

CATALOGUE

2009/2010

- Troubleshooting ☐
- Trainings ☐
- Practise-oriented seminars ☐
- Consulting ☐
- Permanent network monitoring ☐
- INspektor® and PROmanage® ☐
- Diagnostic and service tools ☐
- Infrastructure components ☐
- EMC Suppression Modules ☐
- Power supply ☐
- Individual solutions ☐



Control networks! Localize bottlenecks! Eliminate problems!



- Troubleshooting and fault elimination and in industrial networks
- Acceptance & certification of networks
- Practice-oriented seminars / Workshops
- Tools for commissioning and maintenance
- Infrastructure components
- Permanent network monitoring

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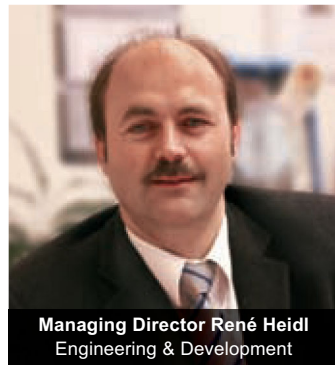
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Philosophy



The Team

Customer-oriented solutions, excellent quality and cost efficiency are our aims. We understand service as performance, competence and flexibility. Trust, openness and mutual respect are the basis of successful cooperation.

Teamwork and communication create transparency of knowledge and are prerequisites for professional advice. We serve our customers and constructive criticism is reason to improve.

The Team of Entrepreneurs

A dual leadership of an ingenious inventor and engineer and a sales expert with a grasp for market and market potentials. A management team with an unrelenting will to succeed not losing sight of reality.

„Our staff is our asset and our product is our know-how based on expertise and experience. It is regarded as imperative to safeguard and expand it continuously...“ R. Heidl (speech at 5th company's anniversary)

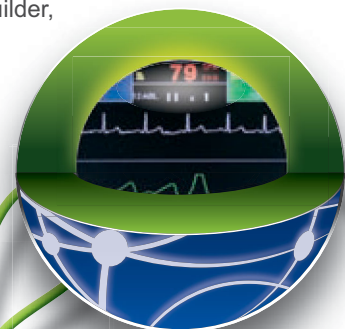
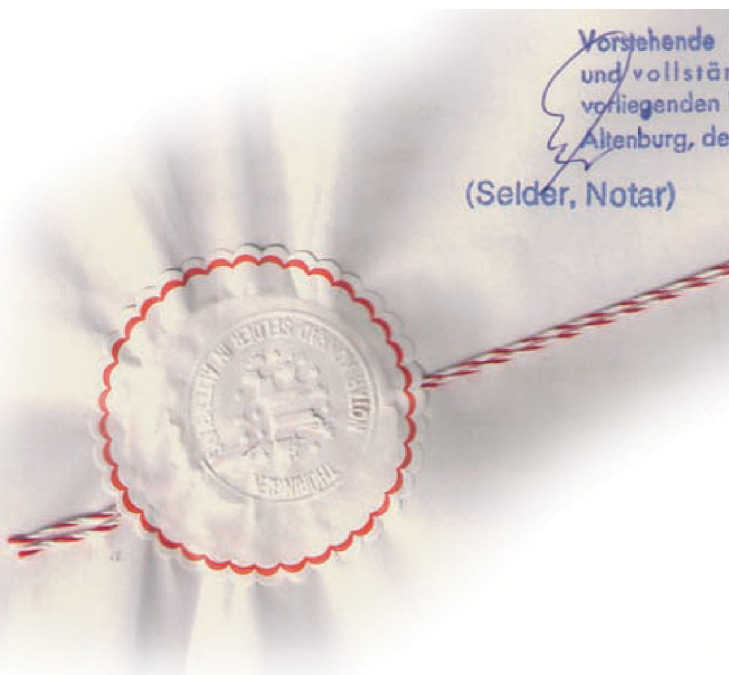
Our Mission

As a manufacturer-independent, cross-sectoral service provider we assess objectively the quality and stability of industrial data networks. A reliable communication is the basis of continuous production. Safe and trouble-free operation of machines and plants are the result of our work.

We define state quantities and make quality measurable.

We make our know-how and experience transparent and are glad to pass it on to our customers.

The cyclical or permanent testing of the network status should be the desire of every design engineer, builder, maintenance man and also service technician.



Corporate Development

The beginning

A small team of specialists with years of experience in fieldbus technology discovered the importance and thus the significance of the metrological proof of the data communication quality. The statement „It works!“ that used to be binding could no longer bear up against the quality requirements of many users.

A „DUO“ founded Indu-Sol GmbH in January 2002 having the sale of diagnostic tools in mind, and encountered in the early days many a misunderstanding and disbelief when issues such as wear and tear and ageing of fieldbus equipment were discussed. Today Indu-Sol is firmly established on market as a leading service provider for fieldbus diagnosis.

Competence in the field, sales skills and customers' confidence have made Indu-Sol an important partner of planners, maintenance engineers and service technicians of major industries in Germany.

The presence

Indu-Sol has grown since then currently employing 30 people and wants to expand even further: 15 measurement engineers work worldwide for German exporters. Even in countries like Japan and China Indu-Sol's expertise is in great demand. Experienced sales experts present products and developments in a practice-oriented environment, give advice and recommendations concerning optimum installation and support when it comes to planning and design.

As a member of the VDI/VDE working groups and the relevant fieldbus organizations Indu-Sol can pass on its experience and the know-how to a broad public. Very popular and appreciated are the training courses and practical seminars offered under the motto „From practice to practice“.

The references show that the industry is turning more and more with great interest to the issue of „Quality in fieldbus technology“. Although there is no norm yet that requires a metrological proof of quality the VDI/VDE Guideline 2184 „Zuverlässiger Betrieb und Wartung von Feldbussystemen“ (reliable operation and maintenance of fieldbus systems) is an important initial step in the right direction.

The future

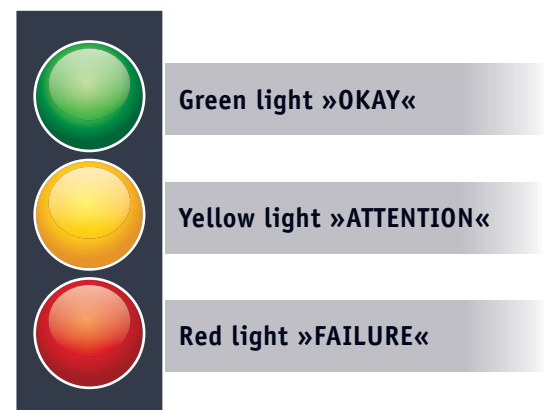
Because of constantly growing networks a permanent monitoring of the communication quality is gaining more and more importance. Although the demand and the awareness are still far from where it should be, Indu-Sol has made one vision reality by its INspektor family. „The market still needs maturing, but the idea of getting warned of a failure sounds convincing even to pessimists...“

The PROFIBUS stand-alone INspektor® is a simple, easy-to-use diagnostic tool that could well be compared with the medical ECG. Thank to a hardware-integrated web server the network status can be displayed subscriber-related as a matrix on any PC via the internet browser thus obviating the need of additional software. Traffic light colours highlight the status and allow to pursue intuitively a quick and targeted maintenance strategy.

The need for more functionality, central monitoring of a multitude of networks of different protocols including Ethernet/PROFINET is fully met by the INspektor family concept including the „PROmanage®“ software.

The simple and targeted status display is used to analyse effectively the industrial network to detect weaknesses and avoid failures by preventive maintenance.

An expensive, painful production failure because of faults in the bus communication is now a thing of the past!



PROFIBUS, ASi, InterBus, CAN, DeviceNet, SafetyBUS p

General

Fieldbus systems are the main artery of automation equipment. Reliability and stability guarantee an uninterrupted production. Advanced automation systems using field bus systems should be basically subject to metrological tests of the data communication quality directly after commissioning. Another essential factor to be considered in the life cycle of a machine or system is that the bus also constitutes a wear part. Besides component ageing, production-related environmental influences, e.g. coolants, lubricants, moisture and countless alternate bending stresses of bus cables, may have an impact on the life. To prevent failures, cyclic measurements of the physical and logic communication reveal the actual fieldbus quality.

Services

- Troubleshooting
- Acceptance/certification of newly installed networks
- Network analysis trouble localizing/fault analysis/fault elimination
- Commissioning support
- Consulting when it comes to planning and design and extension of networks
- Regular inspection measurements at intervals of 12 to 24 months
- Permanent network monitoring with early warning system

Using special-purpose measuring and diagnostic tools the following protocols are supported:



Scope of measurements

„Online test“

- Assessment of transmitting and receiving level (edges, harmonics, levels)
- Assessment of logic data transfer (real cycle time, error telegrams, repeat telegrams)

„Offline test“

- Line test
- Assessment of installation quality (Line length, wiring, resistors)

„Protocol“

- Recommending certificate/acceptance and test record
- Recommendations on measures to be taken for system stability optimization
- Planning and design support

„Additional offerings“

- Topology determination
- Preparing CAD plans of network structure

Ordering details	Art. No.
Acceptance and certification Calibrating a field bus incl. test record	010300
Troubleshooting Trouble localizing / Fault analysis / Fault elimination	010301
Inspection measurements	010320

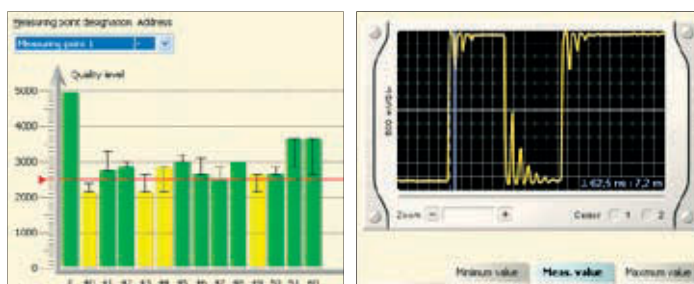


Fig. 1 - PROFview XL® - Signal test

Analysis result for test without termination

No error !

Irregularity A <-> B not determinable
 Irregularity A <-> shield not determinable
 Irregularity B <-> shield not determinable
 Breakout or impedance change not determinable
 Cable break not determinable
 Cable OK
 Impedance approx. 145 ohm
 Cable length approx. 159 m

Fig. 2 - PROFtest II - Line test

Messprotokoll		InduSol	
PROFIBUS-DP		Industrial Solutions	
Physical Layer nach IEC61158 / IEC61784		Sol	
Client:	Date:		
Order No.:	Pages:		
Measurement-Date:	Master System:		
System:			
Measurement tool			
• Physical diagnosis „PROFtest II“ – test-line			
Determination of wired cable line quality per segment			
5 segments	12 MBit/s	transfer rate	1 repeater
1000 m	max. line length	150 Ohm	impedance
0	OLM		
X	visual control cable	150	max. shield current [mA]
X	„PROFview XL“ – test signal shape		
Signal shape evaluation diagnosis software			
X	glitches	X	edges
		X	level
2500	min. signal level	4900	max. signal level
Measurement tool			
• Logical diagnosis „PB-Scope“ – test logic			
Signal logic evaluation software			
1,20	min. cycle time [ms]	X	error telegrams
1,70	average cycle time [ms]	X	repeat telegrams
2,30	max. cycle time [ms]	X	master
X	PROFIBUS hardware configuration		
X	diagnostic repeater		
Measured with tool:			
X	„PROFtest II“	X	„PROFview XL“
X	„PB-Scope“	X	
Acceptance certificate:			
X	approved	X	not approved
X	conditionally approved	X	recommendations
Criteria for inspection ability:			
X	approved	X	not approved
Date:	Signature:		
Seite 1 von 1			

Fig. 3 - Measurement report

Ethernet und PROFINET

General

Ethernet networks are becoming increasingly important in an environment close to the point of production. Other than with the office networks there is an immediate impact on the availability of the machinery and systems, and key figures such as quantity and quality. Even the most trifling communication problem becomes intolerable and requires immediate action to avoid loss of production.

Services

- Consulting in network design and upgrade
- Network planning
- Commissioning assistance
- Trouble localizing / Fault analysis / Fault elimination
- Acceptance tests and certification of new networks
- Inspections at regular intervals

Scope of measurements

- Damping measurements of Cu fiber-optic lines and issue of measurement report
- Overview on the current network (terminals, hubs, switches, network structures)
- Overview on the current IP/MAC addresses
- Telegram recordings on the applications running on the network
- Proof of network function under load (elasticity at 20% load)
- Summarizing all physical and logical measurement results as a protocol

Proactive Network Maintenance

1. Setting up custom-tailored monitoring functions of the installed network nodes (switches and hubs). The aim is to keep the customer updated at all times on the current status of the system by sending out regularly specific queries to the network nodes so that faults can be avoided and changes in the networks detected respectively at an early stage.

2. Installing a network management software being capable of sending out independently and irrespective of the manufacturer queries to all manageable network components, reporting events (long-term documentation) and generating warnings based on preset threshold values before those events may cause trouble. The report function is especially important when it comes to guaranteeing the network availability and requirements for a certification in accordance with DIN ISO 9001.

