands according to the standard prEN 50082-2 dated 11/94. The AMKASYN system has met inspection class 3 of both standards: „EN 60 801-2: 03/94 „Electrostatic discharge requirements“ and „prEN 6100-4-4: 10/94 „Electrical fast transient/burst immunity test“ providing installation, cabling, earthing and shielding is carried out to the correct EMC standard.

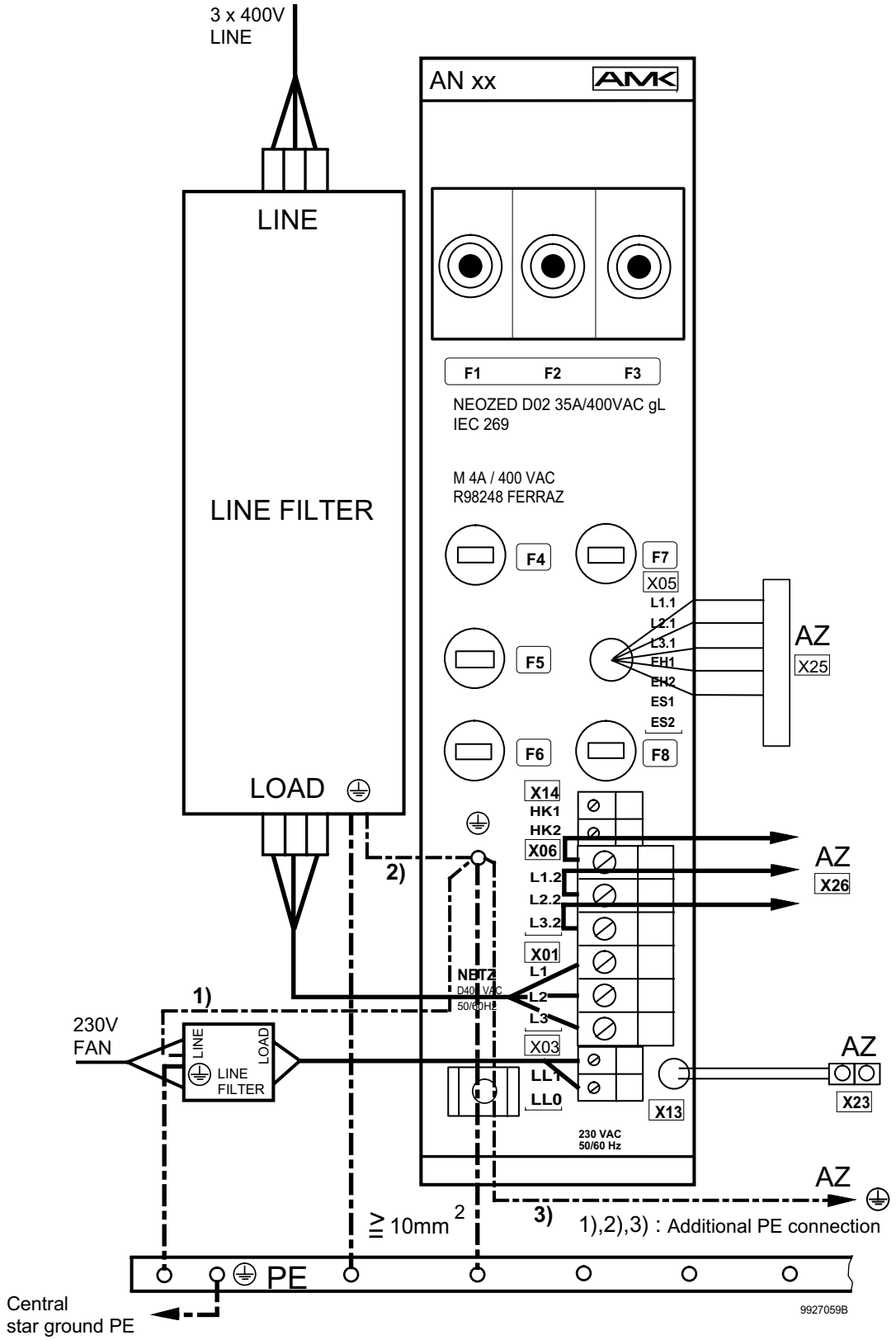
Test results are available on request.

External mains filters

The following mains filters are approved for the power supply modules ANxx (without line filter):

For module	At mains input X01:	At mains input X03:
AN 10, AN 20	FN 351-36-33 (Schaffner)	FN 610-3-06 (Schaffner)
alternative	FMAC-0934-3610 (Timonta)	FMW2-41-3/I (Timonta)
AN 40	FN 351-80-34 (Schaffner)	FN 660-3-06 (Schaffner)
alternative	FMAC-0934-6410 (Timonta)	FSS2-55-2/05 (Timonta)
AN 60	FN 351-110-35 (Schaffner)	FN 660-3-06 (Schaffner)
alternative	FMAC-0937-H110 (Timonta)	FSS2-55-2/05 (Timonta)

Cabling External mains filter - Power supply module ANxx



4 EMC test results of the AMKASYN system

Emitted interference

Requirements according to the basic specification **EN 50 081-2: 03/94**

Applied test standard: EN 55011: 07/92

Result: By using the AMKASYN power supply modules with integrated mains filter **AN 10F, AN 20F, AN 40F,AN 60F** and considering the installation instructions, the radio interference level for units of **class A** with reference to the limits for standards for the radio interference suppression according to standard EN 55011 is kept.

By connecting in series **external mains filter components** to the AMKASYN power supply modules AN 10, AN 20, AN 40, AN 60 and considering the installation instructions, the radio interference (suppression) level **class A** is also reached.

At the present production status the **radio interference (suppression) level „B“** is only reached with discrete filter components additional to the above mentioned actions.

Immunity

Requirements according to the basic specification **prEN 50082-2: 11/94**

Applied test standards:

1. EN 60801-2: 03/94 „Electrostatic discharge requirements“
2. prEN 61000-4-4: 10/94 „Electrical fast transient/burst immunity test“

Result: Considering the installation instructions the limiting values for **degree of inspection 3** are kept.

5 Impressum

Title **Supply requirements AN, AZ, AW, AZ05, AW 1,3/2,6…**

Objective Installation and Cabling of the AMKASYN Drive Systems AN, AZ, AW, AZ05, AW1,3/2,6…

Part-Number 27852

History

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- Software version
- System configuration and application
- Description of problem and presumed cause of failure
- Diagnostic message (error code)

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