

Hardware and Engineering

xStart-XS1 Networkable Motor Starters

11/04 AWB2700-1426GB

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Warning! Dangerous electrical voltage!

Before commencing the installation

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Earth and short circuit the device.
- Cover or enclose any adjacent live components.
- Follow the engineering instructions (AWA) for the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE) must be connected to the protective earth (PE) or the potential equalisation. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference does not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that an open circuit on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the extra-low voltage of the 24 V supply. Only use power supply units complying with IEC 60364-4-41 (VDE 0100 Part 410) or HD384.4.41 S2.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation.
- Emergency stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause a restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed and with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings.
- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency-stop devices should be implemented.
- Wherever faults in the automation system may cause injury or material damage, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks etc.).
- Depending on their degree of protection, frequency inverters may contain live bright metal parts, moving or rotating components or hot surfaces during and immediately after operation.
- Removal of the required covers, improper installation or incorrect operation of motor or frequency inverter may cause the failure of the device and may lead to serious injury or damage.
- The applicable national accident prevention and safety regulations apply to all work carried on live frequency inverters.
- The electrical installation must be carried out in accordance with the relevant regulations (e. g. with regard to cable cross sections, fuses, PE).
- Transport, installation, commissioning and maintenance work must be carried out only by qualified personnel (IEC 60364, HD 384 and national occupational safety regulations).
- Installations containing frequency inverters must be provided with additional monitoring and protective devices in accordance with the applicable safety regulations. Modifications to the frequency inverters using the operating software are permitted.

- All covers and doors must be kept closed during operation.
- To reduce the hazards for people or equipment, the user must include in the machine design measures that restrict the consequences of a malfunction or failure of the drive (increased motor speed or sudden standstill of motor). These measures include:
 - Other independent devices for monitoring safety-related variables (speed, travel, end positions etc.).
 - Electrical or non-electrical system-wide measures (electrical or mechanical interlocks).
 - Never touch live parts or cable connections of the frequency inverter after it has been disconnected from the power supply. Due to the charge in the capacitors, these parts may still be live after disconnection. Fit appropriate warning signs.

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About this manual

This manual contains detailed information about mounting/dismounting as well as electrical installation of motor starters from the XStart-XS1 series. It is only valid in conjunction with the "XI/ON PROFIBUS DP", AWB2700-1394GB or "XI/ON CANopen", AWB2700-1359GB manuals.

→ Unless otherwise specified, all descriptions, safety notes, warnings and other general information of the XI/ON manuals AWB2700-1394GB or AWB2700-1395GB apply.

In addition to describing the mechanical and electrical features, this manual also describes the interfacing of XStart-XS1 via an XI/ON station on the PROFIBUS DP and CANopen bus systems.

Target group

Please read this manual carefully before installing and operating XStart-XS1. We assume that you are familiar with the a fundamental knowledge of physics and that you are familiar with the operation and handling of electrical engineering installations, and are capable of reading, understanding and correctly applying technical schematics and drawings. Furthermore, you will require a sound knowledge of the PROFIBUS DP and CANopen fieldbus systems.

Further manuals for this device

Further information including installation and other information relevant to the XI/ON with PROFIBUS DP can be found in the "XI/ON PROFIBUS DP", AWB2700-1394GB; and concerning the "XI/ON CANopen" in AWB2700-1395GB manuals.

Abbreviations and symbols

This manual uses symbols and abbreviations which have the following meaning:

AGM: trip-indicating auxiliary contact

► indicates actions to be taken.



Note!

Warns of a hazardous situation that could result in damage to the product or components.



Caution!

Warns of the possibility of a hazardous situation that could result in major damage and minor injury.



Warning!

Warns of the possibility of a hazardous situation that could result in major damage and serious or fatal injury or even death.



Indicates interesting tips and additional information.

For greater clarity, the name of the current chapter is shown in the header of the left-hand page and the name of the current section in the header of the right-hand page. Pages at the start of a chapter and empty pages at the end of a chapter are exceptions.

Modification index

| Edition date | Page | Subject | New | Change | Deleted |
|---------------------|----------------------------|---|------------|---------------|----------------|
| 11/04 | 5 | Motor rating 5.5 kW | | ✓ | |
| | 6 | Figure 1: New position number | ✓ | | |
| | 15 | Table 6: XS1-DS0-340-5K5 | ✓ | | |
| | 31 | Figure 41: Colours changed of connections M and +L2 | | ✓ | |
| | 32 | Figure 42: auxiliary switch | | ✓ | |
| | 34 | Table 11: Entry of 5.5 kW | ✓ | | |
| | 57 | XS1-DS0-340-5K5 | ✓ | | |
| 06/04 | 31 | Checking the feedback circuit | ✓ | | |
| | 32 | Figure 42 | ✓ | | |
| 07/03 | 29 | Chapter "Safety features" | ✓ | | |
| 05/03 | 11 | Horizontal top-hat rail installation, vertical installation description | ✓ | | |
| 04/03 | All | Conversion to A4 | | ✓ | |
| | 43 | Interfacing to CANopen | ✓ | | |
| 07/02 | 27, 30, 33, 36, 39, 66, 84 | New power modules: 3 and 4 kW | ✓ | | |

1 Introduction to xStart-XS1

You can find the following subjects in this chapter:

- „Intended usage“
- „Engineering notes/installation of the product“
- „The basic concept“
- „The xStart-XS1 components“

Intended usage



Warning!

The devices described in this manual must be used only in applications prescribed in this manual or in the respective technical descriptions, and only in connection with components and devices from third party manufacturers that have been certified.

Appropriate transport, storage deployment and mounting as well as careful operating and thorough maintenance guarantee trouble-free and safe operation of these devices.

Engineering notes/installation of the product



Warning!

It is imperative that all respective safety measures and accident protection guidelines be adhered to.



Warning!

Electrical installation and commissioning of the XStart-XS1 may only be performed by electricians or personnel instructed in electrical engineering in accordance with the DIN VDE 0105-100 (German) standard.

The basic concept

xStart-XS1 is the modular, bus compatible version of the proven motor starters from Moeller. It connects motors with the world of XI/ON; and thereby assures flexibility with the interoperable system availability.

xStart-XS1 presently offers motor starters in 4 versions:

- DOL starters with trip-indicating auxiliary contacts
- DOL starter without trip-indicating auxiliary contacts
- Reversing starters with trip-indicating auxiliary contacts
- Reversing starters without trip-indicating auxiliary contacts

The xStart-XS1 modules are made up of a base module and a power module. This power module contains the successful PKZM0 motor-protective circuit-breaker as well as one or two DILEM contactors. They enable the connection of assigned motor ratings up to 5.5 kW at a rated operational voltage U_e of 400 V AC.

The connection to XI/ON is made via the internal XI/ON module bus; just simply connect the xStart-XS1 module to the right-hand side of the XI/ON station.

xStart-XS1 can be used with the following XI/ON gateways:

- XN-GW-PBDP-1.5MB
XI/ON Gateway PROFIBUS DP
with 1.5 MBaud; tension spring terminal connection
- XN-GW-PBDP-1.5MB-S
XI/ON Gateway PROFIBUS DP
with 1.5 MBaud; screw terminal connection
- XN-GW-PBDP-12MB
XI/ON Gateway PROFIBUS DP
with 12 MBaud; tension spring terminal connection
- XN-GW-DNET
XI/ON Gateway DeviceNet
up to 500 kBaud
- XN-GW-CANOPEN
XI/ON Gateway CANopen
up to 1000 kBaud

xStart-XS1 cannot be operated in conjunction with the XI/ON Gateway PROFIBUS DP 1.5 MBaud standard, XN-GW-PBDP-1.5MB-STD.



The interfacing to the field bus is implemented via the XI/ON-Gateway as described in the "XI/ON PROFIBUS DP" AWB2700-1394GB or the "XI/ON CANopen" AWB2700-1395GB manuals.

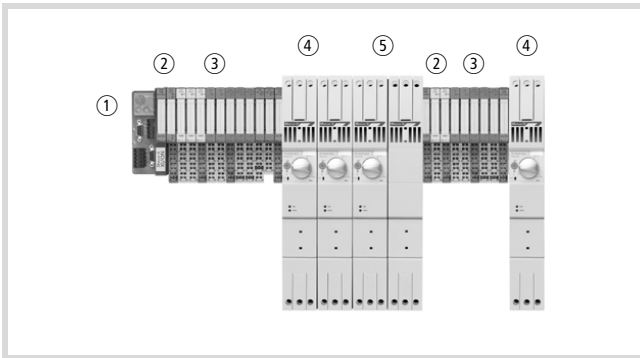


Figure 1: Example of a XI/ON station with xStart-XS1

- ① XI/ON Gateway
- ② Power distribution module
- ③ XI/ON I/O modules
- ④ xStart-XS1 DOL starter module
- ⑤ xStart-XS1 reversing starter module

Flexibility

You can adapt xStart-XS1 to exactly match your system.

xStart-XS1 can be added to any point on your XI/ON station, which enables you to divide your station into system areas of applications to suit your needs.

The motor can be switched off on the spot via the rotary handle.

Easy to operate

All xStart-XS1 modules are made up of a base module and a power module.

To mount, simply press the complete module on to the two top-hat rails. The base module can be mounted first, and the power module added later.

No tools are required to mount or dismount either the power modules or the base modules.

The power modules can be mounted or dismantled without interrupting the power supply or output wiring. This means that the system carries on operating, even when you are required to exchange power modules.

Separate enable within the system is not necessary.

The power modules can be dismantled without interrupting the power supply. Leading contacts ensure that the motor is automatically turned off.

The xStart-XS1 components

- Detailed descriptions and technical data of the individual xStart-XS1 components is contained in chapter 2 of this manual. The Appendix contains ordering information with all xStart-XS1 components and accessories as well as other useful information.

DOL starter

The DOL starter is composed of a PKZM0 motor starter and a DILEM contactor to turn the motor on and off.

It is used to both control and monitor the connected motor as well as to route the main and auxiliary power.

The power module can be pulled for commissioning or maintenance purposes without having to interfere with the wiring.

DOL starters are available in the version without trip-indicating auxiliary contacts (trip-indicating) and with trip-indicating auxiliary contacts.

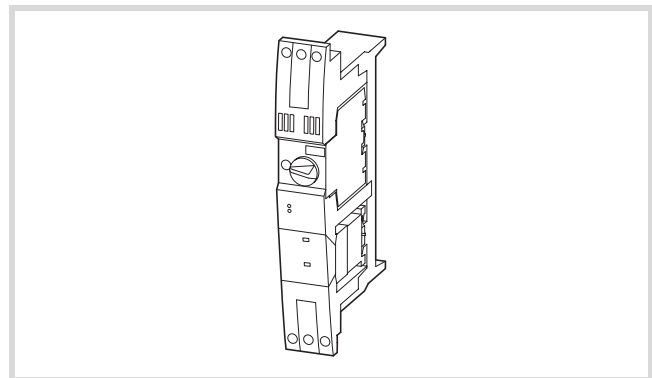


Figure 2: Direct start without trip-indicating auxiliary contact, with base module

- Please observe that the DOL starter with trip-indicating auxiliary contact requires double the mounting space.

Reversing starter

The reversing starter is composed of a PKZM0 motor starter and two DILEM contactor one for the right-handed and one for the left-handed rotation of the motor.

It is used to both control and monitor the connected motor as well as to route the main and auxiliary power.

The power module can be pulled for commissioning or maintenance purposes without having to interfere with the wiring.

Reversing starters are available in the version without trip-indicating auxiliary contacts (trip-indicating) and with trip-indicating auxiliary contacts.

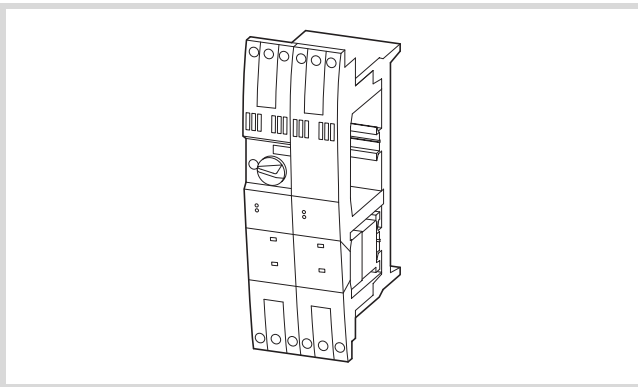


Figure 3: Reversing starter with base module

Base module

The base module is used for fixing the power module to the top-hat rails. It contains the electronics, which monitor and the correct functioning of the power module and generate error or diagnostic messages when necessary.

The base module provides the connection to the XI/ON gateway and the XI/ON modules via the internal XI/ON module bus.

The electronic coding of the power module is performed in the electronics of the base module so that false module insertion can be diagnosed. An incorrect power module cannot be activated.

The base modules are available in the following versions:

- For DOL starters without trip-indicating auxiliary contacts
- For DOL starters with trip-indicating auxiliary contacts and for reversing starters

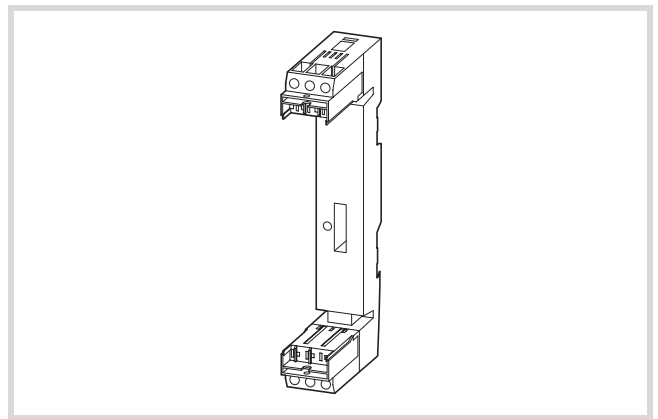


Figure 4: Base module for DOL starter without trip-indicating auxiliary contacts

Accessories for distribution of power

To reduce wiring costs, accessories are available for distribution of power.

Should it be planned to mount several xStart-XS1 modules next to one another, the power can be supplied via a power supply terminal. The power distribution is available for an operating current up to 63 A.



Figure 5: Three-phase commoning link for maximum 4 xStart-XS1 modules

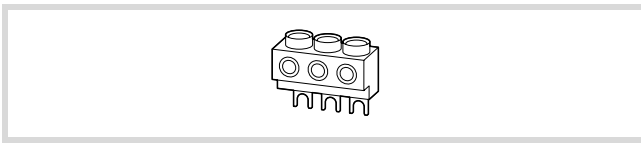


Figure 6: Incoming terminal for power distribution

2 Technical data

This chapter contains the technical data and additional information for the individual xStart-XS1 modules.

The chapter is composed of the general technical data, the description of the individual modules, wiring and electrical circuit diagrams as well as information concerning parameter and diagnostic options.

The specific technical data, the LED indicators and the corresponding base modules are listed for each individual module.

→ The representation of the diagnostic and parameterization features on the PROFIBUS DP are described in chapter "Connection to PROFIBUS-DP", page 33.

→ The representation of the diagnostic and parameterization features on the CANopen are described in chapter "Interfacing to CANopen", page 43.

The module abbreviations are explained as follows:

Table 1: Legend of module abbreviations

| Abbreviations | Description | Example |
|---------------------|---|---|
| Power module | | |
| XS | System identification for xStart-XS1 | XS 1-DS0-340-K06 |
| DS | Function of the power module: DOL starter | XS1- DS 0-340-K06 |
| RS | Function of the power module: Reversing starter | XS1- RS 0-340-K06 |
| 0 | Function of the power module: Standard | XS1-DS0-340-K06 |
| 3 | Number of poles | XS1-DS0-340-K06 |
| 4 | Power module voltage: > 400 V AC | XS1-DS0-340-K06 |
| 0 | Power module versions: without trip-indication | XS1-DS0-340-K06 |
| 1 | Power module versions: with trip-indication | XS1-DS0-341-K06 |
| K | Declaration of the rating of the power module in kW: The figure before the K determines the value before the comma. The digit behind the K indicates the value after the comma. Example: 1K5 corresponds to a power of 1.5 kW | XS1-DS0-340- K 06 |
| xKx | Universal information concerning power | XS1-DS0-340- 1K5 |
| Base module | | |
| XS | System identification for xStart-XS1 | XS -XBMS-DS0-A |
| XB | Base module for xStart-XS1 | XS- XB MS-RS0-A |
| MS | Motor starter | XS- XB MS-RS0-A |
| DS | Function of the power module: DOL starter | XS- XB MS- DS 0-A |
| RS | Function of the power module: Reversing starter | XS- XB MS- RS 0-A |
| 0 | Function of the power module: Standard | XS- XB MS- RS 0-A |
| A | Design of the base module | XS- XB MS- RS 0- A |

The following abbreviations are used in the technical data and wiring diagrams:

Table 2: Technical abbreviations and formula symbols

| Abbreviation | Designation |
|--------------|---|
| I_e | Rated operational current |
| I_{EI} | Nominal current via supply terminal |
| I_{MB} | Nominal current via the module bus |
| I_q | Rated conditional short-circuit current |
| I_u | Rated uninterrupted current |
| L1, 2, 3 | Phase conductor 1, 2, 3 |
| P_N | Rated operational power |
| PE | Protective earth |
| U_e | Rated operational voltage |
| U_{EI} | Nominal voltage via power distribution module |
| U_i | Rated insulation voltage |

Dimensions

The dimensions relate to the completed module (power module including base module).

| Type | B X L X H mm |
|---|-----------------|
| DOL starter | |
| without trip-indicating auxiliary contact | 45 × 128 × 300 |
| with trip-indicating auxiliary contact | 90 × 128 × 300 |
| Reversing starter | |
| without trip-indicating auxiliary contact | 90 × 128 × 300 |
| with trip-indicating auxiliary contact | 90 × 128 × 300 |

Dimension drawings

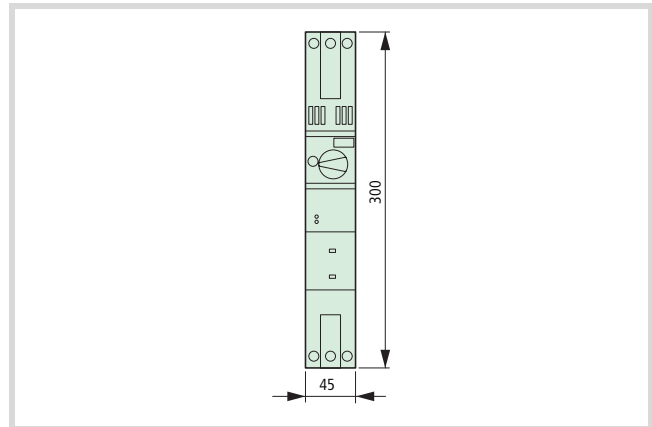


Figure 7: DOL starter without trip-indication

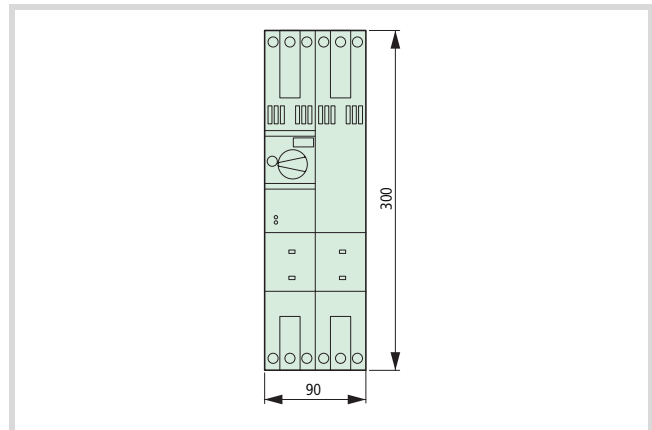


Figure 8: DOL starter with trip-indication

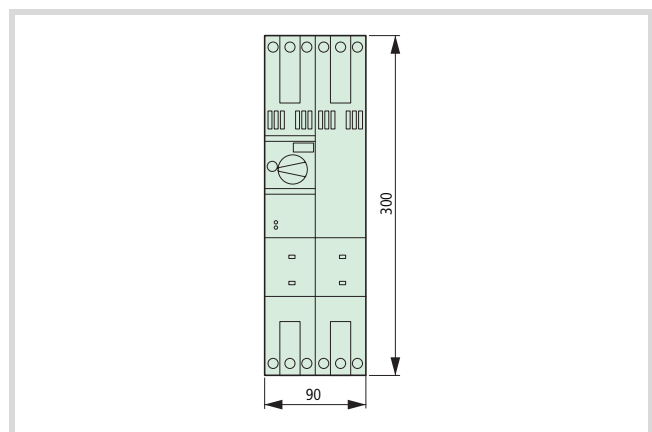


Figure 9: Reversing starter with/without trip-indication

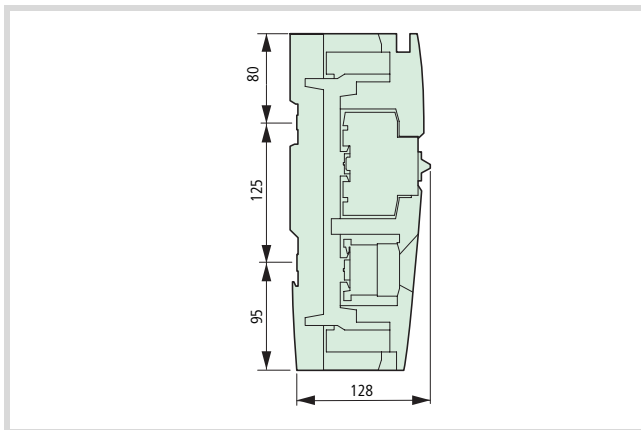


Figure 10: xStart-XS1 complete with base module

General technical data

The detailed technical data for the PKZM0 and DILEM used in xStart-XS1 can be found in the main catalogue, "Industrial Switchgear" HPL0211-2002GB, in chapter 05 for DILEM and 08 for PKZM0.