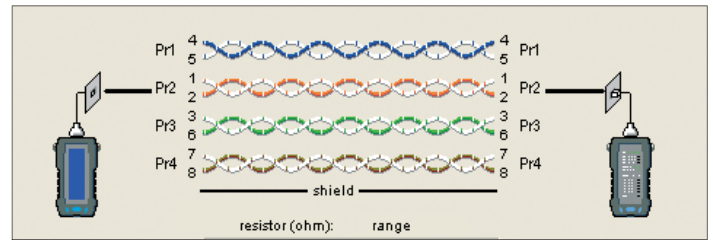


Fig. 1 - ETHERtest - Line test

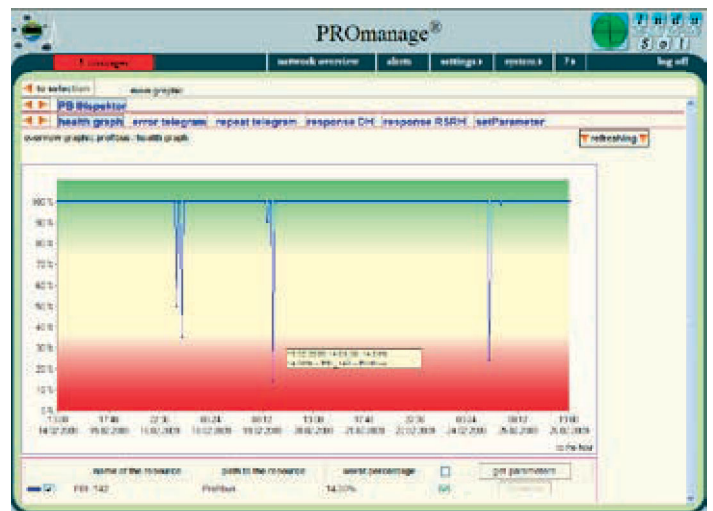


Fig. 2 - PROmanage® - State graph

MEASUREMENT RECORD INDUSTRIAL ETHERNET IEEE 802.3, ISO/IEC 11801		InduSol	
Client: InduSol GmbH • Blumenstrasse 3 • 04626 Schmölln		Date:	
Order No.:	Measurement-Date:	Pages:	
System:			
Network data:	number of network knots	app. 5 Switch	
	number of occupied Port's	app. 50	
	number of terminals		
	kind of line operation	10/100 Mbit FDX/HDX	
	communication protocol	TCP/IP & OSI(H1)	
Measurement physically: „ETHERTEST“ Test network physics Examination of the network cables after Cat. 5 to 100MHz			
Number of existing cu-connections:	?	of it measured:	none
Number of existing fiber-connections:	?	of it measured:	none
Measurement logically: „PROMANAGE“ Test network overview			
app. 18%	max. Network utilization	app. 1%	on the average
x	collisions		
app. 1%	error telegrams	/	kind of errors
Measured with:	<input type="checkbox"/> „ETHERTEST“	<input type="checkbox"/> „ETHERSCOPE“	<input checked="" type="checkbox"/> „PROMANAGE“
Acceptance certificate:	<input checked="" type="checkbox"/> approved	<input type="checkbox"/> not approved	<input type="checkbox"/> conditionally approved
Enclosures:	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> recommendations
Date:	Signature:		
<p>• Tel: +49 34491 5818-0 • Fax: +49 34491 5818-99 • Internet: www.indu-sol.com • E-Mail: info@indu-sol.com</p>			

Fig. 3 - Measurement report

Ordering details	Art. No.
Acceptance and certification Calibrating a network incl. test record	020300
Troubleshooting Trouble localizing / Fault analysis / Fault elimination	020302

OWG

General

Besides the fieldbus systems where data exchange takes place through electrical signals, the transfer of optical signals through optical waveguides (OWG) becomes more and more common in the industry. This technology is capable of bridging very long transfer distances in large automation systems.

Laying optical fibre cables requires great care. To find out whether the entire system will run reliably, the transmission link must undergo metrological testing after installation. Thus, communication disturbances can be avoided. Such checking is carried out by optical time domain reflectometry (OTDR) or transmitted-light method.

Services

- Troubleshooting
- Acceptance / Certification of newly installed networks
- Network analysis - fault localizing / fault analysis / fault elimination
- Commissioning support

Scope of measurements

OTDR procedure (applicable for OWG glass fibres):

- Possible fibre types: Multimode (gradient index), Monomode (step index)
- Attenuation over entire distance and individual sections
- Irregularities, their attenuation and location
- Length of total distance and individual sections
- Return loss of connectors

Transmitted-light method (applicable for OWG glass and plastic fibres):

- Attenuation over entire distance

Measuring certificate/Acceptance and test record:

- Recommendations on measures to be taken for system stability optimization
- Planning and design support

OWG measuring methods

OWG type*	Fibre	Potential measurement method	
		OTDR procedure	Transmitted-light method
Monomode/step fibre 8... 10/125µm	Glass/glass	yes	yes
Multimode/gradient fibre 50/125µm	Glass/glass	yes	yes
62,5/125µm	Glass/glass	yes	yes
Multimode/step fibre 200/280µm	Glass/glass	yes	yes
200/230µm	Glass/plastic	yes	yes
980/1000µm	Plastic/plastic	no	yes

*Differing OWG types on request

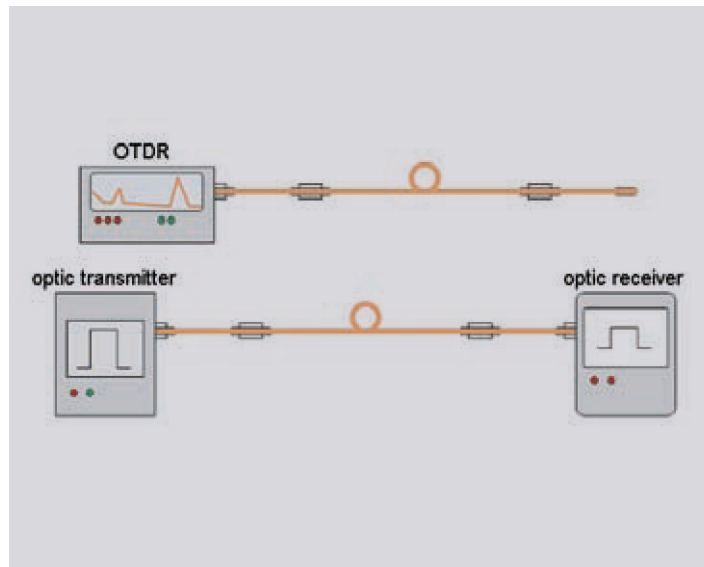
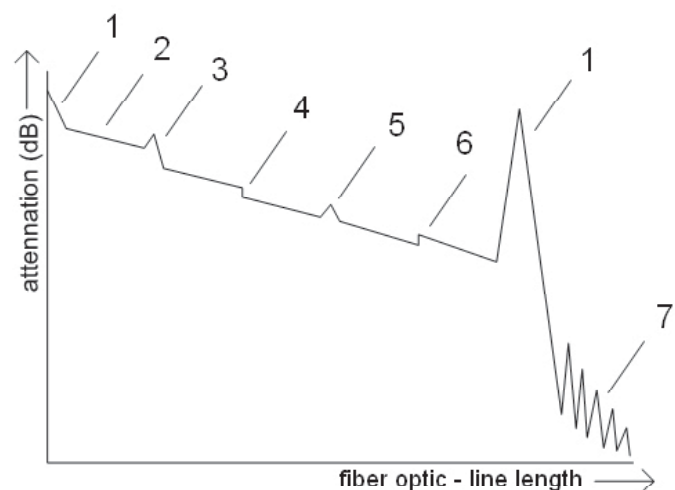


Fig. 1 - Measuring principle



- 1 Fresnel reflection at the beginning and/or end of OWG section (step of refractive index)
- 2 Section without irregularity
- 3 Reflection and negative step
- 4 Negative steps (splice, tolerances of fibre parameters, fibre bending of insufficient radius)
- 5 Peak without attenuation (ghost reflection)
- 6 Positive step (tolerances of fibre parameters)
- 7 Noise

Fig. 2 - OTDR results

Ordering details

Art. No.

Troubleshooting - Acceptance - Certification

020400

Practice-oriented seminar / Workshop for PROFIBUS

Content

The content of training is structured so that all participants of different background involved in planning / commissioning, maintenance and service can be made acquainted with the subject in a straightforward manner. All theoretical discourses are linked with practical requirements.

1. Technical requirements

- „Reliable operation and maintenance of fieldbus systems“ of VDI / VDE 2184 - experience of Indu-Sol in terms in long-term safe data communication
- Laying and installation guidelines acc. to IEC 61158, IEC 61784
- Guidelines and recommendations of PROFIBUS user organisation (PNO)

2. Theoretical basis

- RS 485 transfer physics / symmetrical data transfer / physical transfer principle
- Differential voltage method
- Signal form - Bit coding
- Quality characteristics of data transfer
- Clarification of the terms „Master system - Bus system“

3. Logical data communication

- Protocol structure, backup mechanisms,
- Sequence of cyclical and acyclical data communication

4. Cabling guidelines

- Practice-related information on installation
- Design and execution of bus topology
- Installation and assembly instructions
- Typical sources of error and their impact on handling, function and place of installation of relevant infrastructural components (repeater / diagnostic repeater DP / DP coupler, OLM, OBT)
- Drafting clear topology plans

5. Quality determination in practice

- Function and handling of measuring and diagnostic tools:

„PROFtest II“ - Line test
 „PROFview XL“ - Signal test
 „PROFI-TM“ - Protocol test
 „INspektor“ - Warning of failure

- Determining quality characteristics
- Interpreting measuring results – troubleshooting strategy
- Conclusions and actions
- Establishing acceptance and test criteria

6. Permanent fieldbus monitoring

- „Condition Monitoring“



Fig. 1 - Theoretical basis



Fig. 2 - Practical applications

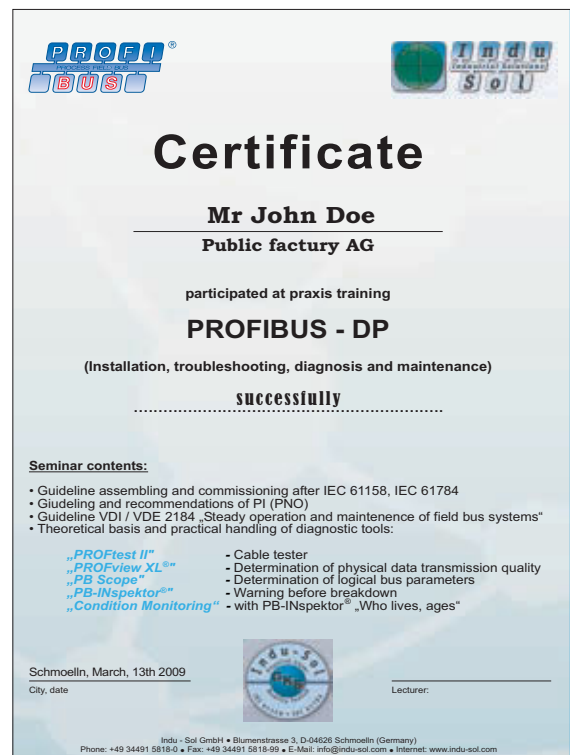


Fig. 3 - Certificate

Every participant will be given a set of detailed training material and an attendance certificate. For more information on our training courses visit our website at www.indu-sol.com. On your request practice-oriented one-day seminars can be held at your premises. Content and topics will be adapted to the needs of your business.

Ordering details	Art. No.
2 days at Indu-Sol's „internal“ (incl. hotel accommodation per person)	010203
1st day at your premises „external“ (max. 6 persons)	010205
1st day at your premises „external“ (max. 12 persons)	010206
2nd days at your premises „external“ (using a real system, max. 6 persons)	010207

Practice-oriented seminar / Workshop for CAN, DeviceNet, SafetyBUS p

Content

The content of training is structured so that all participants of different background involved in planning/commissioning, maintenance and service can be made acquainted with the subject in a straightforward manner. All theoretical discourses are linked with practical requirements.

1. Technical requirements

- Laying and installation standards acc. to IEC 61158
- Installation guidelines for DeviceNet according to ODVA
- „Reliable operation and maintenance of fieldbus systems“ of VDI / VDE 2184
- Experiences of Indu-Sol GmbH in long-term and safe data communication

2. Physical basis

- Elements of CANBUS protocol (layers 1 and 2)
- Physical transfer principle - differential voltage method
- Signal form - Bit coding
- Quality characteristics of data transfer
- EMC / shield current issues

3. Logical basis

- Communication procedure (Producer - Consumer)
- Protocol structure
- Bus access procedure - Organisation of bus communication
- CAN specification 2.0A (standard) and 2.0B (extended CAN protocol)
- Data backup mechanisms - Response to transfer errors
- Bit stuffing

4. Cabling guidelines

- Practice-related information on installation
- Planning and execution of bus topology
- Installation and assembly instructions
- Typical sources of error and their impact
- Use of repeaters, bridges and gateways

5. Quality determination in practice

- Function and handling of measuring and diagnostic tools:
 - „CANBUSview XL - test of line physics
 - „CANBUSview XL - physical communication test
 - „CANBUSview XL / CANscope“ - logical communication test
- Determining the communication quality
- Interpreting the measuring results - troubleshooting strategy
- Conclusion and actions
- Developing acceptance and test criteria

6. Permanent fieldbus monitoring

- „Condition Monitoring“



Fig. 1 - Theoretical basis



Fig. 2 - Practical applications



Fig. 3 - Certificate

Ordering details	Art. No.
1 day at Indu-Sol's „internal“ (incl. hotel accommodation per person)	030202
1 day at your premises „external“ (max. 6 persons)	030201

Every participant will be given a set of detailed training material and an attendance certificate. For more information on our training courses visit our website at www.indu-sol.com. Content and topics will be adapted to the needs of your business.

