Fieldbus Interfaces

AS-Interface

General Information on AS-Interface

The AS-Interface System

The AS-Interface is an integral part of the modern industrial landscape. It was developed in order to network binary sensors and actuators to the higher control level. The data log was optimised for the transmission of small data volumes.

Many sensors and actuators as well as control and signalling units can be networked through the 2-conductor cable which also supplies the voltage. Thus, the traditional looms of cables are eliminated and replaced by the yellow AS-Interface cable.

This also applies to the production of individually designed switchboards and operator control panels or to the installation of decentralised control and signalling units.

The freely selectable network topology and ease of configuration make installation that much easier.

Ease of assembly, requiring little prior knowledge, reduces downtime when faults occur. The fault liability of other systems often results in assembly delays, therefore, the AS-Interface system was consciously designed to reduce error sources.

Installation - a large cost factor - is drastically reduced by using this system.

There are gateways on the market for all prevailing fieldbus systems, such as e.g. CAN, DeviceNet, Ethernet, Interbus, Profibus and others.

The AS-Interface Fieldbus Hierarchy

The position of AS-Interface in the fieldbus pyramid depicts its optimised application for simple digital and and analogue sensors and actuators.
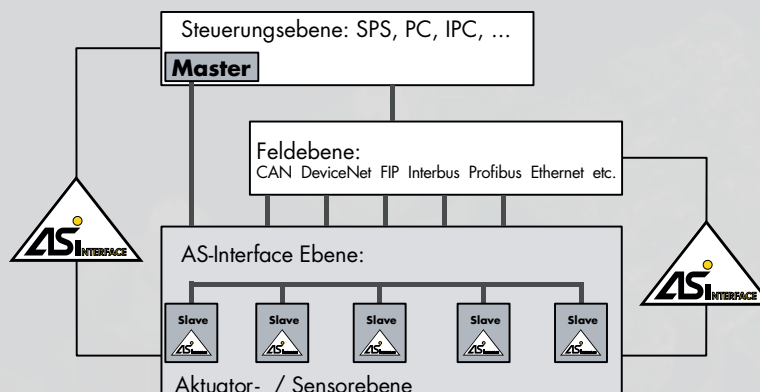
Function Principle of A/B Slaves
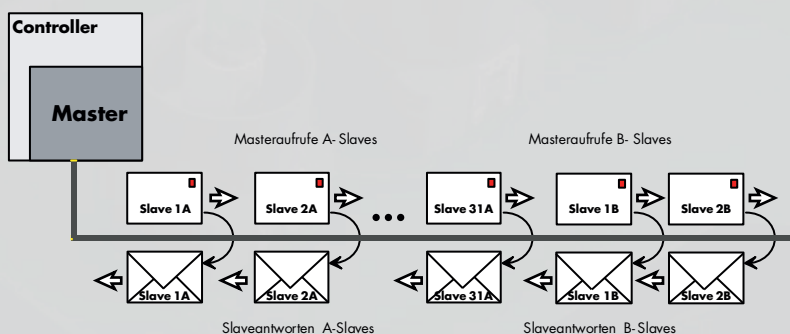
AS-Interface Standard

On slaves according to standard 2.1 one bit of the output data can be used for distinguishing so-called A slaves and B slaves (max. 2 x 31= 62 slaves). Therefore, a slave of the version 2.1 supports 4 bit input and 3 bit output data.

Now one address can be assigned twice, e.g. address 15A and 15B.

In practice, this means that in the first cycle the data of slave 15A are written and read, in the following cycle those of slave 15B. Thus, the cycle time of the slaves A and B increases to max. 10 ms. The cycle time of conventional slaves remains unaffected, since they are retrieved in each cycle.

The standard 2.1 offers to the user double the number of slaves at one cable line while ensuring full downward comptability of the system.