Table 3: Technical data for xStart-XS1

| General Information | |
|---|---|
| Standards and regulations | <ul style="list-style-type: none"> • IEC/EN 60947-1 • IEC/EN 60947-4-1 • DIN/EN 611131 • EN 50081-1 • EN 50082-2 |
| Radio interference suppression, limit value class | according to EN 55011; "A" |
| Protection class | IP 20 |
| Protection against direct contact according to VDE 0106 Part 100 | finger and back-of-hand proof |
| Ambient temperature | |
| Storage min./max. | -25 °C/+70 °C |
| open min./max. | 0 °C/+55 °C |
| Climatic proof | |
| Damp heat, cyclic | according to IEC 60068-2-3 |
| Damp heat, constant | according to IEC 60068-2-3 |
| Shock resistance (half-sinusoidal shock 20 ms) | 8 g |
| Mounting position/distance between the top-hat rails (concentric) | horizontal/125 mm vertical/125 mm (xStart-XS1 tilted by 90° to left) |
| Connection cross-sections | |
| Incoming terminal for: <ul style="list-style-type: none"> • Three-phase commoning link • Motor outgoing circuit | <ul style="list-style-type: none"> • 2.5 to 25 mm² stranded • 2.5 to 16 mm² flexible with ferrule • 1 × (1 to 6) mm² solid • 1 × (1 to 4) mm² flexible with ferrule • 2 × (1 to 2.5) mm² solid • 2 × (1 to 2.5) mm² flexible with ferrule |
| Tightening torque of the connection screws | 1.7 Nm |
| Mechanical lifespan of the DILEM contactors | 10 × 10 ⁶ |

| Main supply circuit | |
|---|---|
| Rated operational voltage U_e | 415 V AC |
| Motor rating P_N | see Ordering Information |
| Rated insulation voltage U_i | 690 V |
| Rated short-circuit current I_q | 100 kA |
| Overvoltage category/pollution degree | III/3 |
| Rated operational current of the three phase commoning link I_u | 63 A |
| Classification type | |
| up to 1.6 A | 1 |
| up to 10 A | 2 |
| Motor start-up current | max. 70 A |
| Auxiliary circuit | |
| Rated voltage U_{EI} | 24 V DC |
| Permissible range | according to EN 61131-2 |
| Rated current from module bus I_{MB} | ≤ 45 mA |
| Rated current from supply terminal I_{EI} | ≤ 100 mA $\mu\epsilon\rho \gamma\omega\gg\tau\rho\omega\lambda\lambda\epsilon\delta \gamma\omega\gg\tau\alpha\gamma\tau\omega\rho$ |
| Rated insulation voltage U_i | 690 V |
| Overvoltage category/pollution degree | III/3 |

Diagnostic messages of the power module

The power module has two LEDs – RUN and ERROR – on its front side, which are used to indicate various operating states or faults.



Figure 11: LEDs for indicating diagnostics

Table 4: Diagnostic messages via LED

| LED | Display | Operating mode | Meaning | Remedy |
|-------|---|--------------------|--|---|
| RUN | Green, flashing, 0.5 Hz | Start standby mode | Normal operation ¹⁾ , PKZM0 is ON, DILEM is OFF | – |
| | Green | Normal operation | Normal operation ¹⁾ , PKZM0 is ON, DILEM is ON | – |
| | OFF | | PKZM0 is switched off; PKZM0 trip (power module without trip-indication) | Switch the PKZM0 on. |
| ERROR | Red, flashing, 5 Hz | Actuation follows | Normal operation ¹⁾ , contactor does not pick up | Replace the power module. |
| | | No actuation | Normal operation ¹⁾ , contactor has welded | Replace the power module. |
| | Red, flashing, 0.5 Hz | Actuation follows | Normal operation ¹⁾ , PKZM0 trip (only on power modules with trip-indication) | Check the wiring of the motor. |
| | Red, flashing, 0.5 Hz, and LED RUN green, flashing, with 0.5 Hz | | Ident error, incorrect power module plugged | Plug a power module of the correct power class. |

1) Normal operation: The module is connected to XI/ON, the 24 V DC auxiliary voltage is connected.

Module parameters

The following parameters can be set for xStart-XS1:

Table 5: Parameters for xStart-XS1

| Parameter name | Value |
|---|---|
| Kind of power module | DOL starter ¹⁾ |
| | Reversing starter |
| AGM trip indication | without trip-indicating auxiliary contact ¹⁾ |
| | with trip-indication |
| Power level in kW | 0.06 kW ¹⁾ |
| | 0.09 kW |
| | 0.18 kW |
| | 0.25 kW |
| | 0.55 kW |
| | 0.75 kW |
| | 1.5 kW |
| | 2.2 kW |
| | 3.0 kW |
| | 4.0 kW |
| Number of acceptable higher kW stages ²⁾ | 0 ¹⁾ |
| | 1 |
| | 2 |
| | 3 |
| | 4 |
| | 5 |
| | 6 |
| | 7 |
| Trip-indication: accepted deviation ²⁾ | Conformance required ¹⁾ |
| | Deviation accepted |

1) Preset

2) These parameters are valid only if the value "Ident-bypass" has been set in the process data. The values can be set, for example, via the control program. A further possibility is via the I/Oassistant software.

The value of the "Number of acceptable higher kW stages" indicates how many power stages the power modules can deviate upwards. Deviations upwards are generally permissible, if the "Ident bypass" value is set in the process data.

The "Trip-indication: accepted deviation" parameter determines if a deviation is permissible when the power module is equipped with a trip-indicating auxiliary contact.

DOL starter without trip-indicating auxiliary contacts

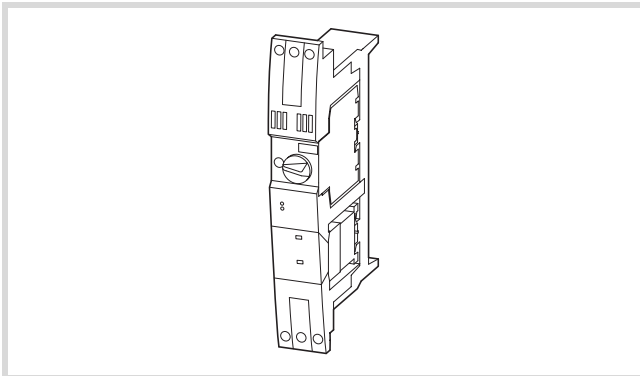


Figure 12: DOL starter without trip-indication

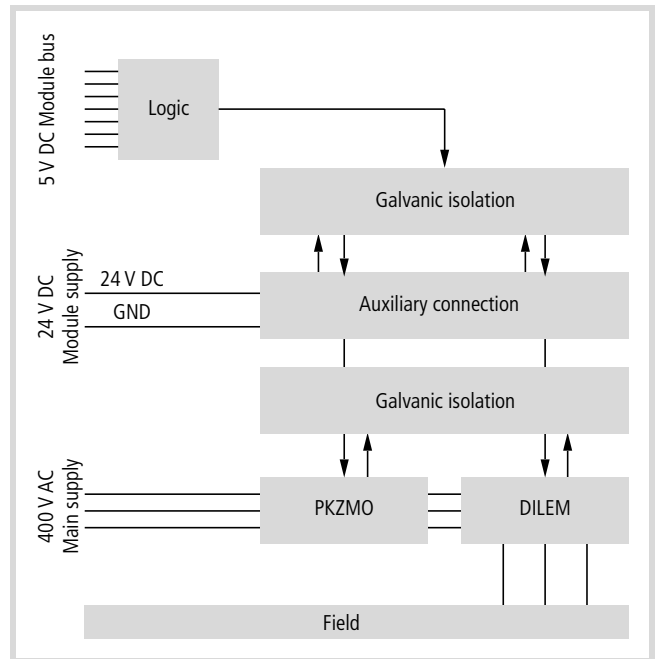


Figure 13: Block diagram

Table 6: Module overview

| Designation | Motor rating P_N at 400 V AC | Rated operational current I_e at 400 V AC | Rated uninterrupted current I_u at 400 V AC | Classification type |
|-----------------|--------------------------------|---|---|---------------------|
| XS1-DS0-340-K06 | 0.06 kW | 0,21 | 0,25 | 2 |
| XS1-DS0-340-K09 | 0.09 kW | 0,31 | 0,4 | 2 |
| XS1-DS0-340-K18 | 0.18 kW | 0,6 | 0,63 | 2 |
| XS1-DS0-340-K25 | 0.25 kW | 0,8 | 1,0 | 2 |
| XS1-DS0-340-K55 | 0.55 kW | 1,5 | 1,6 | 2 |
| XS1-DS0-340-K75 | 0.75 kW | 1,9 | 2,5 | 1 |
| XS1-DS0-340-1K5 | 1.5 kW | 3,6 | 4,0 | 1 |
| XS1-DS0-340-2K2 | 2.2 kW | 5,0 | 6,3 | 1 |
| XS1-DS0-340-3K0 | 3.0 kW | 6,6 | 10,0 | 1 |
| XS1-DS0-340-4K0 | 4.0 kW | 8,5 | 10,0 | 1 |
| XS1-DS0-340-5K5 | 5.5 kW | 11.3 | 16.0 | 1 |

Diagnostic messages

The module has the following diagnostic data available:

- "device identification error"
- "DIL1 error"

Base module

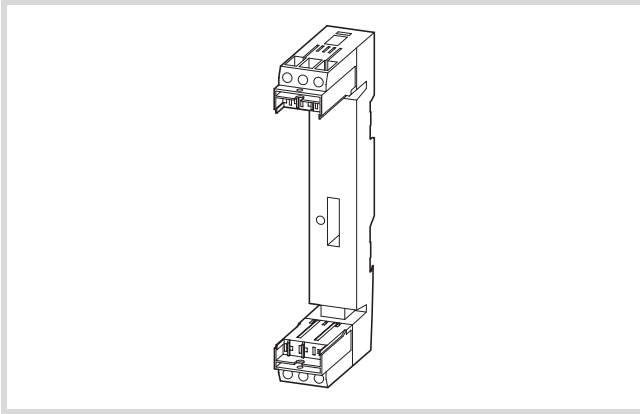


Figure 14: Base module XS1-XBMS-DS0-A

DOL starter with trip-indicating auxiliary contacts

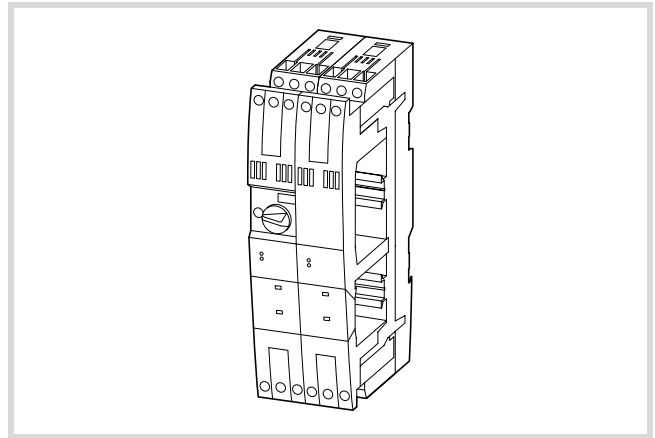


Figure 16: DOL starter with trip-indication

Wiring diagram

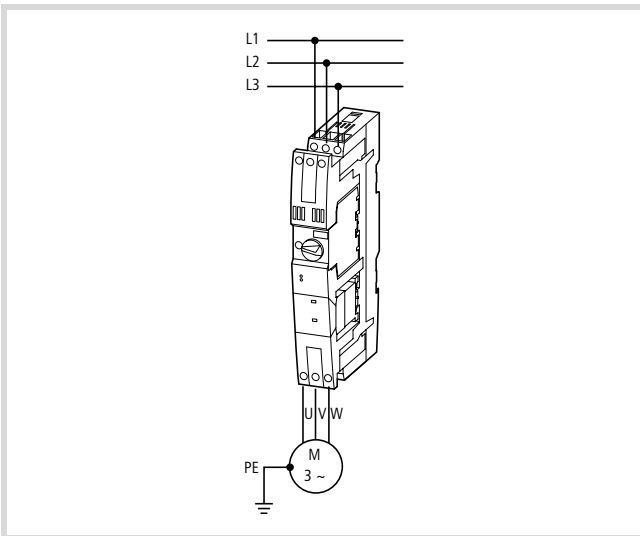


Figure 15: Wiring diagram DOL starter without trip-indication XS1-DS0-340-xKx

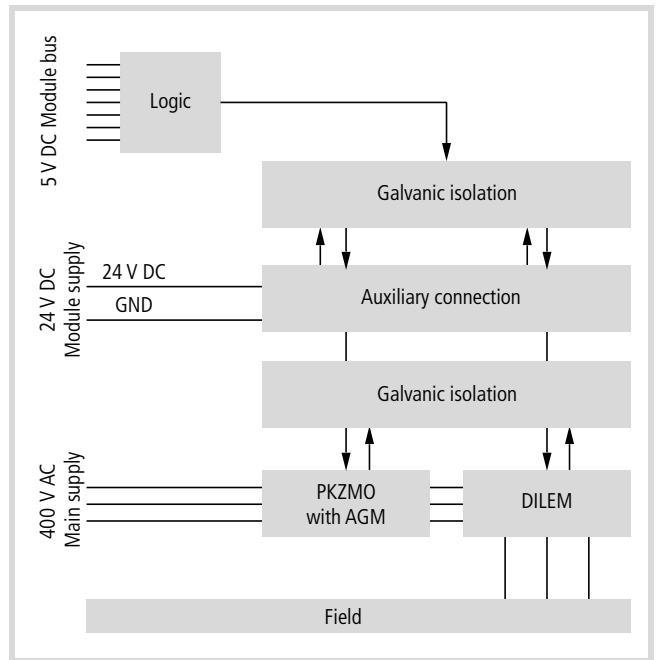


Figure 17: Block diagram

Table 7: Module overview

| Designation | Motor rating P_N at 400 V AC | Rated operational current I_e at 400 V AC | Rated uninterrupted current I_u at 400 V AC | Classification type |
|-----------------|--------------------------------|---|---|---------------------|
| XS1-DS0-341-K06 | 0.06 kW | 0,21 | 0,25 | 2 |
| XS1-DS0-341-K09 | 0.09 kW | 0,31 | 0,4 | 2 |
| XS1-DS0-341-K18 | 0.18 kW | 0,6 | 0,63 | 2 |
| XS1-DS0-341-K25 | 0.25 kW | 0,8 | 1,0 | 2 |
| XS1-DS0-341-K55 | 0.55 kW | 1,5 | 1,6 | 2 |
| XS1-DS0-341-K75 | 0.75 kW | 1,9 | 2,5 | 1 |
| XS1-DS0-341-1K5 | 1.5 kW | 3,6 | 4,0 | 1 |
| XS1-DS0-341-2K2 | 2.2 kW | 5,0 | 6,3 | 1 |
| XS1-DS0-341-3K0 | 3.0 kW | 6,6 | 10,0 | 1 |
| XS1-DS0-341-4K0 | 4.0 kW | 8,5 | 10,0 | 1 |

Diagnostic messages

The module has the following diagnostic data available:

- "device identification error"
- "PKZ short-circuit"
- "PKZ load dump"
- "DIL1 error"

Base module

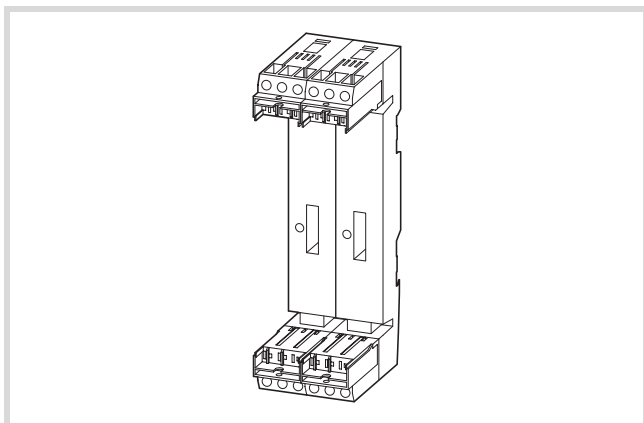
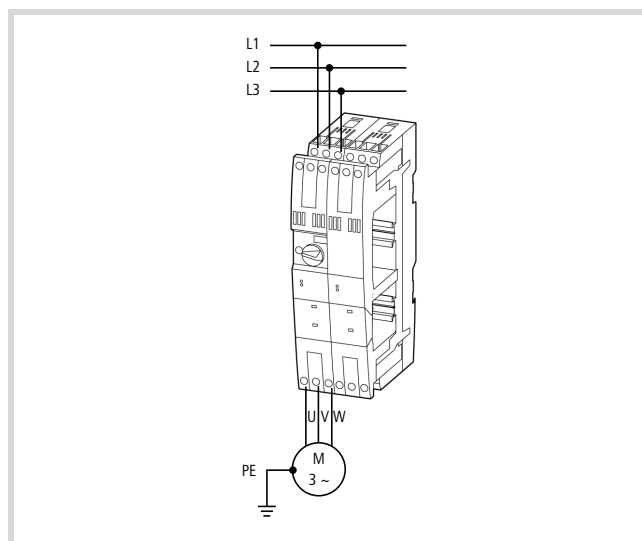


Figure 18: Base module XS1-XBMS-R50-A

Wiring diagram

Figure 19: Wiring diagram DOL starter with trip-indication
XS1DS0-341-xKx

Reversing starter without trip-indication auxiliary contacts

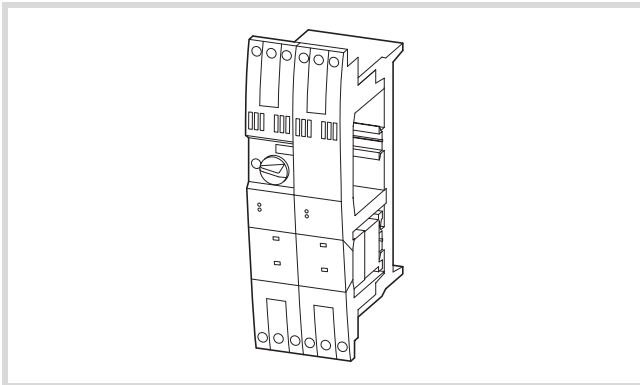


Figure 20: Reversing starter without trip-indication

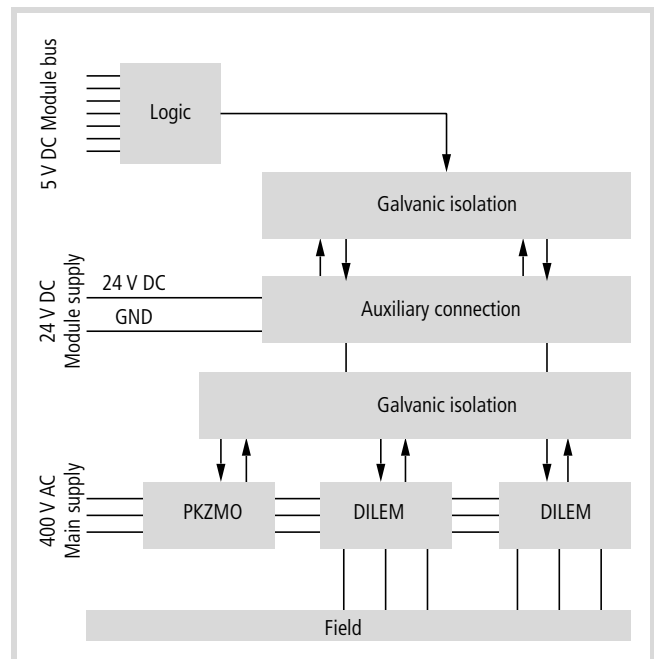


Figure 21: Block diagram

Table 8: Module overview

| Designation | Motor rating P_N at 400 V AC | Rated operational current I_e at 400 V AC | Rated uninterrupted current I_u at 400 V AC | Classification type |
|-----------------|--------------------------------|---|---|---------------------|
| XS1-RS0-340-K06 | 0.06 kW | 0,21 | 0,25 | 2 |
| XS1-RS0-340-K09 | 0.09 kW | 0,31 | 0,4 | 2 |
| XS1-RS0-340-K18 | 0.18 kW | 0,6 | 0,63 | 2 |
| XS1-RS0-340-K25 | 0.25 kW | 0,8 | 1,0 | 2 |
| XS1-RS0-340-K55 | 0.55 kW | 1,5 | 1,6 | 2 |
| XS1-RS0-340-K75 | 0.75 kW | 1,9 | 2,5 | 1 |
| XS1-RS0-340-1K5 | 1.5 kW | 3,6 | 4,0 | 1 |
| XS1-RS0-340-2K2 | 2.2 kW | 5,0 | 6,3 | 1 |
| XS1-RS0-340-3K0 | 3.0 kW | 6,6 | 10,0 | 1 |
| XS1-DS0-340-4K0 | 4.0 kW | 8,5 | 10,0 | 1 |

Diagnostic messages

The module has the following diagnostic data available:

- "device identification error"
- "DIL1 error"
- "DIL2 error"