Practice-oriented seminar / Workshop for Ethernet, PROFINET

Content

- Fundamentals and definitions „IEEE 802.3, ISO / IEC 11801
 - Installation, commissioning, testing, fault analysis
 - Specification „PROFINET“ acc. to PNO guidelines „PN Cabling Guide_2252_V200“
- 1. The common physical basis**
 - Symmetrical data transfer/differential voltage signal
 - 2. Physical elements, Ethernet voltage signals**
 - Network types, network structures, network addresses
 - Fundamental of network design, line types
 - 3. Logical elements of Ethernet**
 - Ethernet in ISO / OSI reference model, telegram structure, protocols
 - 4. Measuring devices / Measuring principles / Measuring techniques**
 - Diagnosis options
 - Diagnosis through standard commands, fault localizing using switches
 - Line test, measuring records acc. to Cat. 5e,
 - Telegram recordings using „ETHERscope®“ / Wireshark“
 - 5. Acceptance conditions / Specifications**
 - Minimum requirements on network planning, installation and testing
 - Additional requirements on PROFINET networks
 - 6. Network security**
 - Basic threat scenarios: viruses, worms, unauthorized access

Ethernet - Hands on:

Installation / Commissioning / Maintenance / Troubleshooting
Use of measuring devices and management tools

- 7. Network installation**
 - The seminar participants build up a network
 - Installation of lines, plug connectors with line test record
- 8. Network commissioning**
 - Assigning IP addresses, network commissioning
 - Installation errors and how to localize them
- 9. Network monitoring/telegram traffic**
 - Telegram monitor „ETHERScope®“ / Wireshark“
- 10. Switch Management and verification of impacts on network**
 - Port mirroring, Spanning Tree, Trunking, VLAN, AutoPartitioning, Port statistics
- 11. Long-term network monitoring**
 - Network scan using „PROscan®“
 - Network monitoring by „PROmanage®“ using SNMP
- 12. Network security**
 - Isolating the built up network by security router



Fig. 1 - Basis seminar

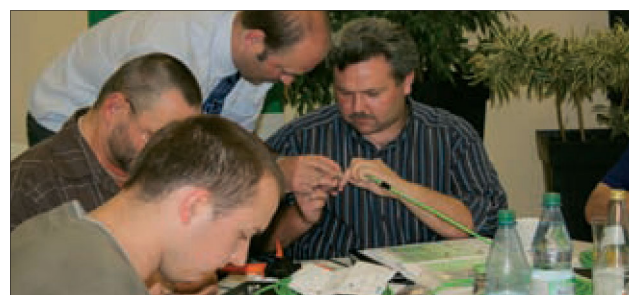


Fig. 2 - Workshop



Fig. 3 - Certificate

Ordering details	Art. No.
2 days at Indu-Sol's „internal“ (incl. hotel accommodation per person)	020210
2 days at your premises „external“ (max. 6 persons)	020207

Every participant will be given a set of detailed training material and an attendance certificate. For more information on our training courses visit our website at www.indu-sol.com. Content and topics will be adapted to the needs of your business.

Special subject courses: S7 - Industrial Communication in Practice

1. Introduction (theory)

- Applications of industrial communication
- Fundamentals of data exchange between SPC and distributed periphery (PROFIBUS, PROFINET)
- Fundamentals of data exchange between SPC Siemens S7
- Options of data exchange of SPC Siemens S 7 with control systems of other manufacturers, PROFIBUS Master / Slave or other fieldbus types via bus converter

2. Hands-on training (development projects)

- Global data exchange via MPI protocol
- Profibus S7 Master => S7 Slave coupling
- Base communication via MPI
- S7 communication industrial Ethernet, connection design in 7 NetPro
- Communication S7 Profibus to CANopen network via Anybus converter

3. Hands-on training (communication to operator units)

- Project design using WinCC flexible for MP277
- SPC communication MP277 via MPI / PROFIBUS and Ethernet
- Project development for operating unit MP277 w. data communication via Ethernet to Control 1 and data transfer via MPI to Control 2

Ordering details	Art. No.
2 days at Indu-Sol's „internal“ (incl. hotel accommodation per person)	020212



Fig. 1 - Training



Fig. 2 - Practical applications

Special subject courses: OWG Practice-oriented seminar / Workshop

Training courses dealing with:
Fundamentals of OWG attenuation measurement
(transmitted-light method)
Connector assembly detachable/non-detachable connectors

1. Fundamentals of OWG

2. Measuring principles

- Norms
- Transmitted-light method
- Backscattering technique
- Attenuation measurement and losses

3. Hands-on training and installation instructions

- Connector types
- Line types and bending radii

Ordering details	Art. No.
1 day at Indu-Sol's „internal“ (incl. hotel accommodation per person)	020214



Fig. 3 - Workshop

Training courses for other topics on request. Every participant will be given a set of detailed training material and an attendance certificate. For more information on our training courses visit our website at www.indu-sol.com. On your request practice-oriented one-day seminars can be held at your premises. Content and topics will be adapted to the needs of your business.

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CAN / DeviceNet / SafetyBUS p

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ASi

Logic tester „ASi Scope“	sheet 25
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Ethernet / PROFINET

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Universal device (for all networks)

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Signal tester „PROFview XL®“

Function

The PROFview XL® is a tool for determining the physical as well as the logical communications quality of the data exchange in PROFIBUS networks. Measurements are performed „online“, i.e. with the system running. The measuring equipment consists of hardware and software. By using an adapter, the hardware can directly plug on the PROFIBUS non-reactively. The measuring and test results are using the software displayed on your PC (Fig 2 - Fig 4). The connection on the PC side is carried out by using USB interface. We basically recommend using both ends of every segment as measuring positions in the PROFIBUS network. For this, the respective measuring point are to be prepared.

The measuring principle - Physical quality determination

The Signal-to-Noise distance

The PROFIBUS runs by using a differential voltage signal transmitting the logical telegram contents to the lines A and B. The amount of the voltage difference as well as the shapes of the signals is a measure for the physical transmission quality or the signal quality, respectively. Every bit is scanned sixteen fold. The evaluation is based on the 6/16th of the total width. Thus, the signal transitions effects are not included in the evaluation.

The slope rate

Aside from the signal-to-noise distance, the chronological recording of either upward or downward slopes is an important measure to completely interpret the physical transmission quality. When evaluating the results „good“ or „bad“, it is assumed that within a time of 2/16th based on the bit length the maximum value has been reached. The measuring result arising from both the signal-to-noise distance and slope rate is recorded against time and displayed as a Q-value in a column chart. By using this measuring method, a quick and simple statement about the current state of the communication quality is possible.

„Safe and stable running PROFIBUS networks should reach a Q-value of at least 2,500 mV“.

Scope of delivery

- PROFview XL®
- Product CD and manual
- USB cable (3 m)
- PROFIBUS accessories
- Carrying case
- Power supply: - adapter AC/DC
- mains cable

Ordering details

PROFview XL®

Art. No.

010149

Accessories / Spare parts

Mobile power supply unit „MoSt“

010405

USB cable 3 m

010133

USB cable 5 m

010134

AC/DC adapter

010130

Power pack cable for AC/DC adapter

010131



Fig. 1 - PROFview XL®

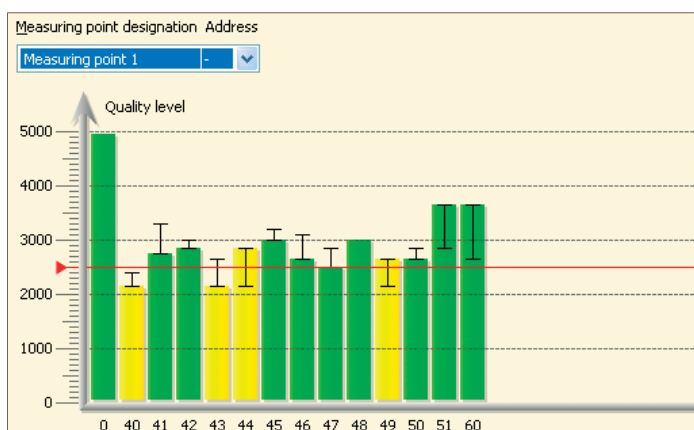


Fig. 2 - Subscriber statistics

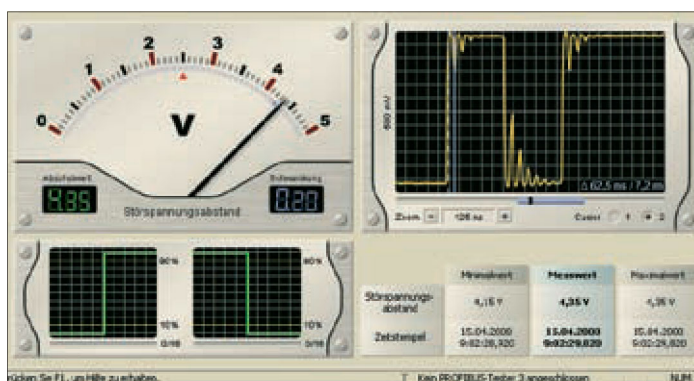


Fig. 3 - Signal form per subscriber

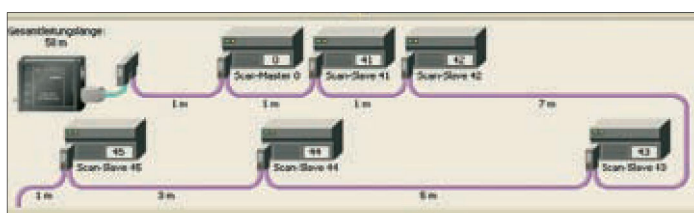


Fig. 4 - Topology scan

Line tester „PROFtest II XL / XXL / XXL-Online“

Function

PROFtest II is a handy and easy-to-handle tool for checking the correct cabling in PROFIBUS networks with RS-485 transmission technique. By using PROFtest II, you will have a quick and simple overview on the actual wiring state either when starting up the system or carrying out a maintenance job. Measurements are normally performed off-line, i.e. without using the PLC/PROFIBUS master. So PROFtest II is looped through either at the start or the end of the line (see fig.2). This step is easy to handle and menu driven. To operate PROFtest II, you need not require any special expertise. The most frequently used menu point is the sheer line test. The measurement is carried out in three steps as follows:

- test without a termination
- test with one termination
- test with two terminations

The error is directly displayed with the line length pinpointed in meters measured from the measuring position. The detected data is represented in a measuring record which can be stored in the device or read out by a PC terminal program (see fig. 3).

When using PROFtest II XXL version, a master function has been integrated, where as PROFtest II XXL-Online features an additional XXL-online function.

Technical data

- Applicable for PROFIBUS using RS-485 transmission technique
- Power supply via either supplied accumulators or power pack
- Baud rate: 9,6 kbps - 12 Mbps
- Dimensions (L x W x H): 230 x 98 x 53 mm

Measuring results - Fault messages

- Display of actually laid line length
- Baud rate scan
- Line impedance measurement
- Correct termination
- Line interruption
- Shield interruption
- Mixed-up lines A-B
- Short circuit line A-B
- Short of line A/B - shield
- Using wrong line types
- Determining reflections
- Non-admissible spur line lengths
- List of all subscribers accessible at bus
- Transmission / Receiving level

Scope of Delivery

- Plastic transport case
- PROFtest II
- Adapter for mains operation plus two rechargeable batteries
- Battery charger appropriate for global use
- Serval adaptors for PROFIBUS connection
- PROFtest II manual

Ordering details	Art. No.
PROFtest II XL (standard)	010157
PROFtest II XXL (master function)	010155
PROFtest II XXL-Online (extended master and online function)	010153



Fig. 1 - PROFtest II XL / XXL / XXL-Online



Fig. 2 - Measurement

Analysis result for test without termination No error !

```

IrregularityA <-> B not determinable
IrregularityA <-> shield not determinable
Irregularity B <-> shield not determinable
Breakout or impedance change not determinable
Cable break not determinable
Cable OK
Impedance approx. 145 ohm
Cable length approx. 159 m
    
```

Fig. 3 - Measurement report

Logic tester „PB-INSpektor®“

Function

Besides the function of a passive data logger the PB-INSpektor® can also be used as fully-fledged measuring device. The necessary hardware is already integrated in the PB-INSpektor®, and the telegram analysis software is installed on the external PC (PROFI-TM; Art No.: 010195).

The contact between the PB-INSpektor® and the bus is rendered through an active programming cable „APKA“ (Art. No.: 010530). The connection to the software (PC, PG, laptop) is accomplished by a standardized USB connection. To avoid the use of 230V AC socket, the PB-INSpektor® can be supplied via a mobile power supply unit „MoSt“ (Art. No.: 010405).