Essential differences between version 2.1 and 2.0

	Version 2.0	Version 2.1 (new)
Number of slaves	31	62
Nbr.. of digital I/O	124 I + 124 O	248 I + 186 O
Max. cycle time	5 ms	10 ms

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Characteristics of AS-Interface
- Master/slave principle
- Optional network topology (tree, star or linear structure)
- Optimised for easy connection of sensors and actuators
- Operation even under must difficult environmental conditions
- Reliable and failure-safe
- Cable length: 100 m, extension e.g. by repeater
- Real-time capable

- Open and manufacturer-independent bus system for the lowest field level of the automation technology
- Standardised acc. to EN 50295, IEC62026
- Addressing: Firm and clear address in the slave (EEPROM)

Advantages of AS-Interface
- One 2-conductor line (data and power) instead of a loom of cables
- Cost-saving installation
- Short start-up times
- Connection of intelligent sensors, actuators, control and signalling units

- Diagnostic of all AS-Interface slaves
- Simple addressing
- Easy to install, easy to expand
- Quick and flexible projection
- Low documentation effort

AS-Interface Compatible Schlegel Products
The assortment includes various products for AS-Interface connection.
The Schlegel slaves can be combined with the actuators of the Oktron, Oktron-R and Oktron-Juwel series as well as with the Rontron-R- and Rontron-Q-Juwel series. Their big advantage over conventional contact blocks lies in the reduced cabling and easy handling. Up to 62 slaves can be connected to one ASI cable. The safe slaves „**Safety at Work**" allow the transmission of safety-related data in combination with an ASI Safety Monitor, thus, enabling emergency-stop buttons to be connected to the ASI system.

Even DUX **Limit Switches** can be combined with ASI slaves and connected to an ASI system. A wide range of actuators is also available for this application field.
The product spectrum also comprises a **Fieldbus module**, allowing the assembly of larger ASI compatible operating panels or enclosures. The modular construction and customer-specific PC board provide high flexibility in design.

Bus Technology

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Modular Operating Device for AS-Interface (8I/8O module)

The modular Schlegel ASI operational concept acc. to specification 3.0 enables the connection of diverse combinations of Schlegel control and signalling units to an AS-Interface system.
The integrated Schlegel ASI I/O module has been designed for the modular configuration of customised operating devices or for front-panel mounting along with Schlegel control units. According to customer's requirements, the operating units can be equipped with illuminated pushbuttons, 2 and 3 position selector switches or key switches. The ASI I/O module has 8 digital inputs and 8 "dimmable" digital outputs with **only one A/B address**.

Special Features
- Only half an address (A/B) acc. to specification V3.0 for 8 inputs and 8 outputs
- Integrated test mode to self-test the command and signalling units
- External diagnostic display possible via signalling unit
- Brightness control/dimming by a parameter request
- Power supply directly through the ASI line
- Customer-specific carrier board

Technical Data

General
- Voltage supply   26,5...31,6 V, through the AS-Interface line
- Total power consumption   ≤ 220 mA
- Operating temperature   -25°C ... +70°C
- Norms and standards   IEC 62026-2, CE