Base module

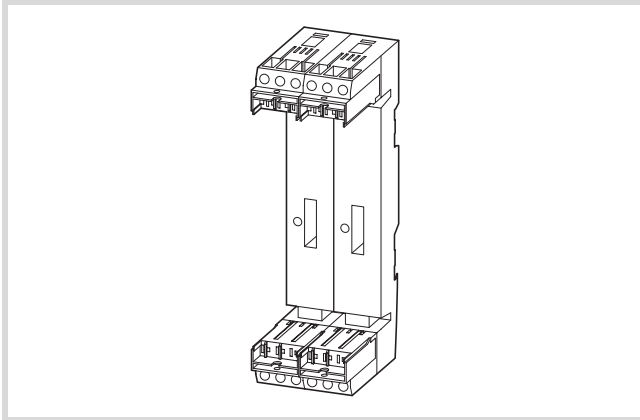


Figure 22: Base module XS1-XBMS-RS0-A

Reversing starter with trip-indication auxiliary contacts

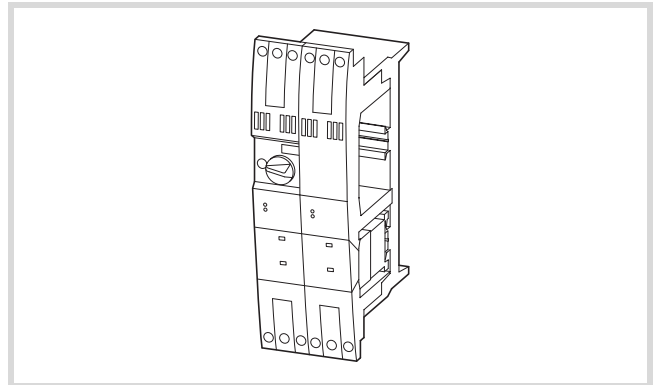


Figure 24: Reversing starter with trip-indication

Wiring diagram

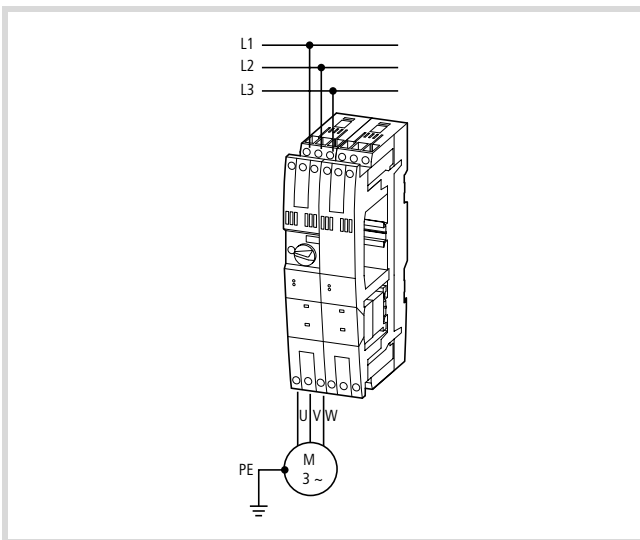


Figure 23: Wiring diagram reversing starter without trip-indication XS1-RS0-340-xKx

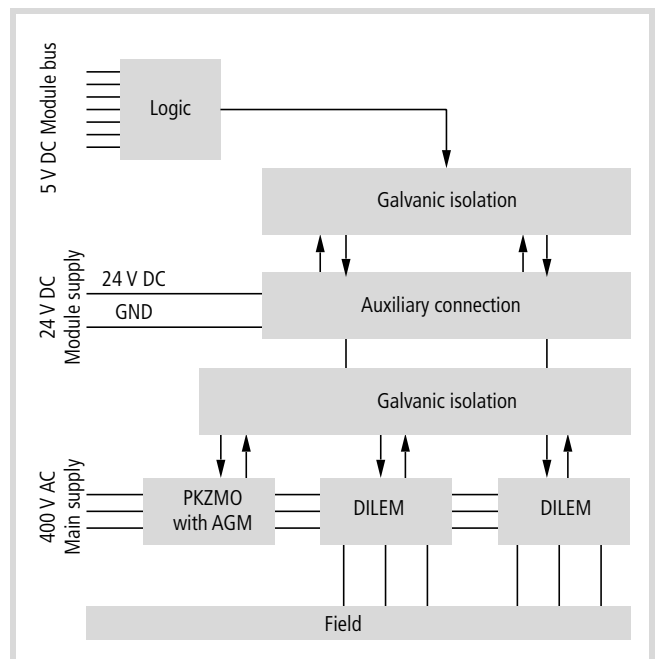


Figure 25: Block diagram

Table 9: Module overview

| Designation | Motor rating P_N at 400 V AC | Rated operational current I_e at 400 V AC | Rated uninterrupted current I_u at 400 V AC | Classification type |
|-----------------|--------------------------------|---|---|---------------------|
| XS1-RS0-341-K06 | 0.06 kW | 0,21 | 0,25 | 2 |
| XS1-RS0-341-K09 | 0.09 kW | 0,31 | 0,4 | 2 |
| XS1-RS0-341-K18 | 0.18 kW | 0,6 | 0,63 | 2 |
| XS1-RS0-341-K25 | 0.25 kW | 0,8 | 1,0 | 2 |
| XS1-RS0-341-K55 | 0.55 kW | 1,5 | 1,6 | 2 |
| XS1-RS0-341-K75 | 0.75 kW | 1,9 | 2,5 | 1 |
| XS1-RS0-341-1K5 | 1.5 kW | 3,6 | 4,0 | 1 |

| Designation | Motor rating P_N at 400 V AC | Rated operational current I_e at 400 V AC | Rated uninterrupted current I_u at 400 V AC | Classification type |
|-----------------|--------------------------------|---|---|---------------------|
| XS1-RS0-341-2K2 | 2.2 kW | 5,0 | 6,3 | 1 |
| XS1-RS0-341-3K0 | 3.0 kW | 6,6 | 10,0 | 1 |
| XS1-RS0-341-4K0 | 4.0 kW | 8,5 | 10,0 | 1 |

Diagnostic messages

The module has the following diagnostic data available:

- "device identification error"
- "PKZ short-circuit"
- "PKZ load dump"
- "DIL1 error"
- "DIL2 error"

Base module

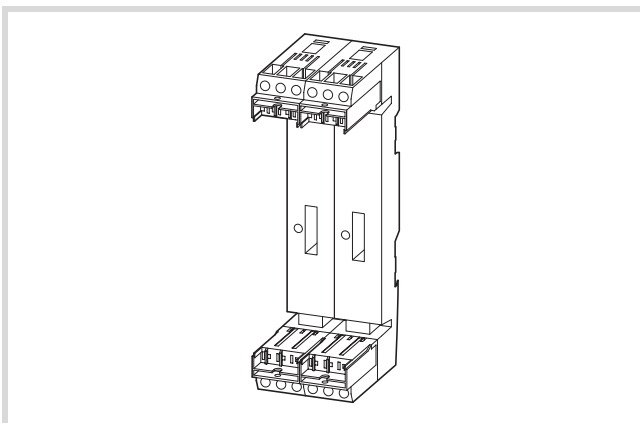


Figure 26: Base module XS1-XBMS-RS0-A

Wiring diagram

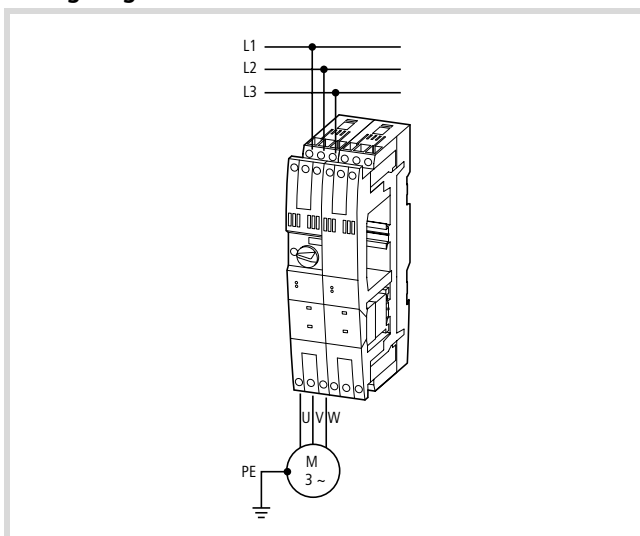


Figure 27: Wiring diagram reversing starter with trip-indication
XS1-RS0-341-xKx

3 Mounting/Dismounting

Mechanical mounting

General installation rules

Instructions concerning mounting/removal of the XI/ON modules can be found in the "XI/ON PROFIBUS-DP", AWB2700-1395GB manual or the "XI/ON CANopen", AWB2700-1359GB manual.

The following rules apply in addition to the mounting instructions stated in the manual:

- The xStart-XS1 modules are mounted on 2 parallel fixed top-hat rails.
- These two top-hat rails have a concentric clearance of 125 mm/4.92 inch.
- It is not necessary to supply xStart-XS1 with 24 V DC auxiliary voltage via a separate power supply module. If however potential isolation to the remaining XI/ON modules is required, a power supply module can be mounted upstream of the first xStart-XS1 module from the left.
- If further XI/ON modules follow xStart-XS1 on the XI/ON station, then a new power supply module must be mounted to the right of each last xStart-XS1 module. The reason is due to the separation of the C-profile busbar: It is interrupted by the xStart-XS1 modules.

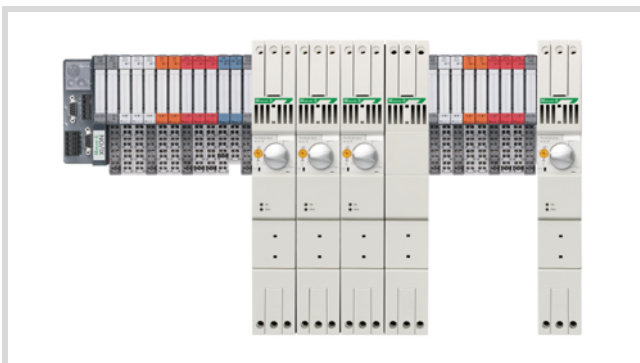


Figure 28: XI/ON system extension with two groups of xStart-XS1 and potential isolation

Mounting rails

To mount xStart-XS1, a second mounting rail is required to be mounted at a concentric distance of 125 mm/4.92 inch below the mounting rail for the XI/ON station. Both mounting rails should be mounted on the same mounting plate.

→ Observe the instructions in the "XI/ON PROFIBUS-DP", AWB2700-1394GB or "XI/ON CANopen", AWB2700-1395GB manuals for correct mounting and earthing of both mounting rails.

Mounting xStart-XS1 base modules

Please observe:

- Both mounting rails must already be securely mounted.
- The XI/ON Gateway as well as the required XI/ON base modules must already be mounted. It should be taken in to consideration that once the xStart-XS1 modules are mounted it is difficult to mount further XI/ON modules to the left of the xStart-XS1 modules.
- If you wish to extend an existing XI/ON station with xStart-XS1 modules, you must first remove the end plate along with the end bracket. The procedure is described in the "Removal of the mounting rail" section in chapter 6 of the "XI/ON PROFIBUS-DP" or "XI/ON CANopen" manuals.
 - It is possible to mount the base module without a power module or complete with the plugged power module.

Follow the procedure below to mount the xStart-XS1 base modules:

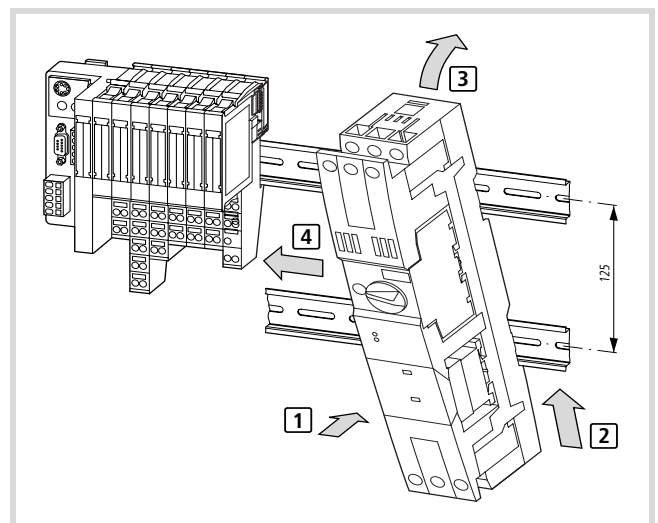


Figure 29: Mounting an xStart-XS1 module

- ▶ Insert the lower groove of the first module from below into the lower mounting rail **1**.
- ▶ Push the module upwards until you detect a mechanical limit **2**.
- ▶ Swivel the upper end of the module to the rear **3**. Press the module firmly against the upper mounting rail, until the upper locking hook clicks in audibly; then carefully let go of the unit.
- ▶ Push the module to the left until it is positioned contiguously with the most outward right XI/ON base module **4**. Correct mounting guarantees a secure connection and the communication via the XI/ON module bus.

If further xStart-XS1 modules are required, repeat steps **1** to **4** accordingly.

Plugging the power modules

The appropriate xStart-XS1 base module must already be mounted.

→ It is recommended to blow the station clean using compressed air before plugging the power modules. This prevents dust and grains of dirt from contaminating the plug-in contacts and thereby negatively influencing the station communications.

Follow the procedure below to plug the xStart-XS1 power modules:

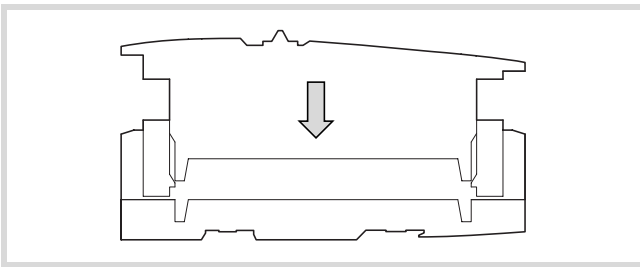


Figure 30: Plugging an xStart-XS1 power module

- ▶ Hold the power module at both ends.
- ▶ Press the power module squarely on to the base module until it locks in with an audible click.

Note!
Ensure that both retaining brackets at the upper and lower ends of the power module are completely closed. These brackets are to ensure locking of the power module into the base module.

Plugging the power module has no effect on the wiring of the base module, that means, it makes no difference if the base module is wired or not.

Warning!
The PKZM0 circuit-breaker on the xStart-XS1 module must be in the OFF position during mounting!

Coding

The coding of the base module and its respective power module is performed electronically on the xStart-XS1:

Appropriate parameterization of the xStart-XS1 module allows you to determine which type of power module with which power class can be operated by the corresponding base module. In addition, you can determine via the parameters if an upward deviation in the rating class is permissible and how great the deviation is allowed to be.

Should the type and/or rating class of the plugged power module not match the parameterized values, a diagnostic message is generated and the power module cannot be activated.

Example:

You wish to use a DOL starter power module with a rating class of 0.18 kW. You determine via the parameters that an upward deviation for 2 rating classes is permissible. Thus, you could plug a DOL starter with a rating class of up to 0.55 kW in to that base module. A diagnostics message is generated. The power module can be activated.

→ The parameterized upward or downward deviation of the ratings class is only possible if the value "Ident bypass" has been set in the process data. If this value is not set, the power module cannot be activated if there is a deviation in its ratings class.

Maximum number of modules

A maximum of 20 xStart-XS1 modules can be used in a XI/ON station as DOL starters without trip-indication auxiliary detectors. The following table offers an overview of the maximum number of different xStart-XS1 module types, on condition that the entire XI/ON station is composed of xStart-XS1 modules of the same type:

Table 10: Maximum number of modules

| Type | Module | Maximum number |
|--|-----------------|----------------|
| DOL starter, without AGM trip-indication | XS1-DS0-340-xKx | 20 |
| DOL starter, with trip-indication | XS1-DS0-341-xKx | 10 |
| Reversing starter, without trip-indication | XS1-RS0-340-xKx | 10 |
| Reversing starter, with trip-indication | XS1-RS0-341-xKx | 10 |

The maximum number of xStart-XS1 modules is reduced by the use of additional power supply modules, for example, to form potential groups.

Caution!
It must be ensured that the correct base modules are used if Bus Refreshing modules are employed for potential isolation purposes!

→ A fault message is generated as soon as the system limits have been exceeded if you use the I/Oassistant software point « Station → Test design ».

Dismounting

Please observe the following regulations when dismounting:

- Individual modules can only then be removed if the modules on their right side have been moved further to the right along the mounting rail. Thereby, there must be a minimum distance of 30 mm between the base module to be removed and the neighbouring modules.
- It is only possible to dismount the base modules if the XI/ON station is disconnected from the power supply and the wiring of the base module concerned has been removed.



Warning!

The XI/ON station must be disconnected from the power supply before beginning with the dismounting procedure. All wiring must be removed.

Further instructions concerning removal of the XI/ON modules can be found in the "XI/ON PROFIBUS-DP", AWB2700-1394GB manual or the "XI/ON CANopen", AWB2700-1359GB manual.

Removal of xStart-XS1 modules

Please observe:

- You can remove the xStart-XS1 modules as a complete module.
- You can remove the power module first and then remove the base module. The appropriate procedures are described in the following sections.
- No tools are required to dismount xStart-XS1 modules.

Proceed as follows to dismount the xStart-XS1 modules:

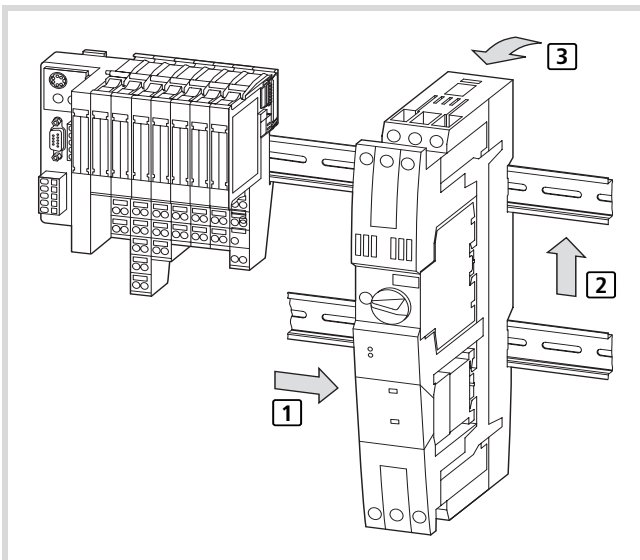


Figure 31: Dismounting a complete xStart-XS1 module

- ▶ Slide the xStart-XS1 module to the right until the clearance to the next left module is at least 30 mm [1].
- ▶ Push the xStart-XS1 module upwards until you detect a mechanical limit [2].
- ▶ Swivel the xStart-XS1 module forwards [3].
- ▶ Remove the xStart-XS1 module from the mounting rail.

Removal of the power module

Please observe:

No tools are required to dismount the power modules.

Proceed as follows to dismount the xStart-XS1 power modules:

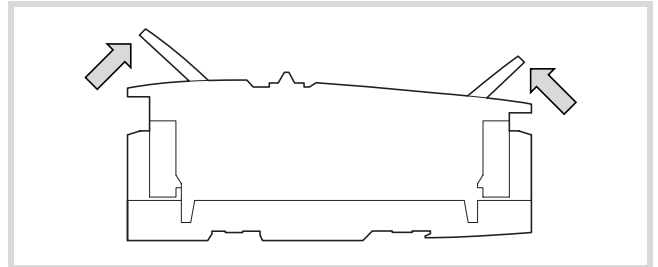


Figure 32: Removal of the power modules – step 1

- ▶ Open both retaining brackets on the upper and lower ends of the power module upwards.

The locking of the power module is released. At the same time the power module is carefully lifted a little. This lifting causes the auxiliary circuit to be automatically interrupted. The contactor drops out, and the main supply circuit is also interrupted.

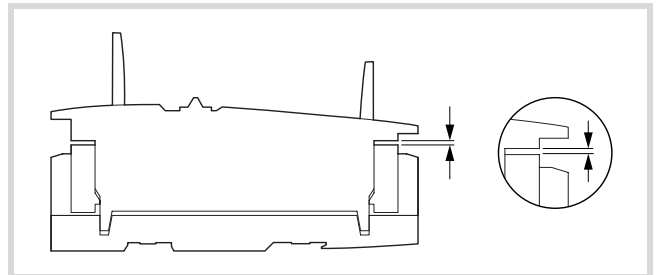


Figure 33: Automatic interruption of the auxiliary circuit by lifting the power module.

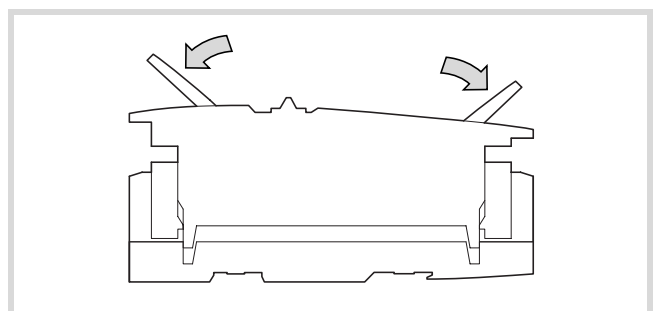


Figure 34: Removing the power module from the base module

- ▶ Close both retaining brackets on the upper and lower ends of the power module again. This unlocks the power module.
- ▶ The power module is removed from the base module by pulling on both ends simultaneously.

- Once the power module has been pulled, the base module can be locked with a padlock; the maximum diameter of the hasp should not exceed 4.5 mm. This efficiently prevents power modules from being plugged (for example, during the commissioning phase).

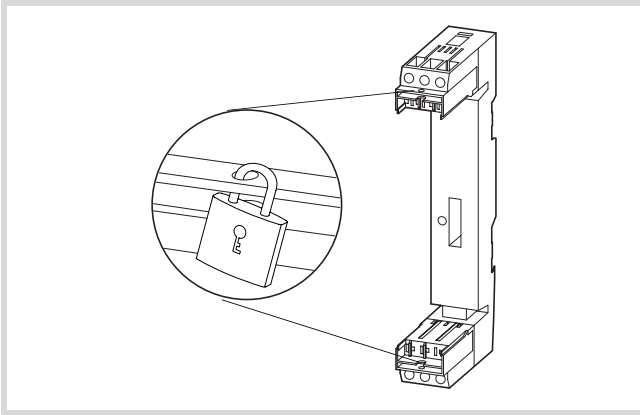


Figure 35: Locking the base module with a padlock

Dismounting base modules

In order to remove the base module, proceed as explained in section "Removal of xStart-XS1 modules", page 23.