Technical data

- Voltage supply: 24 V DC +/-20 %, typ. 0.3 A
- PROFIBUS
 - Protocols: DP, DPV1, FMS, MPI
 - Connection: 9-pole sub-D
 - Baud rate: 9.6 kbps - 12 Mbps
- Ethernet
 - Baud rate: 100BASE-TX / 10BASE-TX
 - Connection: RJ45

General data

- Installation: 35 mm DIN top-hat rail
- Dimensions (H x W x D): 131 x 47 x 111 mm
- Protective system: IP20
- Ambient temperature: 5 °C to 70 °C
- Storage temperature: -20 °C to 70 °C

Scope of delivery

- PB-INSpektor®
- Power pack
- Active programming cable „APKA“
- Crossover cable (5 m)
- Patch cable
- Line set 24V/230V
- Carrying case
- Manual

Ordering details	Art. No.
StarterKIT I (incl. Basic Line)	010168
StarterKIT II (incl. Comfort-Line)	010169

Accessories

Manual	060902
„MoSt“ mobile power supply	010405
„APKA“ active programming cable	010530
Ethernet patch cable	021801
Ethernet patch cable „cross over“	021800
Power pack 2.5 A	010951



Fig. 1 - PB-INSpektor®

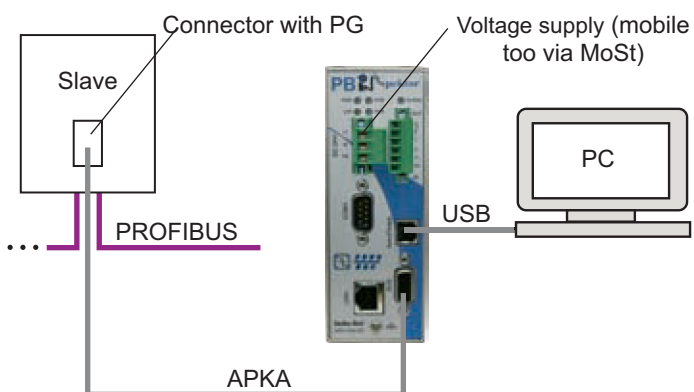


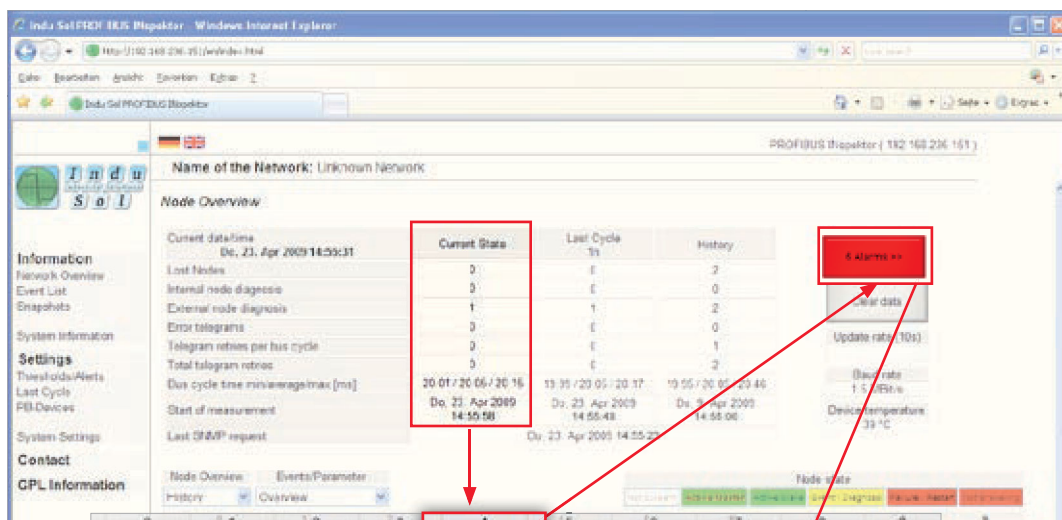
Fig. 2 - Connection example



Fig. 3 - StarterKIT PB-INSpektor®

For more information see the pages 18 and 116!

Actions to analyse event information in PB-INSPEKTOR®



1. Events in fieldbus e.g. „external device diagnosis“

2. Generating an alarm

	0	1	2	3	4	5	6	7	8	9
0	Device 0 Location 0	Device 1 Location 1	Device 2 Location 2	Device 3 Location 3	Device 4 Location 4	Device 5 Location 5	Device 6 Location 6	Device 7 Location 7	Device 8 Location 8	Device 9 Location 9
1	Device 10 Location 10	Device 11 Location 11	Device 12 Location 12	Device 13 Location 13	Device 14 Location 14	Device 15 Location 15	Device 16 Location 16	Device 17 Location 17	Device 18 Location 18	Device 19 Location 19
2	Device 20 Location 20	Device 21 Location 21	Device 22 Location 22	Device 23 Location 23	Device 24 Location 24	Device 25 Location 25	Device 26 Location 26	Device 27 Location 27	Device 28 Location 28	Device 29 Location 29
3	Device 30 Location 30	Device 31 Location 31	Device 32 Location 32	Device 33 Location 33	Device 34 Location 34	Device 35 Location 35	Device 36 Location 36	Device 37 Location 37	Device 38 Location 38	Device 39 Location 39
4	Device 40 Location 40	Device 41 Location 41	Device 42 Location 42	Device 43 Location 43	Device 44 Location 44	Device 45 Location 45	Device 46 Location 46	Device 47 Location 47	Device 48 Location 48	Device 49 Location 49
5	Device 50 Location 50	Device 51 Location 51	Device 52 Location 52	Device 53 Location 53	Device 54 Location 54	Device 55 Location 55	Device 56 Location 56	Device 57 Location 57	Device 58 Location 58	Device 59 Location 59
6	Device 60 Location 60	Device 61 Location 61	Device 62 Location 62	Device 63 Location 63	Device 64 Location 64	Device 65 Location 65	Device 66 Location 66	Device 67 Location 67	Device 68 Location 68	Device 69 Location 69
7	Device 70 Location 70	Device 71 Location 71	Device 72 Location 72	Device 73 Location 73	Device 74 Location 74	Device 75 Location 75	Device 76 Location 76	Device 77 Location 77	Device 78 Location 78	Device 79 Location 79
8	Device 80 Location 80	Device 81 Location 81	Device 82 Location 82	Device 83 Location 83	Device 84 Location 84	Device 85 Location 85	Device 86 Location 86	Device 87 Location 87	Device 88 Location 88	Device 89 Location 89
9	Device 90 Location 90	Device 91 Location 91	Device 92 Location 92	Device 93 Location 93	Device 94 Location 94	Device 95 Location 95	Device 96 Location 96	Device 97 Location 97	Device 98 Location 98	Device 99 Location 99

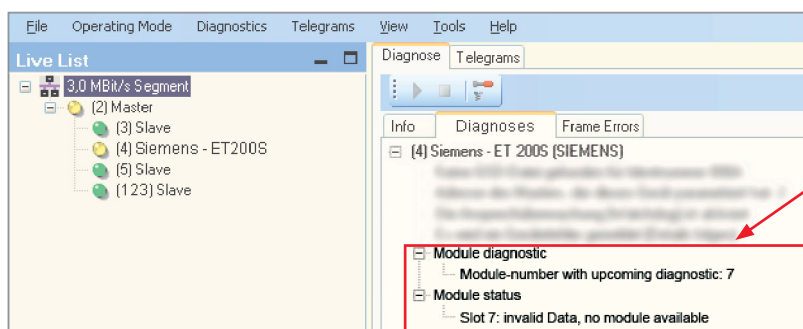
3. View of defective subscriber

Name of the Network: Unknown Network			
<div>Clear Events</div> <div><< Overview</div> <div>Snapshots >></div>			
Date/Time	Event/Parameter	Node Address	Threshold
Do. 16. Apr 2009 14:55:58	External Diagnosis	4	1

4. Time stamp of alarm

5. Telegram recording of fault (snapshot)

Snapshots			<div><< Overview</div>	<div>Event List >></div>
Date/Time	Size	Number of recorded frames		
Do. 16. Apr 2009 14:55:58	6062	609		
To view the Snapshots please use the Software "PROF" TM				



6. Evaluating the telegram recording in diagnosis mode (plain text display)

7. Evaluating the telegram recording in telegram mode

240	14:55:50.057315	2 <- 3	FDL	Response	SC	
249	14:55:50.057319	2 -> 4	DP	Request	DATA EXCHANGE	
250	14:55:50.057324	2 <- 4	DP	Response	DATA EXCHANGE	00 00 00
251	14:55:50.057328	2 -> 5	DP	Request	DATA EXCHANGE	00 00 00
252	14:55:50.057349	2 <- 5	FDL	Response	SC	
253	14:55:50.057352	2.62 -> 4.60	DP	Request	DIAGNOSIS	
254	14:55:50.057361	2.62 <- 4.60	DP	Response	DIAGNOSIS	00 00 00
255	14:55:50.057369	2 -> 123	DP	Request	DATA EXCHANGE	00 00 00
256	14:55:50.057400	2 <- 123	DP	Response	DATA EXCHANGE	00 FE 54
257	14:55:50.057420	2 -> 110	FDL	Request	FDL STATUS	
258	14:55:50.057445	2 -> 2	FDL	Request	TOKEN	
259	14:55:50.057450	2 -> 3	DP	Request	DATA EXCHANGE	
260	14:55:50.057456	2 <- 3	FDL	Response	SC	

8. Measures to eliminate sources of error *prior to Failure !!!*

Logic tester „PROFI-TM“

Function

The PROFI-TM consisting of a hardware and a software component is a tool used to analyse and evaluate the quality of the logic data communication in the PROFIBUS DP and PA. An essential feature of this product is that measurements can be made in the PROFIBUS DP and PA at the same time.

The contact between the hardware component and the bus should be as short as possible distance (max. 10 cm). For this purpose suitable adapters are supplied.

If contacting by adapters is not possible, the active programming cable „APKA“ can be used for distances of up to max. 3 m between the measuring point and the hardware component (Art. No.: 010530). The connection to the software (PC, PG, laptop) is effected through a standardized USB connection.

The software is simple and clearly laid out. Thanks to the clear menu navigation it is easy to switch between the displays „Diagnoses“ and „Telegram“ (Trace).

Advantages

- Protocol analysis for PROFIBUS DP and PA networks and devices
- Scanning and easy-to-survey presentation of the PROFIBUS network structure including all active devices
- Detailed online analysis of all major parameters of the network, PROFIBUS master and connected slaves
- Effective recording and presentation filters
- Large range of triggering options
- Telegram decoding for FDL, DP, DP-V1 and DP-V2
- Telegram recording, also long-term recording
- Automatic drafting of test record
- Intuitive user interface in German and English
- USB interface PROFIprobe with special-purpose diagnostic logic for the most precise results
- Simultaneous and parallel analysis of DP + PA

„Diagnosis“ mode

In „Diagnosis“ mode all bus subscribers are displayed as a tree including address, module name and device symbol (access through GSD file). Through the colour background of each subscriber (green, yellow, red) the subscriber status can be assessed immediately.

	Master status	Slave status
red	STOP	Does not answer in cyclic operation
yellow	CLEAR	Diagnosis (fault) or parameterization
green	OPERATE	Cyclic operation (data exchange)
blue		Not incorporated in DP configuration

Besides the colouring the events are also displayed as plain text and provided with a time stamp.

Slave 10	
Date	Event
12.02.2008 11:00:14.799723	Slave 10 identified
12.02.2008 11:00:14.799723	Slave 10 reports diagnosis
12.02.2008 11:00:29.670216	Slave 10 do not answer (to be parameterized)
12.02.2008 11:00:29.673601	Slave 10 to be parameterized
12.02.2008 11:00:29.677208	Slave 10 reports configuration errors
12.02.2008 11:00:29.680664	Slave 10 reports diagnosis



Fig. 1 - PROFI-TM complete incl. case

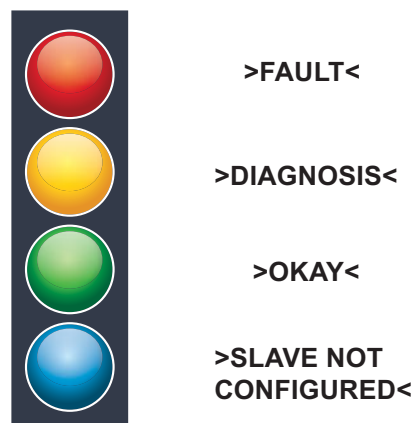


Fig. 2 - Status display

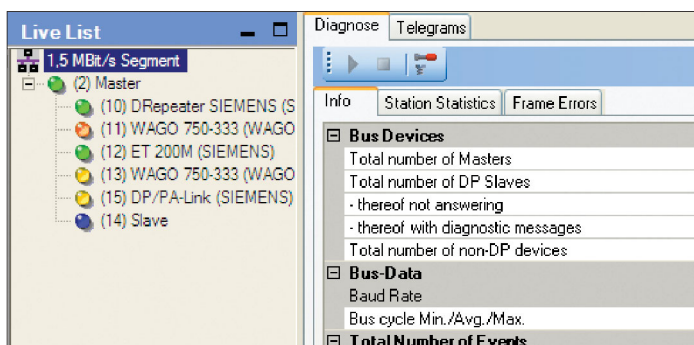


Fig. 3 - „Diagnose“ with Live List

Logic tester „PROFI-TM“

„Telegram“ mode

In the „Telegram“ mode all telegrams are recorded both in the PROFIBUS DP and PA. There are two types, i.e. the „instant recording“ and the „long-term recording“. In both modes an event-oriented start of recording is possible by selectively setting of filters and triggers.

„Instant recording“

This mode should be used if you need a quick survey on the telegram traffic or want to make different bus analyses interactively.

Recorded telegrams are stored in a buffer in the PC memory and can be viewed as „snapshots“ while being recorded (by pressing the space bar).

The capacity of the buffer memory can be adjusted. When it is full the recording is stopped depending on the setting or switched over to ring buffer operation. The residual capacity of the buffer is displayed by a bar in the status line of the Trace mode.

„Long-term recording“

In this mode telegrams are recorded over a longer period and stored directly in one or several files to be viewed and analyzed later.

While the long-term recording is running a window on the right side of the screen indicates which file is currently used for recording, the data volume and number of telegrams already recorded and the duration of recording.

