AMK

AMKASYN

VARIABLE SPEED DRIVES

# AMKASYN

## Digital Inverters in Modular Construction
## Series AN / AZ / AW

## Power Supply Modules AN xx / AN xxF

## Technical manual



4400.1E

Part-No.: 25747

AMK

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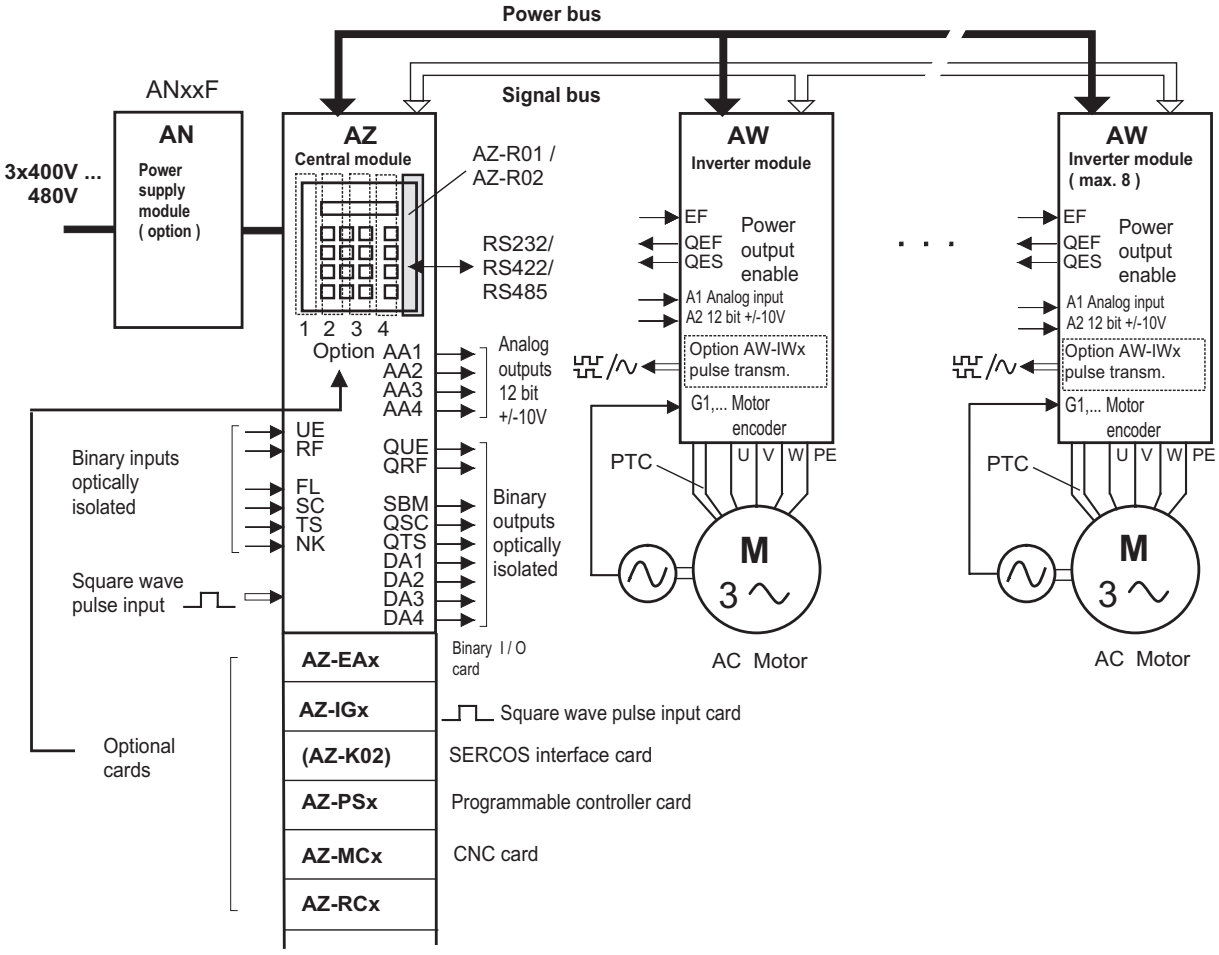
# Contents

# 1 AMKASYN System overview




**Abbreviations:**

| | | | | | |
|---|---|---|---|---|---|
| **UE** | DC - Bus enable | **QUE** | DC - Bus ready handshake | **EF** | Power output enable |
| **RF** | Inverters on ( all ) | **QRF** | Inverters ready handshake ( all ) | **QEF** | Power output enabled |
| **FL** | Error reset | **SBM** | System ready | **QES** | Power output disabled |
| **SC** | Status code call | **QSC** | SC handshake | | |
| **TS** | Status code clock | **QTS** | TS handshake | | |
| **NK** | Cam ( Ref. L.S. ) | **DA1**... **DA4** | Data output DA1...DA4 | | |

The AMKASYN series is a drive system of modular construction for feeding AMK AC motors. The digital inverters regulate the drives in 4 quadrant mode precisely and with high dynamic response. The feed is direct from a 400V three-phase power supply. The inverter modules are supplied from a common DC-bus. The latest power semiconductor technology in conjunction with high-grade integration guarantees high reliability.

