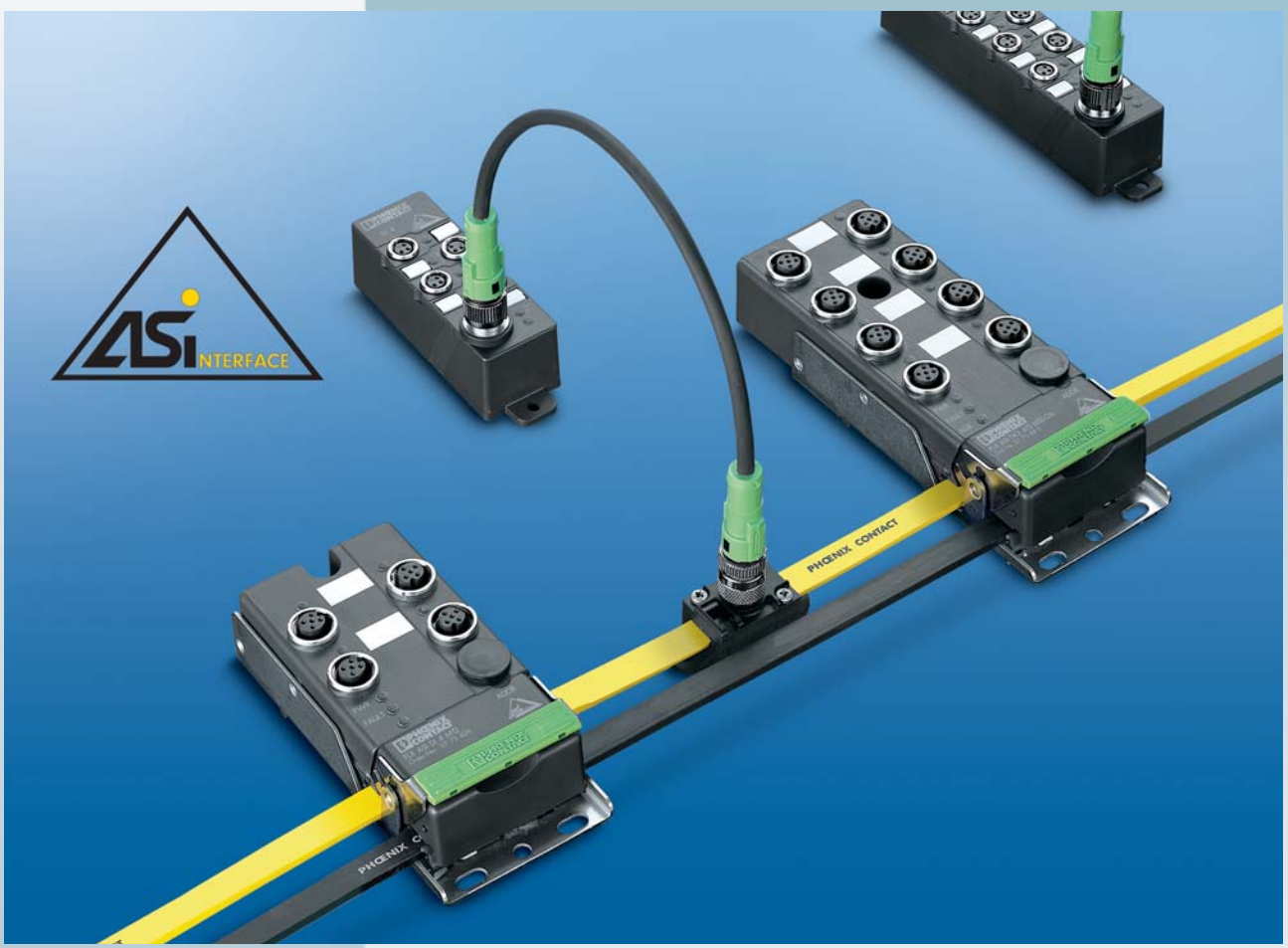
AUTOMATION



User Manual

UM EN FLX ASI SYS PRO INST

Configuring and Installing Devices in the Fieldline Extension AS-Interface Product Group

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User Manual

Configuring and Installing Devices in the Fieldline Extension AS-Interface Product Group

09/2009

Designation: UM EN FLX ASI SYS PRO INST

Revision: 01

This user manual is valid for:

The Fieldline Extension AS-Interface product group

Please observe the following notes

In order to ensure the safe use of the product described, you have to read and understand this manual. The following notes provide information on how to use this manual.

User group of this manual

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This indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING
This indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
This indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

The following types of messages provide information about possible property damage and general information concerning proper operation and ease-of-use.

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1 Fieldline Extension and the AS-Interface System

1.1 Fieldline Extension AS-Interface Product Group

Fieldline Extension is an extension of the existing Fieldline product range. AS-Interface integrates seamlessly into this product range.

Easy handling is a key feature of Fieldline Extension AS-Interface devices. Innovative technologies such as SPEEDCON fast connection technology or tool-free contacting of FLX AS-i M12 devices to AS-Interface reduce the assembly time by 90%.

The input and output devices in the Fieldline Extension AS-Interface product group are designed for distributed automation tasks in harsh environmental conditions. The devices meet IP65/67 protection. The direct connection of sensors and actuators in close proximity to the process is thus easily implemented.

In addition to components with IP65/67 protection, the Fieldline Extension AS-Interface product group also includes other AS-Interface system components. These include IP20 AS-Interface masters/gateways, AS-Interface power supply units, and I/O slaves for use in the control cabinet.

AS-Interface masters are available in two versions.

The AS-Interface master for Inline can be used to connect AS-Interface to virtually all common networks. This connection is established via the network-dependent Inline bus coupler and the Inline local bus.

FLX ASI MA PB SF und FLX ASI MA 2 PB EF master are a Stand-Alone PROFIBUS version for connecting AS-Interface to PROFIBUS DP networks.

The PROFIBUS masters support AS-i specification 3.0. Networks with up to 248 inputs and 248 outputs can be implemented together with different I/O devices (slaves) and IP20 or IP65/67 protection.

They are backwards compatible which means they can also be operated with slaves of AS-Interface specifications 2.0 or 2.1.

1.2 For Your Safety

1.2.1 Correct Usage

AS-i devices are designed for use as specified in this user manual and in the device-specific data sheets.

Always observe the data specified in the user manual and in the data sheets. If the operating instructions and safety notes for configuration, installation, and operation provided in the documentation are followed, the devices should not normally present a risk to people or property.

1.2.2 Regulations

During device configuration, installation, startup, and maintenance, the valid safety and accident prevention regulations for the specific application must be observed.

1.2.3 Safety Notes

NOTE:
To ensure IP65/67 protection, cover unused connections with protective caps.

NOTE:
Only operate AS-i devices with a maximum safety extra-low voltage (SELV) of 30 V according to IEC 60950/EN 60950/VDE 0805.

1.3 Documentation for AS-i Devices

Configuring and Installing Devices in the Fieldline Extension AS-Interface Product Group

This user manual describes the AS-i devices.

This includes:

– Device properties
– Configuration
– Assembly and connection
– Startup

Further information can be found in the user manuals:

– AS-i-Gateways for PROFIBUS,
  UM EN FLX ASI MA PB SF/EF
– Configuring and Installing the AS-Interface Gateway for Inline,
  UM EN ASI MA IL UNI
– Configuring and installing the INTERBUS Inline product range
  IB IL SYS PRO UM E
– Power Supply Units, SYS POWER SUPPLY UM E, Order No. 2745855
– AS-Interface Addressing Device, ASI CC ADR UM E, Order No. 9013727

Device-Specific Data Sheet

The data sheet describes the specific properties of a device.

This includes e.g.:

– Description
– Technical data
– Local diagnostic and status indicators
– Pin assignment and connection example
– Programming data/configuration data

1.4 Function Description of the AS-Interface System

The AS-Interface system enables the easy connection of sensors and actuators to a control system (Actuator Sensor Interface = AS-Interface = AS-i). It replaces the considerably more complex option of parallel cabling in machines and systems. The system simplifies the installation of devices at sensor/actuator level and replaces the conventional cable harness with a single cable. The AS-Interface system is therefore also a serial communication system. As a sensor bus it directly penetrates through to the individual sensors and actuators.

It is precisely here that AS-Interface has become established as a global standard solution. AS-Interface is internationally standardized in standards EN 50295 and IEC 62026-2. It is supported by most well-known manufacturers of control systems and sensors/actuators.

1.4.1 Easy Handling

In the AS-Interface system, the binary I/O device is addressed via the control system (PLC) in the same way as when using I/O boards and a cable harness. The direct addressing of devices and the simple electromechanical structure (penetration technique, tree structure) also simplify retrofitting and the conversion of an AS-i system.

No special knowledge of the system, e.g., for service and maintenance, is required in order to ensure a smooth transition from the previous star cabling to serial bus technology. The unerring self-diagnostics of the AS-i system significantly contribute to the reduction of system downtimes. For example, when replacing a faulty slave device it is not necessary to assign a new address or modify the PLC program. The AS-Interface system supports the replacement of a slave through automatic addressing.

1.4.2 Information Content of Data Telegrams

The AS-Interface system is optimized for networking the most basic devices using just a few items of bit information per device. The data telegrams are therefore very short and have a very simple structure. This means that the electronics to be integrated in the devices can be created cost-effectively. The AS-i telegram contains a maximum of four data bits for information exchange from the control system to the slave (output data) and from the slave to the control system (input data). Both the input data and the output data are updated in each cycle.

For more complex devices, e.g., analog devices, larger amounts of data can also be transmitted. This data must be split and transmitted in several consecutive cycles in multiplex mode.

1.4.3 Communication Principle

The AS-Interface system is a single master system. A bus access method is used for communication, which ensures a defined and fast response time. Communication is always initiated by the master, the slaves only respond to master requests. The master communicates cyclically with all devices, which are addressed using an address that is programmed once. A master cycle consists of the requests for all connected devices. This communication method is known as cyclic polling.

1.4.4 Time Response

The cycle time of the AS-Interface system is deterministic and proportional to the number of devices. A time of 150 microseconds is required per device. At full system configuration with 62 devices, the cycle time is 10 milliseconds. At the end of this time, all information that was transferred from the control system to the Fieldline Extension AS-Interface system (the master) has arrived at the slaves. Within this time all input data has also been read.

1.5 AS-Interface standardization

1.5.1 AS-Interface specification

The AS Interface specification defines the complete AS-Interface system and guarantees standardization of all system components. Three AS-Interface specifications have been published since AS-Interface has been introduced in the mid-90s.

Standard slaves

Specification 2.0 describes standard slaves. Addresses from 1 to 31 can be assigned to standard slaves. This limits an AS-Interface network to 31 AS-Interface slaves.

Slaves with extended addressing

Specifications 2.1 and 3.0 describe slaves with extended addressing. Addresses from 1A to 31A and 1B to 31B may be assigned to AS-Interface slaves according to these specifications. Thus, the possible number of AS-Interface-slaves in a network is doubled compared with specification 2.0.

The currently valid specification is the "Complete Specification" version 3.0, revision 2.0 dated July 09, 2008 (as of August 14, 2009).

Table 1-1 AS Interface specification overview

2.0	2.1	3.0
31 slaves, maximum	62 slaves, maximum	62 slaves, maximum
31 single slaves or 31 A slaves (can be mixed)	31 A slaves and 31 B slaves (single slaves will also be supported.)	31 A slaves and 31 B slaves (single slaves will also be supported.)
4 inputs and 4 outputs	4 inputs and 3 outputs	4 inputs and 4 outputs
Master profile M0, or later	Master profile M3, or later	Master profile M4, or later
No "Combined Transaction"	"Combined Transaction"	"Combined Transaction"
	Support of "Combined Transaction" Type 1	Support of "Combined Transaction" Type 1 to Type 5

1.5.2 AS-Interface profile

Fixed defined profiles for AS-Interface guarantee manufacturer-independent compatibility.

The profiles summarize the meaning of the 4 data bits, the precise configuration, and the precise functions of an AS-i slave.

1.5.3 Profile structure

Slave profile

A slave profile comprises IO code, ID code and ID2 code.

IO code and ID code describe the basic functions of a slave. These fixed codes allow a manufacturer-independent exchange of slave devices and guarantee compatibility among each other. ID2 code is also fixed and describes further identification characteristics of the slave devices.

ID1 code is not considered when a profile is created as the code can be freely changed by the user.

Example

Profile S-7.A.7 (4 inputs, 4 outputs)

IO code = 7	AS-Interface permits 16 different I/O configurations for the 4 data bits. These 16 combinations are distinguished by the IO code. IO code 7, in this example, is defined with 4 bidirectional data bits.
ID code = A	The ID code describes the distinguishing features of the various slaves and is defined by the manufacturer. It cannot be changed. In this example, ID code A defines this slave as a slave with extended addressing.
ID2 code = 7	The ID2 code describes further distinguishing features of the various slaves and is also defined by the manufacturer. It cannot be changed. In this example, ID2 code 7 defines this slave as 4IN/4OUT slave with extended addressing.

Master profile

AS-Interface masters are also categorized in various profiles and are standardized just like AS-Interface slaves.

Standard masters

Standard masters support up to 31 standard slaves or up to 31 slaves with extended addressing. When using slaves with extended addressing, please note that - in this case- addresses 1A to 31A will be supported only.

Standard masters also support only "Single Transaction" see Section 1.6 on page 1-7.

The profiles for standard masters are defined with M0 to M2.

Extended masters

Extended masters support extended addressing. That means up to 62 slaves with extended addressing. Extended masters are backwards compatible. They support "Single Transaction" as well as "Combined Transaction" see Section 1.6 on page 1-7. The profiles for extended masters are defined with M3 to M4.

1.6 Different data transmission types (Single/Combined Transaction)

Single Transaction

AS-Interface Single Transaction permit a maximum information exchange of 4 bits.

Combined Transaction

AS-Interface Combined Transaction (CTT1..5) permit an information exchange of more than 4 bits. Further data exchange rules are needed to implement additional functions requiring a higher data width with AS-Interface such as analog transmission or I/O versions with inputs and outputs > 4. These rules are defined in Combined Transaction.

The data transmission package remains unchanged to ensure backwards compatibility to older profiles. Profiles with Combined Transaction use the multiplex procedure to transmit more than 4 data bits. That means that more than one cycle is used to transfer the data. As data is transmitted in several cycles, this method could possibly cause higher transmission rates than a network without Combined Transaction.

Table 1-2 List of "Combined Transaction" (selection)

Combined Transaction type	Example of a slave profile	Master profile required	Function
Type 1	S-7.3	M3	Analog transmission
Type 1	S-7.4	M3	Extended analog transmission
Type 3	S-7.A.7	M4	4IN/4OUT in extended addressing mode
Type 3	S-7.A.A	M4	8IN/8OUT in extended addressing mode
Type 4	S-7.A.8	M4	16IN in extended addressing mode
Type 5	S-6.0	M4	Fast analog transmission 16 bits

1.7 System Components of the AS-Interface System

An AS-i system consists of at least the components described below.

1.7.1 Masters/Gateways

An AS-i master (gateway) is used to integrate an AS-i system into a higher-level fieldbus. These are "intelligent" units in the AS-i system, which are responsible for serial communication and self-diagnostics in the system. For the control system or in the higher-level network, the AS-i system is represented in the corresponding process data, which can be accessed in the normal way.

1.7.2 Power Supply Units

AS-Interface networks are supplied by special power supply units. These power supply units provide as DC voltage of 29.5 V to 31.6 V at the output side. This is necessary in order to safely operate all the sensors and actuators with the 24 V nominal voltage in the AS-i system. In addition, with an integrated data decoupling network the power supply unit ensures that data can superimpose the supply voltage. AS-i power supply units meet the requirements of "functional extra-low voltages with safe isolation (PELV)". Outputs are usually supplied separately via a black power cable. These standard power supply units must also meet the requirements of PELV. This ensures that in the event of a device fault the AS-i system cannot output any hazardous voltages.

1.7.3 Slaves

Through the concentration of special AS-i functions in the compact protocol chip a wide range of termination devices can be adapted for use in the AS-i system. These termination devices are the devices on the bus, i.e., the slaves. I/O devices are AS-i slaves, which integrate several devices of conventional (parallel) type in AS-i systems.

Slave profile

Each slave is identified by a slave profile. The slave profile is used for clear, functional identification by the AS-i master. The specifications for this are defined in the AS-Interface specification and comprise an ID code, two extended ID codes (ID1 code and ID2 code), and a configuration code for inputs/outputs (IO code). This data indicates the function of the slave.

The slave profile looks like this: S-7.A.0. It comprises the IO code, ID code, and ID2 code, it cannot be modified and is permanently programmed by the manufacturer.

All information in the slave profile (ID, ID1, ID2, and IO code) is required in order to easily replace slaves within an existing system. The master uses this data to check whether the actual configuration matches the desired configuration.

1.7.4 Cable

The entire conventional and complex parallel cabling system, which is prone to errors, is no longer required and is replaced by a single AS-i cable. Power and data are transmitted via a single cable. The profiled flat-ribbon cable, which is typical for AS-i, is used for data transmission for Fieldline Extension AS-i M12 devices. The new innovative locking mechanism for AS-i M12 devices enables tool-free connection to the AS-i flat-ribbon cable.

1.8 Topology

The topology of an AS-i network can be freely selected. The cable routing can be adapted to the local requirements. The network can be created with a linear, star or tree structure. Branch lines are permitted. The system can be installed like a normal electrical installation for power distribution. The devices can be connected to the cable at any point in the system, without having to consider the order, positions or distances. Cable termination resistors are not required on the AS-i cable.