4 Electrical installation

This chapter contains detailed information concerning the electrical installation of xStart-XS1 modules.

Further information concerning the electrical installation of the XI/ON can be found in the "XI/ON PROFIBUS DP", AWB2700-1394GB or "XI/ON CANopen", AWB2700-1359GB manuals.



Warning!

Electrical installation and commissioning of the xStart-XS1 may only be performed by electricians or personnel instructed in electrical engineering in accordance with the DIN VDE 0105-100 (German) standard!

Potential relationships

The potential relationships of a XI/ON station are characterized by the following features:

- The system's joint power supply to the XI/ON gateway, XI/ON I/O modules and xStart-XS1 modules as well as the field supply for the XI/ON I/O modules is distributed via the Bus Refreshing module.
- All modules (gateway, I/O modules, xStart-XS1) are connected capacitively to the mounting rails via the base modules.
- Separate power supplies for the system and the field level allow a potential-free installation.

The following block diagram represents the possible arrangement of a typical XI/ON station with xStart-XS1 modules.

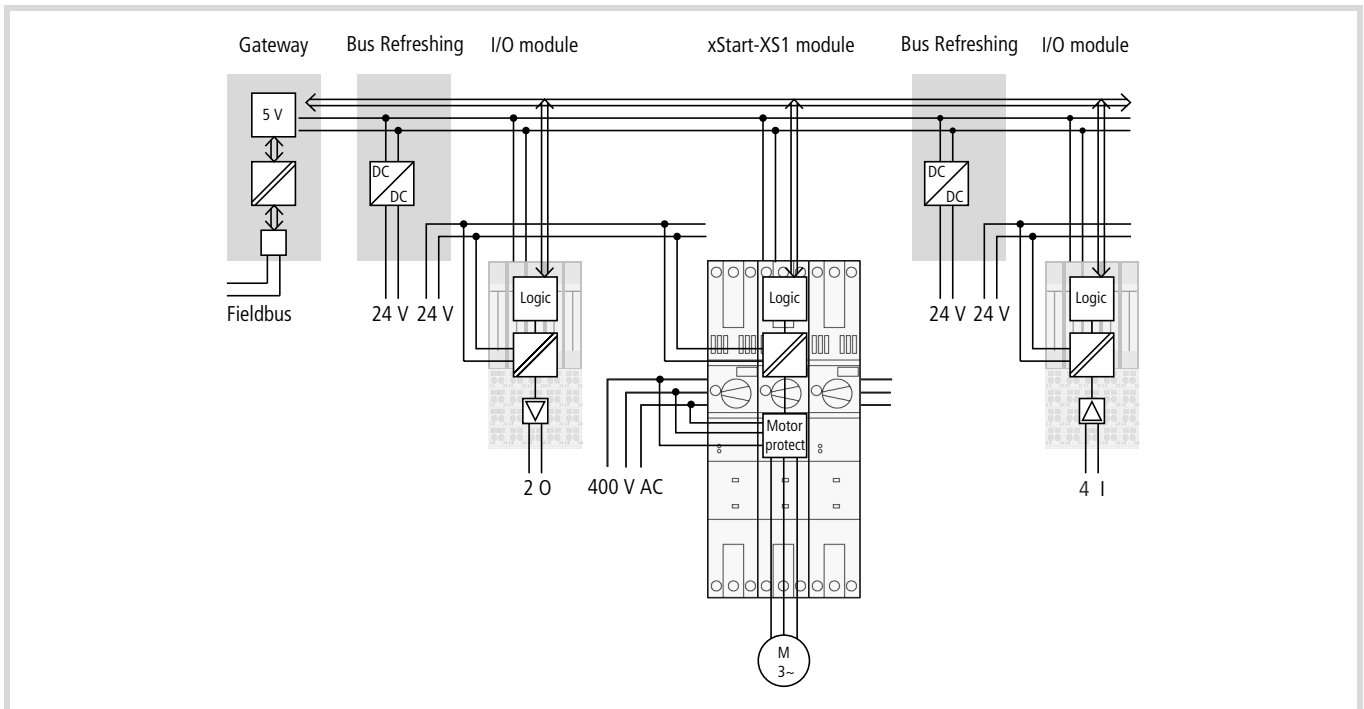


Figure 36: Block diagram of a XI/ON station with xStart-XS1 modules



Further information concerning the electrical potential relationships in a XI/ON station can be found in the "XI/ON PROFIBUS DP", AWB2700-1394GB or "XI/ON CANopen", AWB2700-1495GB manuals.

Electromagnetic compatibility

XI/ON products comply in full with the requirements pertaining to EMC regulations. Nevertheless, an EMC plan is required before installation. This should take into consideration all potential electromechanical sources of interference, such as, galvanic, inductive and capacitive couplings as well as radiation couplings.

Ensuring electromagnetic compatibility

The EMC of XI/ON modules is guaranteed if the following basic rules are adhered to during installation:

- Correct and large surface grounding of inactive metal components
- Correct shielding of cables and devices
- Proper cable routing - correct wiring
- Creation of a standard reference potential and grounding of all electrically operated devices.
- Special EMC measures for special applications

Chassis ground connection of inactive metal parts

All inactive metal components (for example: switchgear cabinets, switchgear cabinet doors, supporting bars, mounting plates, top-hat rails and so forth) must be connected to one another over a large surface area and with a low impedance (grounding). This guarantees a standardized reference potential area for all control elements. The influence of coupled disturbances is reduced.

- In the areas around screw connections, the painted anodized or isolated metal components must be freed of the isolating layer. Protect the points of contact against rust.
- Connect all free moving groundable components (cabinet doors, separate mounting plates and so forth) by using short bonding straps to large surface areas.
- Avoid the use of aluminium components, because its quick oxidizing properties make it unsuitable for grounding.



Warning!

The grounding must never - even inadvertently - take on a dangerous touch potential. For this reason, ground must be connected with a protective conductor

PE connection

The ground and PE-connection (protective earth) must be connected centrally to each other.

Earth-free operation

Observe all relevant safety regulations when operating an earth-free system.

Protect against high frequency interference signals



Note!

In order to comply with radiation limit values in accordance with EN 55011/2000, the supply cables of the module XN-BR-24VDC-D for supplying the gateway with power are to be fed through a ferrite ring (PS416-ZBX-405). This is to be placed immediately next to the connection terminals. From there on, it is not permitted to make connections to further devices.

Mounting rails

All mounting rails must be mounted on to the mounting plate with a low impedance, over a large surface area, and must be correctly earthed. Use corrosion-protected mounting rails.

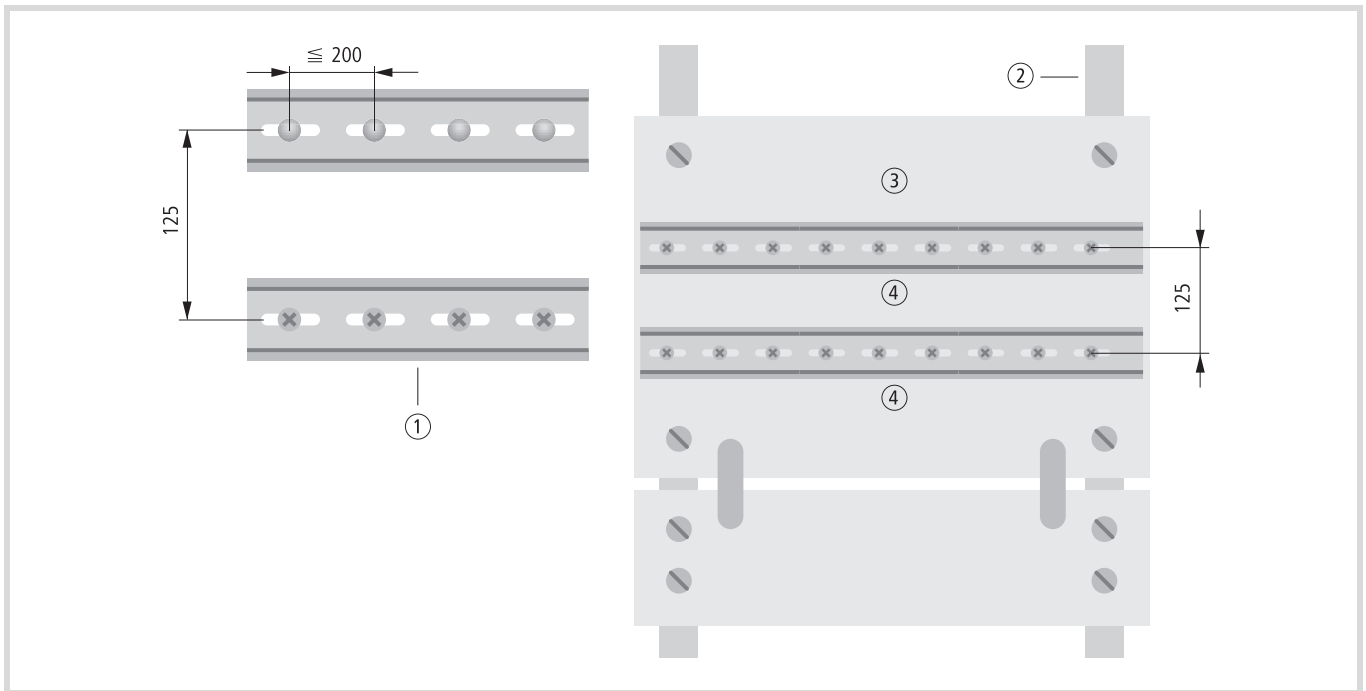


Figure 37: Mounting options

- ① TS35 mounting rail
- ② Mounting rail
- ③ Mounting plate
- ④ TS35 mounting rail

Mount the mounting rails over a large surface area and with a low impedance to the support system using screws or rivets.

Remove the isolating layer from all painted, anodized or isolated metal components at the connection point. Protect the connection point against corrosion (for example, with grease, caution: use only suitable grease).

→ Further information concerning EMC conform design of a XI/ON station as well as EMC conform control panel installation can be found in the "XI/ON PROFIBUS DP", AWB2700-1394GB and "XI/ON CANopen" AWB2700-1395GB manuals.

Wiring

The wiring of xStart-XS1 modules covers the main supply circuit only. The auxiliary circuit is automatically established following the mounting of base and power modules.

Wiring an xStart-XS1 module

The incoming supply to the xStart-XS1 module is implemented from above via three conductors. The connection is achieved via screw terminals.

The connection of the current outputs is made via the underside of the xStart-XS1 module and equally by using screw terminals.

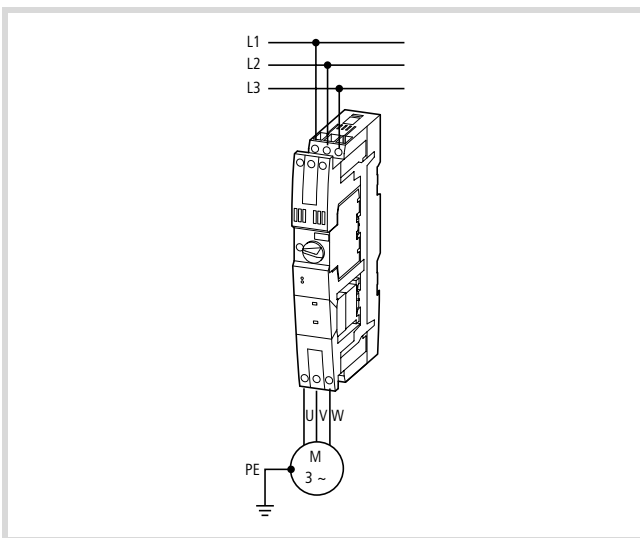


Figure 38: Connection diagram of DOL starter without trip-indicating auxiliary contacts

Wiring several xStart-XS1 modules

Various numbers of modules can be supplied via a three-phase commoning link depending on the type of xStart-XS1 modules used.

- 4 DOL starters without trip-indicating auxiliary contacts
- 2 DOL starters with trip-indicating auxiliary contacts
- 2 reversing starters with or without trip-indicating auxiliary contacts

Mixed operation is also permissible.

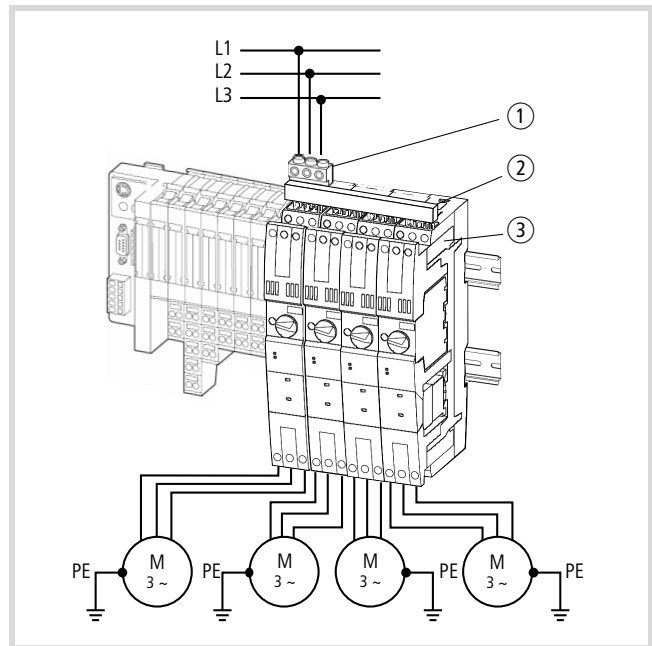


Figure 39: Connection diagram for several DOL starters without trip-indication

- ① Power supply terminal for three-phase commoning link
- ② Three-phase commoning link for up to 4 DOLs starters without trip-indicating auxiliary contacts.
- ③ DOL starter without trip-indicating auxiliary contacts

Several xStart-XS1 modules can be supplied with power via a joint three-phase commoning link.

This requires the power supply to be applied only once via the power supply terminal.



Caution!

It is not permitted for the maximum current via the three-phase commoning link to exceed 63 A.

5 Safety features

Emergency-Stop isolation of xStart-XS1 motor starter – Category 2 to EN 954-1

Shutdown in emergency

Emergency shutdowns take place according to the categories defined in EN 954-1, page 14. This section explains the requirements for xStart-XS1. For details about the categories, see also the Moeller Safety Manual.

This section lists the preconditions defined by the standard for performing an Emergency Stop and the devices required for safe operation of a control system that uses the networkable xStart-XS1 motor starter.

Application:

According to the standard, an Emergency Stop is performed when:

- an immediate disconnection of the power supply does not result in a dangerous condition (uncontrolled stopping – Stop Category 0 to EN 60204-1);
- there is a danger to operator or machine present that must be prevented;
- the Emergency-Stop device and its incoming supply cable are subjected to particular dangers.

Required devices

The following devices are required:

- Device for shutting down in the event of an emergency (Emergency-Stop actuator) with positive opening, e.g. FAK Emergency-Stop button.
- Safety relay with positive-action contacts, e.g. ESR4-NO-21 safety relay.
- Contractors with positive-action contact elements. xStart-XS1, DILEM version with positive-action contacts.
 - Power module: XS1-**DS1/RS1**-34.-.K.
 - Base module: XS1-XBMS-**DS1/RS1**-A

This version is shown in figure 40 and figure 41.

Principle of operation

When the supply voltage is applied to the ESR4-NO-21 safety relay (terminal A1-A2), the Power LED indicates readiness for activating the enable paths. When On pushbutton S2 is pressed, the relay checks whether contactors K1M to KnM are in their resting position through the break contacts of feedback circuit RK. The

feedback circuit is built into the xStart-XS1 modules: you only have to connect the supplied adapter to the feedback circuit (terminals a and b).

When On pushbutton S2 is released, the ESR4 safety relay performs a self-test. If successful, the ESR4 opens the signal path (terminal 31-32). Through the two enable paths (terminal 13-14 and 23-24), contactors K0M and K1M to KnM can now pick up with start signal S4 (→ fig. 43).

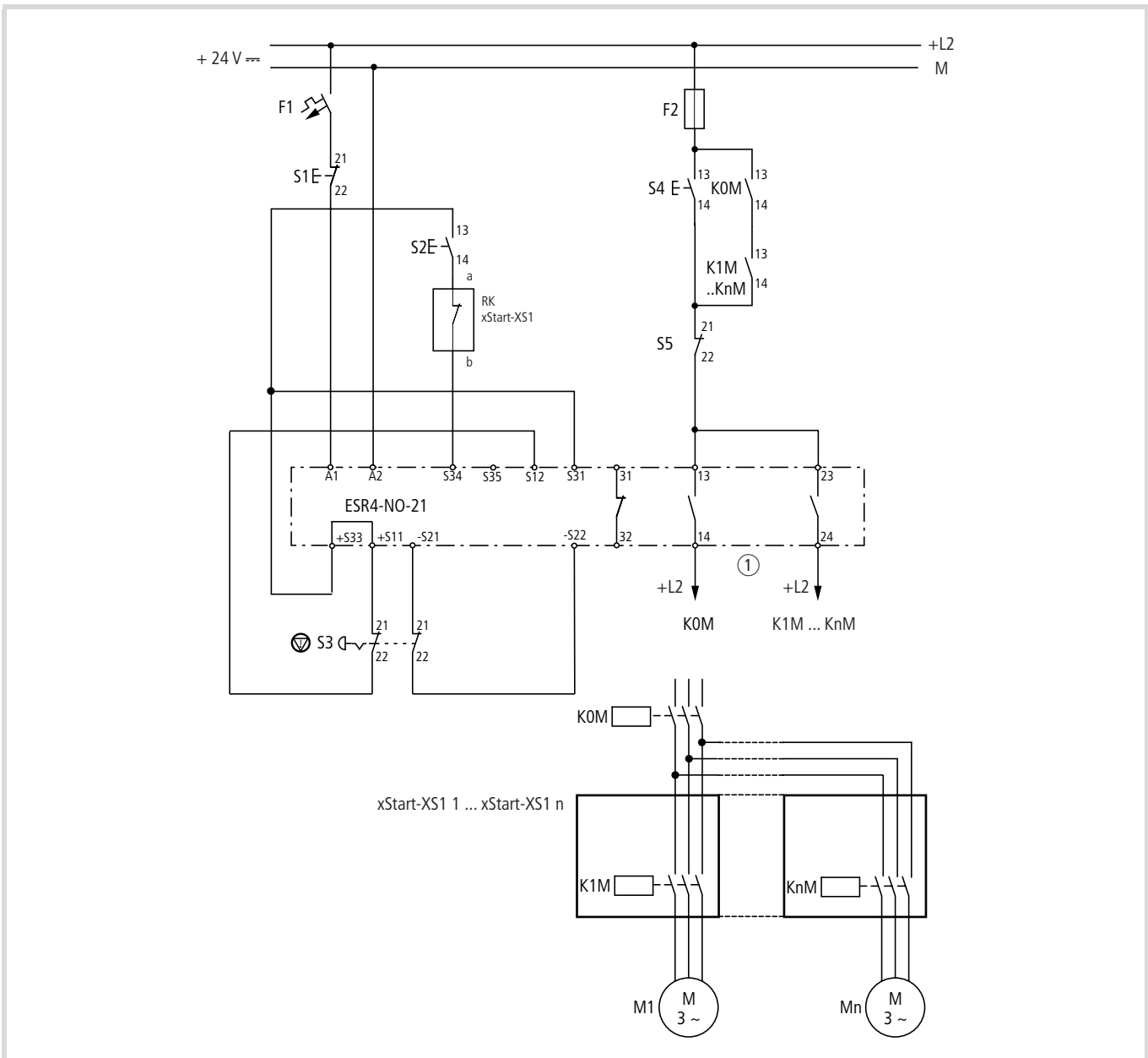


Figure 40: Circuit diagram for ESR4 safety relay with xStart-XS1

- ① Enable paths
- RK: Feedback circuit
- S1: OFF
- S2: ON
- S3: Emergency-Stop

- S4: Start
- S5: Stop
- K0M: Group contactor
- K1M to KnM: Contactors of xStart-XS1 modules

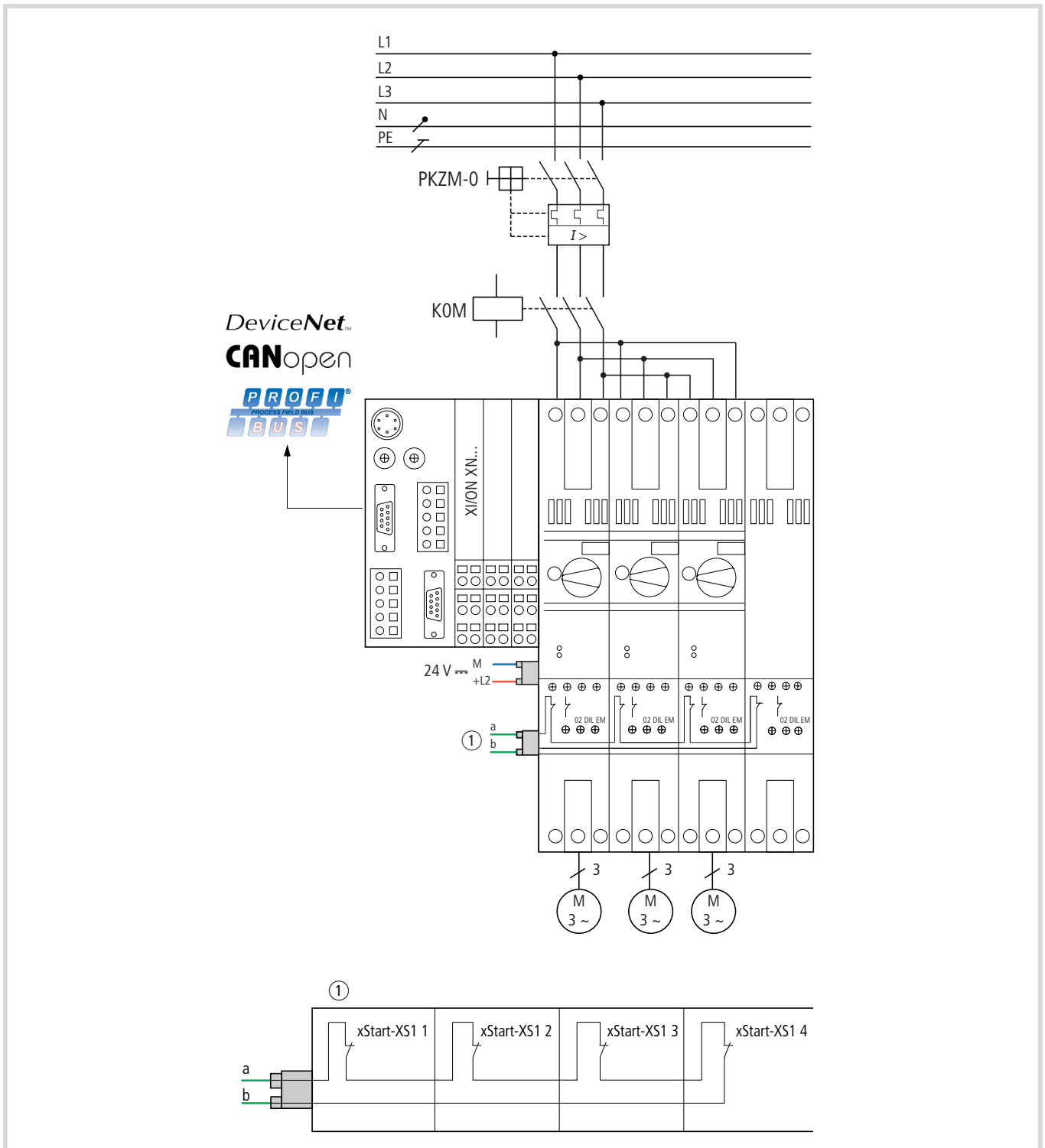


Figure 41: xStart-XS1 with safety equipment

① Feedback circuit

The feedback circuit is formed by the positive-action break contacts of the DILEM contactors. In the base modules, these are connected with pluggable contact bars. During commissioning, perform the following steps:

- Place the auxiliary contact of only the last xStart-XS1 module into the ON (closed) position (→ fig. 42).