# 2 Safety instructions

**Please read and observe additionally the „Safety instructions for AMKASYN Inverters“.**

Meaning of the used symbols:

**Danger**

Possible consequences: Dead or severest injuries!

**Warning**

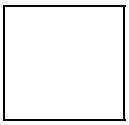
Possible consequences: Severe injuries or death!

**Warning**

**The operation of the drive system in a manner that does not conform to its purpose and intended use can be dangerous and can cause severe injury, up to loss of life, to the user/operator. Misuse can also cause damage to the machinery/equipment of the enduser.**

**In order to minimize the risk of accidents and damage it is necessary that installation, start-up, maintenance and repairs are performed diligently by trained and experienced specialists.**

**Drive system parameters may only be set or modified by the machine manifacturer!**
**Entry of non-conforming parameter values is effecting the drive behaviour and increasing the risk of accidents and damage!**



**Danger**

**Each time before working on the AMKASYN drive system:**
**Interrupt power supply using the MASTER SWITCH!**
**Working under voltage is dangerous to life!**
**More than ONE LIVE CIRCUIT! See diagram! (2 line circuits on AZ module X01, X03).**
**After POWER OFF:**
**Because of capacitor charge don’t touch electrical connections immediately! DC voltage at terminals UZP and UZN is dangerous to life!**
**Before working on the modules wait for discharge time longer than 3 minutes after turning power off!**

**The option cards and all plug connectors must only be inserted or removed when the modules are voltage-free!**

**Never loosen or tighten terminals under voltage!**

# 3 Power Supply

## 3.1 Power Supply modules AN xx / AN xxF specification (NEOZED fuses)

The size of the power supply module AN xx depends upon the output power of the selected central module AZ xx assigned. The value „xx“ states the nominal DC-output power of the AZ module.
Suffix „F“ is specifying power supply modules with integrated mains suppression filter for radio interference level A according to EN55011.

| Type | AN 10 / AN 10F | AN 20 / AN 20F | AN 40 / AN 40F | AN 60 / AN 60F |
|---|---|---|---|---|
| Associated AZ module | AZ 10 | AZ 20 | AZ 40 | AZ 60 |
| Input voltage | 3 x 400V ±10% | | | |
| Fan, main contactor supply | 230V ±10% | | | |
| Line frequency | 47 - 63 Hz | | | |
| Output voltage | equal to input voltage | | | |
| Output frequency | equal to line frequency | | | |
| Efficiency | approx. 0.99 | | | |
| Input current | 16 A | 32 A | 64 A | 96 A |
| Main fuses F1, F2, F3 Type | 20 A NEOZED D02 gL IEC 269 | 35 A NEOZED D02 gL IEC 269 | 80 A NEOZED D03 gL IEC 269 | 100 A NEOZED D03 gL IEC 269 |
| Miniature fuses F4, F5, F6, F7, F8 Make/size | M4A / 400V<br>FERRAZ R98248 6,3 x 32 | | | |
| Recommended cable cross-sections [$mm^2$] / AWG | Cable cross-sections according to „Conductors Table 53.2 UL508C“. Use copper wires (75°C) only. | | | |
| X01: Power input | 4x2,5 / AWG12 | 4x10 / AWG8 | 4x25 / AWG4 | 4x35*/AWG2 |
| X06: Connection AN-AZ 3 x 400V power output | 3x2,5 / AWG12 | 3x6 / AWG10 | 3x16 / AWG4 | 3x35 / AWG2 * |
| X05: Connection AN-AZ Charging circuit | 5x1 / AWG16 | 5x1 / AWG16 | 5x1 / AWG16 | 5x1 / AWG16 |
| X13: Fan supply | 2x0.75 / AWG18 | 2x0.75 / AWG18 | 2x0.75 / AWG18 | 2x0.75 / AWG18 |
| X14: Aux. contact (NC) main contactor (max. 230V / 16 A) | max. 2 x 4 | | | |
| PE connection [$mm^2$] / AWG | 4 / AWG10 | 6 / AWG8 | 25 / AWG2 | 25 / AWG2 |
| Dimensions H x B x D [$mm^3$] / [$in.^3$] | 358 x 90 x 357 / 14.1 x 3.54 x 14.05 | | 538 x 170 x 357 / 21.2 x 6.7 x 14.05 | |
| Weight m [kg]/[lb] AN | 10.5 / 23 | 10.5 / 23 | 16 / 35 | 17 / 37.5 |
| AN...F | 11.1 / 24.3 | 11.1 / 24.3 | 20.5 / 44.9 | 27.7 / 60.7 |