Technical data

- PROFIBUS interface: 9-pole sub-D-connector
galvanically isolated
9.6 kbps - 12 Mbps
- PROFIBUS PA interface: 3-pole screw connector
(for PROFI-TM DP / PA only) galvanically isolated
- USB interface: 31,25 kbps
Version 2.0
- Power supply: 5 V (from USB), < 300 mA
- Temperature range: 0 °C to +55 °C
- Storage temperature: -20 °C to +70 °C
- Dimensions (H x W x D): 69 x 24 x 124 mm
- Protective system: IP20
- Displays (LED): USB status
PROFIBUS status
PROFIBUS PA power
(for PROFI-TM DP / PA only)

Operating systems

- Windows 2000
- Windows XP

Scope of delivery

- PROFI-TM
- Product CD and manual
- Carrying case
- USB cable (3 m)

Ordering details

Art. No.

PROFI-TM DP

010195

PROFI-TM DP / PA

010196



Fig. 4 - Live-List (DP- / PA-Communication)

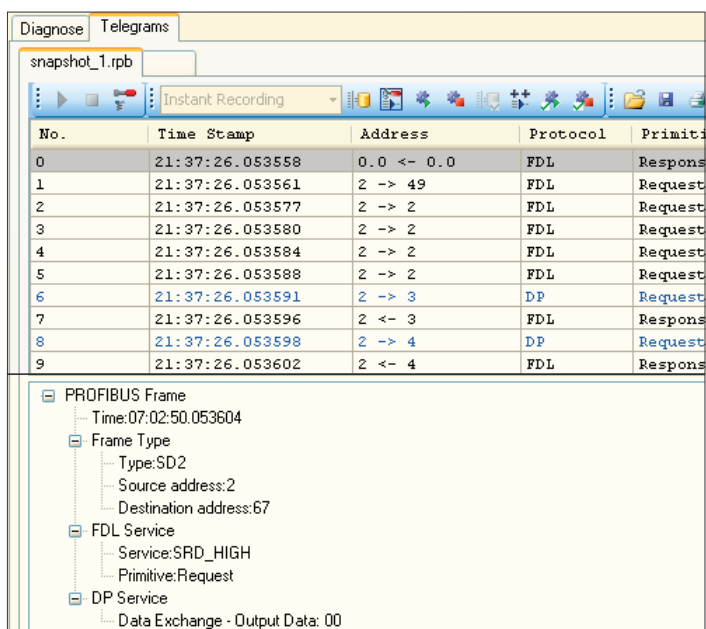


Fig. 5 - Event-oriented telegram recording

	0	1	2	3	4	5	6
0			M	21	3		
10							
20							
30							
40							
50							
60							
70							
80							

Fig. 6 - Subscriber matrix with status display

Universal tester „DM-AM-Kit“

Function

The universal tester „DM-AM-Kit“ is a comprehensive measuring device for the PROFIBUS PA. It is most suitable for commissioning and the quick analysis and elimination of faults.

The hardware is connected with the bus by the connecting cable that comes with the tester. A USB connection connects the hardware with the analysis software of a computer (PC, PG or laptop). With a clamp and a plug-in power pack it can be temporarily installed in a control cabinet for long-term monitoring. Sporadic irregularities on the bus are detected with no need of a permanent connection to the computer. Reports can be generated automatically through an assistant with all norm-related measuring results that can be read at a glance. The high-performance oscilloscope that can also be triggered with rarely occurring events, shows signal characteristics of highest accuracy.

Measuring results - Fault alarms

- **Fieldbus voltage:** The segment voltage is measured between 0 V and 35 V.
- **Earth-fault monitoring:** It measures a potential connection between Fieldbus line and shield.
- **Termination:** Over / under termination is detected and reported.
- **Communication level:** Device-related levels are measured in the range between 0 V and 2.5 V.
- **Jitter:** The jitter of a fieldbus segment has a direct impact on the communication quality of the segment concerned. The power supply quality of the field devices and all other segment components and the cable types and lengths may have an impact on the jitter.
- **Signal polarity:** It is determined for every device.
- **Noise measurement:** The noise signal can be detected for every device address in the range between 100 Hz - 140 kHz.
- **Communication error statistics:** Specific counters, e.g. for CRC and framing errors are displayed.

Approvals

- Conformance statement: TÜV 05 ATEX 2923 X
- Type of protection, temperature class: \neg II 3G EEx nA [nL] IIC T4
- Guideline conformity: RL 94/9 - EG IEC 60079-15

Technical data

- Rated voltage: 20 ... 30 V
- Rated current: 70 ... 30 mA
- Power loss: 0.7 W
- Electromagnetic compatibility: NE 21
- Protective system: IEC 60529
- Shock/Vibration resistance: EN 60068-2-27 / 60068-2-6
- Ambient temperature: -20 °C to 60 °C
- Storage temperature: -40 °C to 85 °C
- Relative air humidity: < 95 % non-condensing
- Shock resistance: 15 g, 11 ms
- Vibration resistance: 1 g, 10 ... 150 Hz
- Dimensions (H x W x D): 114 x 35 x 85 mm


Scope of delivery

- DM-AM kit incl. software package
- Fieldbus cable with test terminals and DM-AM fieldbus connector
- Carrying case and installation instructions
- USB cable (2 m)





Fig. 1 - DM-AM Kit

Segment Tag:

Segment Bus-Communication Status: 

Motherboard Properties

Label	Actual Configuration	Status	Information
Motherboard Properties	Power Hub		
Redundancy	Redundant		
Module A	Galvanic isolated		Excellent
Module B	Galvanic isolated		Excellent

Segment Data

Ignore Secondary Bulk Power Supply when creating Snapshot ☐










Label	Actual Value	Min. Value	Max. Value	Status	Information
Primary Voltage [V]	23.8	23.8	23.8		Excellent
Secondary Voltage [V]	23.8	23.8	23.8		Excellent
Voltage [V]	29.3	29.3	29.3		Excellent
Current [mA]	242.0	242.0	242.0		Excellent
Unbalance [%]	-2.0	-2.0	-2.0		Excellent
Noise [mV]	20.0	15.0	20.0		Excellent
Jitter [us]	0.6	0.5	0.6		Excellent
Min. Signal Level [mV]	626.0	620.0			Excellent
Max. Signal Level [mV]	630.0		630.0		Excellent

Fig. 2 - Segment assessment

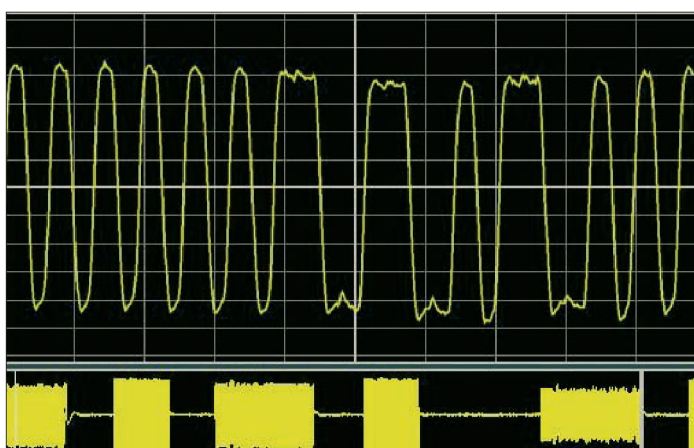


Fig. 3 - Oscilloscope function

Ordering details	Art. No.
DM-AM-Kit	010002
DTM-FC-ADM (licence)	010003

Universal tester „PAtest“

Function

The universal tester „PAtest“ for the PROFIBUS PA is used for the feedback-free measurement of the following parameters, also in explosion-hazardous zones:

- Segment testing with display “OK / BAD”
- Identification of the number of devices in the segment concerned
- Live-list display
- Log-on and log-out of subscribers
- Error and repeat telegrams
- Display of segment voltage
- Display of signal level of all devices
- Short-circuit detection between signal cores and cable shield
- Measurement of noise level average and peak

The PAtest can store test records of 8 segments in an internal memory.

Bus connection

The device is supplied directly via the PROFIBUS PA and so it needs neither a battery nor an external power supply. This makes the PAtest suitable for use in explosions-hazardous zones. Via a USB interface the stored test records are transmitted to the PC where they can be analysed with Microsoft® Excel.

Approvals

- CE / FCC / ATEX Ex ia IIC T4
- FM US ad Canada:
 - Class I, Div 2, ABCD, T4
 - Class I, Zone 2, IIC T4
 - Class I, Div 1, ABCD, T4
 - Class I, Zone 0 und 1, AEx/Ex ia IIC T4

Technical data

- Input voltage:
 - field bus operation: 8 to 32 V DC
 - USB operation: 4.1 to 5.5 V DC
- Input current:
 - fieldbus operation: max. 10 mA
 - USB operation: max. 30 mA
- Power loss:
 - fieldbus operation: max. 320 mW (at 32 V DC)
 - USB operation: max. 165 mW (at 5.5 V DC)
- Temperature range: -20 to +50 °C
- Dimensions (L x W x D): 146 x 88 x 28 mm
- Weight: 378 g
- Direct voltage measuring range: 8 to 32 ± 0.5 V DC
- Signal level measuring range: 0.12 to 2 Vss ± 10 % ± 25 mVss

Operating systems

- Windows 2000
- Windows XP
- Windows Server 2003
- Windows Vista

Scope of delivery

- PAtest incl. MBP and USB interface
- Connecting cable incl. measurement adapters
- USB cable

Ordering details

PAtest

Art. No.

010001



Fig. 1 - PAtest

Report 4 Segment Report			
Segment Measurements	Data	Acceptable Values	OK/BAD
Voltage	31.6V	9.0V Minimum	OK
Lowest Device Signal	1358mV	151mV Minimum	OK
Lowest Device Signal Address	2 (2H)		
Avg Fieldbus Frequency Noise	0mV	74mV Maximum	OK
Peak Fieldbus Frequency Noise	0mV	74mV Maximum	OK
Avg Low Frequency Noise	0mV	149mV Maximum	OK
Peak Low Frequency Noise	5mV	149mV Maximum	OK
Avg High Frequency Noise	0mV	149mV Maximum	OK
Peak High Frequency Noise	10mV	149mV Maximum	OK
Shield Short	No Shorts	No Shorts	OK
Most Recent Add/Drop Address	No Devices Added/Dropped		
Device Add or Drop	None Added/Dropped	None Added/Dropped	OK
Number of Active Devices	3		

Device Measurements	Data	Acceptable Values	OK/BAD
Device Address	2 (2H)		
Signal Level	1392mV	151mV Minimum	OK
Added/Dropped	Not Added/Dropped	Not Added/Dropped	OK
Master or Slave	Master		
Retransmits	0	0	OK
Device Address	21 (15H)		
Signal Level	1450mV	151mV Minimum	OK
Added/Dropped	Not Added/Dropped	Not Added/Dropped	OK
Master or Slave	Slave		
Retransmits	0	0	OK
Device Address	22 (16H)		
Signal Level	1424mV	151mV Minimum	OK
Added/Dropped	Not Added/Dropped	Not Added/Dropped	OK
Master or Slave	Slave		
Retransmits	0	0	OK

Measurement Summary: All Measurements are OK

Fig. 2 - Report

Decentralized data logger „CB-INspektor®“

Function

The CB-INspektor® is a passive data logger for the CAN fieldbus. The traffic light colours (green, yellow, red) highlight the status of the subscriber and provide detailed information on faults, such as

- error telegrams,
- device diagnoses,
- network utilization and
- device failures.

All network data logged are totalled per subscriber and stored and can be retrieved either via the web-based user interface of the CB-INspektor® or the Ethernet using the standardized SNMP query protocol and the management software PROmanage®. Because of the large variety of implemented CAN protocols three different CB-INspektors® are available to the user.

Technical data

- Voltage supply: 24 V DC +/-20 %, typ. 0.3 A
- CAN:
 - Protocols: CAN, CANopen, DeviceNet, SafetyBUS p
 - Connection: 9-pole sub-D
 - Baud rate: 9.6 kbps - 1 Mbps
- Ethernet
 - Baud rate: 100BASE-TX / 10BASE-TX
 - Connection: RJ45

General data

- Montage: 35 mm DIN top-hat rail
- Dimensions (H x W x D): 131 x 110 x 111 mm
- Protective system: IP20
- Ambient temperature: 5 °C to 70 °C
- Storage temperature: -20 °C to 70 °C



Fig. 1 - CB-INspektor®



Fig. 2 - Live List

Graphic display of logic quality parameters in network, early warning alarm when thresholds are exceeded.

Ordering details	Art. No.
CB-INspektor® CAN / CANopen	061410
CB-INspektor® DeviceNet	061420
CB-INspektor® SafetyBUS p	061430

Accessories

PROmanage®	020154
Ethernet patch cable	021801
Ethernet patch cable „Crossover“	021800
Power pack 2.5 A	010951

Line tester „CANtest“

Function

CANtest is a simple and easy-to-handle tool for inspecting the correct cabling on CAN networks using RS-485 transmission technique.

By using CANtest, you will have a quick and simple overview on the cabling state both when starting up the system or performing a troubleshooting job. Handling is easy and menu driven. To operate this tool, you need not have any special expertise. The detected data is represented in a measuring record which can be stored in the device or read out by the supplied PC software. The tool itself is delivered in a robust carrying case. The below mentioned errors are detected and localized. Since in most installation procedures, no attention is paid either to what points are connected by a wired line or what length a line segment really has, the CANtest tool provide a special feature for this purpose.