The only restriction that must be observed is that the total length of the cable must not exceed 100 m. The value includes all cable lengths, i.e., even branch lines.

An AS-i network consists of the following components, see also "System Components of the AS-Interface System" on page 1-8.

– An AS-i master/gateway
– An AS-i power supply unit
– Another power supply unit (as an option) for supplying the outputs with external auxiliary voltage
– A maximum of 62 AS-i slaves (SPEC. 2.1/3.0) or 31 AS-i slaves (SPEC. 2.0)
– AS-i cable (flat-ribbon cable)

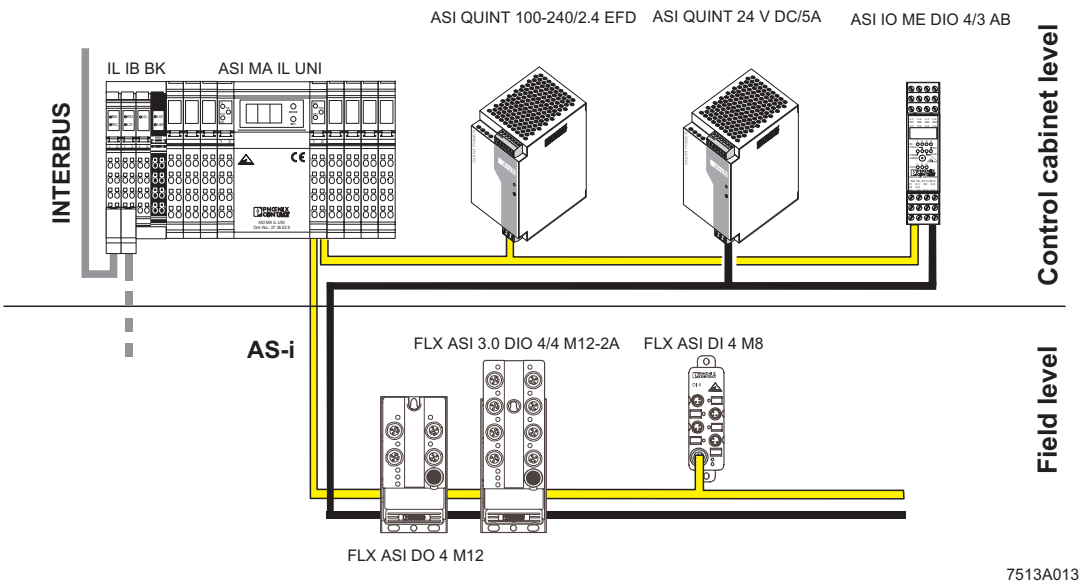


Figure 1-1 Typical structure of an AS-i network

2 AS-Interface Masters/Gateways

An AS-i master (gateway) is used to integrate an AS-i system into a higher-level fieldbus, such as INTERBUS or PROFIBUS. For AS-Interface, the gateway represents the complete master and for the higher-level fieldbus it represents a slave device.

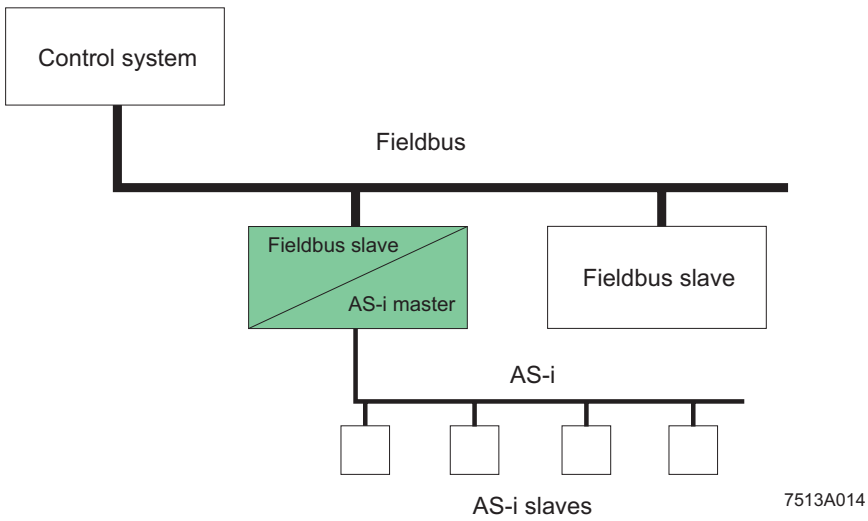


Figure 2-1 AS-i master as the gateway between the fieldbus and AS-Interface

2.1 AS-Interface Master for Inline (ASI MA IL UNI)

2.1.1 Description

The AS-i master (gateway) establishes the connection between a higher-level network and the AS-Interface system. From the point of view of the application program, the AS-i master is a slave, for the AS-Interface system it represents the master. The AS-i master enables - independently of the application program and without additional tools - complete startup and diagnostics of the AS-i system. It maps the I/O information transparently to the other system. It also enables the exchange of parameter and diagnostic data in both directions. The AS-i master enables the operation of 62 slaves with extended addressing. The AS-i master can be ordered using Order No. 2736628.

Components

The AS-i master consists of the following components:

1 Configuration connector
2 Diagnostic and status indicators
3 AS-i connection
4 7-segment display
5 Configuration and diagnostics buttons

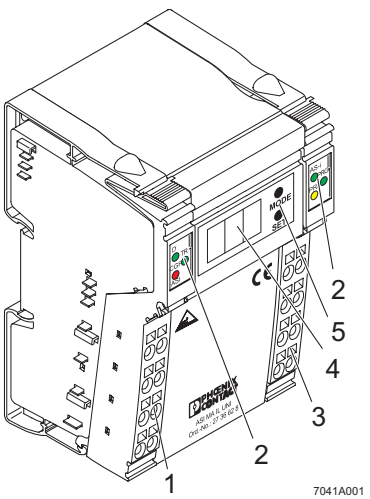


Figure 2-2 ASI MA IL UNI AS-i master

Features

– Diagnostic and status indicators
– Three-digit 7-segment display
– AS-i connection via Inline connector
– Local bus connection via Inline potential distributor
– Up to 62 AS-i slaves with a maximum of 248 inputs and 186 outputs
– Up to 100 m of cable in one AS-i system
– 1 word PCP
– AS-i specification 2.1
– Master profil M3
– IP20 protection

2.1.2 Housing Dimensions

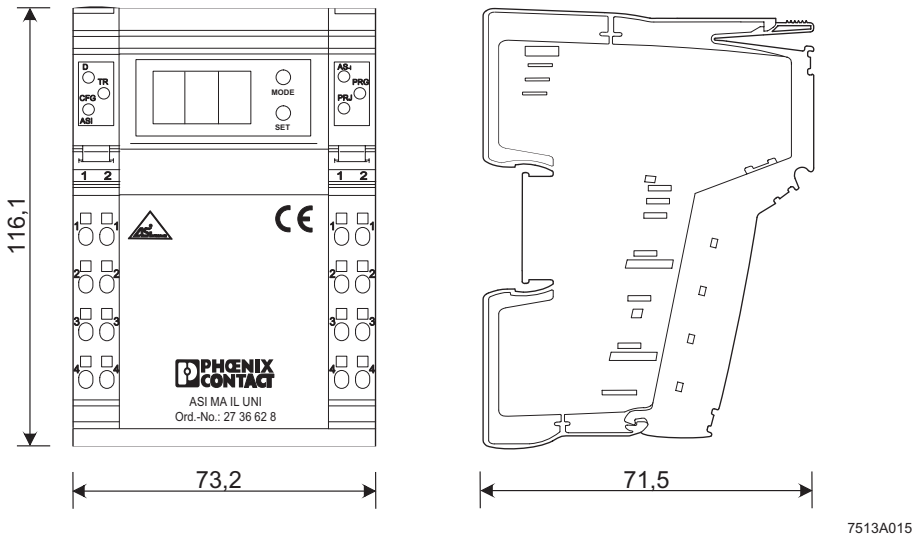


Figure 2-3 Housing dimensions of the ASI MA IL UNI AS-i master in mm

2.1.3 Function

Integration

The AS-i master is used to integrate the AS-Interface system into an Inline station and connects AS-i to a higher-level network. The primary task of the AS-i master for Inline is to transmit bits from the higher-level network to the AS-i slaves (actuators) and bits from AS-i (sensors) to the higher-level network.

Slave device

On one side, the AS-i master for Inline is controlled by the higher-level master, i.e., it is a slave device in the network.

AS-i master

On the other side, it is the AS-i master, i.e., it monitors the connected AS-i system and controls all processes on it.

The processes on both sides are executed independently of one another:

- The information from the process data channel of the Inline Modular local bus is buffered in the AS-i master for Inline until it can be transmitted to the corresponding AS-i slave.
- The latest available information from all AS-i slaves is forwarded in one local bus cycle to the Inline master via the process data channel.

Startup

The AS-i master enables complete startup and diagnostics of the AS-i system. Startup, troubleshooting, and configuration on AS-Interface can be carried out directly on the device using the two buttons, a display, and LEDs.

Parameterization and diagnostics

The AS-Interface gateway for Inline has 1 word of PCP data. Complex functions for parameterization and diagnostics of the AS-Interface system can be used with this parameter channel (PCP). These include:

– Activating/deactivating automatic addressing
– Changing between configuration and operating modes
– Assigning the addresses of connected slaves
– Reading the addresses of connected slaves

A detailed description of available functions can be found in the "Configuring and installing the AS-Interface gateway for Inline" (UM EN ASI MA IL UNI) user manual.

2.1.4 Mounting the AS-Interface Master for Inline (ASI MA IL UNI)

In order to ensure reliable operation, an AS-i master **must** be integrated into an Inline station as follows:

1 End clamp (e.g., CLIPFIX 35, Order No. 3022218)
2 Bus coupler
3 AS-i master for Inline
4 Terminals appropriate to the application (optional)
5 End plate

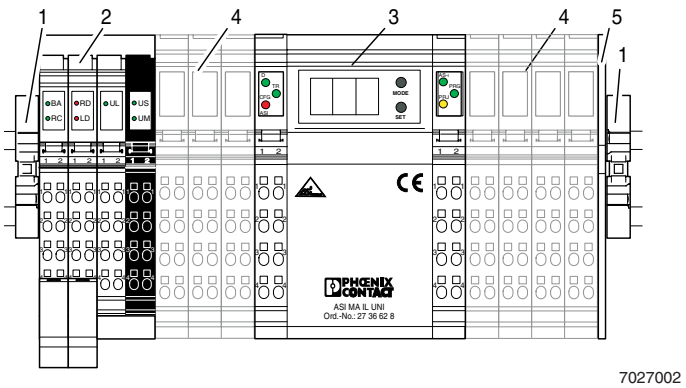


Figure 2-4 Structure of an Inline station with an AS-i master

Snapping the Inline AS-i master onto the DIN rail

- Before snapping on the AS-i master, remove the inserted connectors and the adjacent connector from the neighboring terminal on the left.
- Snap the AS-i master onto the DIN rail (A).
- Ensure that the featherkeys and keyways on the adjacent terminals are securely interlocked (B).

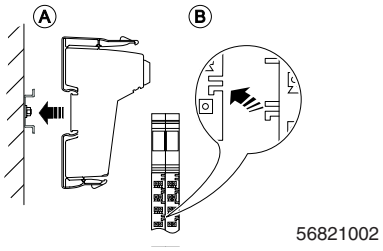


Figure 2-5 Snapping the AS-i master onto the DIN rail

Inserting the connectors

- Insert the connectors in the specified order (1, 2).

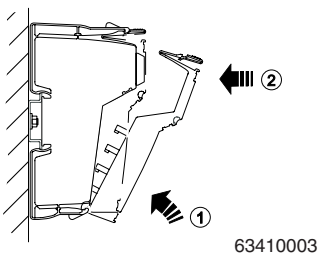


Figure 2-6 Inserting the connectors

2.1.5 Connecting the AS-Interface Master for Inline (ASI MA IL UNI)

Terminal point assignment

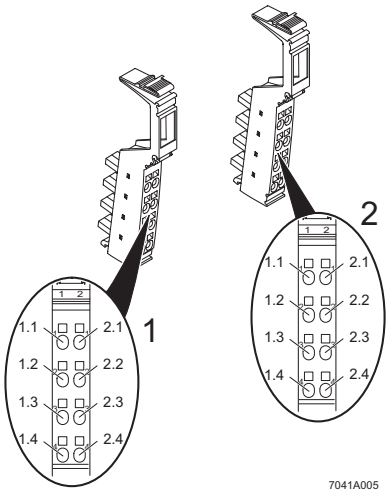


Figure 2-7 Terminal point assignment

Determining the process data length (connector 1)

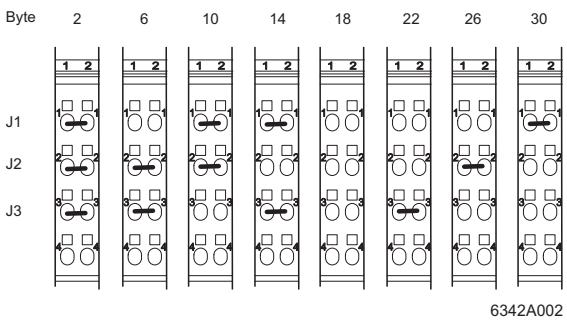


Figure 2-8 Determining the process data length

To determine the process data length, insert wire jumpers in the configuration connector (connector 1) as shown in Figure 2-8 "Determining the process data length".

J1 between 1.1 and 2.1
J2 between 1.2 and 2.2
J3 between 1.3 and 2.3

The process data length may be between 2 bytes and 30 bytes. Please note the different levels according to Figure 2-8.

AS-i connection (connector 2)

Terminal Point	Assignment
1.1, 1.2, 1.3, 1.4	AS-i +
2.1, 2.2, 2.3, 2.4	AS-i –

2.1.6 Power Supply and AS-i Connection Method

The AS-i master does not require a separate power supply. The communications power of the AS-i master is supplied in full from the Inline Modular local bus. All the power for the AS-i electronics is obtained directly from the AS-i network (current consumption around 200 mA from AS-i). An additional 24 V power supply is not required for the AS-i master. The AS-i master is simply integrated in the Inline Modular local bus and connected to the AS-i cable. The master starts working when the AS-i power supply unit is switched on.

Like all other AS-i components, the AS-i power supply unit is connected at any point in the AS-i network via the AS-i cable, see also "Power Supply Units" on page 3-1.

2.1.7 Diagnostic and Status Indicators

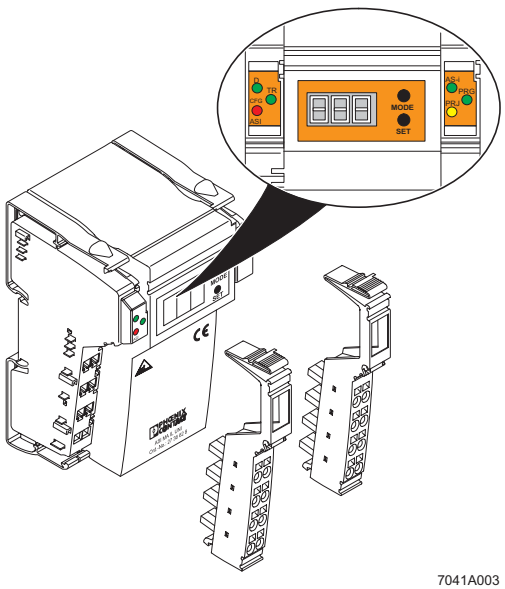


Figure 2-9 ASI MA IL UNI with appropriate connectors

Designation	Color	Meaning
D	Green LED	Diagnostics
	ON	Bus active
	Flashing	
	0.5 Hz	Supply present, bus not active
	2 Hz	Bus active, I/O error
	4 Hz	Cable interrupt before the master
	OFF	No communications power, bus not active

Designation	Color	Meaning
TR	Green LED	PCP communication
	ON	PCP channel not active
	OFF	PCP channel active
CFG	Red LED	AS-i configuration error or I/O error The 7-segment display indicates the lowest AS-i address at which a configuration or I/O error was detected. Once the error at this AS-i address has been removed, the next AS-i address at which an error was detected is displayed, if applicable.
	ON	At least one slave address has a configuration error
	Flashing	At least one AS-i slave has an I/O error
	OFF	No error
AS-i	Green LED	AS-i operating voltage
	ON	AS-i operating voltage present
	OFF	AS-i operating voltage not present
PRG	Green LED	Automatic address programming
	ON	Automatic address programming is possible. A slave is missing in the AS-i configuration and automatic addressing is activated in the gateway (default setting). When an appropriate new slave is connected the unused address is automatically assigned to it.
	OFF	Automatic address programming is not possible. All slaves are present in the AS-i configuration or this function is deactivated in the gateway.
PRJ	Yellow LED	Configuration mode
	ON	Configuration mode is active
	OFF	Configuration mode is not active

Local bus module error

The local bus module error can be configured so that the module error is triggered on an AS-i power-fail (voltage interrupt) or AS-i configuration errors.

2.1.8 Buttons

Button	Meaning
MODE	Activates and deactivates configuration mode, saves configuration data
SET	Modifies configuration data

2.1.9 7-Segment Display

The 7-segment display contains different information depending on the operating state:

– During normal operation it displays a chasing light.
– In the event of a configuration or I/O error, it displays the lowest AS-i address at which an error was detected.
– In configuration mode it displays slave addresses or error messages.

2.1.10 Removing the AS-Interface Master for Inline (ASI MA IL UNI)

Removing the connector

- If a labeling field is present, remove it.
- Remove the connector by pressing the back shaft latching (1) and levering off the connector (2).