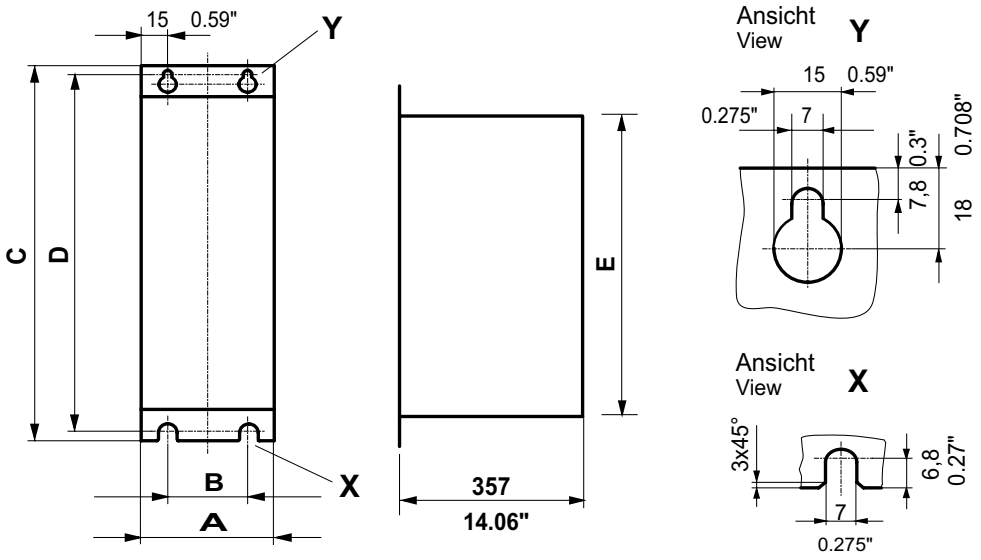
* End of wires with pin-end connector

## 3.2 Power Supply modules AN xxF specification (FERRAZ/NH fuses)

| Type | AN 10 F -1 -1 | AN 20 F -1 -1 | AN 40 F -1 | AN 40 F -1 -1 | AN 60 F -1 | AN 60 F -1 -1** |
|---|---|---|---|---|---|---|
| Associated AZ module | AZ 10 | AZ 20 | AZ 40 | AZ 40 | AZ 60 | AZ 60 |
| Input voltage | 3 x 400V ... 3 x 480V ±10% | | | | | |
| Fan, main contactor supply | 230V ±10% | | | | | |
| Line frequency | 47 - 63 Hz | | | | | |
| Output voltage | equal to input voltage | | | | | |
| Output frequency | equal to line frequency | | | | | |
| Efficiency | ca. 0,99 | | | | | |
| Input current | 16 A | 32 A | 64 A | 64 A | 96 A | 96 A |
| Main fuses F1, F2, F3 Type | 25A URC Gr. 14x 51 FERRAZ Y 093907 | 50A URC Gr. 14x 51 FERRAZ B 093910 | 80A NH-Sicherung gL Gr.000 IEC 269 | 80A URD Gr. 22x 58 FERRAZ A 094829 | 100A NH-Sicherung gL Gr.000 IEC 269 | 100A URD Gr. 22x 58 FERRAZ Y 094827 |
| Miniature fuses F4, F5, F6, F7, F8 Make/Size | FF 6,3A / 500V FERRAZ A 085445 6,3 x 32 | | | | | |
| Recommened cable cross-sections [$mm^2$] / AWG | | | | | | |
| X01: Power input | 4 x 2,5/ AWG12 | 4 x 10/ AWG8 | 4 x 25/ AWG4 | 4 x 25/ AWG4 | 4 x 35*/ AWG2 | 4 x 35*/ AWG2 |
| X06: Connection AN-AZ 3 x 400V power output | 3 x 2,5/ AWG12 | 3 x 6/ AWG10 | 3 x 16/ AWG4 | 3 x 16/ AWG4 | 3 x 35*/ AWG2 | 3 x 35* AWG2 |
| X05: Connection AN-AZ Charging circuit | 5 x 1/ AWG16 | 5 x 1/ AWG16 | 5 x 1/ AWG16 | 5 x 1/ AWG16 | 5 x 1/ AWG16 | 5 x 1/ AWG16 |
| X13: Fan supply | 2 x 0,75/ AWG18 | 2 x 0,75/ AWG18 | 2 x 0,75/ AWG18 | 2 x 0,75/ AWG18 | 2 x 0,75/ AWG18 | 2 x 0,75/ AWG18 |
| X14: Aux. Contact (NC) main contactor (max. 230V / 16A) | max. 2 x 4 | | | | | |
| PE-connection [$mm^2$] / AWG | 4/ AWG10 | 6/ AWG8 | 25/ AWG2 | 25/ AWG2 | 25/ AWG2 | 25/ AWG2 |
| Dimensions H x B x T [mm] | 358 x 90 x 357 14.1 x 3.54 x 14.05 | | 538 x 170 x 357 21.2 x 6.7 x 14.05 | | | |
| Weight approx. [kg]/[lb] | 12 / 26,5 | 12 / 26,5 | 22 / 48,5 | 22 / 48,5 | 30 / 66,2 | 30 / 66,2 |