Measuring results

Wiring tests (Offline)

- Inspecting the terminating resistors
- Checking the Bus cable conductors for short circuits

Cable shield tests (Offline)

- Checking the cable shield for interruption

Line length measurements (Offline)

- Measuring Bus line lengths greater than 25 m.
- Determining the location of a short circuit between CAN_H and CAN_L

Signal tests (Online)

- Transmission rate test
- Test of the electrical signal levels on the lines CAN_H and CAN_L
- Test of the signal edges on the lines CAN_H and CAN_L

Real time Measurements (Online)

- Measuring the Bus load
- Measuring the frequency, rate and number of errors

Technische Daten

- Hard disk: approx. 1 Mb of available space
- USB interface
- Industrial protection: IP30, with the plugged on battery
- Weight: 510 g
- Dimensions (H x W x D): 232 x 97 x 52 mm

Operating systems

- Windows 98 / Windows ME / Windows 2000 / Windows XP

Scope of delivery

- Plastic carrying case
- CANtest tool including battery
- Shorting plug for cable shield test
- Adapter cable for Bus connection
- USB cable to connect CANtest tool to PC
- Battery charger
- Operating instructions
- CD containing the upload software to record the test results on a PC

Ordering details

Art. No.

CANtest

010152



Fig. 1 - Line tester CANtest

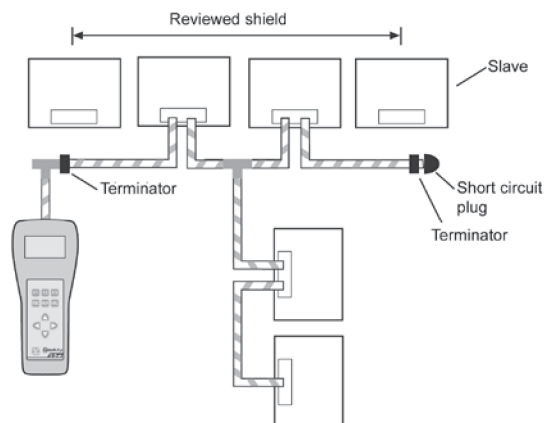


Fig. 2 - Application example

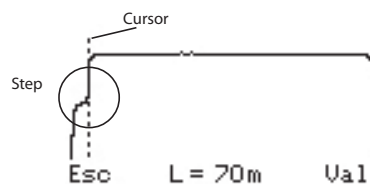


Fig. 3 - Display example „Localization“

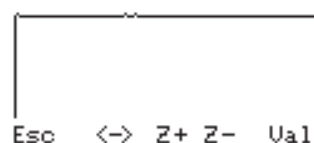


Fig. 4 - Display example „Terminating resistor“

Quality tester „CANBUSview XL“

Function

The CANBUSview XL is a tool for determining the physical and logic communication quality of the data exchange in CAN networks. The measurement is performed online while the system is running. By means of an adapter the hardware is plugged feedback-free onto the CAN. The measuring and test results are displayed through a software on your PC. A standardized USB interface is used for the connection to the PC. We recommend to use the two ends of each segment/master system as measuring location in the CAN network. For this purpose suitable measuring points have to be provided.

The measuring principle

CAN protocols:

With the CANBUSview XL various CAN protocols can be analysed and evaluated in terms of quality, such as CAN, CANopen, SafetyBUS p and DeviceNet. Prior to the measurement the user is requested to select the relevant CAN protocol.

Physical quality determination:

Signal quality

The CAN bus works with a differential voltage signal transmitting the logic telegram content to the lines CAN-H and CAN-L. The amount of the voltage differential and the form of these signals are a measure of the physical transmission quality and signal quality. Every bit undergoes a 64-fold scan. Major parameters used for the analysis are edge steepness, signal-to-noise voltage ratio and ripple of the CAN signal. The measuring result is recorded over the time and as Q-value in the form of a bar chart. This measuring technique allows an easy and quick determination of the actual quality of the data communication.

Wiring test

To ensure a correct bus wiring, the CANBUSview XL has an integrated wiring test. Any line short-circuits, line break, missing or additional terminating resistor can be detected and eliminated. In addition the loop resistances of the CAN line and the CAN current supply line and the total line length are determined.

Logic quality determination:

Parallel to the physical transfer quality determination the CANBUSview XL checks the telegram traffic for defective telegrams, missing acknowledgements and overload of bus subscribers as well as the general bus capacity utilization. The online trigger is used to analyse the communication quality over several days / weeks. This helps to detect sporadic communication faults and allocate the same to a certain period of time. The online trigger is capable of analysing physical and logic faults.



Fig. 1 - Quality tester CANBUSview XL

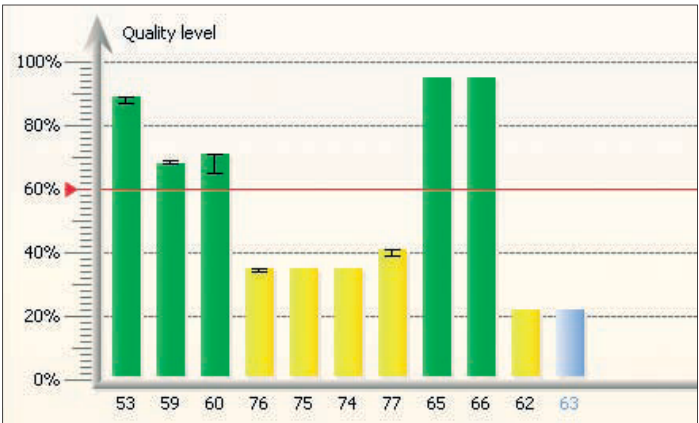


Fig. 2 - Bar chart

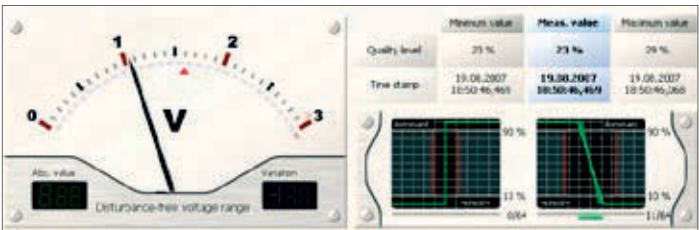


Fig. 3 - Individual measurement



Error				
D-Sub 9 connector				
Connector	Pin	Signal	Error	Designation
 Male	7	CAN_H		Line-break test: An interrupt at CAN_H was found. Please solve the problem.
	2	CAN_L		
	5	CAN_SHLD		
	9	CAN_V+		
	6	CAN_V-		

Fig. 4 - Wiring test

Ordering details	Art. No.
CANBUSview XL for CAN, CANopen, SafetyBUS p	010158
CANBUSview XL for DeviceNet	010159

Logic tester „ASi Scope“

Function

The ASi Scope tool is a simple and easy-to-handle tool to check the correct communication on the ASi BUUs. The measurements are performed online, i.e. with the ASi master connected.

For this purpose the ASi Scope is connected feedback-free with the line through an insulation piercing contact. The connection should be located near the ASi power pack. The handling of the software is easy and menu-navigated. The ASi Scope is capable of analysing the ASi communication over a longer period of time with no need to be connected to a PC. The recorded data are then read out from a PC. To operate the statistics module (Fig. 2) no specific knowledge is needed because the status of communication is signalled by the traffic light colours (green, yellow, red). Certain knowledge of the ASi telegram structure is recommended, however, for the switch over to the telegram mode (Fig. 3). Bundle errors indicate the quality of the communication (Fig. 4). For the data collected a test record is made out.

Measuring results

- Determining the active users and their network availability
- Number of error telegrams per user
- Traffic light picture of communication ability of each slave
- Telegram traffic on the Bus according to the selectable filter and trigger options
- ASi-Bus voltage
- Actual bus cycle time

Technical data

- Applicable to ASi Bus in accordance with the ASi Association
- Power supply via active ASi Bus
- Transmission of the measured data to the PC via serial standard interface (RS232)
- Dimensions (H x W x D): 140 x 90 x 30 mm

Operating systems

- Windows NT4
- Windows 2000
- Windows XP

Scope of delivery

- ASi Scope hard- und software
- Several adapters for connection to ASi Bus as well as external triggers
- A comprehensive auxiliary function included in software package
- Reference book titled „ASi Physical State and Telegram Structure“

Ordering details

ASi Scope

Art. No.