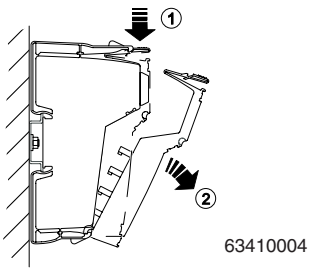


Figure 2-10 Removing the connector

Removing the Inline AS-i master from the DIN rail

- Before removing the base, remove all the connectors from the AS-i master and the connectors of the neighboring terminals (left and right).
- Release the base by pressing on the front and back snap-on mechanisms (1) and pull it out perpendicular to the DIN rail (2).

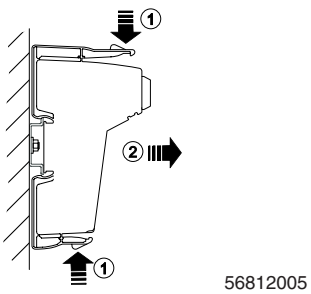


Figure 2-11 Removing the Inline AS-i master from the DIN rail

For additional information please refer to the data sheet and the following documentation:
User manual: Configuring and Installing the AS-Interface Gateway for Inline,
UM EN ASI MA IL UNI User manual: Configuring and Installing the INTERBUS Inline Product Range, IB IL SYS PRO UM E

2.2 AS-Interface Gateway for PROFIBUS with standard function FLX ASI MA PB SF

2.2.1 Description

The AS-i master (gateway) establishes the connection between PROFIBUS DP and the AS-Interface system. From the point of view of the application program, the AS-i master is a slave, for the AS-Interface system it represents the master. The AS-i master can be ordered using Order No. 2773597.

Components

The AS-i master consists of the following components:

1 Diagnostic and status indicators
2 7-segment display
3 Two buttons for hand operations
4 Ground
5 AS-i power supply
6 AS-i circle
7 9-pos. D-SUB female connector for PROFIBUS connection

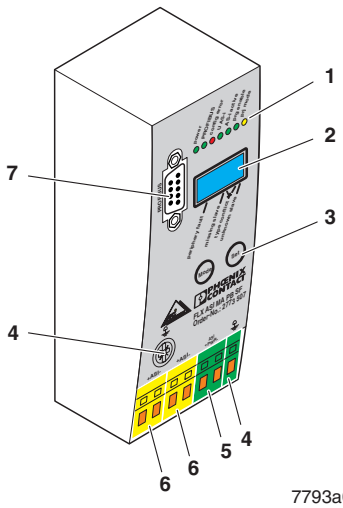


Figure 2-12 AS-i master FLX ASI MA PB SF

Features

– Diagnostic and status indicators
– Three-digit 7-segment display
– AS-i connection via spring-cage terminal block
– Up to 62 AS-i slaves with a maximum of 248 inputs and 248 outputs
– Up to 100 m of cable in one AS-i system
– AS-i specification 3.0
– Master profil M4
– IP20 protection

2.2.2 Housing dimensions

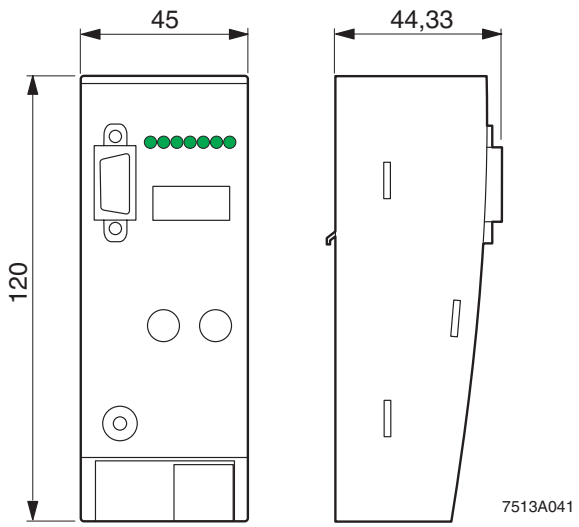


Figure 2-13 Housing dimensions of the FLX ASI MA PB SF master in mm

2.2.3 Function

Connecting to PROFIBUS DP

The AS-i master (gateway) establishes the connection between PROFIBUS DP and the AS-Interface system. The primary task of the AS-i master is to transmit bits from the PROFIBUS DP to the AS-i slaves (actuators) and bits from AS-i (sensors) to the PROFIBUS DP.

PROFIBUS DP slave

On one side, the AS-i master is controlled by the PROFIBUS master, i.e., it represents a PROFIBUS DPslave.

AS-i master

On the other side, it is the AS-i master, i.e., it monitors the connected AS-i system andcontrols all processes on it. All AS-i functions can be called via PROFIBUS DP, see "AS-i Fault Detector" on page 2-17.

Startup

A device database file (GSD) is supplied with the devices, which enables the easy startupof the AS-i master for PROFIBUS DP. A device database file (GSD) is supplied with the devices, which enables the easy startup of the AS-i master for PROFIBUS DP. It is necessary to link a corresponding parameterization/programming software to a device description file (GSD) to start up AS-i masters. It can be downloaded free of charge at www.phoenixcontact.net/download.

By default, the device is set to PROFIBUS address 3. The PROFIBUS address can be modified with two buttons, the three-digit display and the LEDs directly at the device. A detailed description can be found in the "AS-i-Gateways for PROFIBUS" user manual, UM EN FLX ASI MA PB SF/EF.

Configuration

If no PC is available, startup, troubleshooting, and configuration on the AS-i system canalso be carried out directly on the device using the two buttons, the three-digit display, and the LEDs. This also includes the addressing of the connected slaves in your AS-i network.

2.2.4 Mounting/demounting the Master FLX ASI MA PB SF

Mounting/demounting the device on a DIN rail

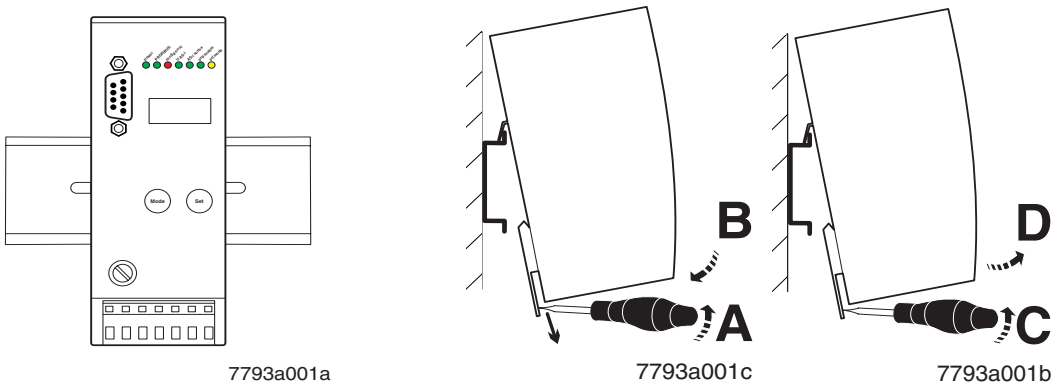


Figure 2-14 Mounting/demounting the device on a DIN rail

- **Assembly:** Use a screwdriver to reach into the latch and pull the latch downwards (A). Snap the device directly onto a DIN rail (B).
- **Removal:** Use a screwdriver to reach into the latch and pull the latch downwards (C). Pull the device out perpendicular to the DIN rail. Pull the device upwards away from the DIN rail (D).

2.2.5 Connecting the Master FLX ASI MA PB SF

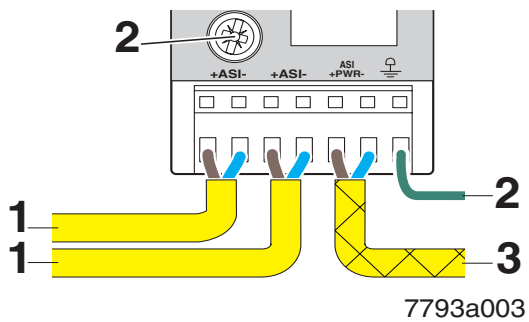


Figure 2-15 Connecting Ground, AS-i circuit and AS-i power supply

- Connect the functional earth ground cable (2) to ground the module.
- Connect the AS-i cables (1) to the corresponding terminals.
- Connect the AS-i power supply (3).

CAUTION:
Observe the required polarity.

- Connect the PROFIBUS to the 9-pin D-SUB female connector (see "Connection to PROFIBUS DP" on page 2-13).

Connection to PROFIBUS DP

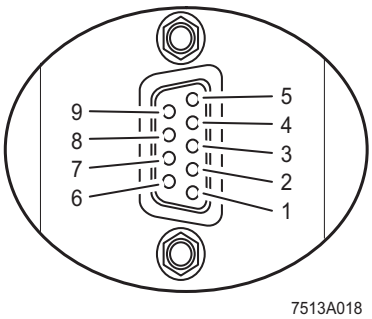


Figure 2-16 Connection to PROFIBUS DP

Pin	Assignment
3	RxD/TxD-P, cable B
5	GND, reference potential up to +5 V
6	+5 V
8	RxD/TxD-N, cable A

2.2.6 Power Supply and AS-i Connection Method

AS-i masters do not require a separate power supply. They are supplied in full from theAS-i cable (current consumption around 200 mA from AS-i). An additional 24 V powersupply is not required for the AS-i master. The AS-i master is simply connected to the AS-i cable. The master starts working when the power supply unit is switched on.

Use a power supply unit that also supplies the AS-i master with voltage and, like all other AS-i components, can be connected to the AS-i cable at any point, see also "Power Supply Units" on page 3-1.

2.2.7 Diagnostic and Status Indicators

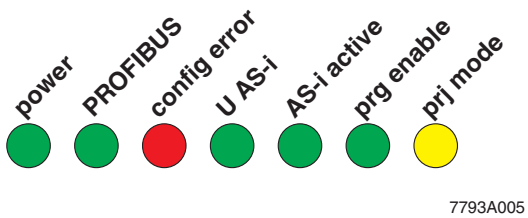


Figure 2-17 Diagnostic and Status Indicators

Designation	Colour	Meaning
power	green	Electronics module operating voltage
PROFIBUS	green/red	Module/network status
config error	red	AS-i configuration error
U AS-i	green	AS-i operating voltage
AS-i active	green	AS-i transmission
	green flashing	B slave indicator
prg enable	green	Programming mode active
prj mode	yellow	Configuration mode active

2.2.8 Buttons

Button	Meaning
Mode	Activates and deactivates configuration mode, saves configuration data
Set	Modifies configuration data

Further technical information can be found in the data sheet and in the user manual: AS-i-Gateways for PROFIBUS, UM EN FLX ASI MA PB SF/EF

2.3 AS-Interface Gateway for PROFIBUS with extended function FLX ASI MA 2 PB EF

2.3.1 Description

The AS-i master (gateway) establishes the connection between PROFIBUS DP and the AS-Interface system. From the point of view of the application program, the AS-i master represents a slave, for the AS-Interface system it represents the master.

The AS-i gateway with extended functions can be used to connect two AS-i circuits.The AS-i master can be ordered using Order No. 2773607.

Components

The AS-i master consists of the following components:

1 RS 232 connection
2 Diagnostic and status indicators
3 Three-digit LCD for displaying the respective operating state of the device and the configuration menu
4 Four buttons for hand operations
5 Ground
6 AS-i power supply, circuit 2
7 AS-i circle 2
8 AS-i power supply, circuit 1
9 AS-i circle 1

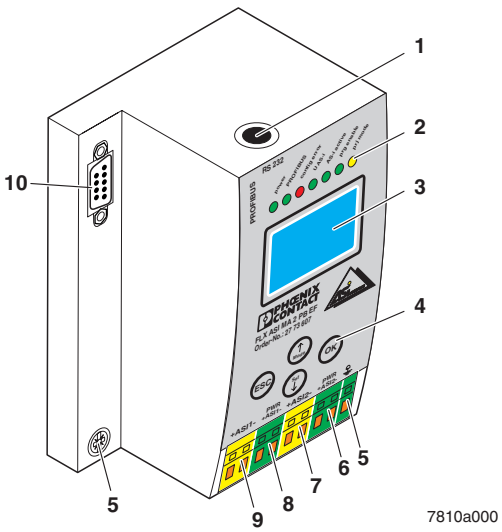


Figure 2-18 AS-i master FLX ASI MA 2 PB EF

Features

- Double master
- Diagnostic and status indicators
- Three-digit LCD
- AS-i connection via spring-cage terminal block
- Up to 62 AS-i slaves with a maximum of 248 inputs and 248 outputs
- Up to 100 m of cable in one AS-i system
- Integrated AS-i Fault Detector
- AS-i specification 3.0
- Master profil M4
- IP20 protection

2.3.2 Housing dimensions

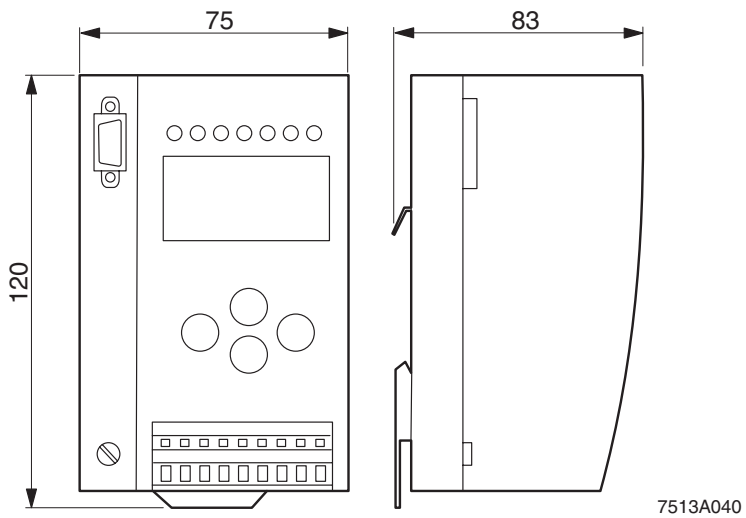


Figure 2-19 Housing dimensions of the FLX ASI MA 2 PB EF master in mm

2.3.3 Function

Connecting to PROFIBUS DP

The AS-i master (gateway) establishes the connection between PROFIBUS DP and the AS-Interface system. The primary task of the AS-i master is to transmit bits from the PROFIBUS DP to the AS-i slaves (actuators) and bits from AS-i (sensors) to the PROFIBUS DP.

PROFIBUS DP slave

On one side, the AS-i master is controlled by the PROFIBUS master, i.e., it represents a PROFIBUS DPslave.

AS-i master

On the other side, it is the AS-i master, i.e., it monitors the connected AS-i system andcontrols all processes on it. All AS-i functions can be called via PROFIBUS DP.

AS-i Fault Detector

Functions of the AS-i Fault Detector:

Duplicate address‘ recognition

If two slaves have the same address in an AS-i circuit, a duplicate address exists. Because of this error the master can not send a request to each slave separately. At that time both repsonses overlap themselves on the line, it is impossible for the master to recognize the slave response safely. It exists an unstable network behaviour.

The function "duplicate address‘ recognition" allows to recognize a duplicate address and to indicate this via the superior fieldbus. By voltage reset at the AS-i circuit 1 the complete gateway with enhanced function range will be shut down. The respective bits ground fault, over-voltage, noise, double address will only be set if AS-i masters are used that support these functions. A duplicate address causes a configuration error and will be shown in the display of the master.

Duplicate addresses can be recognized only in the AS-i segment directly at the master. If both slaves participate in a duplicate address located behind a repeater, the duplicate address‘ recognition is impossible.

Earth Fault Detector

An Earth Fault exists when the voltage U_{GND} (Nominal value of U_{GND}=0,5 U_{AS-i})

is outside of the following range:

10% $U_{AS-i} \leq U_{GND} \leq$ 90% U_{AS-i}

This error limits the fail-safe characteristic of the AS-i transmission substantially. Ground faults are indicated on the masters display.

For recognition of earth faults the master must be grounded with the function earth.

Noise Detector

The noise detector detects alternating voltages on AS-i, which are not produced by AS-i master or AS-i slaves. These interference voltages can cause telegram disturbances. A frequent cause are insufficiently shielded frequency inverters or awkwardly shifted cables. Noises are indicated in the master´s display as well as via the upstream fieldbus.

Overvoltage Detector

Overvoltages are present, if the AS-i line, whose conductors lie normally electrically symmetrically to the plant earth, are strongly electrically raised. A cause can be e.g. power-on procedures of large consumers. However sometimes overvoltages don‘t generally disturb AS-i communication, but can release incorrect signals of sensors. Overvoltages are indicated in the master´s display as well as via the upstream fieldbus.

Startup

A device database file (GSD) is supplied with the devices, which enables the easy startupof the AS-i master for PROFIBUS DP. A device database file (GSD) is supplied with the devices, which enables the easy startup of the AS-i master for PROFIBUS DP. It is necessary to link a corresponding parameterization/programming software to a device description file (GSD) to start up AS-i masters. It can be downloaded free of charge at www.phoenixcontact.net/download.

By default, the device is set to PROFIBUS address 3. The PROFIBUS address can be modified with two buttons, the three-digit display and the LEDs directly at the device.

Configuration

You may also start up, troubleshoot, and configure the AS-i systems with the help of the buttons or the multi-line LCD directly on the device. All functions required can be conveniently carried out in the advanced display mode.