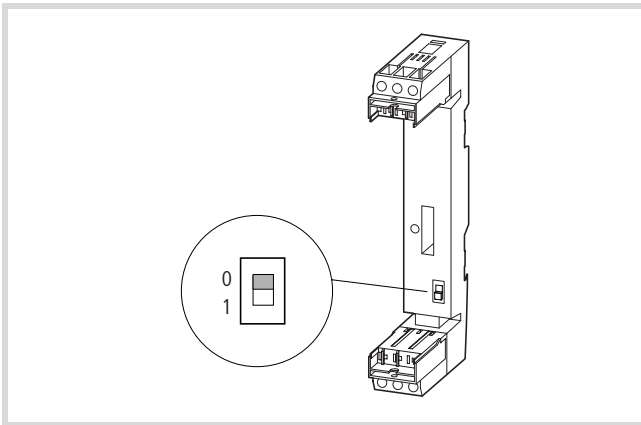


Figure 42: XS1 module: position of auxiliary switch

- ▶ Check the feedback circuit for continuity. With the contactor in its OFF position, this circuit must be closed. Connect a continuity tester to terminals a and b of the supplied adapter (→ fig. 41).
- ▶ The feedback circuit opens when the DILEM contactors are manually energized with the switch position indicator of the snap-fit auxiliary contact. Test this on the first and last xStart-XS1 power module.

figure 43 shows the time sequence. The motor starters are switched by operating switches S2 (ON) and S4 (START). The OFF signal is issued with S5 (STOP).

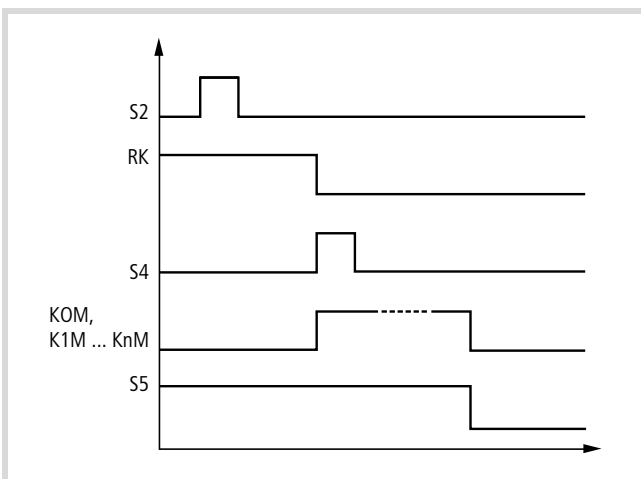


Figure 43: xStart-XS1 sequence with ESR4 safety relay

- S2: ON
- RK: Feedback circuit
- S4: START
- KOM: Group contactor
- K1M to KnM: Contactors of xStart-XS1 modules
- S5: STOP

Properties

On the next ON signal, the ESR4 safety relay reliably detects an open circuit or welded contactor. It also monitors ON pushbutton S2.

Summary

Category 2 requires a verification of the safety functions at suitable intervals by the machine control system. The Moeller components mentioned here fulfill these requirements. Note that no additional wiring of the xStart-XS1 modules is necessary.

6 Connection to PROFIBUS-DP

This chapter contains detailed information relating to connection of the xStart-XS1 to the PROFIBUS-DP.

Further information concerning the PROFIBUS-DP and XI/ON can be found in the "XI/ON PROFIBUS-DP", AWB2700-1394GB manual.

The connections of xStart-XS1 to a Moeller PLC and a Siemens PLC are described.

xStart-XS1 is fieldbus independent. The connection and communication with the other fieldbus stations can only be achieved via the XI/ON gateway.

Electronic device data sheet

The xStart-XS1 modules are integrated into PROFIBUS-DP structure with the aid of the device data base file. These device data are described in the XI/ON specific GSD files from the version 1.4 onwards.

- XN02B2E.gsd → Extended GSD file for the 1.5 Mbaud XI/ON gateway
- XN02B2S.gsd → Standard GSD file for the 1.5 Mbaud XI/ON gateway
- XN02B3E.gsd → Extended GSD file for the 12 Mbaud XI/ON gateway
- XN02B3S.gsd → Standard GSD file for the 12 Mbaud XI/ON gateway

The abbreviations E or S before the ".gsd" file extension indicate how the master calls the process data:

- E = extended
The master reads the process data bit-by-bit ("mapped").
- S = standard
The master reads the process data in byte format.

The respective up-to-date versions of the GSD files can be obtained directly from Moeller (www.moeller.net).

→ xStart-XS1 cannot be operated in conjunction with the XI/ON-Gateway PROFIBUS-DP standard.

xStart-XS1 is available only in the module description according to type version. That means, the xStart-XS1 modules are depicted with a special identification format. This enables an exact identification of the xStart-XS1 modules. The XI/ON gateway only accepts exchange modules of an identical type.

A compressed module description of the xStart-XS1 modules is not possible.

→ Further details concerning the GSD files of the XI/ON can be found in the "XI/ON PROFIBUS-DP", AWB2700-1394GB manual.

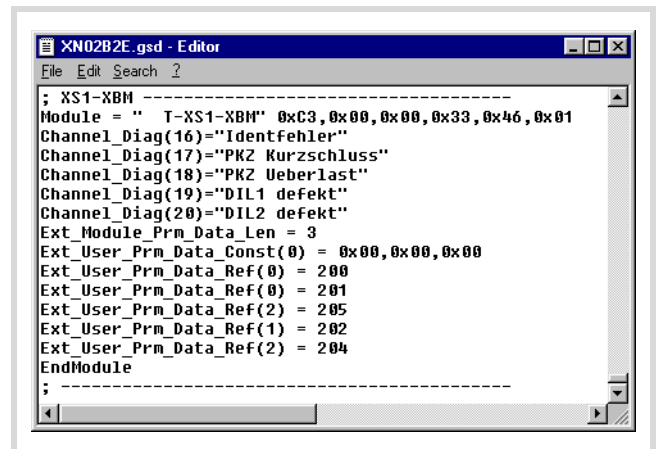


Figure 44: Description of xStart-XS1 in the GSD file

Parameters for xStart-XS1

Each xStart-XS1 module requires 3 byte parameters in the PROFIBUS-DP telegram. The following table shows the structure of these 3 bytes.

Table 11: Parameters for xStart-XS1

| Byte | Bit | Parameter name | Value | Meaning |
|------|--------|---|-------|---|
| 0 | 0 | AGM trip indication | 0 | without trip-indicating auxiliary contact ¹⁾ |
| | | | 1 | with trip-indication |
| | 4 | Kind of power module | 0 | DOL starter ¹⁾ |
| | | | 1 | Reversing starter |
| 1 | 4 to 0 | Power level in kW | 00010 | 0.06 kW ¹⁾ |
| | | | 00011 | 0.09 kW |
| | | | 00100 | 0.18 kW |
| | | | 00101 | 0.25 kW |
| | | | 00110 | 0.55 kW |
| | | | 00111 | 0.75 kW |
| | | | 01000 | 1.5 kW |
| | | | 01001 | 2.2 kW |
| | | | 01010 | 3.0 kW |
| | | | 01011 | 4.0 kW |
| | | | 01100 | 5.5 kW |
| 2 | 3 to 0 | Number of acceptable higher kW stages ²⁾ | 0000 | 0 ¹⁾ |
| | | | 0001 | 1 |
| | | | 0010 | 2 |
| | | | 0011 | 3 |
| | | | 0100 | 4 |
| | | | 0101 | 5 |
| | | | 0110 | 6 |
| | | | 0111 | 7 |
| | 7 to 4 | Trip-indication: accepted deviation ²⁾ | 0000 | Conformance required ¹⁾ |
| | | | 0001 | Deviation accepted |

1) Standard settings of the parameters

2) These parameters are valid only if the value "Ident-bypass" has been set in the process data. The values can be set, for example, via the control program. A further possibility is via the software I/Oassistant.

The texts listed in the columns "Parameter name" and "Meaning" correspond to the entries in the GSD file. These texts can also be found with identical wording in the configuration software of the PROFIBUS-DP master which is used.

Diagnostic messages for xStart-XS1

The xStart-XS1 modules require 1 byte for diagnostics data in the PROFIBUS-DP telegram. The following table shows the structure of this diagnostic byte:

Table 12: Diagnostic messages for xStart-XS1

| Bit | Diagnostic | Remark |
|-----|---------------------------------|---|
| 0 | "device identification error" | The module identification of the plugged power module does not correspond to the parameterized module identification. The parameterized rating class has been exceeded or fallen short of. |
| 1 | PKZ short-circuit ¹⁾ | The diagnostic was set, as soon as an interruption at the trip-indication was recognized. The trip-indication remains active until it is acknowledged with the red Reset button. |
| 2 | PKZ overload ¹⁾ | The diagnostic message remains until the knob-operated rotary switch of the PKZM0 is turned back to the "ON" position. |
| 4 | "DIL1 error" | – |
| 5 | DIL2 defective ²⁾ | – |

1) only with xStart-XS1 with AGM trip-indication

2) only with reversing starters

The texts listed in the "Diagnostics" column correspond to the entries in the GSD file.

Process data

xStart-XS1 has 1 byte of input data and 1 byte of output data available. The following table shows the respective structure:

Table 13: Process data

| Process data | Bit | Contents | Value | Meaning |
|--------------|--------------|-----------------------------------|---------------------|--------------|
| Input data | 0 | Current status DIL1 | 0 | OFF |
| | | | 1 | ON |
| | 1 | Actual status DIL2 ¹⁾ | 0 | OFF |
| | | | 1 | ON |
| | 2 | Status PKZM0 | 0 | OFF |
| | | | 1 | ON |
| 3 | Reserved | 0 | – | |
| 4 to 7 | Not assigned | – | – | |
| Output data | 0 | Required status DIL1 | 0 | OFF |
| | | | 1 | ON |
| | 1 | Nominal status DIL2 ¹⁾ | 0 | OFF |
| | | | 1 | ON |
| | 2 | Reserved | 0 | - |
| | 3 | Ident-bypass | 0 | No tolerance |
| 1 | | | Tolerance permitted | |
| 4 to 7 | Not assigned | – | – | |

1) only with reversing starters

Maximum number of modules

A XI/ON station can consist of a XI/ON gateway, a Bus Refreshing module and a maximum of 20 xStart-XS1 modules as DOL starters without AGM trip-indicating auxiliary contacts. The following table offers an overview of the maximum number of different xStart-XS1 module types, on condition that the entire XI/ON station is composed of xStart-XS1 modules of the same type:

Table 14: Maximum number of modules

| Type | Module | Maximum number |
|--|-----------------|----------------|
| DOL starter, without AGM trip-indication | XS1-DS0-340-xKx | 20 |
| DOL starter, with trip-indication | XS1-DS0-341-xKx | 10 |
| Reversing starter, without trip-indication | XS1-RS0-340-xKx | 10 |
| Reversing starter, with trip-indication | XS1-RS0-341-xKx | 10 |

The maximum number of xStart-XS1 modules is reduced by the use of additional power supply modules, for example, to form potential groups.

▽ Note!
It must be ensured that the correct base modules are used if Bus Refreshing modules are employed for potential isolation purposes!

→ A fault message is generated as soon as the system limits have been exceeded if you use the I/Oassistant software point « Station → Test design » .

Further information concerning the maximum number of stations with a XI/ON station can be found in the "XI/ON PROFIBUS-DP", AWB2700-1394GB manual.

Connection of a Moeller PS4-341-MM1 PLC to a LE4-504-BS1

The interfacing of xStart-XS1 into a XI/ON station is described in the following which is connected with a Moeller PS4-341-MM1 PLC via a LE4-504-BS1 local expansion.

The Moeller configuration software "CFG-DP", version 2.0 is used to configure the XI/ON station in this example.

Reading-in the GSD file

→ The manner in which you should proceed in order to read in a new XI/ON-GSD file can be found in the "Connection to a Moeller PS416 PLC" described in the "XI/ON PROFIBUS-DP", AWB2700-1394GB manual.

Proceed as follows to update your GSD file:

- ▶ Copy your GSD file into the "...\Fieldbus\Profibus\GSD" directory.
- ▶ Press the "Ok" button to confirm the appearing dialog box to overwrite an existing file.
- ▶ Icon files that may already exist do not have to be overwritten.
- ▶ Start the software "CFG-DP".

After these steps the actual XI/ON entry can be found as usual in the selection dialog box for slaves.

Configuring the XI/ON Station with xStart-XS1

Proceed as follows to insert your xStart-XS1 modules in a new or in an existing XI/ON station:

- ▶ Double click the corresponding XI/ON station or insert a new XI/ON station in your fieldbus structure.
- ▶ Select the entry "T-XS1-XBM" in the configuration dialog box and add the necessary amount of modules via the button "Append Module".

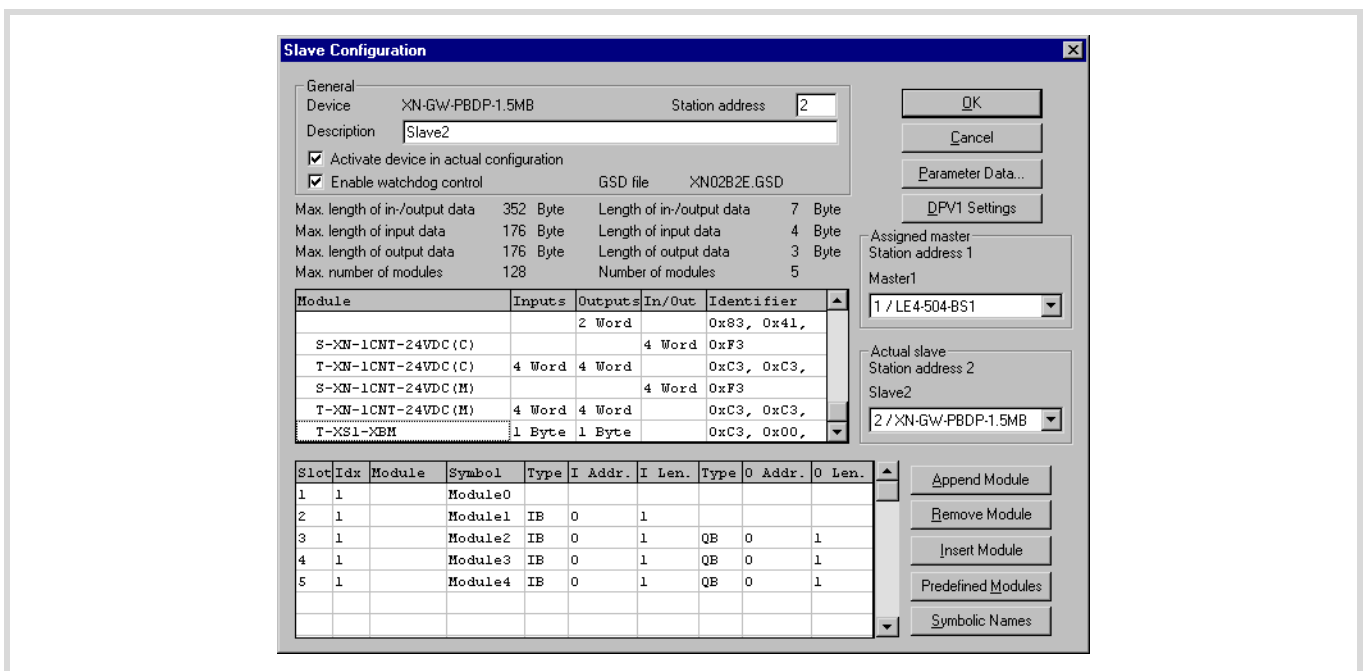


Figure 45: Selection of xStart-XS1 modules

Diagnostics using a Moeller PS4-341-MM1 PLC as an example

The software "CFG-DP", version 2.0 from Moeller is used in our example to describe diagnostic messages.

When connected to a Moeller PLC PS4-341-MM1, the diagnostic is done via the local expansion module LE4-504-BS1.

The diagnostics are described in the dialog box "Extended Device Diagnostic":

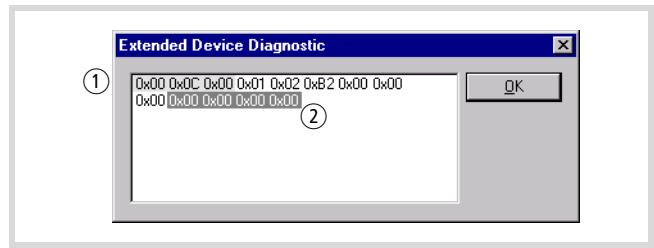


Figure 46: Diagnostic description of a XI/ON station with xStart-XS1

- ① Diagnostic bytes 0 to 2
- ② Diagnostic bytes 9 to 12

The hexadecimal data shown in the figure above have the following meanings:

Table 15: Diagnostic bytes

| Diagnostic byte | Meaning | Remark |
|-----------------|---|---|
| 0 | Status area 1 of the station | – |
| 1 | Status area 2 of the station | – |
| 2 | Status area 3 of the station | – |
| 3 | Master's address, from where the slave was configured | in accordance with the PROFIBUS-DP standard |
| 4 to 5 | Slave identifier | in accordance with the PROFIBUS-DP standard |
| 6 to 8 | Diagnostic bytes 0 to 2 of the XI/ON Gateway | → manual "XI/ON PROFIBUS-DP", AWB2700-1394GB |
| 9 to 12 | Diagnostic bytes of the modules capable of diagnosis in the XI/ON station (Bus Refreshing module, 3 xStart-XS1 modules) | → section "Diagnostic messages for xStart-XS1", page 35 as well as in the "PROFIBUS-DP", AWB2700-1394GB manual. |

Connection to a Siemens S7-300 PLC

The following describes the integration of xStart-XS1 in a XI/ON station that is connected to a Siemens S7-300 PLC.

The software package "SIMATIC Manager" Version 5.0.5.0 from Siemens is used in this example.

Reading-in the GSD file

→ The manner in which you should proceed in order to read in a new XI/ON-GSD file can be found in the "Connection to a Siemens S7 PLC" described in the "XI/ON PROFIBUS-DP", AWB2700-1394GB manual.

Proceed as follows to update your GSD file:

- ▶ Copy the corresponding GSD file to the "Step7\S7data\GSD" directory.

- ▶ Start the "SIMATIC Manager" software and open the hardware configurator.
- ▶ Click <Extra Update catalog> command.

Subsequently, the updated entry for XI/ON can be found as usual in the hardware catalog.

Configuring the XI/ON Station with xStart-XS1

Proceed as follows to insert your xStart-XS1 modules in a new or in an existing XI/ON station:

- ▶ Mark the respective XI/ON station in the PROFIBUS-DP structure or insert a new XI/ON station.
- ▶ In the case of a new XI/ON station, insert all required XI/ON modules in the correct order.
- ▶ Select the entry "T-XS1-XBM" for xStart-XS1 from the hardware catalogue. Using a drag-and-drop operation, place it in the required position of the selected XI/ON station's module list.