010180



Fig. 1 - Logic tester ASi Scope

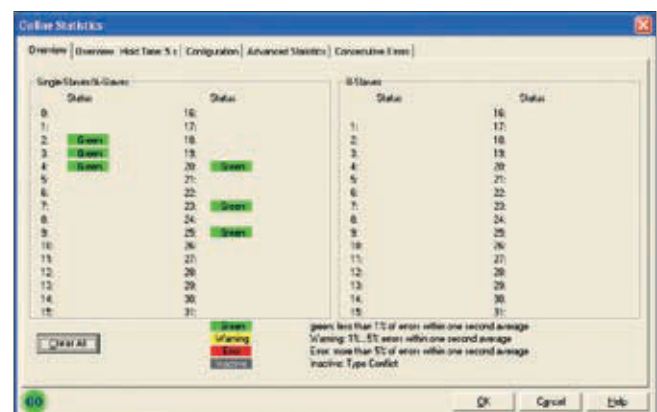


Fig. 2 - Statistics mode

Pos.	Telegram	Slave	Master Data	CSH4	CSH5	CSH6	CSH7	CSH8	CSH9	CSH10	CSH11	CSH12	CSH13	CSH14	CSH15	CSH16	CSH17	CSH18	CSH19	CSH20	CSH21	CSH22	CSH23	CSH24	CSH25	CSH26	CSH27	CSH28	CSH29	CSH30	CSH31	CSH32	CSH33	CSH34	CSH35	CSH36	CSH37	CSH38	CSH39	CSH40	CSH41	CSH42	CSH43	CSH44	CSH45	CSH46	CSH47	CSH48	CSH49	CSH50	CSH51	CSH52	CSH53	CSH54	CSH55	CSH56	CSH57	CSH58	CSH59	CSH60	CSH61	CSH62	CSH63	CSH64	CSH65	CSH66	CSH67	CSH68	CSH69	CSH70	CSH71	CSH72	CSH73	CSH74	CSH75	CSH76	CSH77	CSH78	CSH79	CSH80	CSH81	CSH82	CSH83	CSH84	CSH85	CSH86	CSH87	CSH88	CSH89	CSH90	CSH91	CSH92	CSH93	CSH94	CSH95	CSH96	CSH97	CSH98	CSH99	CSH100	CSH101	CSH102	CSH103	CSH104	CSH105	CSH106	CSH107	CSH108	CSH109	CSH110	CSH111	CSH112	CSH113	CSH114	CSH115	CSH116	CSH117	CSH118	CSH119	CSH120	CSH121	CSH122	CSH123	CSH124	CSH125	CSH126	CSH127	CSH128	CSH129	CSH130	CSH131	CSH132	CSH133	CSH134	CSH135	CSH136	CSH137	CSH138	CSH139	CSH140	CSH141	CSH142	CSH143	CSH144	CSH145	CSH146	CSH147	CSH148	CSH149	CSH150	CSH151	CSH152	CSH153	CSH154	CSH155	CSH156	CSH157	CSH158	CSH159	CSH160	CSH161	CSH162	CSH163	CSH164	CSH165	CSH166	CSH167	CSH168	CSH169	CSH170	CSH171	CSH172	CSH173	CSH174	CSH175	CSH176	CSH177	CSH178	CSH179	CSH180	CSH181	CSH182	CSH183	CSH184	CSH185	CSH186	CSH187	CSH188	CSH189	CSH190	CSH191	CSH192	CSH193	CSH194	CSH195	CSH196	CSH197	CSH198	CSH199	CSH200	CSH201	CSH202	CSH203	CSH204	CSH205	CSH206	CSH207	CSH208	CSH209	CSH210	CSH211	CSH212	CSH213	CSH214	CSH215	CSH216	CSH217	CSH218	CSH219	CSH220	CSH221	CSH222	CSH223	CSH224	CSH225	CSH226	CSH227	CSH228	CSH229	CSH230	CSH231	CSH232	CSH233	CSH234	CSH235	CSH236	CSH237	CSH238	CSH239	CSH240	CSH241	CSH242	CSH243	CSH244	CSH245	CSH246	CSH247	CSH248	CSH249	CSH250	CSH251	CSH252	CSH253	CSH254	CSH255	CSH256	CSH257	CSH258	CSH259	CSH260	CSH261	CSH262	CSH263	CSH264	CSH265	CSH266	CSH267	CSH268	CSH269	CSH270	CSH271	CSH272	CSH273	CSH274	CSH275	CSH276	CSH277	CSH278	CSH279	CSH280	CSH281	CSH282	CSH283	CSH284	CSH285	CSH286	CSH287	CSH288	CSH289	CSH290	CSH291	CSH292	CSH293	CSH294	CSH295	CSH296	CSH297	CSH298	CSH299	CSH300	CSH301	CSH302	CSH303	CSH304	CSH305	CSH306	CSH307	CSH308	CSH309	CSH310	CSH311	CSH312	CSH313	CSH314	CSH315	CSH316	CSH317	CSH318	CSH319	CSH320	CSH321	CSH322	CSH323	CSH324	CSH325	CSH326	CSH327	CSH328	CSH329	CSH330	CSH331	CSH332	CSH333	CSH334	CSH335	CSH336	CSH337	CSH338	CSH339	CSH340	CSH341	CSH342	CSH343	CSH344	CSH345	CSH346	CSH347	CSH348	CSH349	CSH350	CSH351	CSH352	CSH353	CSH354	CSH355	CSH356	CSH357	CSH358	CSH359	CSH360	CSH361	CSH362	CSH363	CSH364	CSH365	CSH366	CSH367	CSH368	CSH369	CSH370	CSH371	CSH372	CSH373	CSH374	CSH375	CSH376	CSH377	CSH378	CSH379	CSH380	CSH381	CSH382	CSH383	CSH384	CSH385	CSH386	CSH387	CSH388	CSH389	CSH390	CSH391	CSH392	CSH393	CSH394	CSH395	CSH396	CSH397	CSH398	CSH399	CSH400	CSH401	CSH402	CSH403	CSH404	CSH405	CSH406	CSH407	CSH408	CSH409	CSH410	CSH411	CSH412	CSH413	CSH414	CSH415	CSH416	CSH417	CSH418	CSH419	CSH420	CSH421	CSH422	CSH423	CSH424	CSH425	CSH426	CSH427	CSH428	CSH429	CSH430	CSH431	CSH432	CSH433	CSH434	CSH435	CSH436	CSH437	CSH438	CSH439	CSH440	CSH441	CSH442	CSH443	CSH444	CSH445	CSH446	CSH447	CSH448	CSH449	CSH450	CSH451	CSH452	CSH453	CSH454	CSH455	CSH456	CSH457	CSH458	CSH459	CSH460	CSH461	CSH462	CSH463	CSH464	CSH465	CSH466	CSH467	CSH468	CSH469	CSH470	CSH471	CSH472	CSH473	CSH474	CSH475	CSH476	CSH477	CSH478	CSH479	CSH480	CSH481	CSH482	CSH483	CSH484	CSH485	CSH486	CSH487	CSH488	CSH489	CSH490	CSH491	CSH492	CSH493	CSH494	CSH495	CSH496	CSH497	CSH498	CSH499	CSH500	CSH501	CSH502	CSH503	CSH504	CSH505	CSH506	CSH507	CSH508	CSH509	CSH510	CSH511	CSH512	CSH513	CSH514	CSH515	CSH516	CSH517	CSH518	CSH519	CSH520	CSH521	CSH522	CSH523	CSH524	CSH525	CSH526	CSH527	CSH528	CSH529	CSH530	CSH531	CSH532	CSH533	CSH534	CSH535	CSH536	CSH537	CSH538	CSH539	CSH540	CSH541	CSH542	CSH543	CSH544	CSH545	CSH546	CSH547	CSH548	CSH549	CSH550	CSH551	CSH552	CSH553	CSH554	CSH555	CSH556	CSH557	CSH558	CSH559	CSH560	CSH561	CSH562	CSH563	CSH564	CSH565	CSH566	CSH567	CSH568	CSH569	CSH570	CSH571	CSH572	CSH573	CSH574	CSH575	CSH576	CSH577	CSH578	CSH579	CSH580	CSH581	CSH582	CSH583	CSH584	CSH585	CSH586	CSH587	CSH588	CSH589	CSH590	CSH591	CSH592	CSH593	CSH594	CSH595	CSH596	CSH597	CSH598	CSH599	CSH600	CSH601	CSH602	CSH603	CSH604	CSH605	CSH606	CSH607	CSH608	CSH609	CSH610	CSH611	CSH612	CSH613	CSH614	CSH615	CSH616	CSH617	CSH618	CSH619	CSH620	CSH621	CSH622	CSH623	CSH624	CSH625	CSH626	CSH627	CSH628	CSH629	CSH630	CSH631	CSH632	CSH633	CSH634	CSH635	CSH636	CSH637	CSH638	CSH639	CSH640	CSH641	CSH642	CSH643	CSH644	CSH645	CSH646	CSH647	CSH648	CSH649	CSH650	CSH651	CSH652	CSH653	CSH654	CSH655	CSH656	CSH657	CSH658	CSH659	CSH660	CSH661	CSH662	CSH663	CSH664	CSH665	CSH666	CSH667	CSH668	CSH669	CSH670	CSH671	CSH672	CSH673	CSH674	CSH675	CSH676	CSH677	CSH678	CSH679	CSH680	CSH681	CSH682	CSH683	CSH684	CSH685	CSH686	CSH687	CSH688	CSH689	CSH690	CSH691	CSH692	CSH693	CSH694	CSH695	CSH696	CSH697	CSH698	CSH699	CSH700	CSH701	CSH702	CSH703	CSH704	CSH705	CSH706	CSH707	CSH708	CSH709	CSH710	CSH711	CSH712	CSH713	CSH714	CSH715	CSH716	CSH717	CSH718	CSH719	CSH720	CSH721	CSH722	CSH723	CSH724	CSH725	CSH726	CSH727	CSH728	CSH729	CSH730	CSH731	CSH732	CSH733	CSH734	CSH735	CSH736	CSH737	CSH738	CSH739	CSH740	CSH741	CSH742	CSH743	CSH744	CSH745	CSH746	CSH747	CSH748	CSH749	CSH750	CSH751	CSH752	CSH753	CSH754	CSH755	CSH756	CSH757	CSH758	CSH759	CSH760	CSH761	CSH762	CSH763	CSH764	CSH765	CSH766	CSH767	CSH768	CSH769	CSH770	CSH771	CSH772	CSH773	CSH774	CSH775	CSH776	CSH777	CSH778	CSH779	CSH780	CSH781	CSH782	CSH783	CSH784	CSH785	CSH786	CSH787	CSH788	CSH789	CSH790	CSH791	CSH792	CSH793	CSH794	CSH795	CSH796	CSH797	CSH798	CSH799	CSH800	CSH801	CSH802	CSH803	CSH804	CSH805	CSH806	CSH807	CSH808	CSH809	CSH810	CSH811	CSH812	CSH813	CSH814	CSH815	CSH816	CSH817	CSH818	CSH819	CSH820	CSH821	CSH822	CSH823	CSH824	CSH825	CSH826	CSH827	CSH828	CSH829	CSH830	CSH831	CSH832	CSH833	CSH834	CSH835	CSH836	CSH837	CSH838	CSH839	CSH840	CSH841	CSH842	CSH843	CSH844	CSH845	CSH846	CSH847	CSH848	CSH849	CSH850	CSH851	CSH852	CSH853	CSH854	CSH855	CSH856	CSH857	CSH858	CSH859	CSH860	CSH861	CSH862	CSH863	CSH864	CSH865	CSH866	CSH867	CSH868	CSH869	CSH870	CSH871	CSH872	CSH873	CSH874	CSH875	CSH876	CSH877	CSH878	CSH879	CSH880	CSH881	CSH882	CSH883	CSH884	CSH885	CSH886	CSH887	CSH888	CSH889	CSH890	CSH891	CSH892	CSH893	CSH894	CSH895	CSH896	CSH897	CSH898	CSH899	CSH900	CSH901	CSH902	CSH903	CSH904	CSH905	CSH906	CSH907	CSH908	CSH909	CSH910	CSH911	CSH912	CSH913	CSH914	CSH915	CSH916	CSH917	CSH918	CSH919	CSH920	CSH921	CSH922	CSH923	CSH924	CSH925	CSH926	CSH927	CSH928	CSH929	CSH930	CSH931	CSH932	CSH933	CSH934	CSH935	CSH936	CSH937	CSH938	CSH939	CSH940	CSH941	CSH942	CSH943	CSH944	CSH945	CSH946	CSH947	CSH948	CSH949	CSH950	CSH951	CSH952	CSH953	CSH954	CSH955	CSH956	CSH957	CSH958	CSH959	CSH960	CSH961	CSH962	CSH963	CSH964	CSH965	CSH966	CSH967	CSH968	CSH969	CSH970	CSH971	CSH972	CSH973	CSH974	CSH975	CSH976	CSH977	CSH978	CSH979	CSH980	CSH981	CSH982	CSH983	CSH984	CSH985	CSH986	CSH987	CSH988	CSH989	CSH990	CSH991	CSH992	CSH993	CSH994	CSH995	CSH996	CSH997	CSH998	CSH999	CSH1000	CSH1001	CSH1002	CSH1003	CSH1004	CSH1005	CSH1006	CSH1007	CSH1008	CSH1009	CSH1010	CSH1011	CSH1012	CSH1013	CSH1014	CSH1015	CSH1016	CSH1017	CSH1018	CSH1019	CSH1020	CSH1021	CSH1022	CSH1023	CSH1024	CSH1025	CSH1026	CSH1027	CSH1028	CSH1029	CSH1030	CSH1031	CSH1032	CSH1033	CSH1034	CSH1035	CSH1036	CSH1037	CSH1038	CSH1039	CSH1040	CSH1041	CSH1042	CSH1043	CSH1044	CSH1045	CSH1046	CSH1047	CSH1048	CSH1049	CSH1050	CSH1051	CSH1052	CSH1053	CSH1054	CSH1055	CSH1056	CSH1057	CSH1058	CSH1059	CSH1060	CSH1061	CSH1062	CSH1063	CSH1064	CSH1065	CSH1066	CSH1067	CSH1068	CSH1069	CSH1070	CSH1071	CSH1072	CSH1073	CSH1074	CSH1075	CSH1076	CSH1077	CSH
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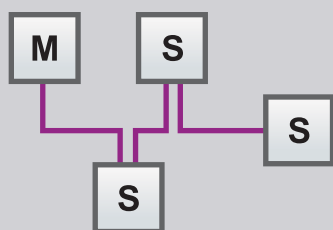
Introduction to Ethernet

INDUSTRIAL ETHERNET

Solutions and services for industrial communication

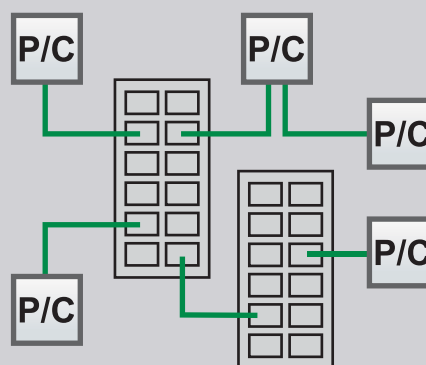
With the introduction of the SINEC H1 Bus in 1985 the Ethernet-based communication found its way into automation technology. The constantly growing data flow, however, brings these systems to their limits. These limits are overcome by the development of the industrial Ethernet to PROFINET. Since the initial presentation of PROFINET in 2000 by the PROFIBUS-Nutzerorganisation e.V. (user organization) more and more existing systems have been converted and new ones are provided with it from the beginning. This standard allows a seamless connection of field level and IT. The combining of these two areas which could not be more different, makes a network analysis inevitable. Every system maintenance engineer should be able and in a position to analyse and evaluate the fieldbus under his responsibility. Early signs of problems in the Ethernet / PROFINET are, for example, error telegrams, excessive utilization or reduced bus speed.

PROFIBUS



Master/Slave principle

PROFINET



Provider/Consumer model

Industrial Switch - general

Since the Ethernet is nothing but a sequence of point-to-point connections, active components are necessary that 'interconnect' the connections. We distinguish between Hub and Switch with hubs no longer been used in industrial networks. Switches are smart hubs and forward the desired connection to reduce the network load. While passing the switch the telegrams are checked for possible errors.

Unmanaged Switch

Can be used as switch by plug and play without restrictions are applicable as a Switch and meet the minimum requirements described above.

Managed Switch

Can also be used as plug and play but have considerably more functions. The main reason, however, why to use managed switches is the fact that the monitoring of the telegram traffic, such as number of faulty telegrams/port, utilization/port done by the switch is available as statistical information for fault location or network status definition. As a basic rule: „Never trust an active network component that cannot tell you how it feels.“



PRO ACTIVE NETWORK MANAGEMENT

„Time is money“ - Only one saying or everyday reality?

When it comes to using or transferring information, the importance of an unrestricted, reliable and stable network can hardly be expressed more appropriately than by the above saying. It is Indu-Sol's intent to explain the functioning of industrial networks. „If everything runs smoothly, the world is perfect ...!“ Unfortunately, experiences of the last few years have also taught us differently - critical areas and weak points of the network start generating much earlier but become apparent not before the network fails.

Example: When we run a network 100 MBit /FDX (full duplex), the degree of utilisation is usually 5%. Let's assume a line breaks, data exchange will automatically switch over to 'halfduplex' because of the intelligence of our users. The relations in the network start changing without anyone outside noticing it.

Kleine Ursache - große Wirkung

To avoid collisions, now all users communicate on the CSMA / CD principle leading automatically to a higher network utilisation. Adding to that are the risk of data loss and timeout.