A detailed description of the menu structure is supplied with the device. For more detailed information, please refer to the user manual: UM EN FLX ASI MA PB SF/EF

2.3.4 Mounting/demounting the Master FLX ASI MA 2 PB EF

Mounting/demounting the device on a DIN rail

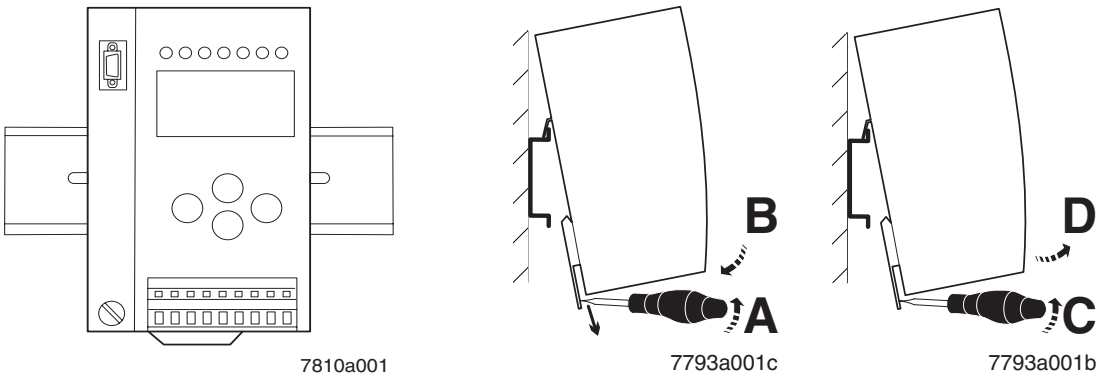


Figure 2-20 Mounting/demounting the device on a DIN rail

- **Assembly:** Use a screwdriver to reach into the latch and pull the latch downwards (A). Snap the device directly onto a DIN rail (B).
- **Removal:** Use a screwdriver to reach into the latch and pull the latch downwards (C). Pull the device out perpendicular to the DIN rail. Pull the device upwards away from the DIN rail (D).

2.3.5 Connecting the Master FLX ASI MA 2 PB EF

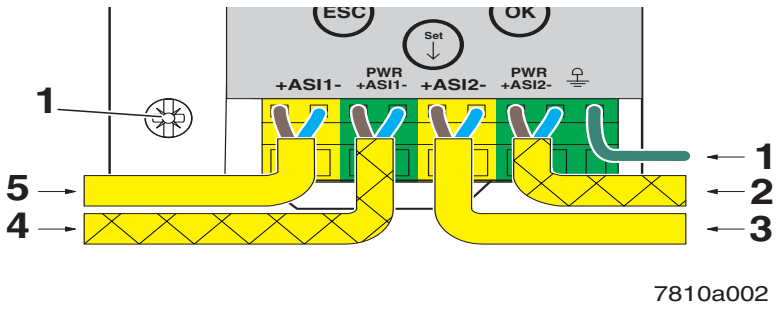


Figure 2-21 Connecting Ground, AS-i circuit and AS-i power supply

- Connect the functional earth ground cable (1) to ground the module.
- Connect the AS-i cables (3, 5) to the corresponding terminals.
- Connect the AS-i power supply (2, 4).

CAUTION:
Observe the required polarity.

- Connect the PROFIBUS to the 9-pin D-SUB female connector (see "Connection to PROFIBUS DP" on page 2-20).

Connection to PROFIBUS DP

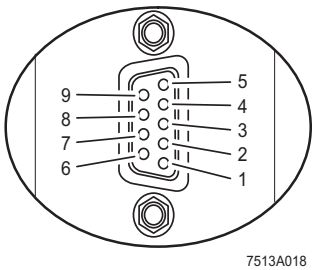


Figure 2-22 Connection to PROFIBUS DP

Pin	Assignment
3	RxD/TxD-P, cable B
5	GND, reference potential up to +5 V
6	+5 V
8	RxD/TxD-N, cable A

2.3.6 Power Supply and AS-i Connection Method

AS-i masters do not require a separate power supply. They are supplied in full from the AS-i cable (current consumption around 200 mA from AS-i). An additional 24 V powersupply is not required for the AS-i master. The AS-i master is simply connected to theAS-i cable. The master starts working when the power supply unit is switched on.

Use a power supply unit that also supplies the AS-i master with voltage and, like all other AS-i components, can be connected to the AS-i cable at any point, see also "Power Supply Units" on page 3-1.

2.3.7 Diagnostic and Status Indicators

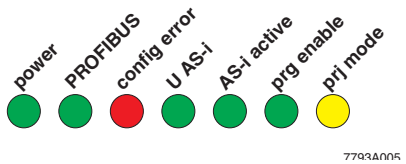


Figure 2-23 Diagnostic and Status Indicators

Designation	Colour	Meaning
power	green	Electronics module operating voltage
PROFIBUS	green/red	Module/network status
config error	red	AS-i configuration error
U AS-i	green	AS-i operating voltage
AS-i active	green	AS-i transmission
	green flashing	B slave indicator
prg enable	green	Programming mode active
prj mode	yellow	Configuration mode active

2.3.8 Buttons

Button	Meaning
Mode	Activates and deactivates configuration mode, saves configuration data
Set	Modifies configuration data
ESC	Change mode, Change to next lower menu, Change editing
OK	Change mode, Change to next higher menu, Confirm selection

Further technical information can be found in the data sheet and in the user manual:
AS-i-Gateways for PROFIBUS, UM EN FLX ASI MA PB SF/EF.

3 Power Supply Units

3.1 Description

Power supply units greatly influence the availability and operational reliability of electrical systems. Therefore, the power supply unit should be chosen as carefully as all the other system components. Universal power supply units must meet all the necessary requirements. This increases the reliability of electrical systems.

ASI QUINT power supply units supply the AS-i system with the power required. In order to minimize the number of terminal points, a single two-wire cable is used to transmit information and supply power. AS-i power supply units use an integrated filter to ensure that the modulated data flow is not affected.

Device view, connections, and operating elements

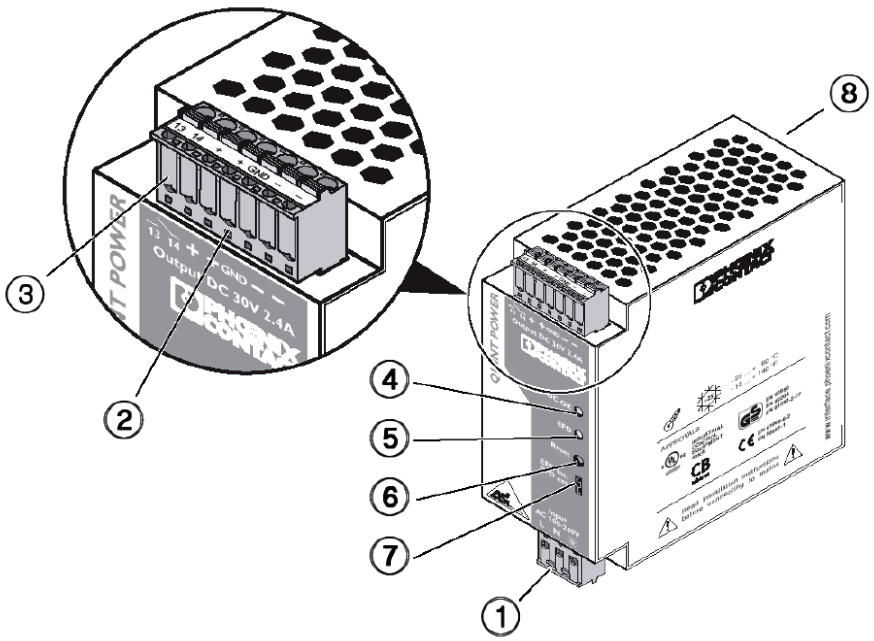


Figure 3-1 Device view, connections, and operating elements of the ASI QUINT 100-240/2.4 A EFD power supply unit

1 AC input: 85 - 264 V AC input voltage, 45 Hz - 65 Hz frequency
DC input: 90 - 250 V DC input voltage

2 DC output: 30 V DC output voltage

3 Floating EFD output

4 Green DC OK indicator

5 Red EFD indicator

6 Reset button

7 EFD internal/external switch

8 UTA 107 universal DIN rail adapter

3.2 Product Versions for the AS-Interface System

The following power supply units are available from Phoenix Contact for the AS-i system:

Description	Order Designation	Order No.
Primary-switched power supply unit	ASI QUINT 100-240/2.4 A EFD	2736686
Primary-switched power supply unit	ASI QUINT 100-240/4.8 A EFD	2736699

3.3 Function

One cable – two functions

Thanks to its simplified installation technology, AS-Interface offers further potential savings. In order to minimize the number of terminal points, a single two-wire cable is used to transmit information and supply power.

AS-i power supply units use an integrated filter to ensure that the modulated data flow is not affected. In addition, the short-circuit-proof and idling-proof voltage output provides a power reserve of around 60%. This means that even loads with high inrush currents can start safely.

Safety through automatic ground fault detection

If there are two ground faults in an AS-i system, this can result in undesired machine startup or it no longer being possible to stop the machine. In order to prevent this, the AS-i power supply units from Phoenix Contact indicate the first ground fault. The message is indicated on the device via LEDs and via an output. In the configuration set upon delivery, the alarm output signal can be used to selectively stop the system via the control program. As an alternative, it is possible to configure the AS-i power supply unit so that the AS-i voltage switches off automatically when a ground fault is detected. Dangerous states for operating personnel and for machines/systems are thus prevented in advance.

Universal use

The wide-range input, which can be used to operate the AS-i power supply units from Phoenix Contact on all popular single-phase AC and DC networks, supports universal use.

Integrated harmonic filter

EN 61000-3-2 came into force on January 1, 2001. As of this date, all primary-switched power supply units, which are connected directly to the public low-voltage network, must be fitted with a harmonic filter in order to suppress the supply of high-frequency reverse currents into the power supply company's network. All AS-i power supply units from Phoenix Contact are fitted with an active PFC filter (Power Factor Correction). In addition to the filter function, this circuit ensures mains buffering of more than 40 ms across the entire input voltage range.

Wide range of applications

The ASI QUINT 100-240/2.4 EFD and ASI QUINT 100-240/4.8 EFD power supply units meet the requirements of EN 55022 Class B with regard to noise immunity and noise emission. The devices are therefore suitable for universal use – both under extreme industrial conditions and in sensitive office and residential areas.

For additional information, please refer to the data sheets for the power supply units or the SYS POWER SUPPLY UM E user manual (Order No. 2745855).

3.4 Housing Dimensions of the Power Supply Units

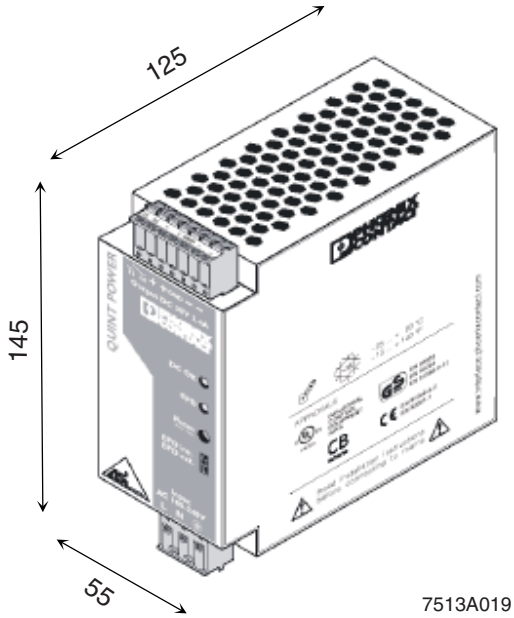


Figure 3-2 Housing dimensions of the ASI QUINT 100-240/2.4 A EFD power supply unit in mm

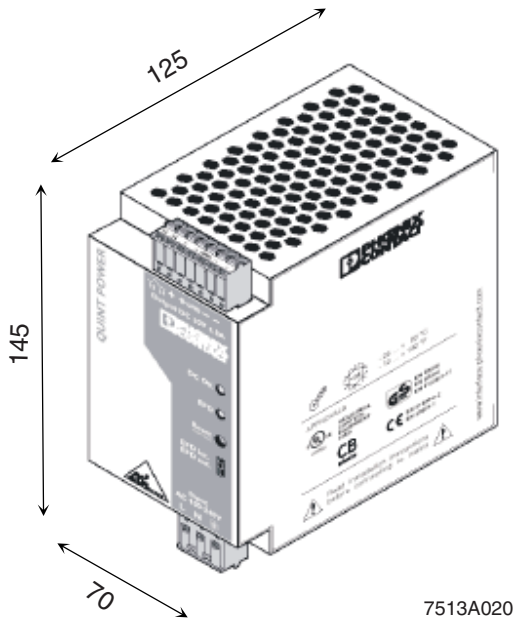


Figure 3-3 Housing dimensions of the ASI QUINT 100-240/4.8 A EFD power supply unit in mm

3.5 Mounting/Removing Power Supply Units

CAUTION:
Never carry out work when voltage is present.

CAUTION: Explosion hazard
Never carry out work when voltage is present.

CAUTION:
In order to ensure sufficient convection, a minimum spacing of 5 cm must be maintained between other modules above and below the device.

Side spacing between other modules is not required in order to ensure correct device function.

The housing temperature can reach high values depending on the ambient temperature and device load.

3.5.1 Mounting on the DIN Rail (Narrow Mounting Position)

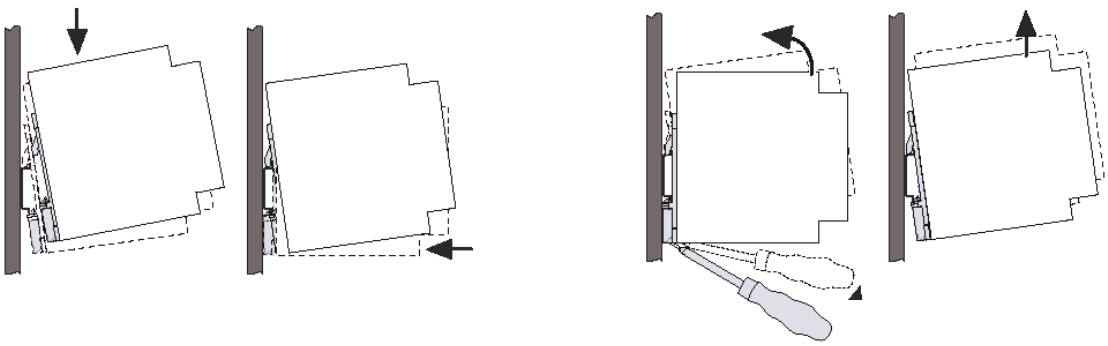


Figure 3-4 DIN rail mounting/removal

The power supply unit can be snapped onto all 35 mm DIN rails according to EN 60715. It should be mounted horizontally (with the input terminals facing downwards).

3.5.2 Mounting on the DIN Rail (Flat Mounting Position)

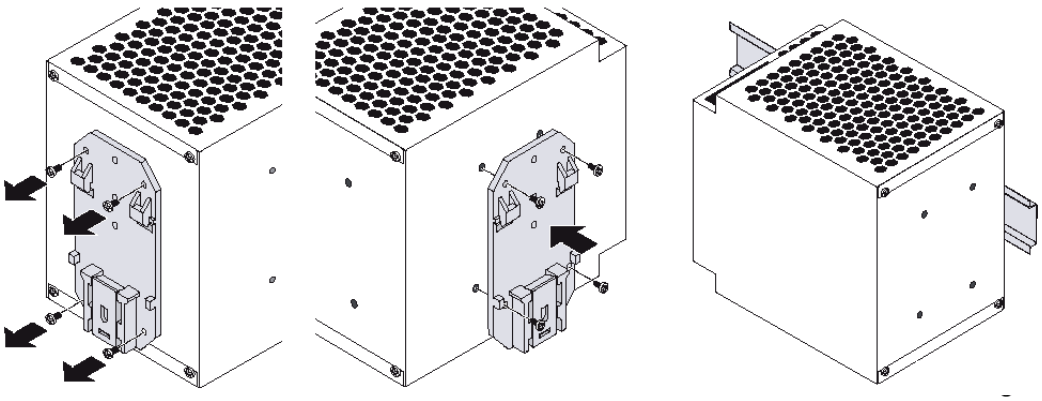


Figure 3-5 Flat mounting position with UTA 107 universal DIN rail adapter

The device is supplied as standard for a narrow mounting position. A flat mounting position is achieved by mounting the device at a 90° angle to the DIN rail.

To do this, mount the UTA 107 DIN rail adapter as shown in Figure 3-5 (Torx T10 mounting screws, tightening torque of 0.8 - 0.9 Nm (7 - 8 lb in)). No additional mounting material is required.

3.6 Connecting the Power Supply Units

The device is equipped with plug-in spring-cage terminals. This enables fast device connection and visible isolation of the electrical connection, if required.

CAUTION:
Connectors may only be operated when the power is switched off.

The following cable cross-sections can be connected:

Solid [mm^2]	Stranded [mm^2]	AWG	Stripping Length L [mm]
0.2 - 2.5	0.2 - 2.5	24 - 12	10

In order to comply with UL approval, use copper cables that are designed for operating temperatures > 75°C. For reliable and safe-to-touch connections, strip the cable ends according to Figure 3-6.

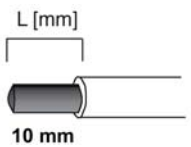


Figure 3-6 Stripping length

NOTE:
Each AS-Interface system may only be supplied by one AS-Interface power supply unit.

4 Slaves

Up to 62 slaves can be connected to the AS-Interface system (master/slave structure). Up to three actuators and/or four sensors can be connected to each slave. The master permanently monitors the slaves by scanning them cyclically. For maximum expansion, the cycle time is less than 10 ms; the maximum cycle time may increase when certain profiles are used. The cycle time adjusts automatically to the number of connected slaves (6 slaves around 1 ms, 31 slaves around 5 ms).