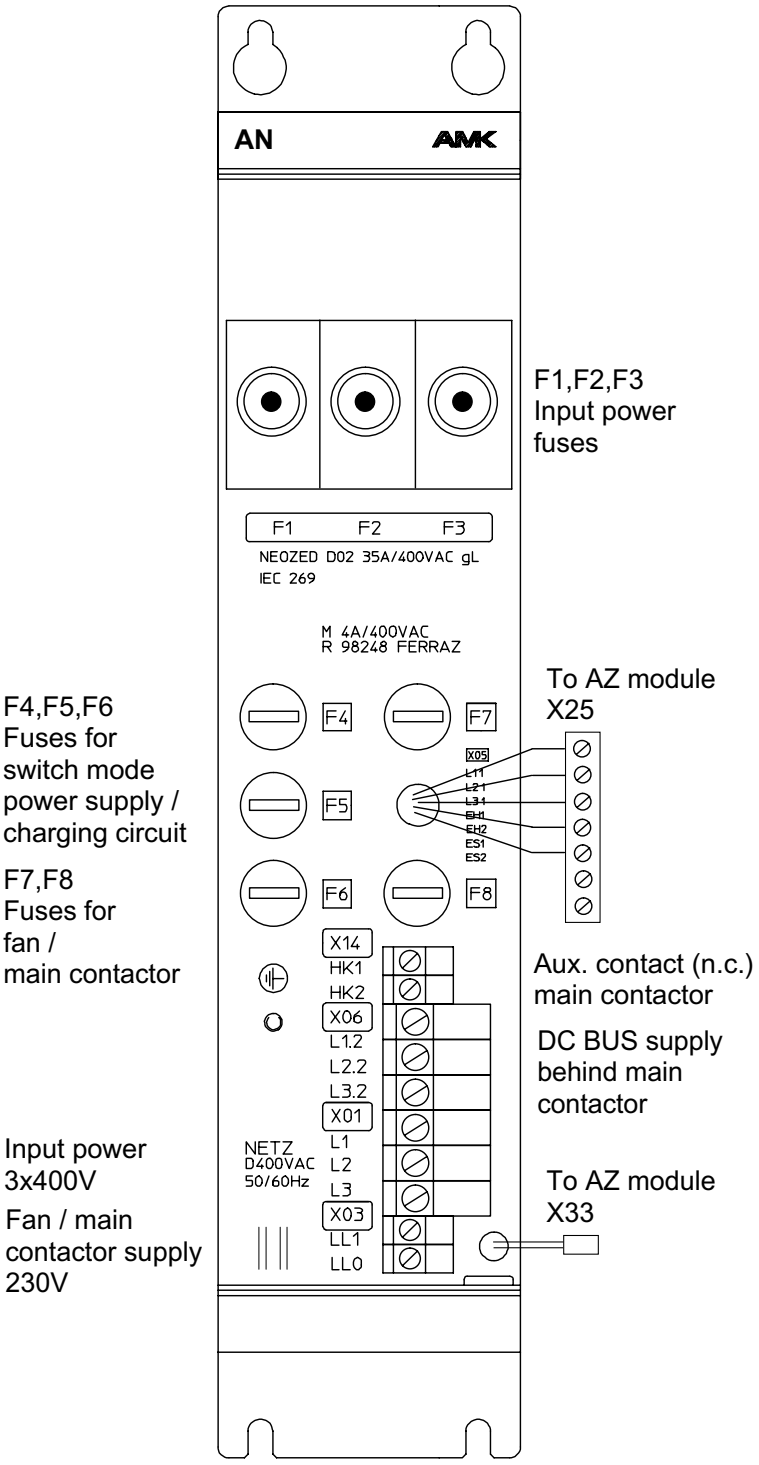
* End of wires with pin end connector.
** 60 kW only with 3 x 480V,
52 kW reduced power with 3 x 400V