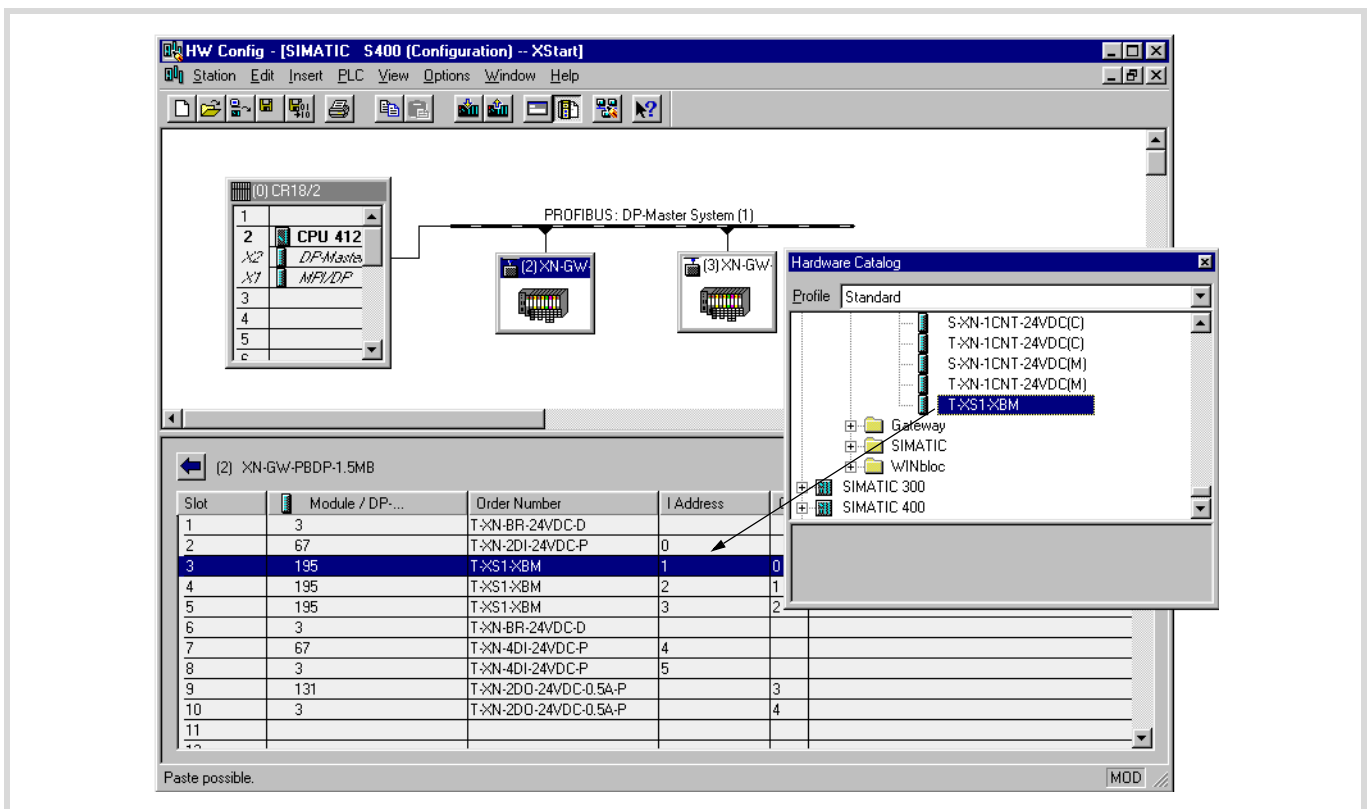


Figure 47: Inserting xStart-XS1 modules

→ Please observe that a power supply module must again be added first when adding XI/ON modules after a group of xStart-XS1 modules (in the example: the entry "T-XN-BR-24VDC-D").

Setting of the parameters for xStart-XS1 modules

Double-click the corresponding entry in the module list to open the DP Slave Properties dialog box of an xStart-XS1 module. It is possible to set various parameters in this dialog box:

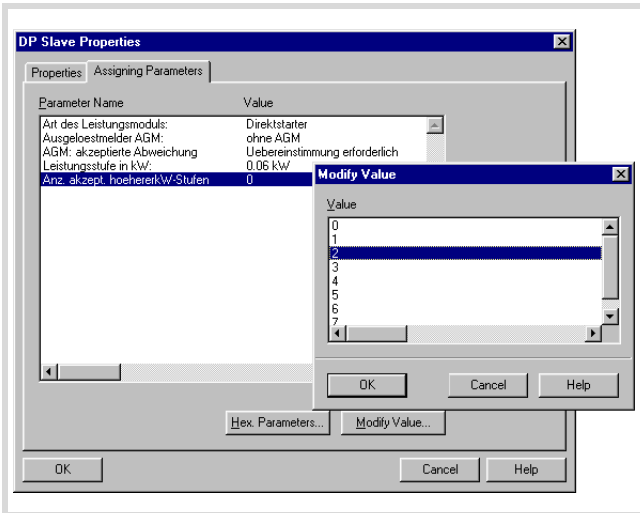


Figure 48: Parameterization of an xStart-XS1 module

Diagnostics using a Siemens S7-400 PLC as an example

The diagnostic functions of xStart-XS1 modules that are connected to a Siemens PLC require a special function block, which can be obtained directly from Siemens.

The individual diagnostics are shown in a table of variables.

Example:

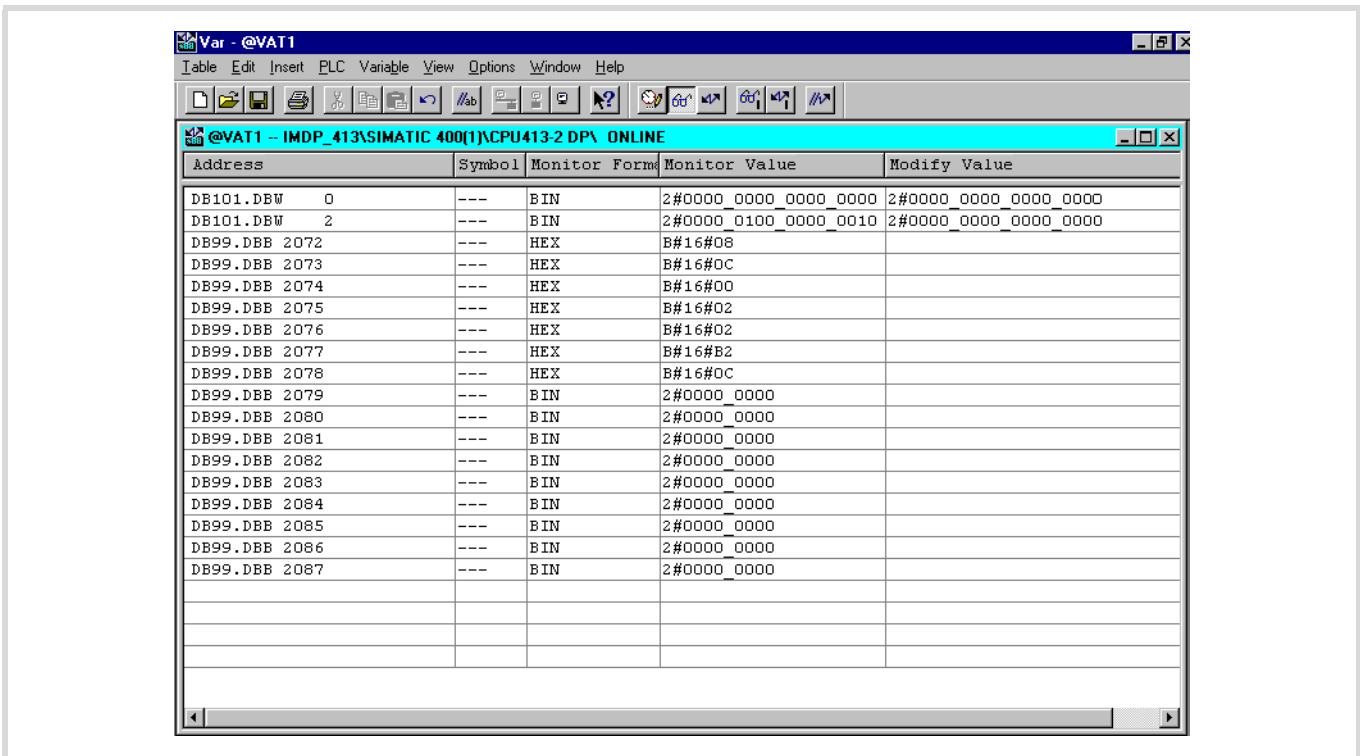


Figure 49: Diagnostics representation in the STEP 7 software – variables table

The operands have the following meanings:

Table 16: Operands legend

| Operand | Status value | Meaning |
|---------------|--------------|--|
| DB101.DBW | 0 | PLC- internal information |
| DB101.DBW | 2 | PLC- internal information |
| DB99.DBB 2072 | B#16#08 | Station status byte 1 |
| DB99.DBB 2073 | B#16#0C | Station status byte 2 |
| DB99.DBB 2074 | B#16#00 | Station status byte 3 |
| DB99.DBB 2075 | B#16#02 | Address of diagnostic master |
| DB99.DBB 2076 | B#16#02 | Identity-number high byte |
| DB99.DBB 2077 | B#16#B2 | Identity-number low byte |
| DB99.DBB 2078 | B#16#0C | Gateway diagnostic byte 0 |
| DB99.DBB 2079 | 2#0000_0000 | Gateway diagnostic byte 1 |
| DB99.DBB 2080 | 2#0000_0000 | Gateway diagnostic byte 2 |
| DB99.DBB 2081 | 2#0000_0000 | Diagnostic byte module 1 XN-BR-24VDC-D |
| DB99.DBB 2082 | 2#0000_0000 | Diagnostic byte module 2 XS1-XBM |
| DB99.DBB 2083 | 2#0000_0000 | Diagnostic byte module 3 XS1-XBM |
| DB99.DBB 2084 | 2#0000_0000 | Diagnostic byte module 4 XS1-XBM |
| DB99.DBB 2085 | 2#0000_0000 | Diagnostic byte module 5 XN-BR-24VDC-D |
| DB99.DBB 2086 | 2#0000_0000 | Diagnostic byte module 6 XN-2DO-24VDC-0.5A-P |
| DB99.DBB 2087 | 2#0000_0000 | Diagnostic byte module 7 XN-2DO-24VDC-0.5A-P |

The operands with the grey background correspond with the standards header of the PROFIBUS-DP standard. The diagnostics bits and bytes for the Gateway and for the XI/ON modules are described in the "XI/ON PROFIBUS-DP", AWB2700-1394GB manual.

7 Interfacing to CANopen

This section contains detailed information relating to connection of the xStart-XS1 to the CANopen.

Further information concerning the CANopen and XI/ON can be found in the "XI/ON CANopen" AWB2700-1359GB manual.

The coupling of an xStart-XS1 to a Moeller PLC is described. This Moeller PLC consists of the following components:

| Description | Type | Article no. |
|--|-----------------------------------|------------------|
| XC600 | | |
| XC600 master PLC | | |
| Base module | XC-ADP | 255916 |
| Power supply module | XC-POW50-UPS | 255927 |
| Communication module | XC-NET-CAN | 255914 |
| CPU module | XC-CPU601-E1M | 255908 |
| Operating module | XC-SYS1 | 255929 |
| Connection cable Ethernet cross cable | XC-CAT5-X-2 | 256487 |
| XI/ON | | |
| XI/ON-CANopen gateway | XN-GW-CANopen | 225163 |
| Bus-refreshing module | XN-BR-24VDC | 25187 |
| xStart-XS1 reversing starter | XS1-RS0-340-2k2 XS1-XBMS-RS0-A | 231258 231268 |
| Software package for programming conform to IEC 61131-3 | XSOFT-Professional | 255930 |

Individual details concerning the XSystem system can be found on the Internet page <http://www.moeller.net> → Industry → Automation. Note the link to the Online catalogue also.

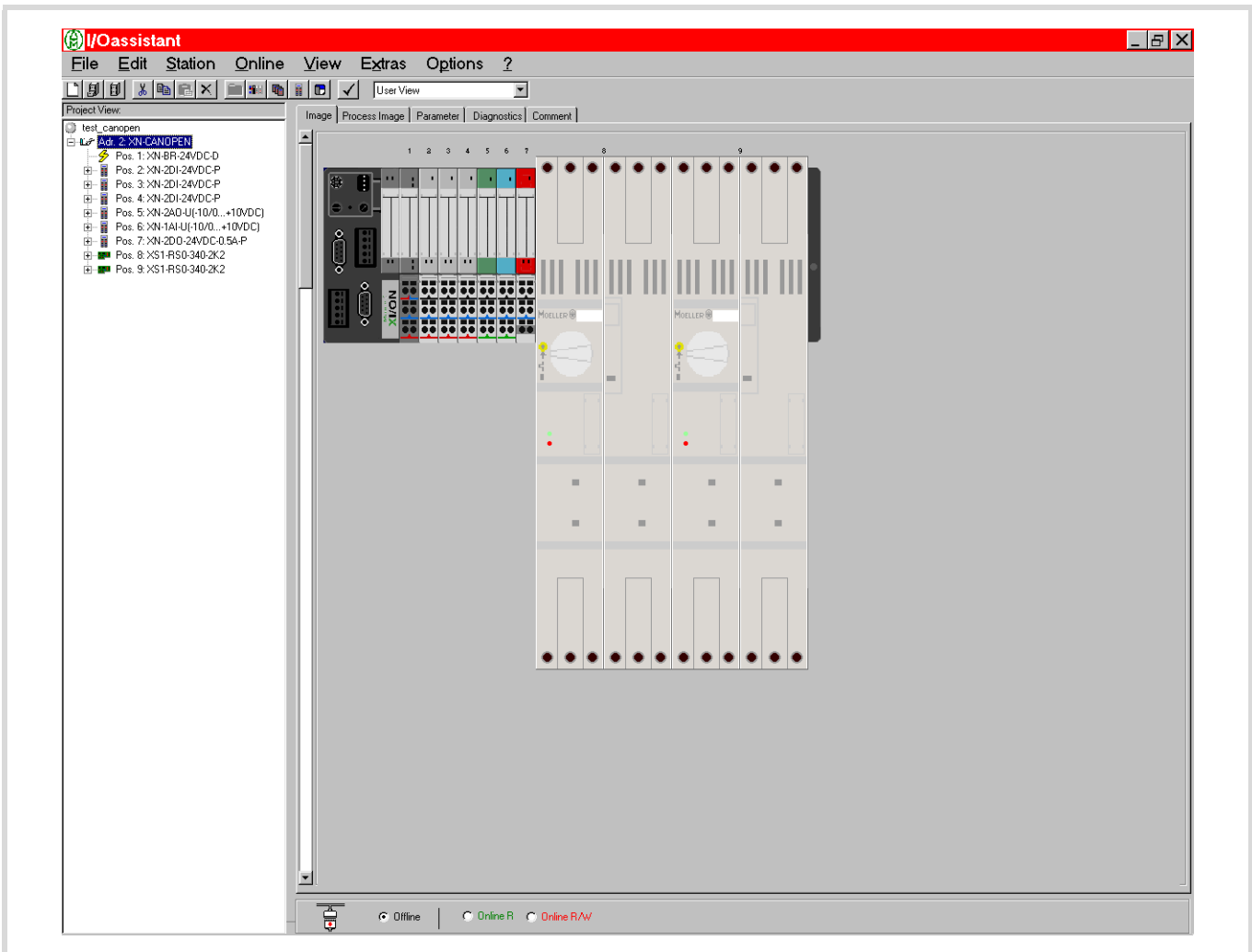


Figure 50: XI/ON CANopen Gateway with xStart-XS1 modules

xStart-XS1 is fieldbus independent. The connection and communication with the other fieldbus stations can only be achieved via the XI/ON gateway.

→ Further details concerning the EDS files of the XI/ON can be taken from sections 2 and 3 in the "XI/ON CANopen" manual.

Electronic device data sheet

The xStart-XS1 modules are integrated into CANopen structure with the aid of the device data base file. This master data is described in the XI/ON specific device data base file (EDS file).

xStart-XS1 is available in the module description according to the type version. That means, the xStart-XS1 modules are depicted with a special identification format. This enables an exact identification of the xStart-XS1 modules. This identity is stored in the electronic data sheet, the so-called EDS file (→ figure 51, page 47). The XI/ON Gateway only accepts exchange modules of the same type, i.e. you can only swap xStart-XS1 base and power modules with each other. More details concerning the integration of xStart-XS1 modules can be found in the following section "Parameters for xStart-XS1".

Parameters for xStart-XS1

Each xStart-XS1 module in the CANopen telegram occupies 3 byte parameters. The following table shows the structure of these 3 bytes.

Table 17: Parameters for xStart-XS1

| Byte | Bit | Parameter name | Value | Meaning |
|------|--------|---|-------|---|
| 0 | 0 | AGM trip indication | 0 | without trip-indicating auxiliary contact ¹⁾ |
| | | | 1 | with trip-indication |
| | 4 | Kind of power module | 0 | DOL starter ¹⁾ |
| | | | 1 | Reversing starter |
| 1 | 4 to 0 | Power level in kW | 0010 | 0.06 kW ¹⁾ |
| | | | 0011 | 0.09 kW |
| | | | 0100 | 0.18 kW |
| | | | 0101 | 0.25 kW |
| | | | 0110 | 0.55 kW |
| | | | 0111 | 0.75 kW |
| | | | 1000 | 1.5 kW |
| | | | 1001 | 2.2 kW |
| | | | 1010 | 3.0 kW |
| | | | 1011 | 4.0 kW |
| 2 | 3 to 0 | Number of acceptable higher kW stages ²⁾ | 0000 | 0 ¹⁾ |
| | | | 0001 | 1 |
| | | | 0010 | 2 |
| | | | 0011 | 3 |
| | | | 0100 | 4 |
| | | | 0101 | 5 |
| | | | 0110 | 6 |
| | 0111 | 7 | | |
| | 7 to 4 | Trip-indication: accepted deviation ²⁾ | 0000 | Conformance required ¹⁾ |
| | | | 0001 | deviation accepted |

1) Standard settings of the parameters

2) These parameters are valid only if the value "Ident-bypass" has been set in the process data. The values can be set, for example, via the control program. A further possibility is via the software I/Oassistant. The texts listed in the columns "Parameter name" and "Meaning" correspond to the entries in the EDS file.

During the initial power-up of your xStart-XS1 modules, the base module reads in the respective parameter set stored in the EEPROM (factory default setting). If power modules (e. g. 2.2 kW starter: XS1-DS0-340-2k2) have been exchanged with identical modules, the parameterization of xStart-XS1 is also identical.

If higher rating xStart-XS1 modules are used, e. g. a 0.75 KW starter is exchanged against a 2.2 KW starter, the identity bypass sets the rating 2 stages higher. You can implement this in the I/O assistant or with XSoft.

Diagnostic messages for xStart-XS1

xStart-XS1 modules occupy 1 byte diagnostic data in CANopen telegrams. The following table shows the structure of this diagnostic byte:

Table 18: Diagnostic messages for xStart-XS1

| Bit | Diagnostic | Remark |
|-----|---------------------------------|--|
| 0 | "device identification error" | The module identification of the plugged power module does not correspond to the parameterized module identification. The parameterized rating class has been exceeded or fallen short of. |
| 1 | PKZ short-circuit ¹⁾ | The diagnostic was set, as soon as an interruption at the trip-indication was recognized. The trip-indication remains active until it is acknowledged with the red Reset button. |
| 2 | PKZ overload ¹⁾ | The diagnostic message remains until the knob-operated rotary switch of the PKZM0 is turned back to the "ON" position. |
| 4 | "DIL1 error" | – |
| 5 | DIL2 defective ²⁾ | – |

1) only with xStart-XS1 with AGM trip-indication

2) only with reversing starters

The texts listed in the "Diagnostics" column correspond to the entries in the EDS file.

Process data

xStart-XS1 has 1 byte of input data and 1 byte of output data available. The following table shows the respective structure:

Table 19: Process data

| Bit | Contents | Value | Meaning |
|-------------|----------------------------------|-------|---------|
| Input data | | | |
| 0 | Current status DIL1 | 0 | OFF |
| | | 1 | ON |
| 1 | Actual status DIL2 ¹⁾ | 0 | OFF |
| | | 1 | ON |
| 2 | Status PKZM0 | 0 | OFF |
| | | 1 | ON |
| 3 | Reserved | 0 | – |
| 4 to 7 | Not assigned | – | – |
| Output data | | | |
| 0 | Required status DIL1 | 0 | OFF |
| | | 1 | ON |

| Bit | Contents | Value | Meaning |
|--------|------------------------------------|-------|---------------------|
| 1 | Setpoint status DIL2 ¹⁾ | 0 | OFF |
| | | 1 | ON |
| 2 | Reserved | 0 | – |
| 3 | Ident-bypass | 0 | No tolerance |
| | | 1 | Tolerance permitted |
| 4 to 7 | Not assigned | – | – |

1) only with reversing starters

Maximum number of modules

A XI/ON station can consist of a XI/ON gateway, a bus refreshing module and a maximum of 20 xStart-XS1 modules as DOL starters without AGM trip-indicating auxiliary contacts. The following table offers an overview of the maximum number of different xStart-XS1 module types, on condition that the entire XI/ON station is composed of xStart-XS1 modules of the same type:

Table 20: Maximum number of modules

| Type | Module | Maximum number |
|--|-----------------|----------------|
| DOL starter, without AGM trip-indication | XS1-DS0-340-xKx | 20 |
| DOL starter, with trip-indication | XS1-DS0-341-xKx | 10 |
| Reversing starter, without trip-indication | XS1-RS0-340-xKx | 10 |
| Reversing starter, with trip-indication | XS1-RS0-341-xKx | 10 |

The maximum number of xStart-XS1 modules is reduced by the use of additional power supply modules, for example, to form potential groups.