4.1 Description for Fieldline Extension AS-i M12 Devices

Versions

The Fieldline Extension AS-Interface product group includes digital slave devices with the following functions:

- DI

Digital input devices acquire digital control signals from the process level. These signals are transferred to the higher-level automation equipment via the bus. The signal status is indicated on the device using LEDs. Sensors are connected via M12 screw connectors. The sensors are supplied from the sensor voltage U_{LS} (26.5 V to 31.6 V from AS-Interface).

- DO

Digital output devices transfer the digital control signals from the automation equipment to the process level at the actuators. For the specified load currents for the outputs of the various devices, please refer to the data sheet. The signal status is indicated on the device using LEDs. Actuators are connected via M12 screw connectors. The outputs are short-circuit-proof. The actuators are supplied from the auxiliary voltage U_{AUX} (20 V DC PELV to 30 V DC PELV).

- DIO

Digital I/O devices have digital inputs and digital outputs with the same properties as the input and output devices.

Connections

The bus and supply are connected to the AS-i flat-ribbon cable using the penetration technique. The I/O devices are connected via M12 connectors using SPEEDCON fast connection technology.

Degree of protection

The devices have IP65/67 protection.

4.1.1 Housing Versions for Fieldline Extension AS-i M12 Devices

Two housing versions are available for Fieldline Extension AS-i M12 devices.

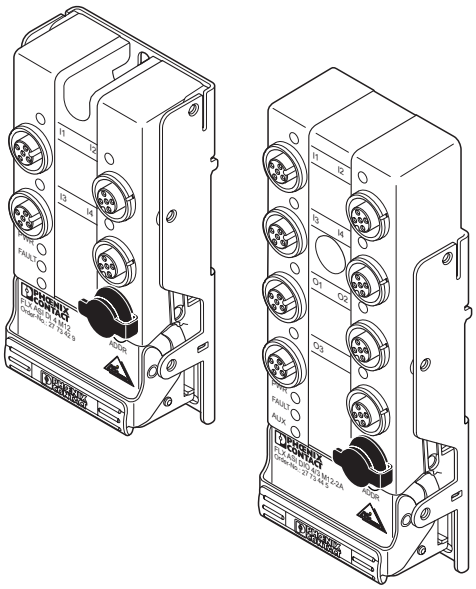


Figure 4-1 Housing versions for Fieldline Extension AS-i M12 devices

A Digital devices (DI/DO/DIO)

B Digital devices (DIO)

4.1.2 Housing Dimensions of Fieldline Extension AS-i M12 Devices

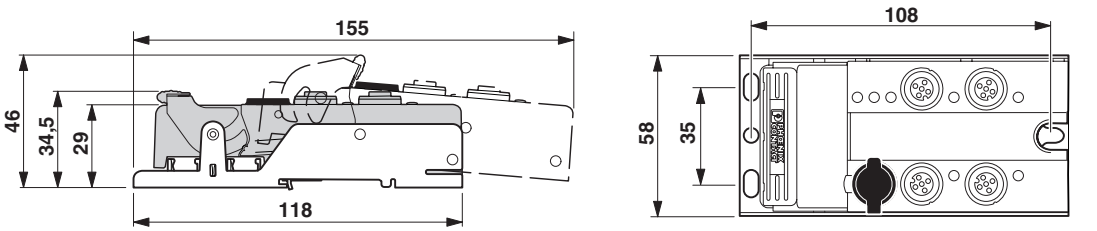


Figure 4-2 Housing dimensions of Fieldline Extension AS-i M12 devices (DI/DO/DIO) in mm

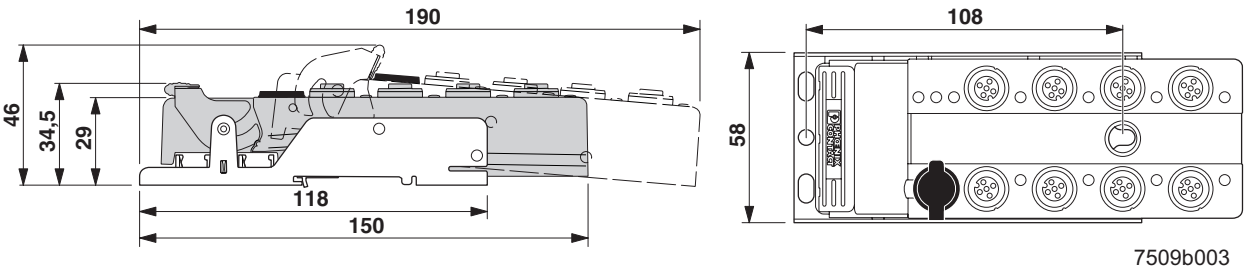


Figure 4-3 Housing dimensions of Fieldline Extension AS-i M12 devices (DIO) in mm

4.1.3 Basic Structure of Fieldline Extension AS-i M12 Devices

Figure 4-4 shows the basic structure of the devices. Depending on the device function, the device may **not** have all of the elements shown. These elements are marked with an asterisk.

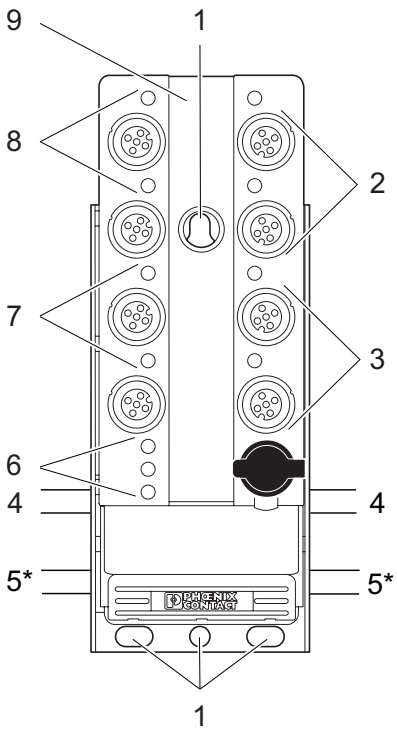


Figure 4-4 Basic structure of Fieldline Extension AS-i M12 devices

1 Top and bottom mounting holes
2 Connections for inputs
3 Connections for outputs
4 Connection to AS-i (bus and power supply)
5 Connection to auxiliary voltage AUX*
6 Status indicators for AS-i power supply
7 Status indicators for the outputs
8 Status indicators for the inputs
9 Slot for self-adhesive labeling field

4.1.4 Mounting Fieldline Extension AS-i M12 Devices

Fieldline Extension AS-i devices can be mounted directly on the machine. They can be screwed onto flat surfaces or snapped onto a DIN rail.

The mounting surface must be flat to avoid strain in the housing when tightening the screws.

Mounting with screws

The devices can be mounted directly on the mounting surface using two or more mounting holes (1) in Figure 4-5. The diameter of the mounting holes is 4 mm, the cylindrical sinking is 8 mm. For the drill hole spacing, please refer to the dimensional drawings on page 4-3.

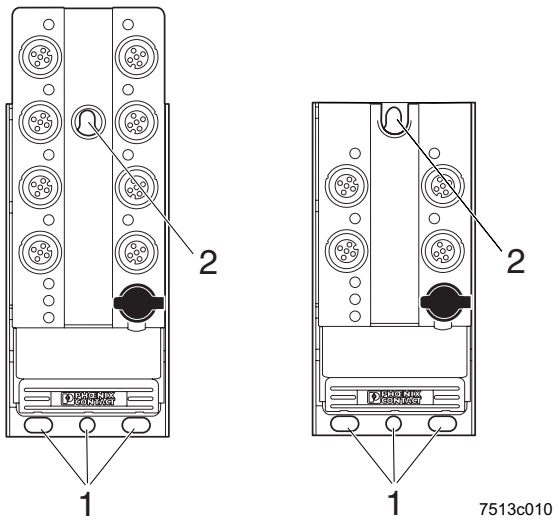


Figure 4-5 Front mounting of Fieldline Extension AS-i M12 device

Tighten the mounting screws on the support plate with a maximum of 0.8 Nm.

Use the protection against unlocking (FLX ASI M12 FS, Order No. 2773539) to prevent the device from getting unlocked unintentionally. Screw the protection against unlocking to one of the mounting holes (1) in Figure 4-5.

DIN rail mounting

Mounting

- Place the device with the bottom metal edge (1) on the DIN rail.
- Push the device forwards (A) until it snaps onto the DIN rail.

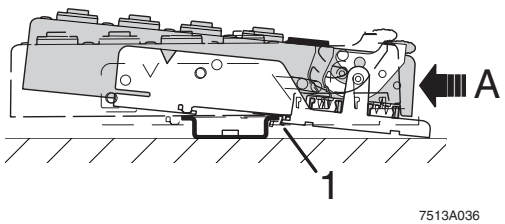


Figure 4-6 Snapping the device onto the DIN rail

Removing

- Push the device forwards (B).
- At the same time, push the device down (C), until it detaches from the DIN rail.

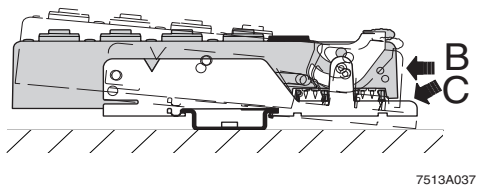


Figure 4-7 Removing the device from the DIN rail

4.1.5 Flat-Ribbon Cable

A key electromechanical feature of AS-Interface is the flat-ribbon cable. This cable design is used because the AS-i cable should be contacted where possible without cutting off or stripping the sheath. In order to avoid the risk of polarity reversal of the wires, the flat-ribbon cable has a keyway at one end. Unless forced mechanically, the cable cannot be inserted incorrectly in the cable routing aids, which prevents unintentional polarity reversal. The trapezoidal cross-section of the cable makes it easier to seal the cable in the devices, thus providing IP67 protection.

In addition to the mechanical keying, both wires in the flat-ribbon cable are color-coded: the positive cable has brown sheathing and the negative cable has light blue sheathing. The external sheath is usually yellow, and when the same cable type is used for the external auxiliary voltage of output devices with 24 V DC a black sheath is used.

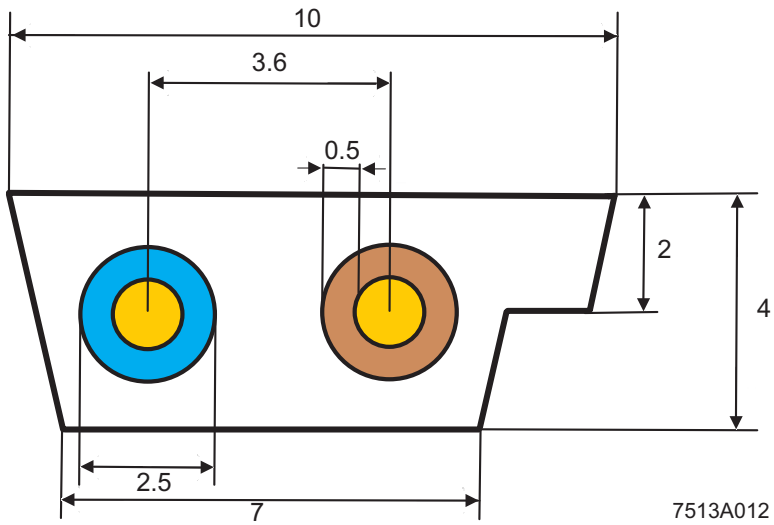


Figure 4-8 AS-i flat-ribbon cable

The cable sheath can consist of various different types of insulation material. For normal rubber cable, the sheath ensures that it automatically closes any contact points that have opened again. This effect is known as self-healing. This means that multiple contact and release is possible at the same point without adversely affecting the seal and the cable insulation.

Other cable materials are also available, which have a high level of resistance to chemicals and can permanently withstand UV light. However, the selected material does affect the mechanical properties of the outer cable sheath.

4.1.6 Penetration Technique

For the AS-i flat-ribbon cable, the penetration technique is used as the connection method.

The penetration technique enables contact to be established quickly, easily, and reliably between the cable and the device without having to strip or cut the cable in any way. No special tools are required.

The electrical connection of cables in the flat-ribbon cable to the device is established via contact pins, which penetrate through the cable sheath to the copper conductors. This method is therefore only suitable because the position of the conductors in the cable is fixed and there is no braided shield to prevent penetration.

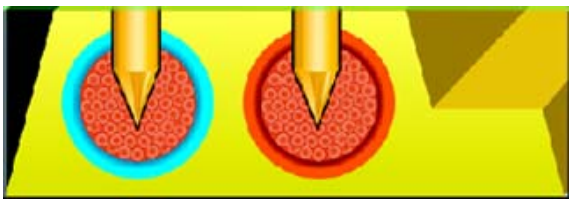


Figure 4-9 Cable connection using the penetration technique

The cable support has negative contouring, which prevents incorrect insertion of the cable resulting in polarity reversal. When the device locking latch is closed, the contact pins automatically penetrate through the cable sheath and the conductor insulation into the litz wire structure. Following assembly, additional pressure is not required in order to ensure permanent contacting.

The penetration technique used with AS-i means that the system can be installed extremely easily and quickly.

4.1.7 Connecting AS-Interface and the Auxiliary Voltage AUX to M12 Devices

The connection to AS-Interface and the auxiliary voltage AUX is established by inserting the AS-i flat-ribbon cables in the corresponding cable routing aids in the mounting base of the device and then contacting the electronics module. Contact is established as soon as the locking latch snaps in.

Proceed as follows:

- Open the device by releasing the locking latch (A) and then pushing the electronics module until it engages with a click (B).
- Insert the yellow flat-ribbon cable for the bus in the cable routing aid (AS-i) (C1).
- If necessary, insert the black flat-ribbon cable for the auxiliary voltage AUX in the cable routing aid (C2).
- Close the device by pushing the electronics module back to its original position until it engages with a click (D). Then close the locking latch (E). The device is connected to the AS-i cable(s) using the penetration technique by snapping in the locking latch.

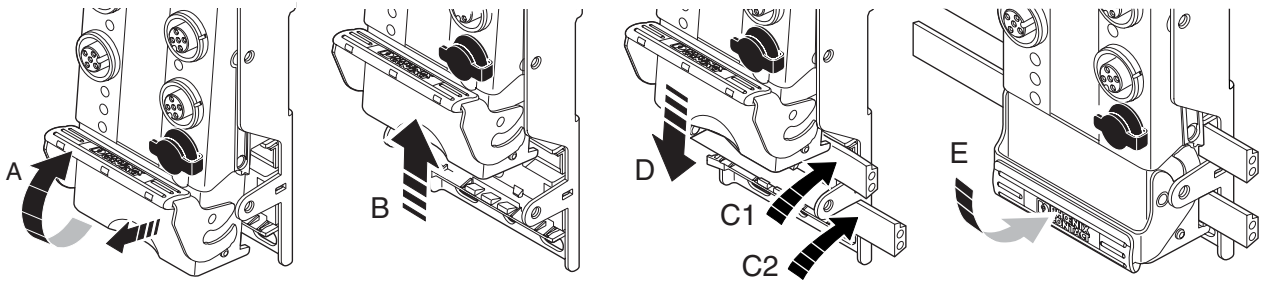


Figure 4-10 Inserting the AS-i flat-ribbon cable

To reverse the orientation of the cables, proceed as follows:

- Remove the cable routing aid from the device using a screwdriver (A) and turn it over (B).
- Insert the cabling routing aid in the device again (C). Insert the corresponding flat-ribbon cable in the cable routing aid (D).
- Close the device by pushing the electronics module back to its original position until it engages with a click (E). Then close the locking latch.

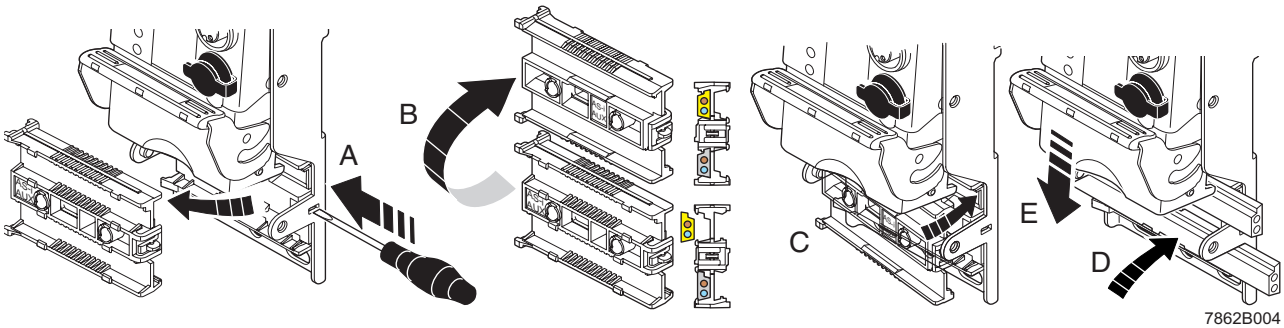


Figure 4-11 Reversing the cable orientation

4.1.8 Pin Assignment of the Inputs and Outputs

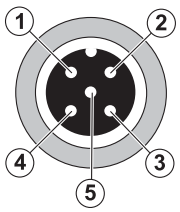


Figure 4-12 Pin assignment of the inputs and outputs

Pin	Female Input Connectors			
	IN1	IN2	IN3	IN4
1	IN+1	IN+2	IN+3	IN+4
2	IN2	Not used	IN4	Not used
3	IN-1	IN-2	IN-3	IN-4
4	IN1	IN2	IN3	IN4
5	Not used			

Pin	Female Output Connectors			
	OUT1	OUT2	OUT3	OUT4
1	Not used	Not used	Not used	Not used
2	OUT2	Not used	OUT4	Not used
3	OUT-1	OUT-2	OUT-3	OUT-4
4	OUT1	OUT2	OUT3	OUT4
5	Not used			

The M12 connectors are designed for a tightening torque of 0.4 Nm.