# 4 Dimensions Power Supply modules AN xx / AN xxF

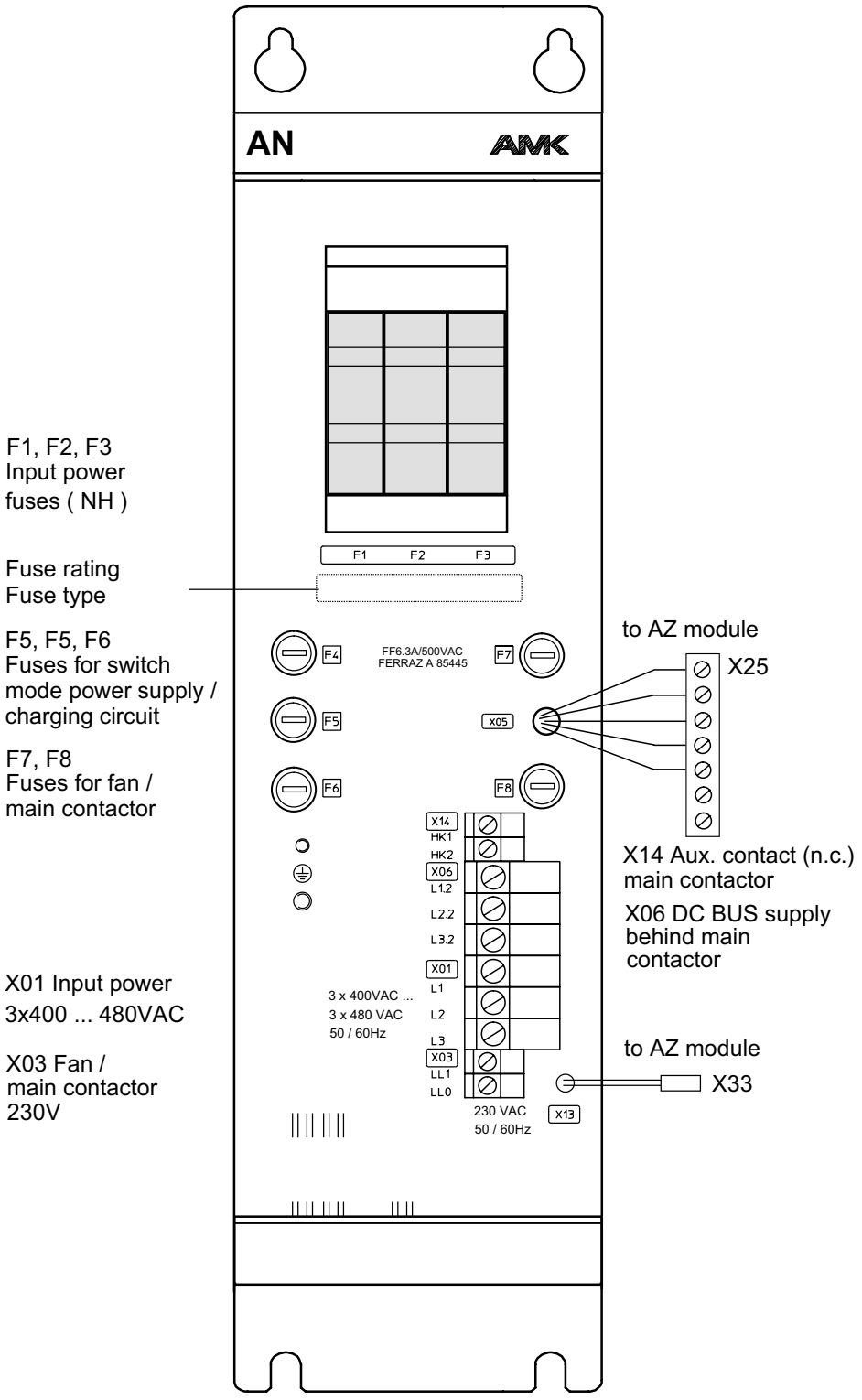



| Type | A | B | C | D | E |
|---|---|---|---|---|---|
| AN10/ AN10F | 90 (3.54") | 60 (2.36") | 415 (16.34") | 400 (15.75") | 358 (14.09") |
| AN20/ AN20F | 90 (3.54") | 60 (2.36") | 415 (16.34") | 400 (15.75") | 358 (14.09") |
| AN40/ AN40F | 170 (6.69") | 140 (5.51") | 595 (25.43") | 580 (22.84") | 538 (21.18") |
| AN60/ AN60F | 170 (6.69") | 140 (5.51") | 595 (25.43") | 580 (22.84") | 538 (21.18") |