→ It must be ensured that the correct base modules are used if Bus Refreshing modules are employed for potential isolation purposes!

→ A fault message is generated as soon as the system limits have been exceeded if you use the I/Oassistant software point « Station Test design ».

Further information concerning the maximum number of stations with a XI/ON station can be found in the "XI/ON CANopen", AWB2700-1359GB manual.

Connection to a Moeller XC600 PLC

The following describes the integration of xStart-XS1 in a XI/ON station that is connected to a Moeller XC600 PLC.

The Moeller configuration software XSoft version 2.2.5.2 is used to configure the XI/ON station in this example.

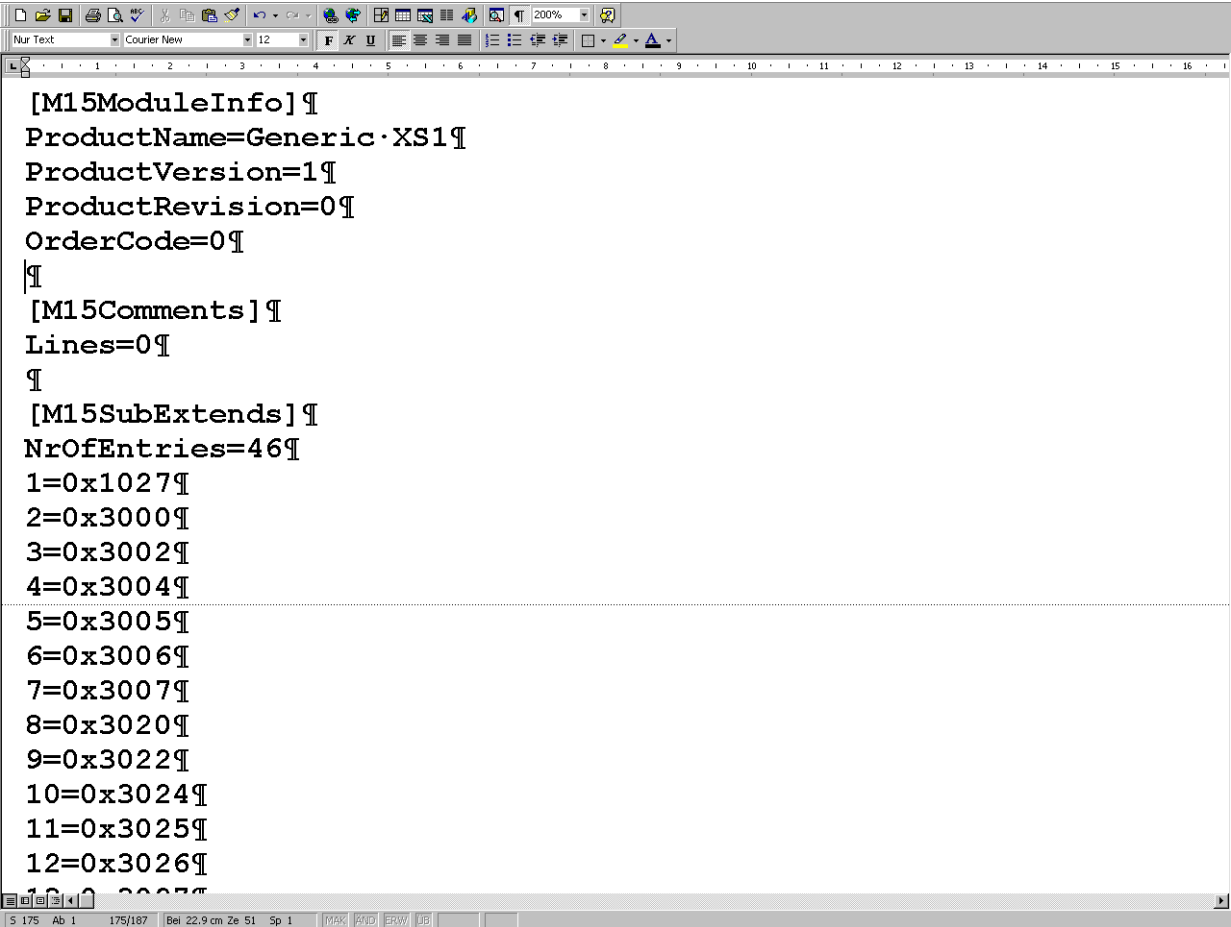
- ▶ Press the "Ok" button to confirm the appearing dialog box to overwrite an existing file.
- ▶ Icon files that may already exist do not have to be overwritten.
- ▶ Start the XSoft software.

After these steps the actual XI/ON entry can be found as usual in the selection dialog box for CAN-module selection.

Reading-in the EDS file

Proceed as follows to update your EDS file:

- ▶ Copy your EDS file to the "...\XSoft\Targets\Moeller\XC600\" folder



```
[M15ModuleInfo]¶
ProductName=Generic·XS1¶
ProductVersion=1¶
ProductRevision=0¶
OrderCode=0¶
¶
[M15Comments]¶
Lines=0¶
¶
[M15SubExtends]¶
NrOfEntries=46¶
1=0x1027¶
2=0x3000¶
3=0x3002¶
4=0x3004¶
5=0x3005¶
6=0x3006¶
7=0x3007¶
8=0x3020¶
9=0x3022¶
10=0x3024¶
11=0x3025¶
12=0x3026¶
13=0x3027¶
```

Figure 51: EDS file

Configuring the XI/ON Station with xStart-XS1

The expansion of an XC600 PLC with a CANopen module is described here. This is a supplement to the "XControl control systems" Creating an example project, AWB2700-1428GB.

Proceed as follows to insert your CANopen modules in a new or in an existing XC600 PLC:

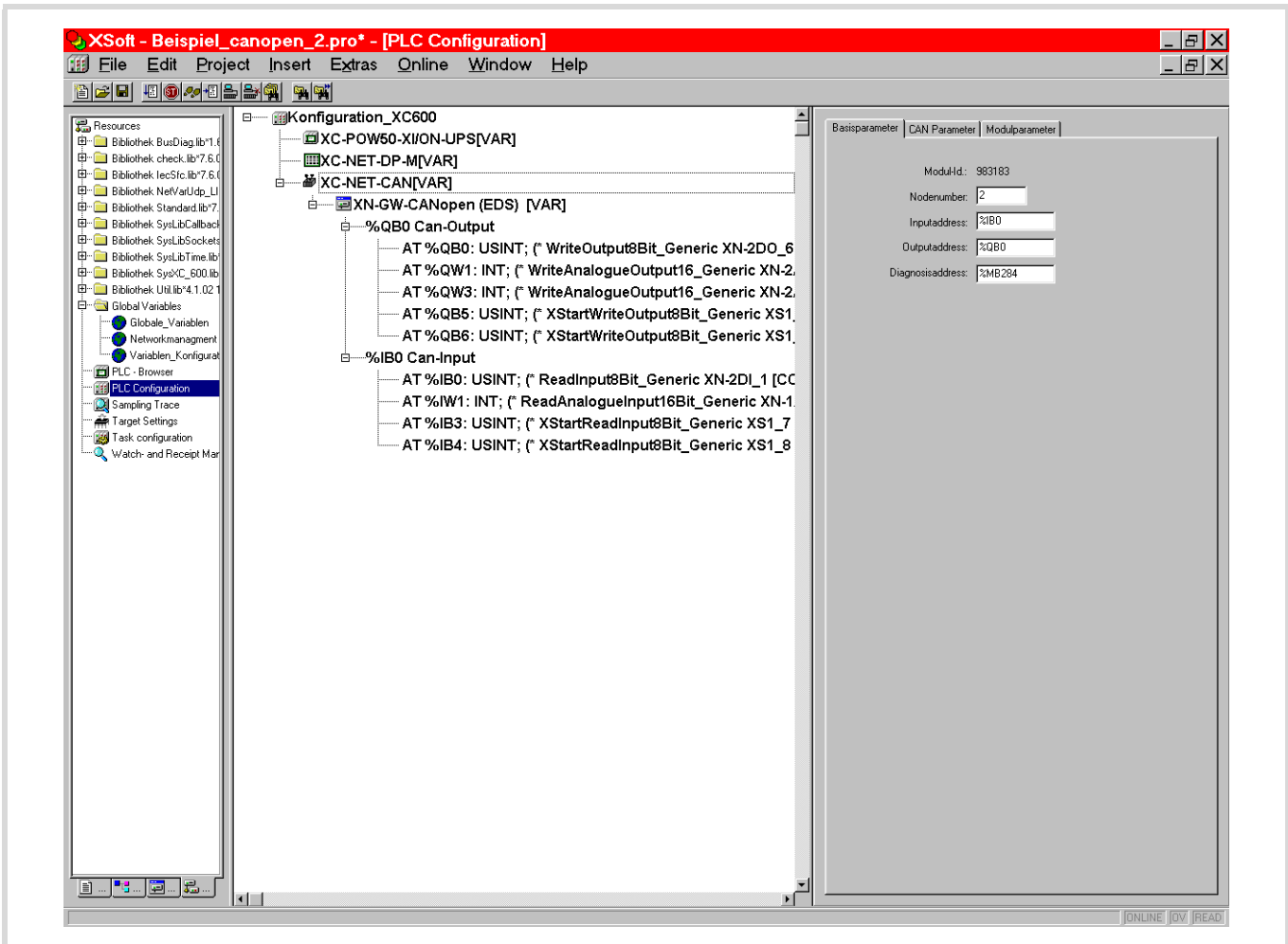


Figure 52: Design of the XC600 configuration

Ensure that the correct address is set on the CANopen module – in the example: CE000_{hex} –. Further information can be found in the XControl, AWB2700-1428GB manual.

- ▶ Mark the "XC600" element in the "PLC Configuration" window.
- ▶ Click with the righthand mouse button and select "Append subelement". → XC-Net-CAN.

A window with three parameter tabs opens. The factory default settings can be retained.

- ▶ Activate the "Autostart" and "Support DSP301, V4.01 and DSP306" functions in the "CAN parameters" tab.
- ▶ In order to configure the output module, mark the XC-NET-CAN element and click it with the righthand mouse button.
- ▶ Select "Append subelement" and select the "XN-GW-CANopen" module (→ fig. 53).

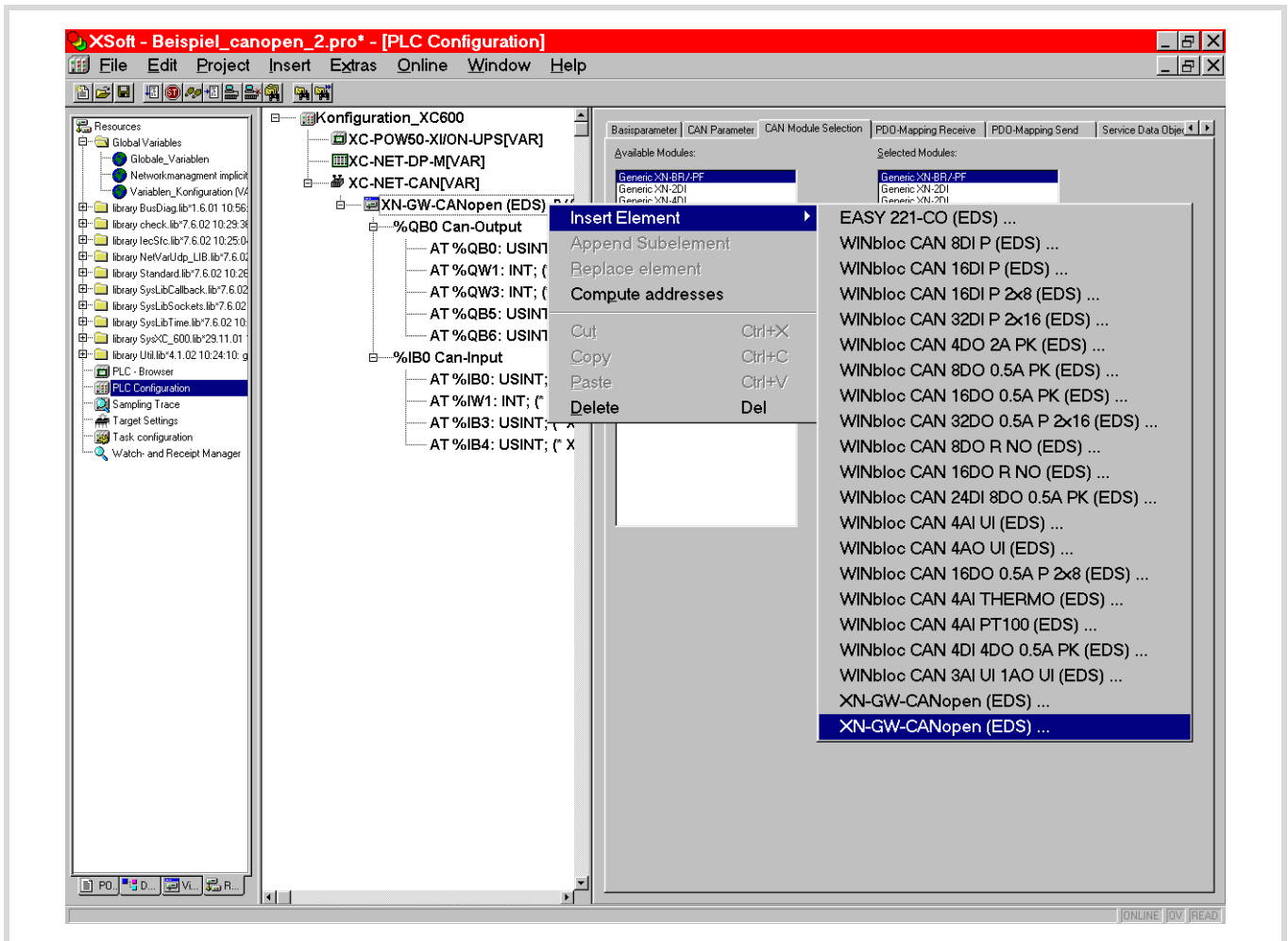


Figure 53: CANopen module selection

Multiple tabs are displayed when you click on the XN-GW-CANopen Gateway. The following buttons should be ticked in the CAN parameters tab

- Create all SDO's
- Reset node
- Nodeguarding (Guard time > 0; Life time Factor > 0)

All other parameter settings can be retained. The list of available XI/ON and xStart-XS1 modules can be viewed under the "CAN Module Selection" tab.

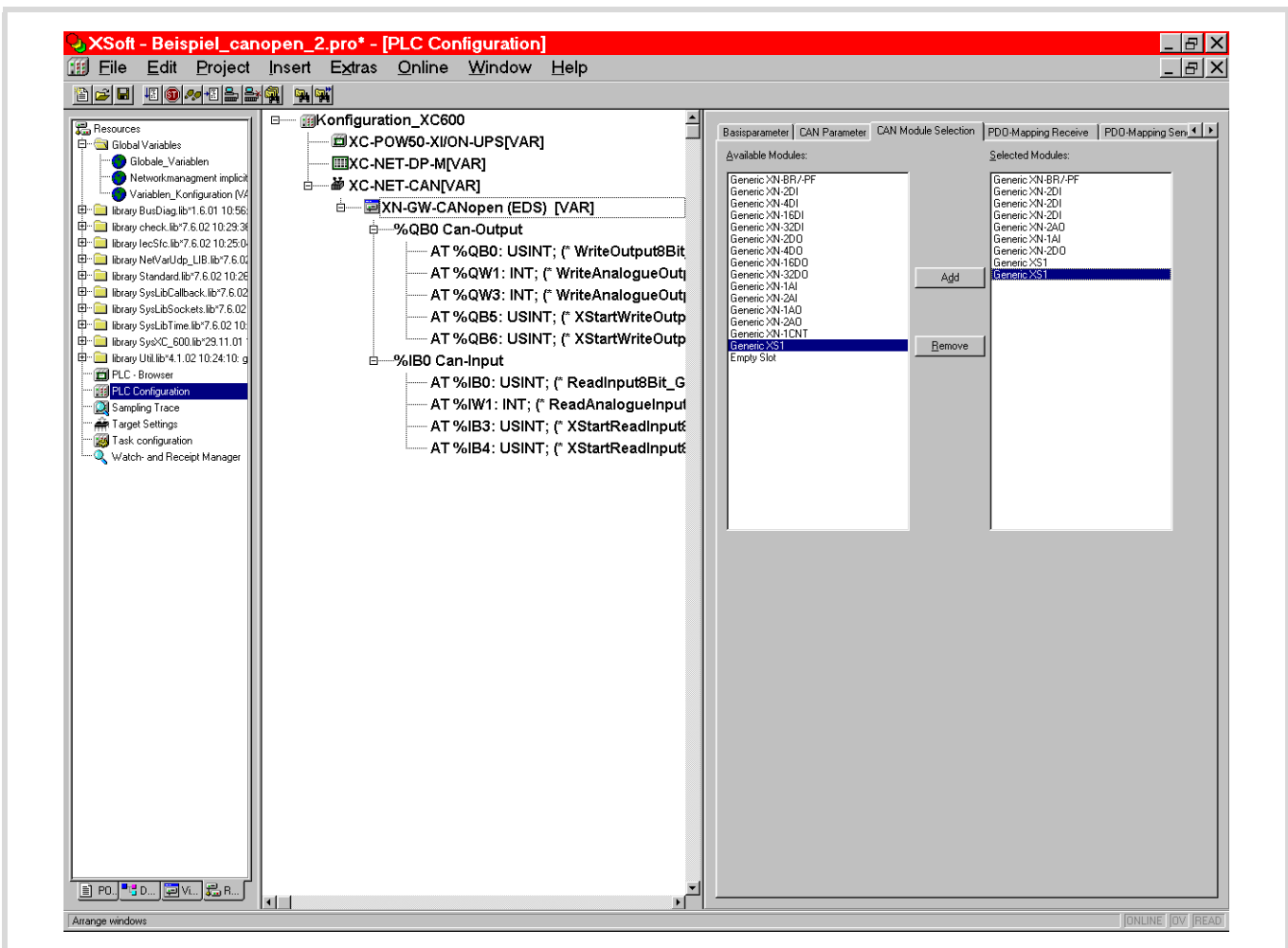


Figure 54: xStart-XS1 module selection

By clicking for example on the “Generic XS1” module and accepting it with the “Add” button, the xStart-XS1 module is added to the selection list.

Please note that a Bus refresh or Power feeding module (→ Generic XN-BR/PP) must be set behind the XN-GW-CANopen Gateway. If you wish to set new XI/ON modules behind an xStart-XS1 motor group, they must also commence with a BR/PP module. They form so-called structured function blocks of XI/ON and XStart modules, because attachment of the connection cable to an individual XI/ON module which is installed between two xStart-XS1 modules is not possible. Furthermore, the entire function block can be de-energized via the BR/PP module when maintenance is required.

Manufacturer-specific Process Data Objects (PDO)

The process data of the xStart-XS1 module is linked with manufacturer-specific PDO objects. The xStart-XS1 combi-module has digital I/O's and an unsigned 32 Bit parameter set (kW power ratings). As a result, this module cannot be treated as a pure I/O module in accordance with CAN in Automation (CiA) CANopen specifications. Eight bytes of process data can be transmitted via manufacturer-specific PDOs for transmitting and for receiving.

Each xStart-XS1 module requires 1 byte for transmitting and receiving process data, and thus, it is possible to connect up to 8 starters via a PDO.

The process data of up to 20 DOL starters can be integrated via further freely definable objects (→ section “Free process data objects (PDO)”, page 51).

→ Observe the information in the “XI/ON CANopen”, AWB2700-1359GB manual for setting up the communication for the CANopen Gateway.

Enabling of the manufacturer-specific PDOs

- ▶ Select the XN-GW-CANopen PLC Configuration tab.
- ▶ The following options should be selected in the “CAN parameters” tab:
 - Create all SDO's
 - Reset node
- ▶ Select the “PDO-Mapping Receive” tab.
- ▶ Select the object: (PDO 0x1410 Id: \$NodeId+0x8000240). The “Generic XS1..” entry can be found in the selected configuration.
- ▶ Click on properties
- ▶ Modify the CAN-Identifier range (COP-ID) e. g. to the value: Id: 0x27F or an other free address.

Proceed with the "PDO-Mapping Send" tab in the same fashion:

- ▶ Open the "PDO-Mapping Send" tab.
- ▶ Select the object: (PDO 0x1810 Id: \$NodeId+0x8000240). The "Generic XS1.." entry can be found in the selected configuration.
- ▶ Modify the CAN-Identifier range (COP-ID) e. g. to the value: Id: 0x400001FF or an other free address.

Details for calculation of the identifier of the CANopen communication (COP-ID) can be found in the "XI/ON CANopen", AWB2700-1359GB manual.

Free process data objects (PDO)

The other xStart-XS1 modules can be enabled via free objects in accordance with the CAN in Automation (CiA) CANopen specification already mentioned. The maximum possible configuration of 20 DOL starters without/with trip-indication and 10 reversing starters without/with trip-indication may not be exceeded.

As soon as more than 8 xStart-XS1 modules are linked via the "CAN Module Selection" tab in the "PLC Configuration" window, the PDOs for the 9th and the other xStart-XS1 modules – Receive (= contactor coil) and Send (= auxiliary switch signals) must be integrated and enabled.

Proceed as follows:

Receive (contactor coil)

The PDOs for all xStart-XS1 modules can be found within the object 5200.