4.1.9 Labeling Fieldline Extension AS-i M12 Devices

All Fieldline Extension AS-i M12 devices can be labeled individually.

The following options are available:

– Labeling each row of slots
– Using a continuous labeling strip for all slots

Description	Designation	Order No.
Material for labeling individual slots (1 in Figure 4-13)	BMKL 15 x 9 WH	803663
Material for continuous labeling of all slots for devices with four slots (2 in Figure 4-13)	BMKL 64 x 16 WH	8021807
Material for continuous labeling of all slots for devices with eight slots (3 in Figure 4-13)	BMKL 11,5 (108X16) WH	821797

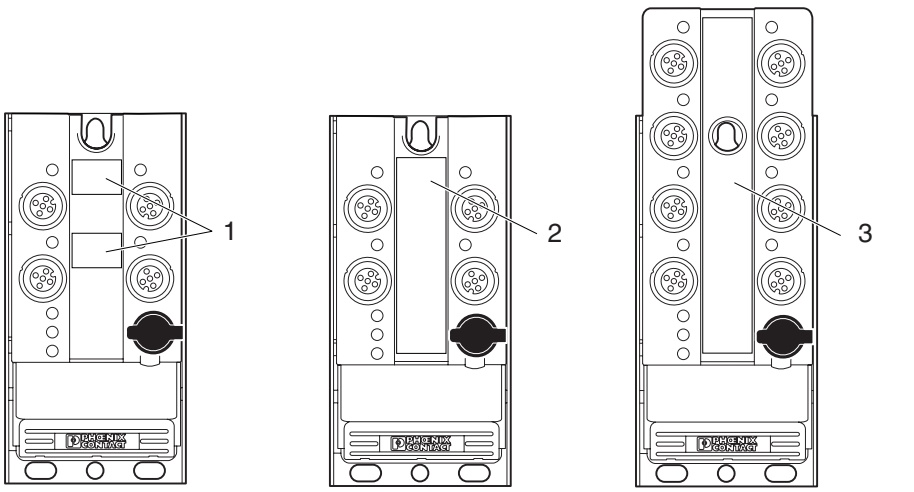


Figure 4-13 Labeling options

All of the above labeling options are self-adhesive and supplied on DIN A4 sheets.

For professional labeling, Phoenix Contact offers the CMS-MARK-WIN software (see Phoenix Contact CLIPLINE catalog).

4.1.10 Diagnostic and Status Indicators of Fieldline Extension AS-i M12 Devices

Diagnostic indicators

Diagnostic indicators (green/yellow/red) indicate whether an error is present. In the event of an error, they indicate the error type and location. A Fieldline Extension AS-i M12 device is operating correctly if all of the green diagnostic indicators are on.

Status indicators

Status indicators (yellow) indicate the signal status of the corresponding input/output. If the yellow status indicators are on, this indicates the signal status "1" of the I/O signal.

Fieldline Extension AS-i M12 devices have two areas for diagnostic and status indicators. These areas are illustrated in Figure 4-14.

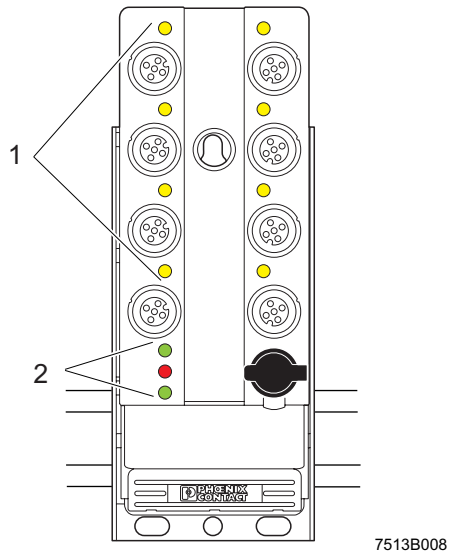


Figure 4-14 Main diagnostic and status indicators

1 Inputs and outputs (device-specific)

2 AS-i bus-specific indicators

For additional information about the diagnostic and status indicators, please refer to the data sheet for the relevant device.

4.1.11 Setting the Address for Fieldline Extension AS-i M12 Devices

Before starting up a system with an AS-Interface system for the first time, all connected devices must be assigned an operating address. By default upon delivery, all devices have the address "zero". During address assignment, only one device may be addressed with "zero".

Address programming via the master

Addressing can be performed by the master via the AS-Interface cable. All devices must be connected individually and addressed directly.

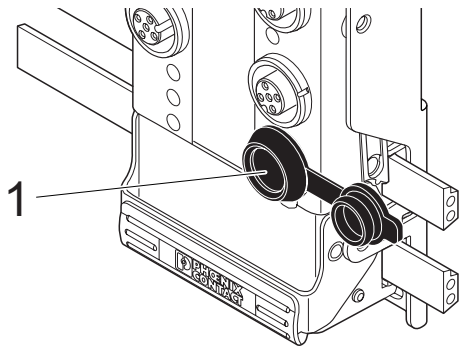
For additional information about address programming, please refer to "Address Assignment" on page 7-1.

Address programming using an addressing device

There is also the option of using an addressing device for manual addressing.

To manually set the address of the device, proceed as follows:

- Remove the protective cap (1) from the female addressing connector.
- Connect the addressing device (Order No. 2741338) to the female addressing connector using the addressing cable (Order No. 2741341).
- At the touch of a button, the address of the connected slave can be read and displayed on the LCD.
- The address that is returned can be modified using the two arrow buttons in order to enter the new desired address.
- Press the programming button to save the device address.
- Disconnect the addressing device from the device.
- Push the protective cap back onto the female addressing connector.



7472B006

Figure 4-15 Female addressing connector

For additional information about addressing, please refer to the user manual:
AS-Interface Addressing Device, ASI CC ADR UM E, Order No. 9013727

4.1.12 Replacing the Electronics Module

If in the event of servicing it is necessary to replace the electronics module, proceed as follows:

- Release the locking latch (A).
- Remove the electronics module from the mounting base (B).
- Make sure the arrows on the side of the electronics module and mounting base line up when snapping the electronics module onto the mounting base with the locking latch open (C).

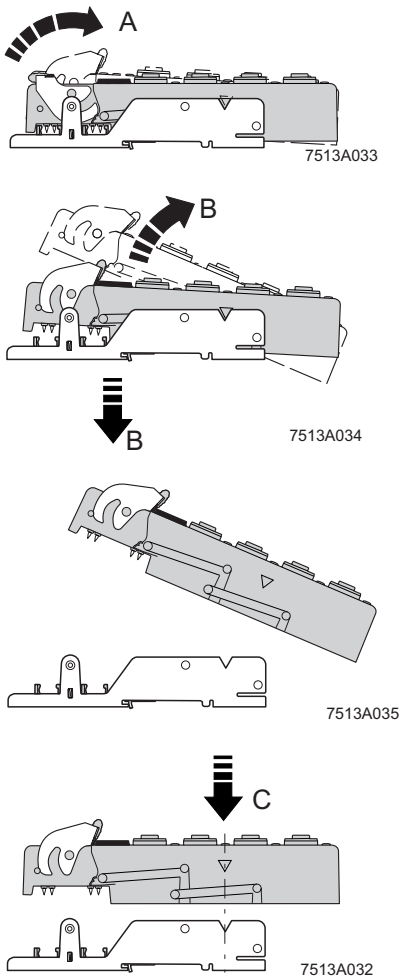


Figure 4-16 Replacing the electronics module

4.2 Description for Fieldline Extension AS-i M8 Devices

Versions

The Fieldline Extension AS-Interface product group includes digital slave devices with the following functions:

- DI

Digital input devices acquire digital control signals from the process level. These signals are transferred to the higher-level automation equipment via the bus. The signal status is indicated on the device using LEDs. Sensors are connected via M8 screw connectors. The sensors are supplied from the sensor voltage U_{LS} (26.5 V to 31.6 V from AS-Interface).

- DIO

Digital I/O devices have digital inputs and digital outputs. They acquire digital control signals from the process level. These signals are transferred to the higher-level automation equipment via the bus. Sensors are connected via M8 screw connectors. The sensors are supplied from the sensor voltage U_{LS} (26.5 V to 31.6 V from AS-Interface).

Digital I/O devices transfer the digital control signals from the automation equipment to the process level at the actuators. For the specified load currents for the outputs of the various devices, please refer to the data sheet. Actuators are connected via M8 screw connectors. The outputs are short-circuit-proof. The actuators are supplied from the auxiliary voltage U_{AUX}. The signal status is indicated on the device using LEDs.

Connection

The bus and supply (20 V DC PELV to 30 V DC PELV) are connected via an M12 screw connector using SPEEDCON fast connection technology. The I/O devices are connected via M8 connectors.

Degree of protection

The devices have IP65/67 protection.

4.2.1 Housing Versions for Fieldline Extension AS-i M8 Devices

Independent of the bus system, two housing versions are available for Fieldline Extension AS-i M8 devices.

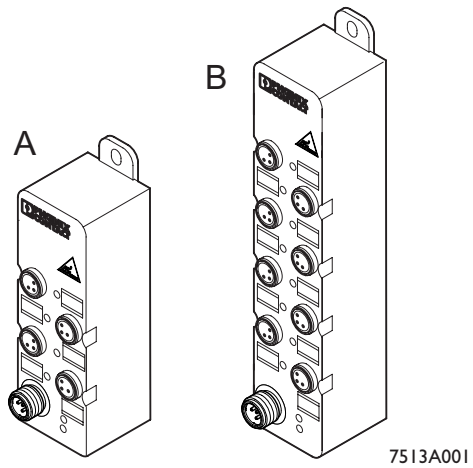


Figure 4-17 Housing versions for Fieldline Extension AS-i M8 devices

A Digital input device,
connection to AS-i (bus and power supply via M12 connectors)

B Digital I/O device,
connection to AS-i (bus and power supply via M12 connectors)

4.2.2 Housing Dimensions of Fieldline Extension AS-i M8 Devices

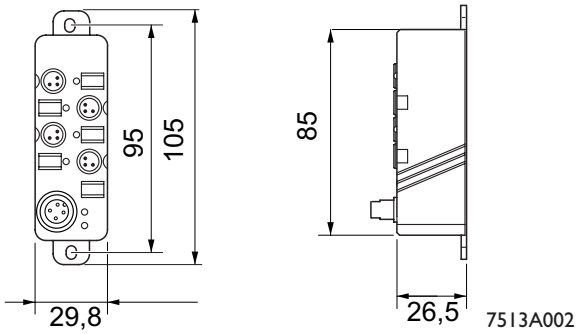


Figure 4-18 Housing dimensions of Fieldline Extension AS-i M8 devices in mm (digital input devices)

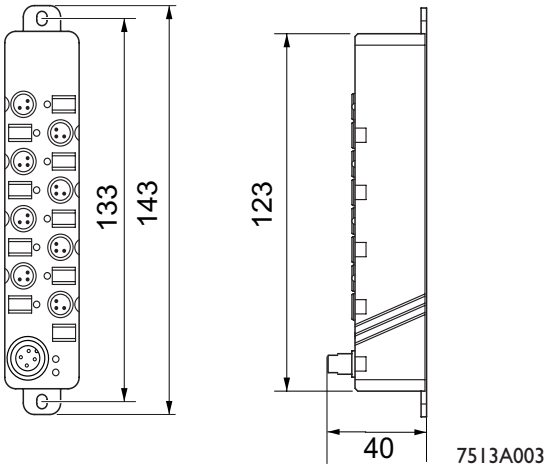


Figure 4-19 Housing dimensions of Fieldline Extension AS-i M8 devices in mm (digital I/O devices)

4.2.3 Basic Structure of Fieldline Extension AS-i M8 Devices

Figure 4-20 shows the basic structure of Fieldline Extension AS-i M8 devices.

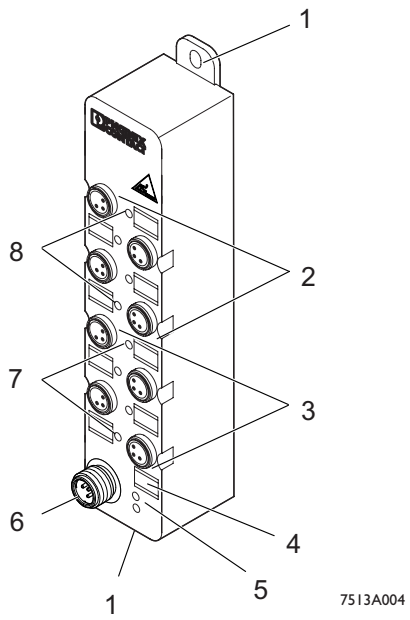


Figure 4-20 Basic structure of Fieldline Extension AS-i M8 devices

1 Top and bottom fixing clip
2 Connections for inputs
3 Connections for outputs
4 Slot for labeling field
5 Status indicators for AS-i power supply
6 Connection for AS-i (bus and power supply)
7 Status indicators for the outputs
8 Status indicators for the inputs

4.2.4 Mounting Fieldline Extension AS-i M8 Devices

Fieldline Extension AS-i devices can be mounted directly on the machine. They can be screwed onto flat surfaces.

The mounting surface must be flat to avoid strain in the housing when tightening the screws.

Direct mounting

The devices can be mounted directly on the mounting surface using two mounting holes (1) in Figure 4-21. The diameter of the mounting holes is 4 mm, the cylindrical sinking is 8 mm. For the drill hole spacing, please refer to the dimensional drawings in Figure 4-19 on page 4-17.

Mounting on a mounting profile

When mounting on a mounting profile, the mounting materials required are two screws with a diameter of 4 mm (M4) and a maximum head diameter of 7 mm and two retaining washers. The screws should have a minimum length of 30 mm.

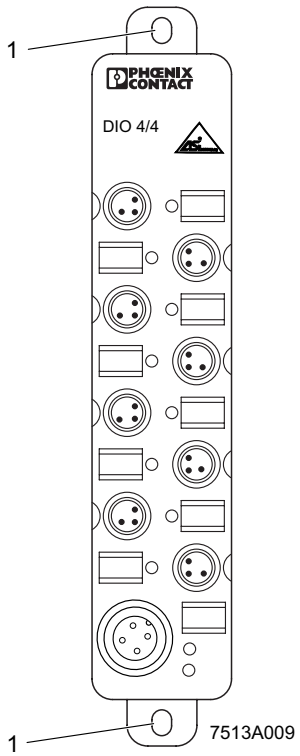


Figure 4-21 Front mounting of a Fieldline Extension AS-i M8 device

Tighten the mounting screws with a maximum of 0.8 Nm.

4.2.5 Connecting AS-Interface and the Auxiliary Voltage AUX to M8 Devices

For Fieldline Extension AS-i M8 devices, the AS-i bus and the power supply are connected via an M12 female connector. Fieldline Extension AS-i output devices also require the auxiliary voltage AUX, which is likewise connected via this M12 female connector.

Connection

All supply voltages are connected via an M12 connector.

4.2.6 Pin Assignment of the AS-i Connection

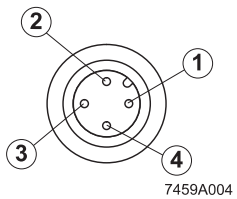
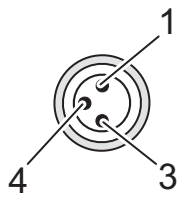


Figure 4-22 Pin assignment of the AS-i connection

Pin	AS-i and AUX
1	AS-i +
2	AUX-
3	AS-i -
4	AUX+

4.2.7 Pin Assignment of the Inputs and Outputs



6375A004

Figure 4-23 Pin assignment of the inputs and outputs

Pin	Female Input Connector	Female Output Connector
1	30 V U_S supply voltage for sensors	Not used
3	0 V	0 V
4	Input	Output

4.2.8 Labeling Fieldline Extension AS-i M8 Devices

The devices can be labeled next to the bus connection (4 in Figure 4-20) and at every I/O connection.

Depending on the device type, five or ten blank marking labels are supplied as standard with the devices.

When labeling, proceed as follows:

- Complete a labeling field and snap it into the relevant slot.
- If you want to replace a labeling field, it can be removed using a small screwdriver.

For professional labeling, Phoenix Contact offers the CMS-MARK-WIN software (see Phoenix Contact CLIPLINE catalog).

4.2.9 Diagnostic and Status Indicators of Fieldline Extension AS-i M8 Devices

Diagnostic indicators

Diagnostic indicators (green/red) indicate whether or not an error is present. In the event of an error, they indicate the error type and location. A Fieldline Extension AS-i M8 device is operating correctly if all of the green indicators are on.

Status indicators

Status indicators (yellow) indicate the signal status of the corresponding input/output. If the yellow status indicators are on, this indicates the signal status "1" of the I/O signal.

Fieldline Extension AS-i M8 devices have two areas for diagnostic and status indicators. These areas are illustrated in Figure 4-24.

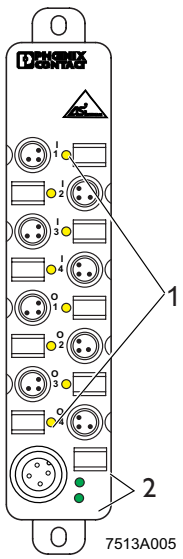


Figure 4-24 Diagnostic and status indicators of Fieldline Extension AS-i M8 devices

1 Inputs and outputs (device-specific)

2 AS-i bus-specific indicators (not for DI)

For additional information about the diagnostic and status indicators, please refer to the data sheet for the relevant device.