Communication
- AS-Interface specification   V3.0
- AS-Interface profile   S-7.A.7.A
- Communication protocol   CTT3 for Master M4
- Max. cycle time   ≤ 40ms
- Inputs   8, digital, 19 ... 26V DC
- Outputs   8, for signalling units, 24V, max. 50mA
                                               dimmable in 4 steps
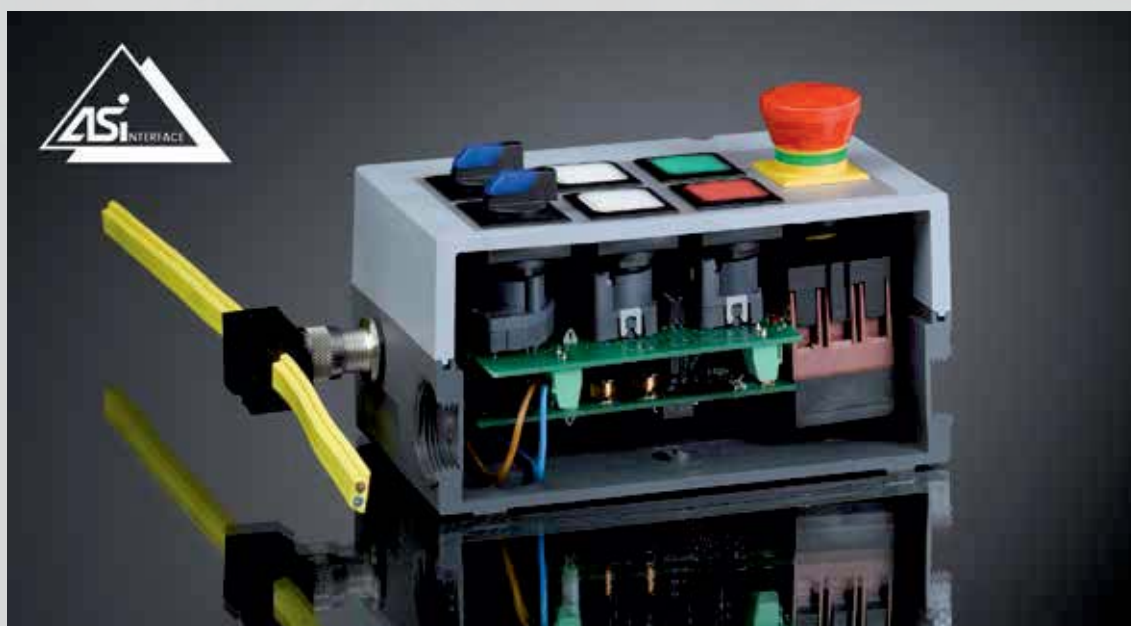
Modular Control Panel for EtherCAT

The EtherCAT module complements the modular fieldbus concept of Georg Schlegel for linking customer-specific control units to various bus systems.
16, optionally up to 64 illuminated contact blocks can be addressed via the bus module. For this purpose, the contact blocks are arranged according to customers' requirments on a carrier board, which is then plugged from behind on the actuators that are mounted in a control panel. The bus module is attached on the rear of the carrier board and serves for the connection of the EherCAT. A XML file is provided for system configuration.