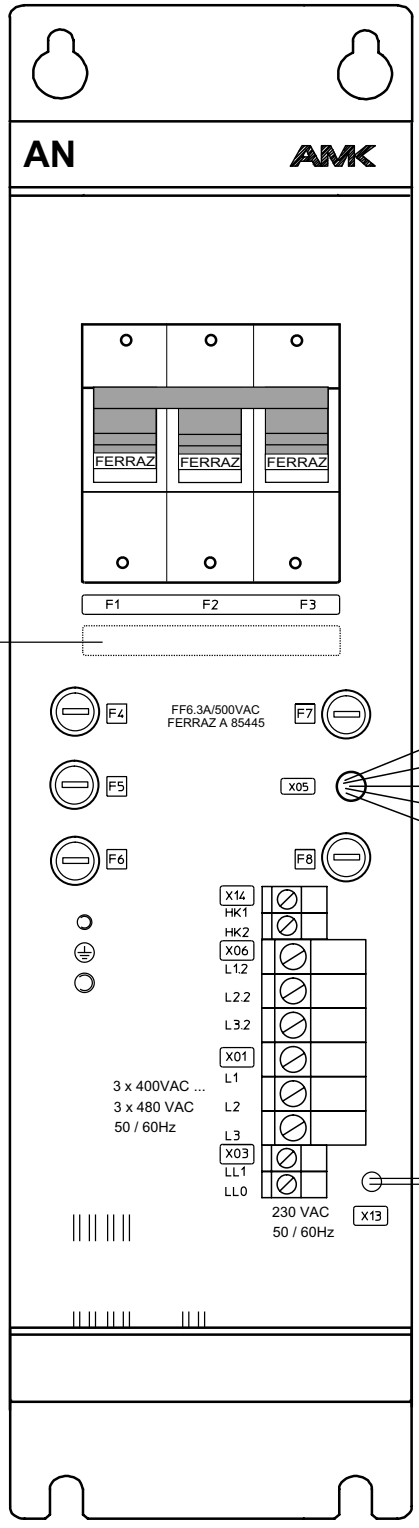
# 5 Front view Power Supply modules AN xx / AN xxF (option) (NEOZED fuses)



# Front view Power Supply modules AN xxF (NH fuses)



# Front view Power supply modules AN xxF (FERRAZ fuses)




F1, F2, F3
Input power fuses
( FERRAZ )