4.2.10 Setting the Address for Fieldline Extension AS-i M8 Devices

Before starting up a system with an AS-Interface system for the first time, all connected devices must be assigned an operating address. By default upon delivery, all devices have the address "zero". During address assignment, only one device may be addressed with "zero".

Address programming via the master

Addressing can be performed by the master via the AS-Interface cable. All devices must be connected individually and addressed directly.

For additional information about address programming, please refer to "Address Assignment" on page 7-1.

Address programming using an addressing device

There is also the option of using an addressing device for manual addressing.

To manually set the address of the device, proceed as follows:

- Remove the AS-i round cable from the AS-i connection (1) on the device.
- Connect the addressing device (Order No. 2741338) to the AS-i connection (1) using a 4-pos. unshielded cable with M12 connector.
- At the touch of a button, the address of the connected slave can be read and displayed on the LCD.
- The address that is returned can be modified using the two arrow buttons in order to enter the new desired address.
- Press the programming button to save the device address.
- Disconnect the addressing device from the device.
- Connect the AS-i round cable to the AS-i connection on the device.

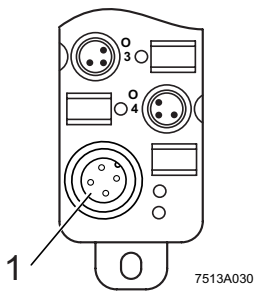


Figure 4-25 Addressing and AS-i connection

For additional information about addressing, please refer to the user manual:
AS-Interface Addressing Device, ASI CC ADR UM E, Order No. 9013727

4.3 Description for AS-i Control Cabinet Modules

Versions

An AS-Interface system contains digital AS-i control cabinet modules with the following functions:

- DI

Digital input modules acquire digital control signals from the process level. These signals are transferred to the higher-level automation equipment via the bus. The signal status is indicated on the module using LEDs. The sensors are connected via plug-in COMBICON connections. The sensors are either supplied from the sensor voltage U_{LS} (26.5 V to 31.6 V from AS-Interface) or from an external power supply unit.

- DIO

Digital I/O modules have digital inputs and digital outputs. They acquire digital control signals from the process level. These signals are transferred to the higher-level automation equipment via the bus. The sensors are connected via plug-in COMBICON connections. The sensors are supplied from the sensor voltage U_S.

Digital I/O modules transfer the digital control signals from the automation equipment to the process level at the actuators. For the specified load currents for the outputs of the various modules, please refer to the data sheet. The actuators are connected via plug-in COMBICON connections. The outputs are protected against short circuits and overloads. The actuators are supplied from the auxiliary voltage AUX. The signal status is indicated on the device using LEDs.

Connection

The bus, I/O devices, and supply are connected via plug-in COMBICON connections.

Degree of protection

The modules have IP20 protection.

4.3.1 Product Versions for AS-i Control Cabinet Modules

The following control cabinet modules are available from Phoenix Contact for the AS-i system:

Description	Order Designation	Order No.
AS-Interface input module with four digital inputs (AB slave)	ASI IO ME DI 4 AB	2741671
AS-Interface I/O module with four digital inputs and three digital outputs (AB slave)	ASI IO ME DIO 4/3 AB	2741668
AS-Interface I/O module with four digital inputs and four digital outputs (AB slave)	ASI IO ME DIO 4/4 AB	2773542

4.3.2 Description for ASI IO ME DI 4 AB

The ASI IO ME DI 4 AB is an AS-Interface input module with four digital inputs (AB slave). It is used to input digital signals in the control cabinet.

Components

The module consists of the following components:

1 Plug-in COMBICON connections
2 Diagnostic and status indicators
3 Female addressing connector

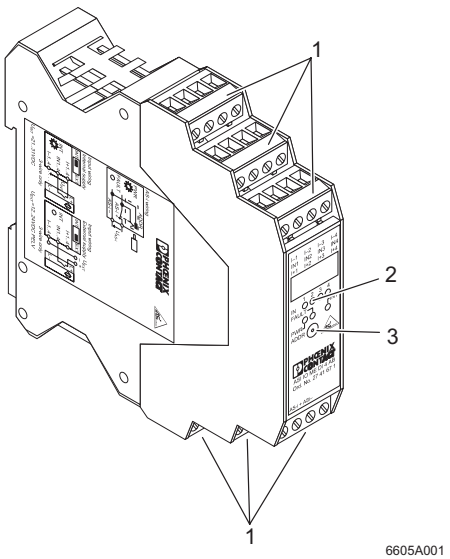


Figure 4-26 Module view

Features

– Four digital signal inputs
– Diagnostic and status indicators
– Female addressing connector
– AB slave with extended addressing options for up to 62 AS-i slaves
– Plug-in COMBICON connections
– Communication monitoring
– Inputs for 2 and 3-wire sensors
– Inputs supplied from either the AS-i supply or the external auxiliary voltage
– IP20 protection

4.3.3 Description for ASI IO ME DIO 4/3 AB

The ASI IO ME DIO 4/3 AB is an AS-Interface I/O module with four digital inputs and three digital outputs (AB slave). It is used to input and output digital signals in the control cabinet.

Components

The module consists of the following components:

1 Plug-in COMBICON connections
2 Diagnostic and status indicators
3 Female addressing connector

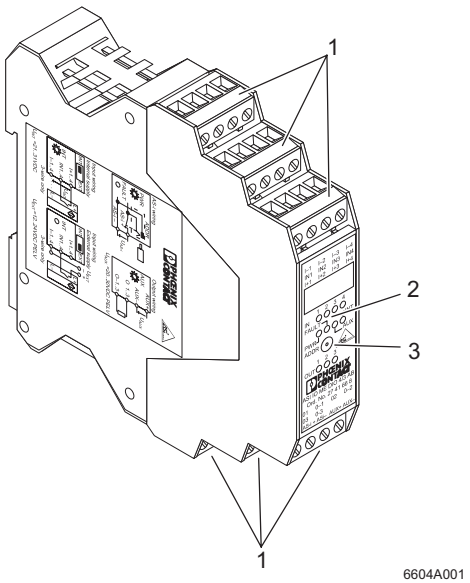


Figure 4-27 Module view

Features

- Four digital signal inputs
- Three digital signal outputs
- Diagnostic and status indicators
- Indicator for the external auxiliary voltage
- Female addressing connector
- AB slave with extended addressing options for up to 62 AS-i slaves
- Plug-in COMBICON connections
- Communication monitoring
- Inputs for 2 and 3-wire sensors
- Inputs supplied from either the AS-i supply or the external auxiliary voltage
- Outputs supplied from the external auxiliary voltage
- IP20 protection

4.3.4 Description for ASI IO ME DIO 4/4 AB

The ASI IO ME DIO 4/4 AB is an AS-Interface I/O module with four digital inputs and four digital outputs (AB slave). It is used to input and output digital signals in the control cabinet.

Components

The module consists of the following components:

1 Plug-in COMBICON connections
2 Diagnostic and status indicators
3 Female addressing connector

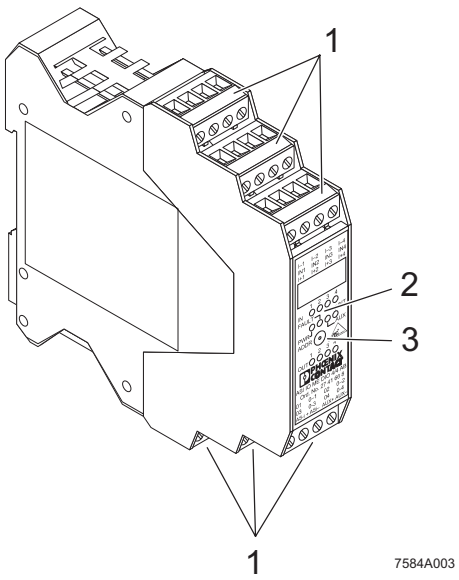


Figure 4-28 Module view

Features

– Four digital signal inputs
– Four digital signal outputs
– Diagnostic and status indicators
– Indicator for the external auxiliary voltage
– Female addressing connector
– AB slave (specification 3.0)
with extended addressing options for up to 62 AS-i slaves
– Plug-in COMBICON connections
– Communication monitoring
– Inputs for 2 and 3-wire sensors
– Inputs supplied from either the AS-i supply or the external auxiliary voltage
– Outputs supplied from the external auxiliary voltage
– IP20 protection

4.3.5 Housing Dimensions of Control Cabinet Modules

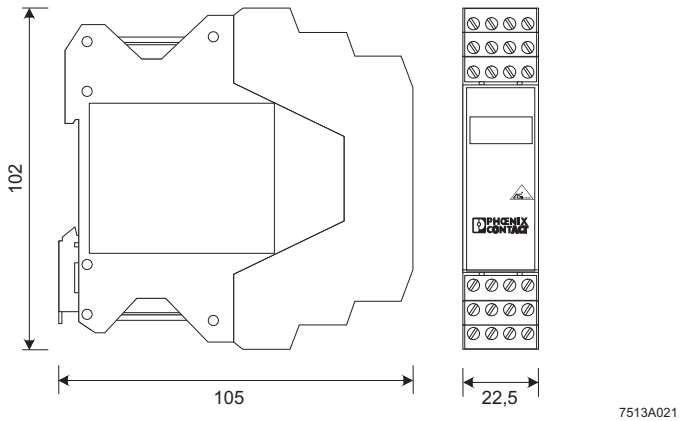


Figure 4-29 Housing dimensions of modules in mm

4.3.6 Mounting Control Cabinet Modules

Snap the module directly onto a DIN rail (1).

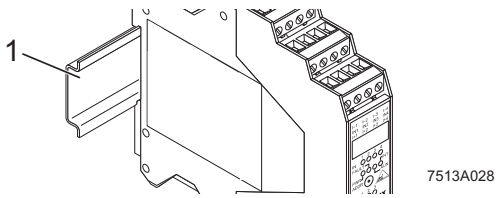


Figure 4-30 Snapping on modules

4.3.7 Connecting Cables

If required, loosen the mounting screws. Insert the cables in the corresponding connections (1 to 4) and tighten the mounting screws.

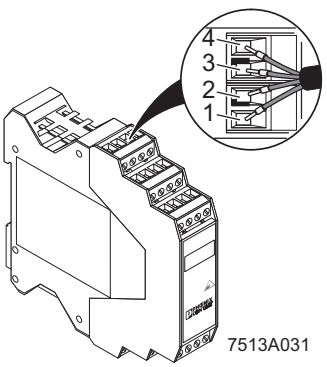


Figure 4-31 Connecting cables

4.3.8 Terminal Assignment of Control Cabinet Modules

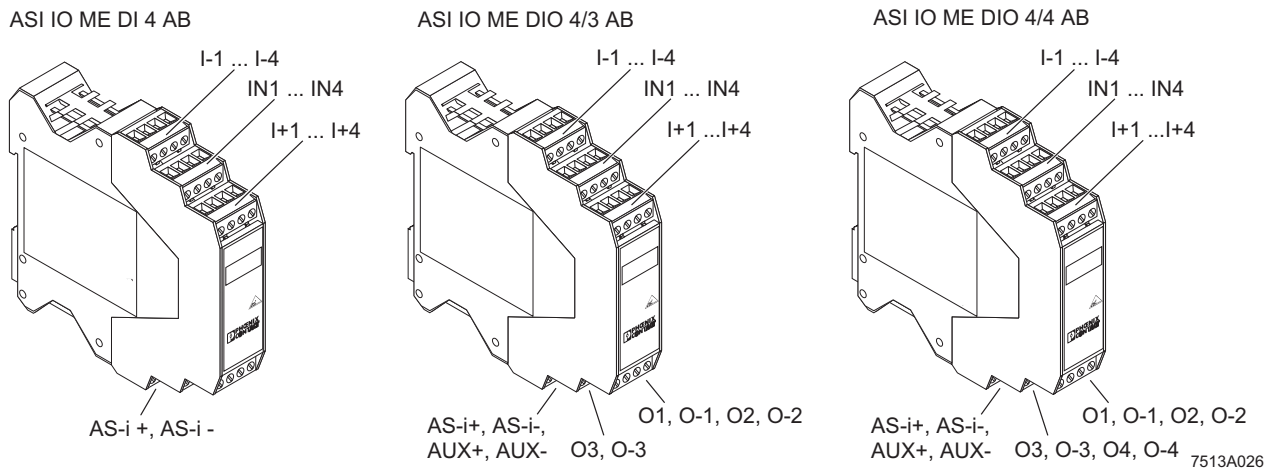


Figure 4-32 Terminal assignment of the modules

ASI IO ME DI 4 AB		ASI IO ME DIO 4/3 AB		ASI IO ME DIO 4/4 AB	
Terminal Point	**Assignment**	**Terminal Point**	**Assignment**	**Terminal Point**	**Assignment**
1.1, 1.2, 1.3, 1.4	I–1 ... I–4	I–1 ... I–4	L–1 ... I–4	I–1 ... I–4	L–1 ... L–4
2.1, 2.2, 2.3, 2.4	IN1 ... IN4	IN1 ... IN4	IN1 ... IN4	IN1 ... IN4	IN1 ... IN4
3.1, 3.2, 3.3, 3.4	I+1 ... I+4	I+1 ... I+4	L+1 ... L+4	I+1 ... I+4	L+1 ... L+4
AS-i +, AS-i –	AS-i +, AS-i –	O1, O–1, O2, O–2	O1, O–1, O2, O–2	O1, O–1, O2, O–2	O1, O–1, O2, O–2
		O3, O–3	O3, O–3	O3, O–3, O4, O–4	O3, O–3, O4, O–4
		AS-i+, AS-i–	AS-i+, AS-i–	AS-i+, AS-i–	AS-i+, AS-i–
		AUX+, AUX–	AUX+, AUX–	AUX+, AUX–	AUX+, AUX–

4.3.9 Diagnostic and Status Indicators of Control Cabinet Modules

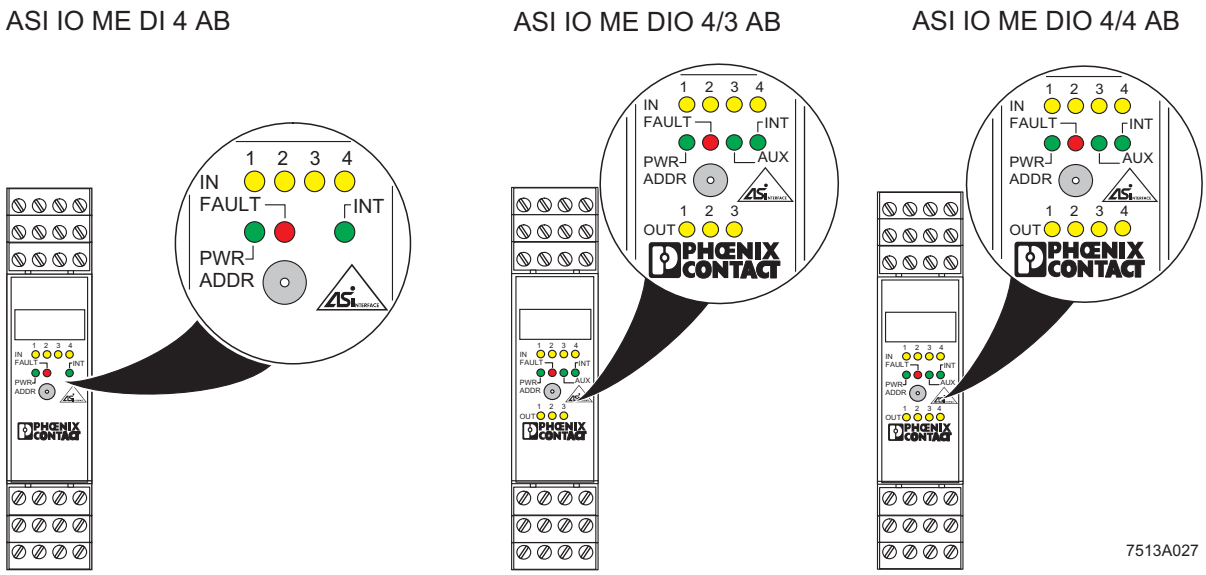


Figure 4-33 Diagnostic and status indicators

ASI IO ME DI 4 AB		
Designation	**Color**	**Meaning**
IN	Yellow LED	Status of the inputs
PWR	Green LED	AS-i operating voltage
FAULT	Red LED	Error display
	ON	Communication error or address is 0
	Flashing	Overload of sensor power supply and/or outputs
	OFF	No error
INT	Green LED	Internal input supply

ASI IO ME DIO 4/3 AB and ASI IO ME DIO 4/4		
Designation	**Color**	**Meaning**
IN	Yellow LED	Status of the inputs
PWR	Green LED	AS-i operating voltage
FAULT	Red LED	Error display
	ON	Communication error or address is 0
	Flashing	Overload of sensor power supply and/or outputs
	OFF	No error
AUX	Green LED	External auxiliary voltage
INT	Green LED	Internal input supply
OUT	Yellow LED	Status of the outputs

4.3.10 Setting the Address for Control Cabinet Modules

To set the module address manually instead of via the master, proceed as follows:

- Connect the addressing device (Order No. 2741338) to the female addressing connector (1) using the addressing cable (Order No. 2741341).
- Set the module address.
- Disconnect the addressing device from the module.

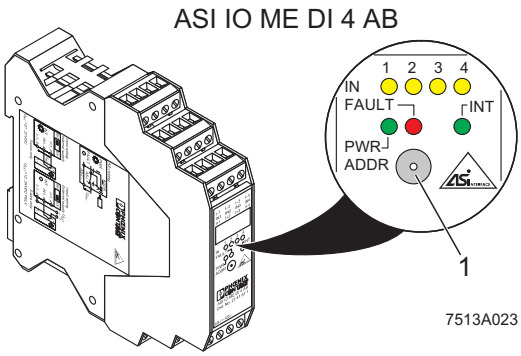


Figure 4-34 Connecting the addressing device using the example of an ASI IO ME DI 4 AB

4.3.11 Setting the Sensor Power Supply

You can specify whether the sensor is to be supplied from the AS-i circuit or from an external power supply.