Special Features:
- Various independent 7-segment displays with up to 8 digits can be controlled via the EtherCAT.
  Such customer-specific diplays can be offered on request.
- The modular grid of the carrier board can be customised.
- The control panel can also be used for other bus systems by replacing the bus module.

Technical Data

General:
- Power supply: 24 V external supply
- Operating temperature: -20°C...+50°C
- Degree of protection: IP00
- Power consumption - bus module: max. 200mA
- Inputs: 16, optionally 64
- Outputs: 16, optionally 64, can be illuminated
- Conformity: CE

Communication:
- EtherCAT specification: 100 MBit/s, full-duplex
- EtherCAT controller: ET1100
- supported protocols: CANopen over EtherCAT (CoE)
- bus connection: electrically isolated
- XML file: UG-IC EC V1-3.xml
- bus connection: IN/OUT via 2 RJ45 8/8
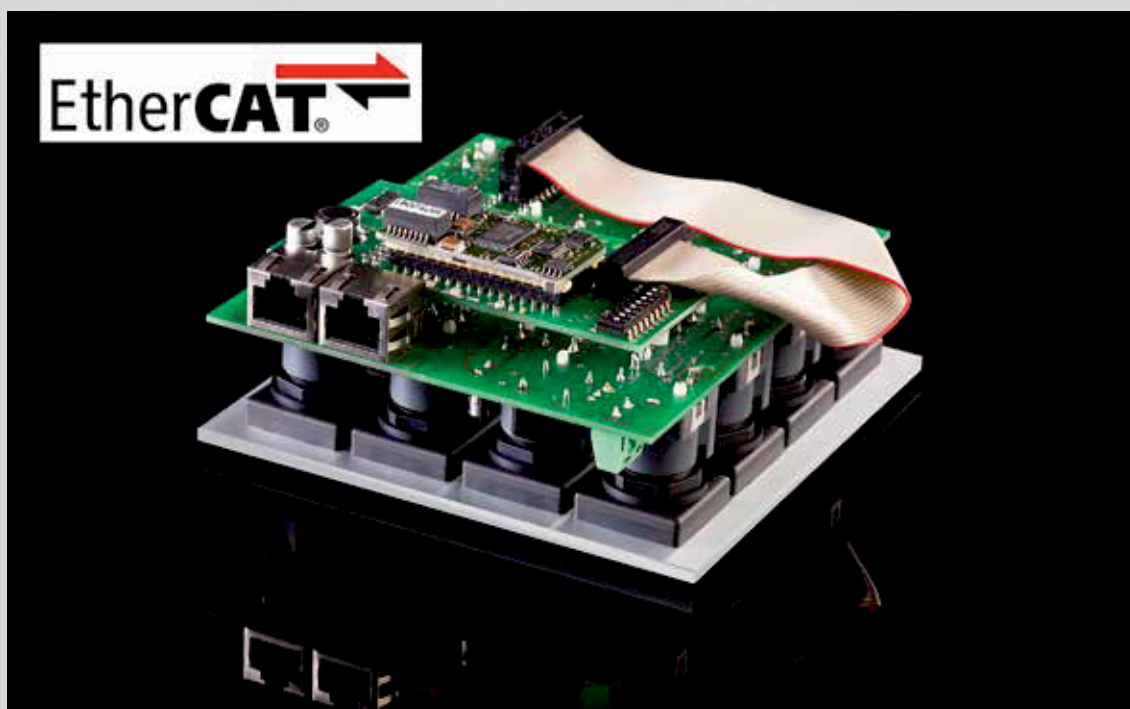
Modular Control Device for CANopen