Fuse rating
Fuse type

F5, F5, F6
Fuses for switch mode power supply / charging circuit

F7, F8
Fuses for fan / main contactor

X01 Input power
3x400 ... 480VAC

X03 Fan / main contactor 230V

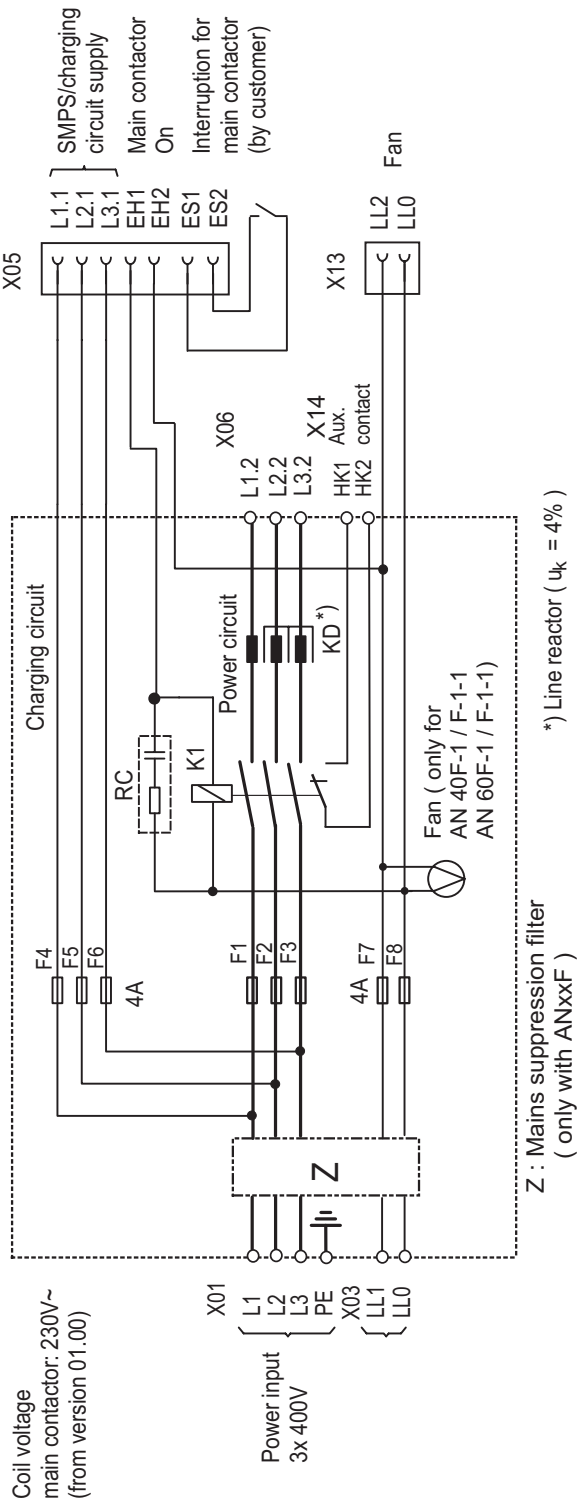
to AZ module
X25

X14 Aux. contact (n.c.) main contactor

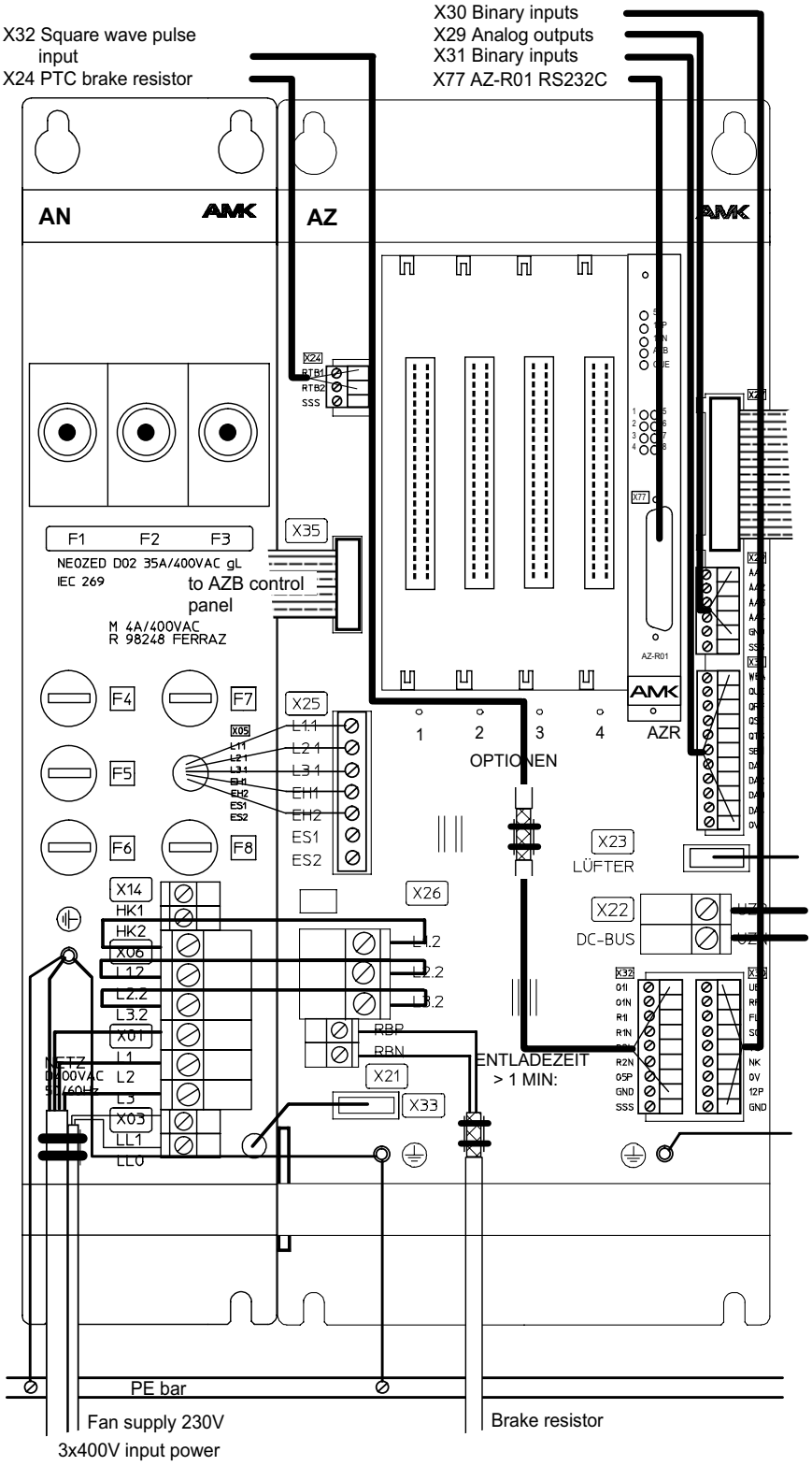
X06 DC BUS supply behind main contactor

to AZ module
X33

# 6 Block diagram and connection drawing Power Supply modules AN xx / AN xxF



# 7 Wiring Power Supply modules AN xx / AN xxF



# 8 Functional description Power Supply modules

The power supply module AN is offered as option and contains all components that are required for the power-side feed-in of the AMKASYN drive system.

The supply for generating the DC-BUS voltage is provided to the AZ module through the main fuses F1, F2, F3, the main contactor K1 and the line reactor KD. The feed of the switched mode power supply in the AZ module, fused via F4, F5, F6 is branched off before the main contactor.

In the power supply module AN xxF a mains suppression filter is additionally integrated which guarantees the conformity of the radio interference voltage's limiting values according to class A (EN 5501) for the AMKASYN system. It must however be provided, that cabling, shielding and earthing are executed as instructed.

The AC voltage for the fans in the modules (230V, see „AN... specifications“) must be provided by the customer at the terminals X03. F7 and F8 fuse the fan circuit.

On the power side, the terminals X06 in the AN module must be connected with the terminals X26 in the AZ module. Insert plug-in terminal block X05 in the plug connector X25 and the fan cable in socket X33.

If the power supply module AN option is not used, the corresponding components (fuses, main contactor, line reactor) must be procured, installed and wired by the customer.

A main contactor with a pickup time of < 100 ms is required.

# 9 Signal description of Power Supply modules

**Terminals EH1, EH2, ES1, ES2**

A relay contact in the central module AZ bridges terminals EH1 and EH2 on the plug-in terminal block X05 and thus energizes the main contactor coil. Terminals ES1-ES2 are connected in series to the contactor coil. The loop ES1-ES2 must be closed by the customer by the contact of a safety time relay. The main contactor supply is interrupted on the hardware side by separating the connection ES1-ES2.