For the ASI IO ME DI 4 AB and ASI IO ME DIO 4/3 modules, proceed as follows:

- To release the upper part, press on both tabs (1) one after the other using a screwdriver.
- Pull the upper part towards you until you can feel some resistance.

Opening the module
ASI IO ME DI 4 AB
ASI IO ME DIO 4/3 AB

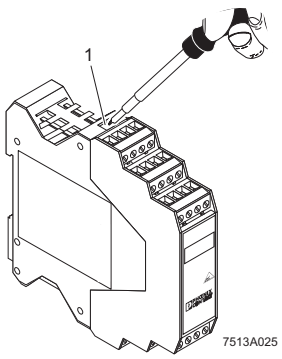


Figure 4-35 Opening the module

- If you are using an external sensor power supply (U_{EXT} = 12 V DC to 30 V DC) set the switch to the "EXT" position.
- If you want to supply the sensor from the **AS-i circuit** set the switch to the "INT" position. The green "INT" LED lights up.

CAUTION: Use a PELV power supply
The auxiliary voltage for the output supply must be taken from an isolated power supply (PELV according to IEC 60364-4-41).

Setting the switch
ASI IO ME DI 4 AB
ASI IO ME DIO 4/3 AB

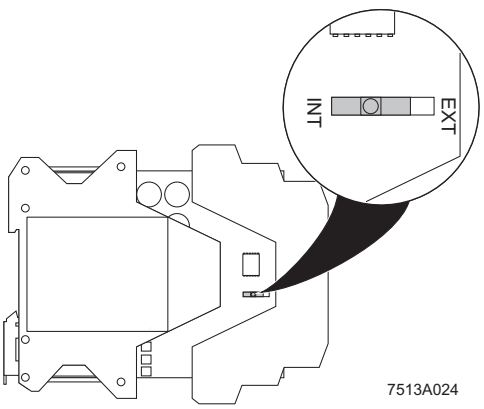


Figure 4-36 Setting the switch

Setting the switch
ASI IO ME DIO 4/4 AB

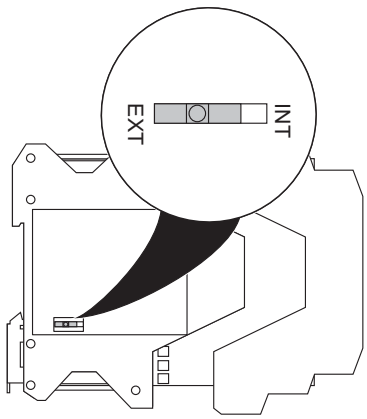


Figure 4-37 Setting the switch

- If you are using an **external** sensor power supply (U_{EXT} = 12 V DC to 30 V DC) set the switch to the "EXT" position.
  The green "INT" LED does not light up.
- If you want to supply the sensor from the **AS-i circuit** set the switch to the "INT" position. The green "INT" LED lights up.

CAUTION: Use a PELV power supply
The auxiliary voltages for the input/output supply must be taken from an isolated power supply (PELV according to IEC 60364-4-41).

For additional information about the control cabinet modules, please refer to the corresponding data sheets.

5 Configuration

Before selecting the devices of an AS-i system it is useful to clarify the requirements of your application with the aid of a checklist. This enables quick and optimum planning of your own system.

5.1 Number of Inputs and Outputs

The number of inputs and outputs required determines whether the application can be covered with a single AS-i system. An AS-i system can operate a maximum of 62 slaves with 4 digital inputs and 4 digital outputs each (specification 3.0). This equals a maximum of 248 inputs and 248 outputs per system.

Considerably fewer inputs and outputs are often required in an AS-i system. In this case, masters and slaves can be used according to AS-i specification 2.0 (e.g., FLX ASI DO 4 M12). These single slaves do not support the extended addressing options according to AS-i specification 2.1. Single slaves can also be used in mixed operation with specification 2.1 slaves (e.g., FLX ASI DI 4 M12).

5.2 Position of Inputs and Outputs in the Application

The advantage of an AS-i system is that the termination devices can be connected directly at the installation location. When using devices, small groups of terminal points are created, e.g., 4 digital inputs. Check how the termination devices to be connected can be assigned to specific AS-i devices. The most cost-effective solution is to use devices with 4 digital inputs and 4 digital outputs. This configuration can be implemented, e.g., with the FLX ASI DIO 4/4 M8-1A according to specification 2.0. or even with the FLX ASI 3.0 DIO 4/4 M12-2A according to specification 3.0. This means that the same number of inputs and outputs are required and that they are located at the same points in the application. Otherwise use devices with different I/O combinations. Please note the limit is 62 slaves (specification 2.1/3.0).

5.3 Required Current in an AS-i System

Each AS-i system is supplied by a power supply unit. Therefore correct sizing is crucial from as early as the system planning phase. To do this, all current loads in the AS-i system must be identified and their current requirement quantified.

Each AS-i master and AS-i slave obtains a specific amount of current from AS-i. These values are listed in the relevant data sheet, typically a master requires, e.g., 100 mA to 200 mA and a slave requires 30 mA to 60 mA. In addition, the sensors and actuators that are supplied directly via AS-i must be taken into consideration.

Please note that the sensors connected to the AS-i devices are supplied via the power supply unit. The connected actuators are operated separately via the black AS-i cable.

Example Calculation:		
AS-i system with 25 slaves and 100 sensors. The actuators are supplied via a 24 V auxiliary voltage.		
AS-i master	200 mA	200 mA
AS-i slaves	25 x 40 mA	1000 mA
Sensors	100 x 10 mA	1000 mA
Total		**2200 mA**

In this example, a total of 2.1 A is required in the AS-i system. Here it is sufficient to use an AS-i power supply unit with a maximum output current of 2.4 A,
e.g., ASI QUINT 100-240/2.4 A EFD.

5.4 Selecting the Cable

A typical, profiled flat-ribbon cable made from rubber is used consistently throughout the AS-i system. This offers the advantage of a quick and easy connection method. In the event that the cable must meet special requirements in terms of resistance to oil or
UV light, versions are also available that are made from resistant materials such as PUR.
For additional information, please refer to "Flat-Ribbon Cable" on page 4-7.

5.5 Speed of Data Exchange

At maximum configuration, the AS-i system has a very fast cycle time of 10 ms. If even faster response times are required, reducing the number of slaves results in a proportional decrease in the cycle time. A system with just six slaves can thus be updated in 1 ms.

If only part of the data needs to be updated faster, there is the option of configuring some of the slaves without extended addressing. This reduces the number of possible slaves in the AS-i system. The devices operated as single slaves are updated twice as fast,
i.e., in a maximum of 5 ms. Both methods can also be combined.

When using AS Interface slaves according to specification 3.0 (e.g, Profile 7.A.7), please note that the cycle time is above the previously mentioned 10 ms for these "combined transactions". The exact cycle time depends on the selected slave type/profile.

5.6 Integrating the AS-i System in the Control System

The type of control system used determines which AS-i master is selected. A fieldbus system is often already available for the same system. The corresponding gateways can then be used as AS-i masters.

Integration in a PROFIBUS DP network

For integration in a PROFIBUS DP network, use the AS-i masters FLX ASI MA PB SF or FLX ASI MA 2 PB EF.

Integration in another network

To connect AS-Interface to virtually all other networks, the ASI MA IL UNI AS-i gateway for Inline can be used in combination with a corresponding Inline bus coupler.

Together with a modular ILC1xx or ILC3xx compact controller from Phoenix Contact, the ASI MA IL UNI AS-i gateway for Inline. becomes a compact control unit including master with Ethernet interface. A station combined this way is parameterized and programmed with the PC WORX software.

5.7 AS-Interface in the Control Cabinet

One of the key advantages of the AS-i system is that termination devices are connected directly to the machine. Ultimately the system is designed with a very high level of protection in the form of IP67. This saves a lot of space in the control cabinet, which usually contains just the AS-i master and the AS-i power supply unit. If, however, I/O functions are required directly via AS-Interface in the control cabinet, AS-i ME Line devices, e.g., ASI IO ME DIO 4/3 AB, can be used.

6 General Information About Installation

When preparing for cable installation, the local conditions and the corresponding mounting regulations are of major importance. Cables can be installed, for example, in cable ducts or on cable jumpers.

A minimum distance between the cabling and possible sources of interference (e.g., machines, welding equipment, power cables) is defined in the relevant regulations and standards. During system planning and installation, these regulations and standards must be taken into account and observed.

Protect the cables from sources of electrical/magnetic interference and mechanical strain.

Observe the following guidelines to keep mechanical danger and interference as low as possible:

Mechanical strain

- Select the correct cable type for each application (e.g., indoor or outdoor installation, drag chains).
- Observe the minimum bending radius.
- Cables must not enter the shear area of moving machine parts.
- Do not install bus cables at right angles to driving paths and machine movements.
- Use cable ducts or cable jumpers.

Observe the specifications for the cable used.

Interference

- Signal and power supply cables should not be installed in parallel. If necessary, metal isolating segments should be placed between the power supply and signal cables.
- During installation, all connector interlocks must be firmly tightened to ensure the best possible contact.

Cable routing in control cabinets

- Install AS-i cables in separate cable ducts.
- Install AS-i cables with a minimum distance of 10 cm to power cables.

Cable routing in buildings

- Where possible, use metal cable hangers.
- Install AS-i cables as far away as possible from sources of interference, for example, motors and welding equipment.

6.1 Interference Suppression Measures

Phoenix Contact recommends connecting relay coils or motor coils with an RC element to protect the devices against interference. Depending on the application, the delay time of the relay can be increased by approximately 1 ms.

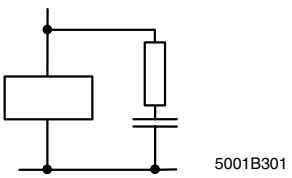


Figure 6-1 Relay coil with RC element

For the sizing of the RC element the following values are recommended:
R = 100 Ω to 200 Ω; C = 220 nF to 470 nF.

6.2 Installation Instructions

Electrostatic discharge

The device contains components that can be damaged or destroyed by electrostatic discharge. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) according to EN 61340-5-1 and EN 61340-5-2.

NOTE:

The device may only be installed and removed by qualified personnel while observing the ESD regulations.

NOTE: Ensure IP65/67 protection

To ensure IP65/67 protection, cover unused connections with protective caps.

NOTE: Avoid damage to the electronics

Only supply the sensors of FLX ASI M8 and FLX ASI M12 devices with the voltage U_{LS} provided at the terminal points.

NOTE: Avoid polarity reversal

Avoid polarity reversal of the supply voltages U_{LS} and U_{AUX}.

6.3 Mounting Distances

No specific distances must be observed between devices or between a device and a cabinet door or cover. Mounting distances are determined solely by the connectors used and the bending radii of the cables.

7 Startup

7.1 Mounting and Installation

Fieldline Extension AS-i devices can be mounted directly on the machine. They can be screwed onto a flat surface, see page 4-5. Fieldline Extension AS-i M12 devices can also be snapped onto a DIN rail, see page 4-6.

When using Fieldline Extension AS-i M12 devices with separate mounting bases the devices do not all have to be installed in the same area or at the same time. The first step is to mount the mounting bases on the machine. The AS-i flat-ribbon cable can then be installed. In a separate step, the electronics module is snapped on shortly before or during initial startup of the AS-i system, see also page 4-14.

7.2 Address Assignment

Before starting up a system with the AS-Interface system for the first time, all connected slaves must be assigned an operating address. By default upon delivery, the address for all slaves is set to zero.

Address assignment via the AS-Interface master

Address programming can be carried out directly via an AS-Interface master during device startup. AS-Interface masters offer the option of carrying out address assignment for connected AS-i slaves directly on the device using indicators and operating buttons. As only one slave can be addressed with the address "zero", only one slave may be active with this address in the system.

For additional information, please refer to the user manuals:

Configuring and Installing the AS-Interface Gateway for Inline, UM EN ASI MA IL UNI, Order No. 2699671

AS-i Gateways for PROFIBUS, UM EN FLX ASI MA PB SF/EF

Address assignment via a manual addressing device

Another option is to use a special addressing device that has been specified for AS-Interface, which enables manual address assignment.

At the touch of a button, the address of the connected slave can be read and displayed on the LCD. The address that is returned can be modified using the two arrow buttons in order to enter the new desired slave address. The address is saved on the slave via the programming button. Slaves with different connection methods can be connected directly to this simple manual programming device via a universal connection head without the need for adapters.

For additional information about addressing, please refer to the user manual:
AS-Interface Addressing Device, ASI CC ADR UM E, Order No. 9013727

7.3 Configuring the Master

To operate and monitor the AS-i system, the AS-i master constantly compares the actual status of all slaves with the desired status. Therefore the AS-i master must be informed once of the desired status of the system during AS-i system startup; this is referred to as the master configuration process.

In the simplest case, the network at the time of startup can be configured as the desired configuration.

For additional information, please refer to the user manuals:

Configuring and Installing the AS-Interface Gateway for Inline, UM EN ASI MA IL UNI, Order No. 2699668

AS-i Gateways for PROFIBUS, UM EN FLX ASI MA PB SF/EF

7.4 Operation

The AS-i master carries out system diagnostics continuously during operation. Errors in the system configuration are displayed immediately together with the corresponding slave address.

To this end, AS-i masters have LED indicators and displays. This means that it is immediately clear whether an error has occurred and where the error is located in the system.

In the event that a slave device fails, only the affected device has to be replaced. This means that the system can continue operating. The replacement device is automatically started up using the correct communication address, without having to restart the system.

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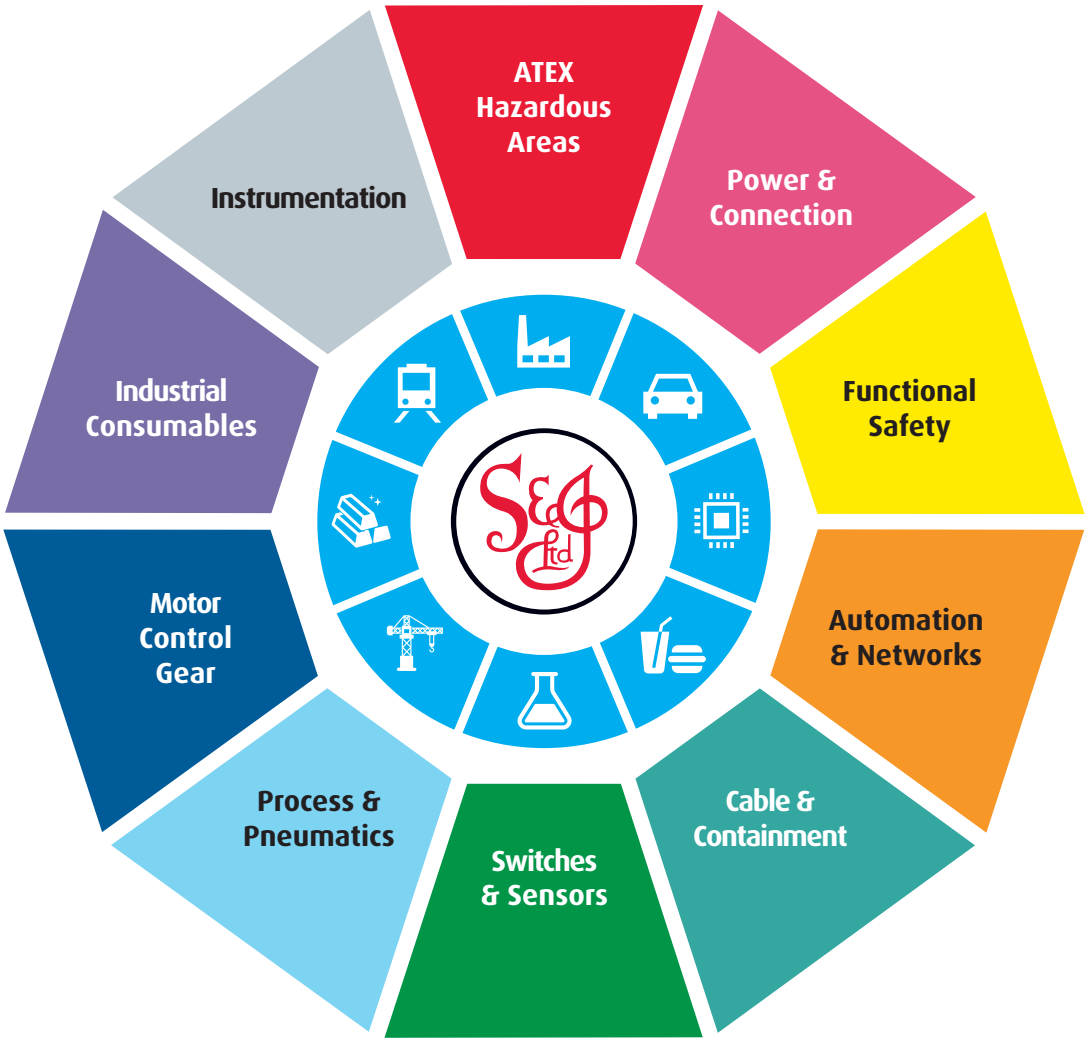
Backing up this technical ability is a range of 50,000+ products available from stock for nationwide next day delivery (same day if required!), or you can collect what you need from any of our trade counters around the UK.

Select your specialist interest below to learn more about how we can help.



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