The CANopen module is suitable for the modular design of keypads or operating units.
A maximum of 16 key modules, each with 4 actuators, can be connected to one CANopen module.
Depending to the number of planned key and display functions, the required number of key modules is sticked together. The CanOpen fieldbus module is directly slipped onto the first key module. The other key modules are connected to each other via a 4-pole cable.

A 2-colour LED display indicates the status of each key. Optionally, the key illumination can be controlled via CANopen.
The Schlegel CANopen modules offer 2 analogue inputs to connect two external potentiometers.
Two hex. coding switches enable quick and easy self-configuration and addressing.

Special Features
- The LEDs of all connected key modules can optionally be dimmed via the CAN bus with a SDO telegram or via a potentiometer at the analogue input 1.
- For night-lighting the LEDs can also be activated with a SDO telegram and adjusted to the desired brightness level.

Technical Data:

Key Module

- power supply: via CANopen module
- mounting grid: 27mm x 27mm
- Operating temperature: -25 to +55°C
- Internal bus: 4-core for data and power supply connection
- Mounting depth: approx. 70mm with plugged in CANopen module
- LED socket: T5,5k
- Signalling unit: soldered 2-colour LED or pluggable T5,5k LED,
                                   max. current per LED colour 20mA

CANopen Module

- Power supply: 20 to 30V DC
- Total power consumption: max. 2A,
- Analogue inputs: for 1 or 2 potentiometers 10k
- Assembly   pluggable into the first key module
- CAN bus: max. data rate 1MBit/s, connectable termination resistance 120Ω,
                                   adjustment of baud rate/node nbr. via two hex rotary switches
- Possible key modules: max. 16 4-key modules
- Conformity: Version 2.0.02 (CiA)
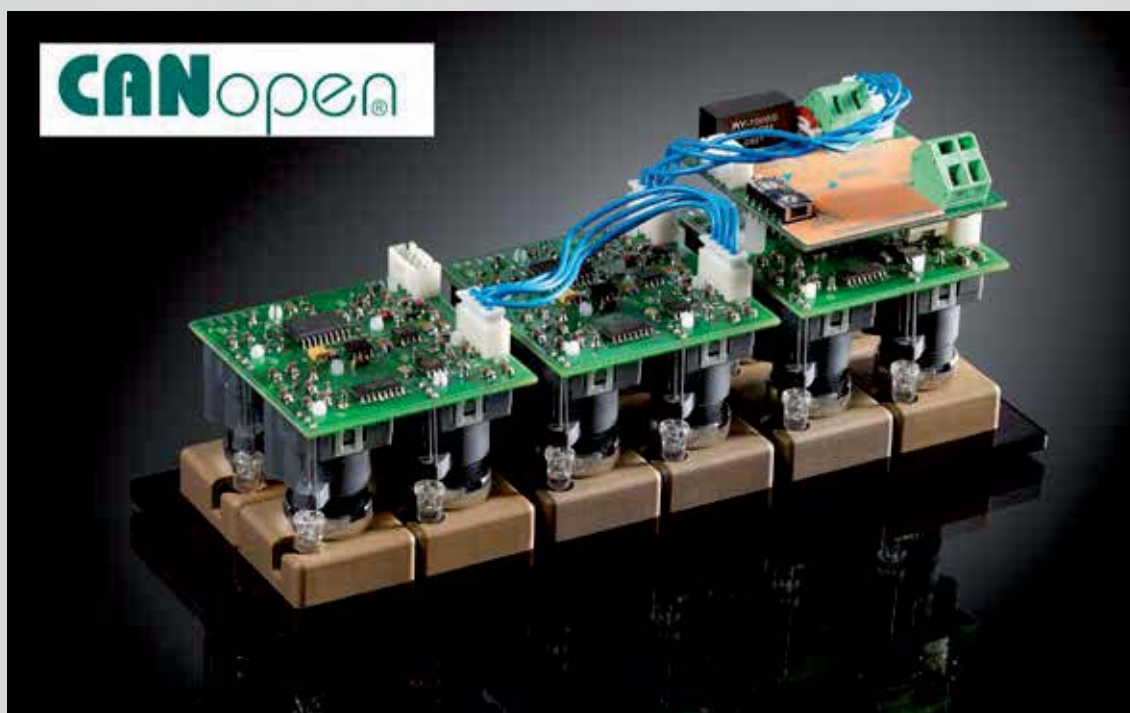
Modular Control Device for Profibus DP

The Profibus-DP module enables the construction of keyboard and operating units. The contact blocks are fitted on a customer-specific carrier board. Up to 16 (optionally 64) contact blocks are interfaced to the system via the Profibus nodes by means of a fieldbus module. Coding switches allow quick and easy addressing.
The GSD file is also provided.

Special Features
- The integrated self-test allows quick and easy control of the pushbuttons and pilot lights without being connected to the bus.
- The bus-specific status message "Data Exchange" can be transmitted to the operating interface and indicated
- The LED brightness of the pilot lights or illuminated pushbuttons can be dimmed (nightlight design)
- The grid of the carrier board can be designed according to customer's requirements
- Optional expansion to 64 I/O matrix
- Enables connection of the Schlegel 7-segment display LXL(J)ASCE via the bus
- An additional module allows the transfer of 8 to 10 bit AD values from the operator control panel to the bus
- Usability of the module with other bus systems by simply exchanging the bus module

Technical Data

General
- Power supply: external 24V DC, customer-specific connection
- Operating temperature: -25°C to +50°C
- Total power consumption: ≤100mA (+ power consumption 10mA/LED)
- Inputs: 16, optionally 64 switching inputs
- Outputs: 16, optionally 64 (LED's - pilot lights)
- Conformity: CE