The user thus has the possibility of isolating the drive system on the power side from the power supply by an external safety circuit. The input of the switched mode power supply is not interrupted in this case and axis-specific data is retained.

Input RF „Inverters On“ must be switched off before or simultaneously with the interruption of ES1-ES2. The drive system goes to fault without this measure. It must be noted that regenerative braking is possible only with the main contactor closed! If the safety regulations require direct shutdown of the main contactor, an external braking resistor which converts surplus braking energy into heat must be connected to the AZ module should the internal braking resistor not be sufficient.

**Terminals HK1, HK2 (from AN version 01.00)**

Auxiliary contact (n.c.) of main contactor. External evaluation by the higher ranking controller.

# 10 AN module exchange

**Important information:**

1. **MASTER SWITCH OFF. AWAIT DC BUS DISCHARGING TIME > 3 MINUTES!**
2. Remove module front cover.
3. Loosen strain relief for the cables.
   Unscrew terminals for power input (X01) and fan supply (X03).
4. Unscrew terminals X06 (and X14 if used).
5. Use extracting tool to disconnect plug-in terminal block X25 at AZ module.
6. Disconnect fan connector X33 at AZ module. For this loosen the latching at the narrow edge by pressing with your fingers.
7. Unscrew PE connections at AN module.
8. Loosen module fastening screws at the mounting panel.
9. Slightly lift the module and take it out towards you.
10. Insert the new AN module with the same specification, lower it and securely tighten the fastening screws.
11. Securely tighten PE connections at AN module.
12. Insert and latch fan connector (X33) at AZ module.
13. Insert plug-in terminal block X25 at AZ module.
14. Securely connect the single wires at terminals X06 (and X14 if used).
    **Pay attention to the correct phase-sequence!**
15. Securely connect power input at terminal X01 and fan supply at X03.
    **Pay attention to the correct phase-sequence!**
16. For strain relief fix all cables to the bases with cable ties.
17. Put in the module front cover.
18. Main switch on. Restart.

# 11 Impressum

**Title** **AMKASYN Power supply modules AN**

**Objective** Technical Description AMKASYN Power supply modules
AN xx / AN xxF / AN xxF-1 (-1)

**Part-Number** 25747

**History**

| Date |
|---|
| 2000/44 |

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- Diagnostic message ( error code )

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