- ▶ Click on the module: XStart_Writeoutput_8bit_Generic_XS1_9. This is the 9th xStart-XS1 module.
- ▶ Mark the process data object into which the process data is to be integrated/mapped. (PDO 0x1411)
- ▶ Press the Add button.
- ▶ Further modules are linked as described above.

The enabling of these PDOs is performed by stating the CAN Identifier range.

- ▶ Mark the PDO to be enabled.
- ▶ Click on properties
- ▶ Select the identifier range (COP-ID) e. g. with 0x27E.



Note!

Ensure that unwanted access (conflicts) to PDO addresses already assigned does not occur.

Send (auxiliary switch messages)

- ▶ Select the "PDO-Mapping Send" tab.
- ▶ Click within the object 5000 on the 9th module: XStartReadInput8bit_Generic_XS1_9.
- ▶ Mark the process data object into which the PDOs are to be integrated. (PDO 0x1811).
- ▶ Press the Add button.
- ▶ Further modules are linked as described above.

The enabling is performed again by stating the CAN Identifier range.

- ▶ Modify the CAN-Identifier range (COP-ID) e. g. to the value: ID: 0x400001FE.



Note!

Ensure that unwanted access (conflicts) to PDO addresses already assigned does not occur.

The COP-ID 0x4000xxxx must be enabled according to the CAN-specification. The 30th bit must be set in the identifier range. The object is permitted to send signals here.

xStart-XS1 program example with a Moeller XC600 PLC

The example describes an XC600 PLC with a connected CANopen Gateway, multiple XI/ON I/O modules and two xStart-XS1 reversing starters (→ page 43).

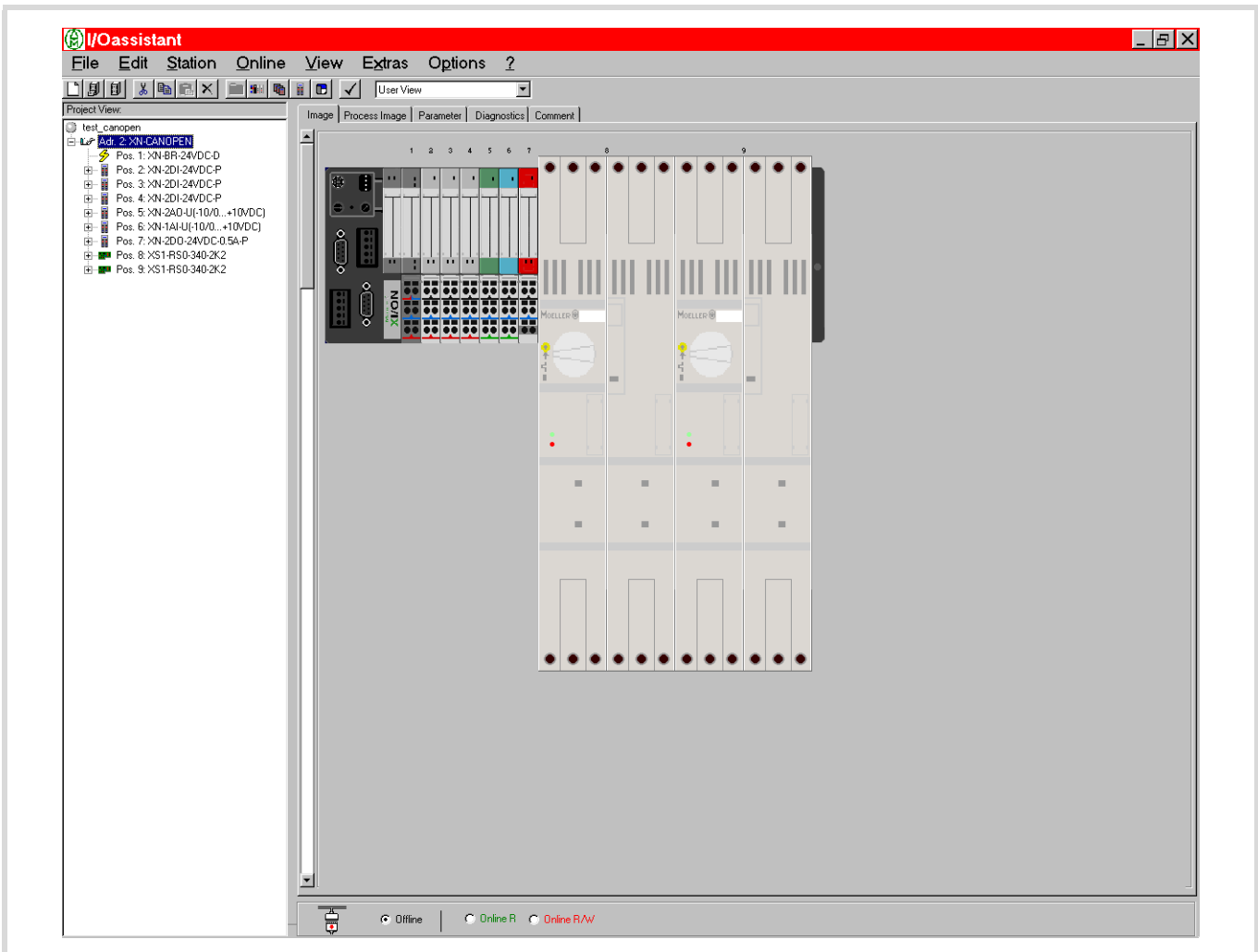


Figure 55: CANopen Gateway with connected xStart-XS1 reversing starters

One byte each is available for the input and output data per xStart-XS1 (→ table 19, page 46).

Declaration of the variables can be performed directly as a definition of global variables in the PLC Configuration window (→ fig. 52, page 48).

These variables apply for all elements. This procedure has the advantage that if modifications are performed later on the hardware of the station, the declared variables are correctly addressed.

The variables are defined locally in this example.

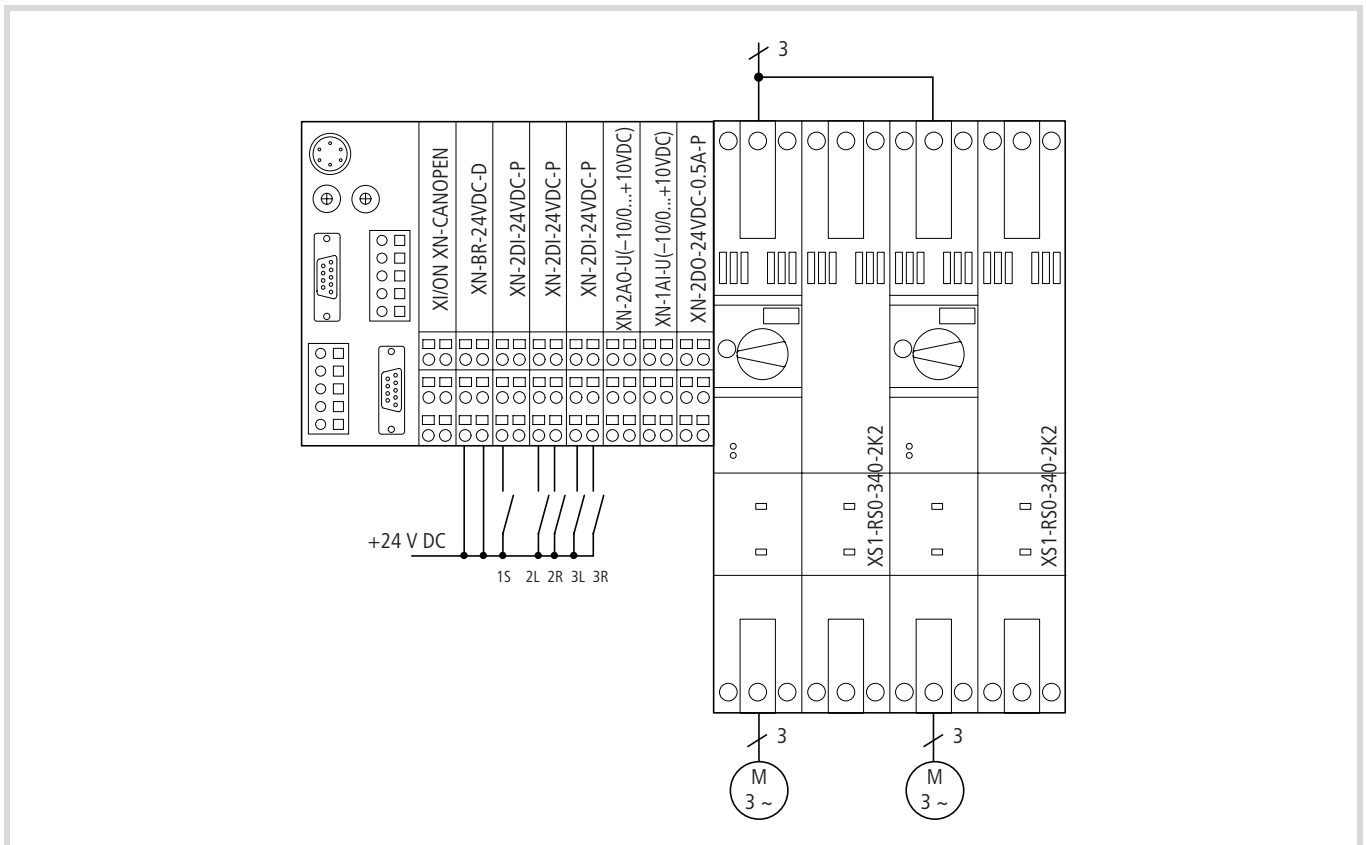


Figure 56: Example for the actuation of xStart-XS1 modules

- 1S: keyswitch actuator
- 2L: xStart-XS1 1, left contactor
- 2R: xStart-XS1 1, right contactor
- 3L: xStart-XS1 2, left contactor
- 3R: xStart-XS1 2, right contactor

There are two left-right selector switches from the Moeller RMQ program as well as a keyswitch actuator (switch_1S) used. The xStart-XS1 outputs (contactor coils) are actuated for example with the variable: X_Start_1LQ. This is possible on a bit-by-bit or byte format basis. In the example, the auxiliary contacts are actuated via the X_Start_1InBit or X_Start_1InByte variables.

Please note that the inputs are only set (forced), if the variables are also set in IL.

The screenshot shows the XSoft software interface with a ladder logic program. The program is titled 'XSoft - Beispiel_canopen_2.pro* - [PLC_PRG (PRG-IL)]'. The main window displays the following code:

```

0001 PROGRAM PLC_PRG
0002 VAR
0003   ("schlüsselschalter")
0004   Schalter_1S AT %IX0.0 : BOOL;
0005   ("Dreheschalter 2 Links/Rechts")
0006   Schalter_2L AT %IX0.2 : BOOL;
0007   Schalter_2R AT %IX0.3 : BOOL;
0008   ("Dreheschalter 3 Links/Rechts")
0009   Schalter_3L AT %IX0.4 : BOOL;
0010   Schalter_3R AT %IX0.5 : BOOL;
0011   ("X Start 1")
0012   X_Start_1LQ AT %QX5.0 : BOOL;
0013   X_Start_1RQ AT %QX5.1 : BOOL;
0014   ("X Start 2")
0015   X_Start_2LQ AT %QX6.0 : BOOL;
0016   X_Start_2RQ AT %QX6.1 : BOOL;
0017
0018   X_Start_InByte AT %IB3 : BYTE;
0019
0020   Test: BYTE;
0021 END_VAR

0001 LD   Schalter_1S
0002 AND  Schalter_2L
0003 ANDN Schalter_2R
0004 ST   X_Start_1LQ
0005
0006
0007 LD   Schalter_1S
0008 AND  Schalter_2R
0009 ANDN Schalter_2L
0010 ST   X_Start_1RQ
0011
0012 LD   Schalter_1S
0013 AND  Schalter_3L
0014 ANDN Schalter_3R
0015 ST   X_Start_2LQ
0016
0017 LD   Schalter_1S
0018 AND  Schalter_3R
0019 ANDN Schalter_3L
0020 ST   X_Start_2RQ
0021

```

Figure 57: Example for the CANopen actuation of xStart-XS1 modules

→ The xStart-XS1 reversing starter modules have an internal Firmware interlock, which prevents simultaneous actuation of the reversing contactors. However, the auxiliary contact signals (X_Start_1Inbit, here: IX3.0) for interlock (self retaining) of the contactor relays can be used.

Annex

Glossary

| | |
|--|---|
| Trip-indicating auxiliary contact | Trip-indicating auxiliary contact, additional switch with which a PKZMO can be extended |
| Rated conditional short-circuit current I_q (see IEC/EN 60947-1/IEV 441-17-20) | Short-circuit current that can be conducted a short-circuit protective device, for example, a switching device protected by a motor-protective circuit-breaker, for example, a contactor, during the break time of the safety device. |
| Motor rating P_N (see IEC/EN 60947-1) | Power rating, with which a switching device can switch at the assigned → rated operational voltage corresponding to the utilization category, for example, contactor of the utilization category AC-3: 37 kW at 400 V |
| Rated operational voltage U_e (see IEC/EN 60947-1) | Voltage to which the characteristic values of a switching device relate. The highest rated operational voltage must never be higher than the → rated insulation voltage . |
| Rated operational current I_e (see IEC/EN 60947-1) | Current that a switching device can carry, taking in to consideration → the rated operational voltage , service life, utilization category and ambient temperature. |
| Rated uninterrupted current I_u (see IEC/EN 60947-1) | Current which the switching device can carry when in uninterrupted operation (for weeks, months or years). |
| Rated insulation voltage U_i (see IEC/EN 60947-1) | Voltage to which insulation test and creepage distances relate. The highest rated operational voltage must never be higher than the → Bemessungsbetriebsspannung rated insulation voltage. |
| Protection against direct contact | Protective measures incorporated in the design, which prevent direct touch (without tools) of live system components (→ fingerproof , → back-of-hand proof). |
| Damp heat, constant | Climatic test, in which a switching device is tested at a constant humidity of 93 %, and an ambient temperature of 40 °C. During this test, checks are made of the electrical and mechanical functions of the switching device. |
| Damp heat, cyclic | Climatic test, in which a switching device is tested during changing climatic cycles. A cycle consists of 12 hours at 93 % relative humidity and 40 °C ambient temperature, and 12 hours at 95 % relative humidity and 25 °C ambient temperature. During this test, checks are made of the electrical and mechanical functions of the switching device. |
| Fingerproof | A switching device is said to be safe from finger touch when the electrically live parts cannot be touched when the actuating elements are being operated. This is true also for the operation of adjoining switching devices. The safe from finger touch area of pressure operated electrical equipment is a circle around the actuating element with a minimum radius of 30 mm vertical to the operating facility. Within this circle, parts that are dangerous to touch are permitted to be arranged at a depth of at least 80 mm below the operating level. |
| Back-of-hand proof | A switching device whose electrically live parts cannot be touched within in an imaginary sphere with a diameter of 50 mm is said to be back-of-hand proof. |
| Nominal voltage (see IEC 38) | Voltage, after which electrical equipment is called and to which particular operating features relate. |
| Shock resistance | Characteristic of a switching device, to survive sudden movements without alterations to the operating status and without damage. The contacts of switching devices that are in operation are not allowed to lift; the main contacts of switches that are not in operation are not allowed to hit together. A circuit-breaker must not trip, and no changes are permitted to occur to the circuit state of control circuit isolators. |

| | |
|---|--|
| Overvoltage category (see IEC/EN 60947-1) | <p>Code number for overvoltages, for example, due to lightning strike or switching operations that can possible occur at the point of installation. For industrial switchgear, overvoltage category III applies. According to the overvoltage categories, switching devices can be used in the following areas:</p> <ul style="list-style-type: none"> • Overvoltage category IV: Installation directly at the connection point of the installation (direct lightning strike possible), for example, at an overhead cable connection. • Overvoltage category III: Electrical equipment of which special demands are made in relation to reliability for connecting to stationary facilities, these being protected by lightning arresting facilities, for example, switches in low-voltage distribution systems or in controls used in industrial applications. • Overvoltage category II: Devices for connecting to stationary installations, for example, household appliances, electrical tools. • Overvoltage category I: Electrical equipment for connection to electrical circuits with overvoltage protective equipment, for example, electronic equipment. |
| Ambient temperature, open (see IEC 441-11-13) | Temperature of the room (for example, workshop, switchroom) in which the switching device is installed. |
| Pollution degree (see IEC/EN 60947-1) | <p>Coding number for expected amount of conductive dust and humidity that can lead to the reduction of the voltage proofing of the switching device. The pollution degree is described in the following:</p> <ul style="list-style-type: none"> • Pollution degree 1: There are no or only dry occurrences of non-conductive pollution. The pollution does not influence the voltage proofing. • Pollution degree 2: Usually only non-conductive pollution. However, temporary occurrences of conductivity are to be reckoned with. • Pollution degree 3: (switching devices for industrial use) Conductive pollution or dry, non-conductive pollution that can become conductive due to condensation. • Pollution degree 4: The pollution leads to a permanent conductivity, for example, due to conductive dust, rain of snow. |
| Supply terminal | Base module of either a Power Feeding module or a Bus Refreshing module via which the supply voltage is fed for the XI/ON modules. |
| Classification type | <p>State of a switchgear assembly (motor starter) during and after the test with the rated conditional short-circuit current:</p> <ul style="list-style-type: none"> • Classification type "1": No risk to persons or installations No immediate operational readiness required Damage to the starter is permissible • Classification type "2": No risk to persons or installations Starter is suitable for further operation No damage to the starter with exception of a slight welding of the switching contacts, if these can be easily separated without any appreciable deformation. |

Module overview and accessories

xStart-XS1

| Power modules | Bases modules XS1-XBMS- ... | |
|---------------|--------------------------------|----------|
| | ...DS0-A | ...RS0-A |

DOL starter without trip-indication

| | | |
|-----------------|---|---|
| XS1-DS0-340-K06 | ✓ | – |
| XS1-DS0-340-K09 | ✓ | – |
| XS1-DS0-340-K18 | ✓ | – |
| XS1-DS0-340-K25 | ✓ | – |
| XS1-DS0-340-K55 | ✓ | – |
| XS1-DS0-340-K75 | ✓ | – |
| XS1-DS0-340-1K5 | ✓ | – |
| XS1-DS0-340-2K2 | ✓ | – |
| XS1-DS0-340-3K0 | ✓ | – |
| XS1-DS0-340-4K0 | ✓ | – |
| XS1-DS0-340-5K5 | ✓ | – |

DOL starter with trip-indication

| | | |
|-----------------|---|---|
| XS1-DS0-341-K06 | – | ✓ |
| XS1-DS0-341-K09 | – | ✓ |
| XS1-DS0-341-K18 | – | ✓ |
| XS1-DS0-341-K25 | – | ✓ |
| XS1-DS0-341-K55 | – | ✓ |
| XS1-DS0-341-K75 | – | ✓ |
| XS1-DS0-341-1K5 | – | ✓ |
| XS1-DS0-341-2K2 | – | ✓ |
| XS1-DS0-341-3K0 | – | ✓ |
| XS1-DS0-341-4K0 | – | ✓ |

Reversing starter without AGM

| | | |
|-----------------|---|---|
| XS1-RS0-340-K06 | – | ✓ |
| XS1-RS0-340-K09 | – | ✓ |
| XS1-RS0-340-K18 | – | ✓ |
| XS1-RS0-340-K25 | – | ✓ |
| XS1-RS0-340-K55 | – | ✓ |
| XS1-RS0-340-K75 | – | ✓ |
| XS1-RS0-340-1K5 | – | ✓ |
| XS1-RS0-340-2K2 | – | ✓ |
| XS1-RS0-340-3K0 | – | ✓ |
| XS1-RS0-340-4K0 | – | ✓ |

Reversing starter with AGM

| | | |
|-----------------|---|---|
| XS1-RS0-341-K06 | – | ✓ |
| XS1-RS0-341-K09 | – | ✓ |

| Power modules | Bases modules XS1-XBMS- ... | |
|-----------------|--------------------------------|----------|
| | ...DS0-A | ...RS0-A |
| XS1-RS0-341-K18 | – | ✓ |
| XS1-RS0-341-K25 | – | ✓ |
| XS1-RS0-341-K55 | – | ✓ |
| XS1-RS0-341-K75 | – | ✓ |
| XS1-RS0-341-1K5 | – | ✓ |
| XS1-RS0-341-2K2 | – | ✓ |
| XS1-RS0-341-3K0 | – | ✓ |
| XS1-RS0-341-4K0 | – | ✓ |

Accessories

| Mechanical accessories | Type |
|--|----------------|
| Lockable rotary handle for locking the XStart-XS1 module as a main switch in accordance with VDE 0113 | AK-PKZ0 |
| Sealing device to protect against manipulation, sealable with commercially available sealing wire | PL-PKZ0 |
| Electrical accessories | |
| Three-phase commoning link for 2 DOL starters without trip-indication | B3.0/2-PKZ0 |
| Three-phase commoning link for 4 DOL starters without trip-indication or 2 DOL starters with trip-indication or 2 reversing starters | B3.0/4-PKZ0 |
| Power supply terminal for three-phase commoning link | BK25/3-PKZ0 |
| Empty connection cover, protected against accidental contact, for covering non-occupied connections on the three-phase commoning link. | H-B3-PKZ0 |
| Documentation | |
| "XI/ON PROFIBUS DP" manual | |
| German | AWB2700-1394D |
| English | AWB2700-1394GB |
| "XI/ON-CANopen" manual | |
| German | AWB2700-1395D |
| English | AWB2700-1395GB |
| Automation Systems and Drives, Main Catalogue, German | HPL0213-2001D |
| Industrial Switchgear, Main Catalogue, German | HPL0211-2001D |
| XI/ON Supplementary Catalogue | |
| German | NK2725-1042D |
| English | NK2725-1042GB |

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