Communication
- Profibus specification: DPV0 to DPV2
- Data length: 96 Byte I/O
- Module name: 8 Byte Inp. 8 Byte Outp.
- Cycle time of I/O´s 10ms directly, optionally via matrix 30ms
- Address range: 0 - 127, adjustable via coding switch
- Bus connection: customer-specific
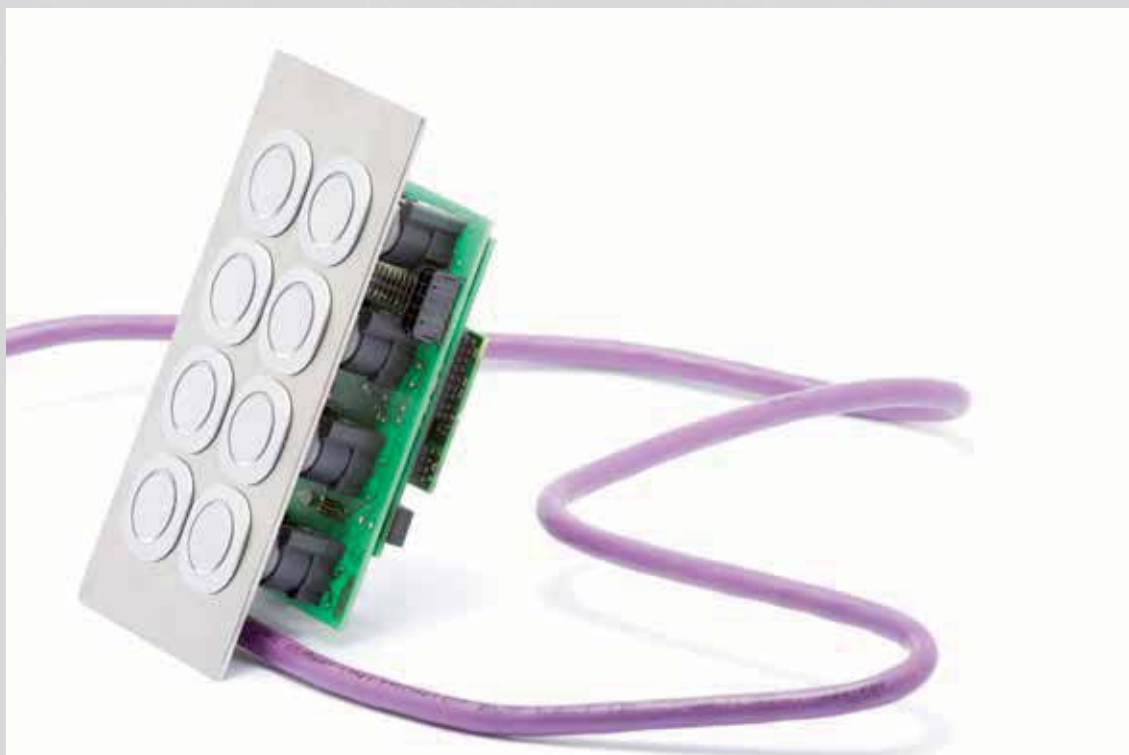
Modular Control Device for ProfiNET IO

The ProfiNET IO module complements the modular fieldbus concept of the company Georg Schlegel and enables the connection of customer-specific operating devices to the diverse bus systems.
16, optionally up to 64, illuminated contact blocks can be addressed via the bus module. The contact blocks are arranged on a carrier board according to customer requirements, which is then attached to the rear of the panel-mounted actuators. The bus module is plugged on the back side of the carrier board and serves for the connection to ProfiNET IO. A GSDML file is provided for system configuration.

Special Features:
- Various independent 7-segment displays with up to 8 digits can be controlled via the ProfiNET IO. Such customer-specific displays can be offered on request.
- The modular grid of the carrier board can be customised.
- The control device can also be used for other bus systems by simply exchanging the bus module.
- The ProfiNET IO interface uses two RJ45 female connectors on the carrier board for the bus connection.

Technical Data:

General:
- Power supply: 24 V, external supply
- Operating temperature: -20°C…+50°C
- Degree of protection: IP00
- Power consumption - bus module: max. 200mA
- Inputs: 16, optionally 64
- Outputs: 16, optionally 64, 10mA LED current
- Conformity: CE

Communication:
- ProfiNET IO specification: 2 ports with transformer
- Fieldbus Baud rates: up to 100 MBaud
- IP address: bus assignment
- Fieldbus functions: TCP/IP and UDP/IP
- Certified bus nodes: ProfiNET IO Conformance Class B
- Bus connection: 2-port connection

- The GSDML file will be forwarded by email.
- Two RJ45 female connectors are provided on the carrier board for the connection of ProfiNET IO .
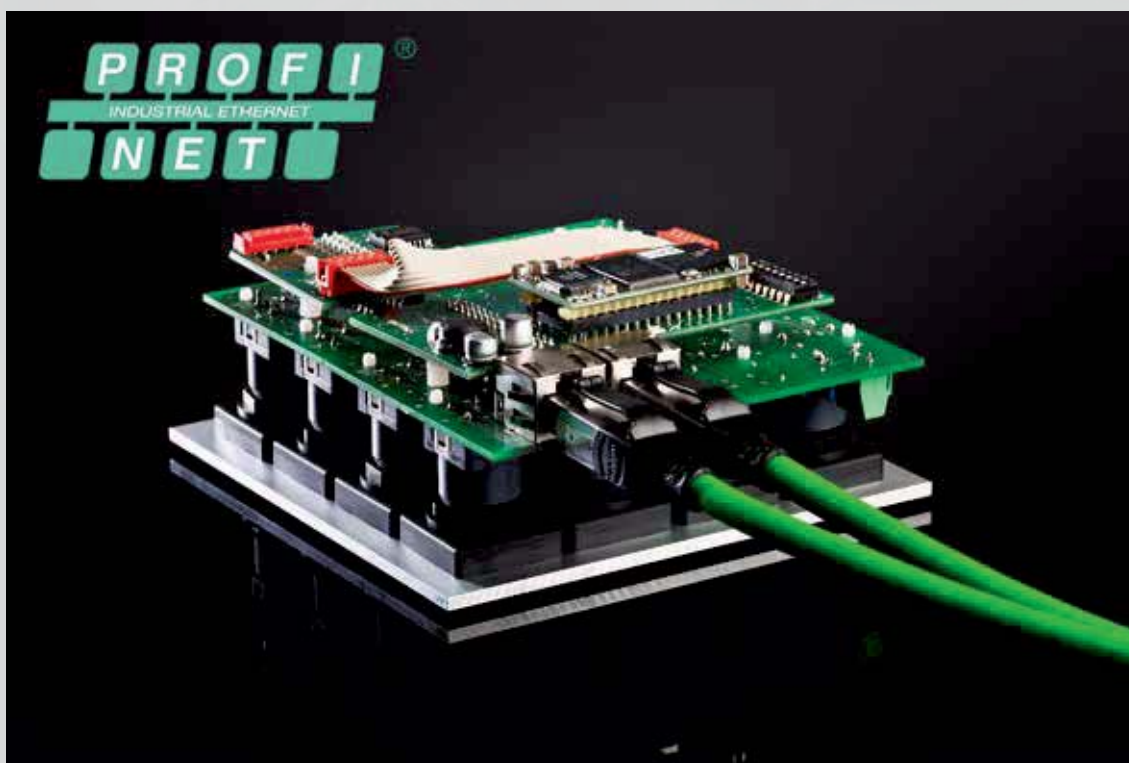
More Fieldbus Interfaces

The bus module from Schlegel enables to connect the Schlegel control units (pushbuttons & pilot lights) to various bus systems (in preparation):

- CANopen
- DeviceNet
- Profinet I/O
- EtherCAT
- Ethernet 10MB
- LONWorks62
- MPI
- Powerlink
- Ethernet IP

Structure of a Bus Connection

A bus module serves to connect a customer-specific carrier board, which is equipped with the contact blocks and the bus nodes, to the relative bus system.
The bus module is adapted via an interface. The bus module is attached on the rear of the carrier board (simply plug in) and secured with locking pins.
The fieldbus cable is connected to the relative fieldbus according to the bus- or customer-specific requirements.
The basic unit offers 16 inputs (contact blocks) and 16 outputs (LEDs) for illuminated pushbuttons or pilot lights. A matrix (software) enables the unit to be expanded to 64 I/O at a cycle time of 30ms.

Special Features

- The integrated self-test allows quick and easy controlling of the pushbuttons and pilot lights without bus connection
- Bus-specific messages can be sent to the user interface and displayed
- The LEDs of the pilot lights and illuminated pushbuttons can be dimmed (nightlight design)
- The grid of the carrier board is designed according to customer's specification
- Optional expansion to 64 I/O matrix
- Possible to connect the Schlegel 7-segment display LXL(J)ASCE via the bus
- An additional module enables to transfer 8 to 10 Bit AD values from the operating panel to the bus
- Usability of the module with other bus systems by simply exchanging the bus module