Acting comes before reacting

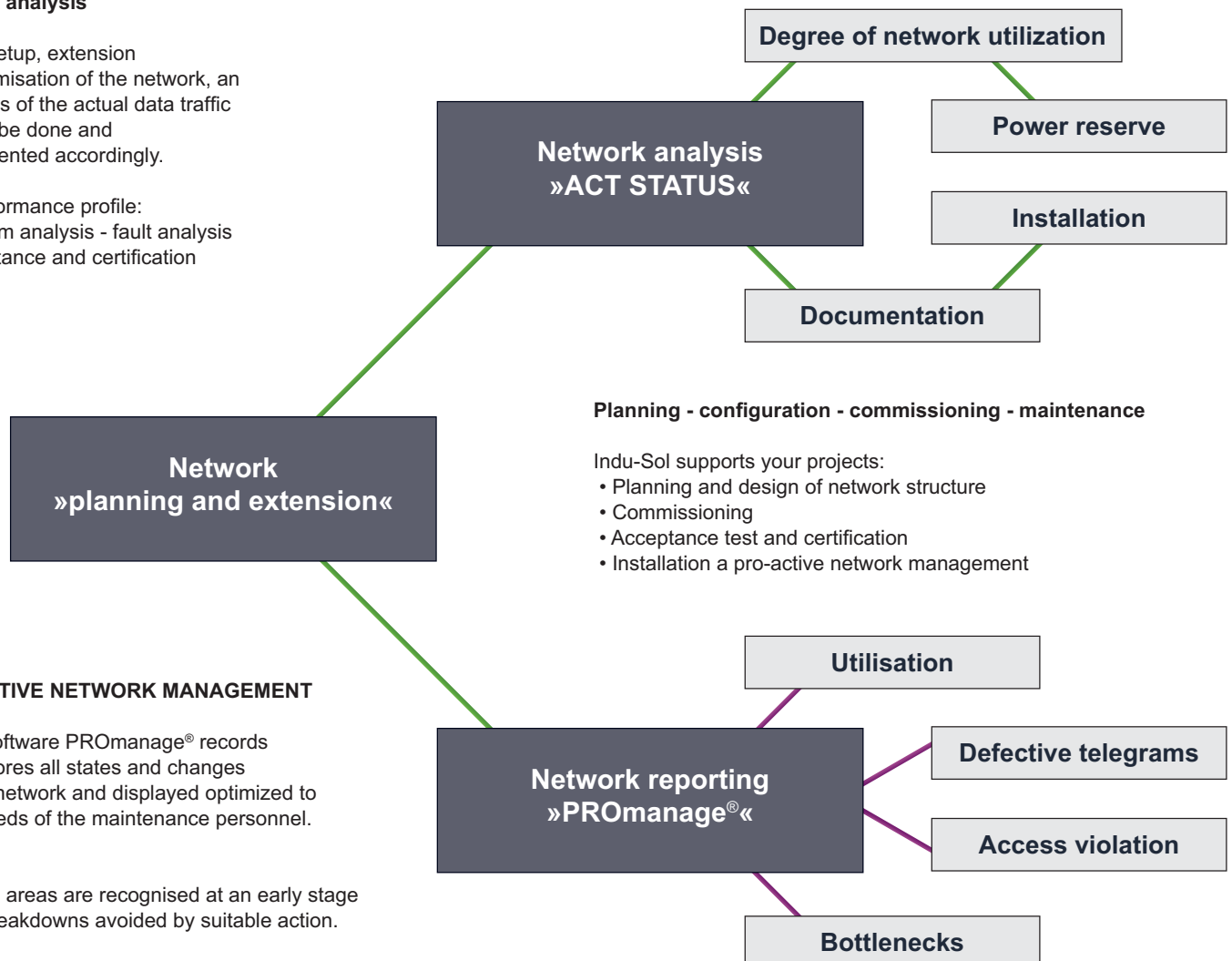
„PROmanage®“ is an industrial Ethernet analyzer software providing in connection with the manageable switches a comprehensive picture of all events in the respective monitored network segment. A statistics module can record data over several hours and days.

Network analysis

- After setup, extension or optimisation of the network, an analysis of the actual data traffic has to be done and documented accordingly.

Our performance profile:

- Problem analysis - fault analysis
- Acceptance and certification



Planning - configuration - commissioning - maintenance

Indu-Sol supports your projects:

- Planning and design of network structure
- Commissioning
- Acceptance test and certification
- Installation a pro-active network management

PRO ACTIVE NETWORK MANAGEMENT

- The Software PROmanage® records and stores all states and changes in the network and displayed optimized to the needs of the maintenance personnel.
- Critical areas are recognised at an early stage and breakdowns avoided by suitable action.

PRO ACTIVE NETWORK MAINTENANCE

Warning of failure!

Network monitoring software „PROmanage®“

Function

PROmanage® is a central software (incl. database) to analyze, manage and store data of the communication quality in industrial networks. By using the standard SNMP queries all port statistics of the manageable switches can be queried at minute intervals and stored with a time stamp, for example. With this sophisticated analytical technique irregularities can be detected immediately and adjustable thresholds trigger an alarm. Through this statistics function the data are available to the minute up to one year. Thus historic events, such as sporadic failures, can be tracked at any time and used for cause study.

Logging of network data (SNMP)

The network data are logged by the standardized Ethernet protocol „SNMP“ (Simple Network Management Protocol). At a pre-defined interval all INspektors® and switches are queried cyclically by the management software PROmanage® (standard: 1 minute) and the data stored in a MySQL database.

Display of network data

All collected network data can be displayed on every PC in the network via a web-based interface. The existing Internet browser (Microsoft Internet Explorer or Mozilla Firefox) is used for this purpose. No other software needs to be installed to display the network data. These data are available to the user as statistics (reports) and event messages (event lists).

Statistics (reports)

Based on PROmanage® a large number of graphic reports with current and historic data can be produced. Depending on the application chronological sequences of the network performance and device-related fault rate can be shown.

Event messages

With the integrated threshold management limits can be defined for every network parameter. When these limits are reached the event is entered in the event list together with a time and description. Network faults can thus be retrieved by fast click.

Alarms

An implemented alarm management forwards event messages automatically. By selecting a modern information medium (e-mail, news service) all messages can be transferred to the responsible unit in a timely manner. Transmitting routes can thus be shortened and undesired plant shutdowns avoided.

Note

In the Ethernet one Device is equal to eight switch ports.
Example: For one manageable switch of 32 ports the resources of 4 Devices have to be reserved in the PROmanage®.

Ordering details

PROmanage®
max. 5 devices (SNMP-capable)

PROmanage®
max. 20 devices (SNMP-capable)

Art. No.

020155

020154

Others available on request!



Fig. 1 - Network monitoring software „PROmanage®“

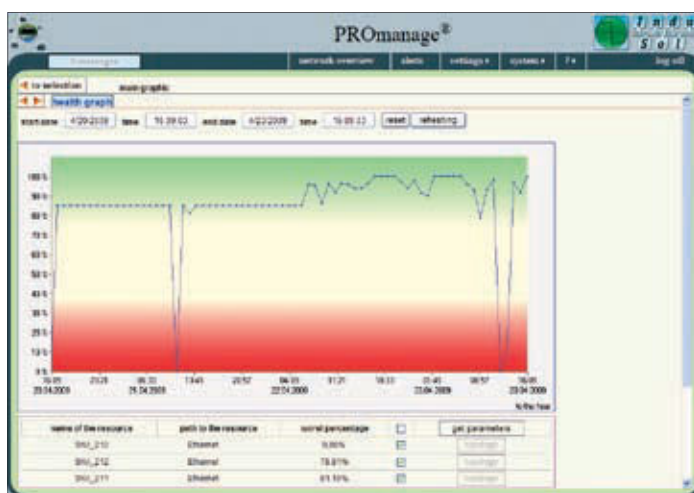


Fig. 2 - State graph

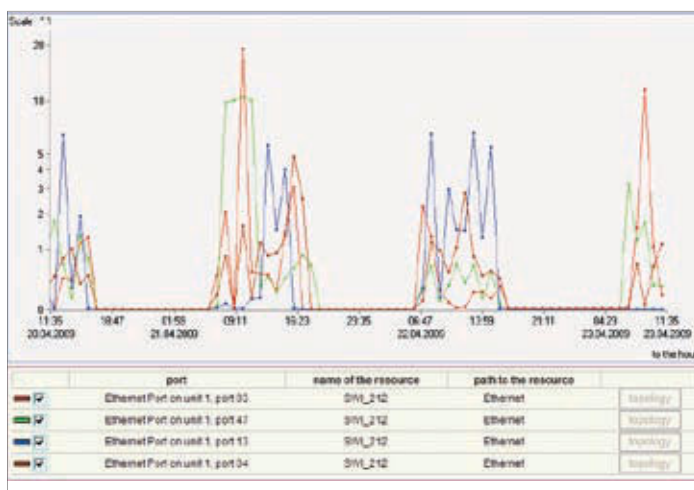


Fig. 3 - Network utilization

Line tester „ETHERtest II“

Funktion

The ETHERtest II is an indispensable measuring device to check, document and certify a network infrastructure. It has two areas of performance:

Line test mode

It includes all necessary measurements needed to certify networks up to category 6 (350 MHz) such as line length, damping, resistance, crosstalk, delay, shield and wiring diagram. All measurements are graphically displayed. A locator helps to define the type and exact location of a fault. A certification record is issued.

To carry out the line test, it is necessary to have a remote station (Dual Remote).

Network test mode

ETHERtest II lists independently lists all stations transmitting in network mode. The network load is also displayed. Functions such as Ping, Traceroute and Traffic Generator are available.

Device Interfaces

- Line test RJ45 port (optical fiber available as accessory equipment)
- Serial interface for transmitting the measured results onto the PC
- USB
- 3.5 mm stereo interface for Talkset
- Battery charger interface
- Compact flash card slot
- Handling: Touch-sensitive LCD colour screen (6 x 16) cm

Memory

- Internal flash memory 4 MB
- Compact flash-card up to 30 MB

Power Supply

- Exchangeable NiMH battery
- Service life approx. 5 h for network test
- Service life approx. 8 h for cable test

Performance tests in Network mode

- Autotest verifies performance of following services: Email, Web, File, DNS, DHCP, WINS, Novell, Print, FTP, Primary DC, Secondary DC, Server, Switches and Router
- Ping, Traceroute and SNMP Queries verify the accessibility of the network components
- Statistics creates a „snapshot“ of the network conditions
- Traffic Generator allows the network test to be carried out under defined network load conditions
- MAC Loopback measures throughput, loss, delay and variation on an Ethernet network
- Blink Hub Port localizes the active network cable connections
- Network Database stores the network information



Fig. 1 - Line tester „ETHERtest“

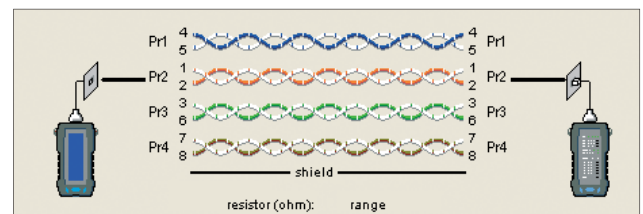


Fig. 2 - Wiring plan

The wiring plan shows whether the individual cores were correctly connected, so that the specific lay of the pairs in the cable is maintained.

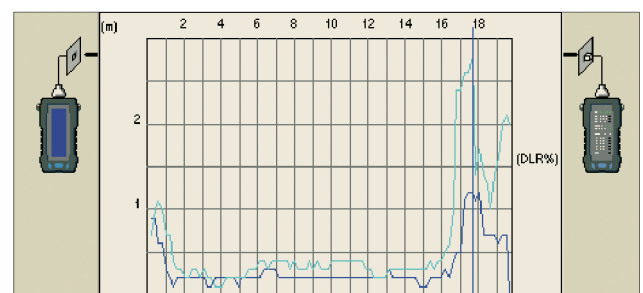


Fig. 3 - Fault order

This figure shows at which distance one core or a pair gets too high an attenuation.

Ordering details

Art. No.

ETHERtest II

020151

ETHERtest II mit LWL-Zubehör

020152

Scope of delivery

- ETHERtest (RJ45)
- Dual Remote (RJ45)
- Carrying case

Telegram analyzer „ETHERscope®“

Function

ETHERscope® is an expert telegram analyzer software that can be run on every PC or laptop using Windows from NT and higher. Depending on the measuring point in the network the entire Ethernet telegram traffic can be recorded. A range of filter / triggering functions make it possible to focus on certain telegram types and individual network users respectively. The user interface is in English language whereas quick-start instructions are in German.

Measuring principle

The data are recorded via a built-in standard Ethernet card of the PC/laptop. No specific hardware is required. A second Ethernet interface card is necessary for the bidirectional telegram recording, provided the used switches / hubs do not feature such function.

Evaluation

As an expert analyzer, the ETHERscope comments as far as possible all recorded telegrams as plain text. The whole telegram structure can also be viewed through to the byte level. For analyzing and evaluating the telegram traffic, a variety of submenus is available. Some basic knowledge of Ethernet technology is advantageous to understand the telegram contents. A teaching book comes as standard with the delivery.

Application guide

The measuring location is one of the most important criterion for telegram recording as not all telegrams can be viewed at every location in the network because of the switch technology. If the installed switches/ hubs lack functions like Mirrorport (port aliasing) or bidirectional telegram recording, you have to loop in the link by using a TAP (refer to accessories).

Operating systems

- Windows NT
- Windows 2000
- Windows XP

Scope of delivery

- Expert analyzer software
- Teaching book

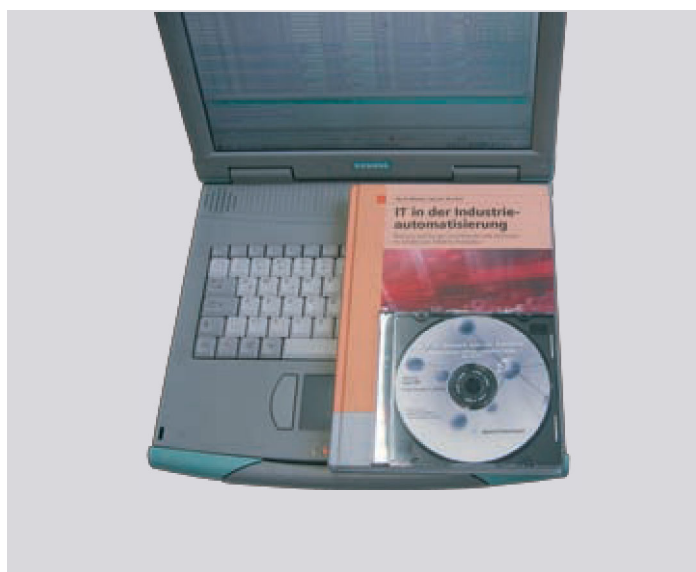


Fig. 1 - Telegram analyzer „ETHERscope®“

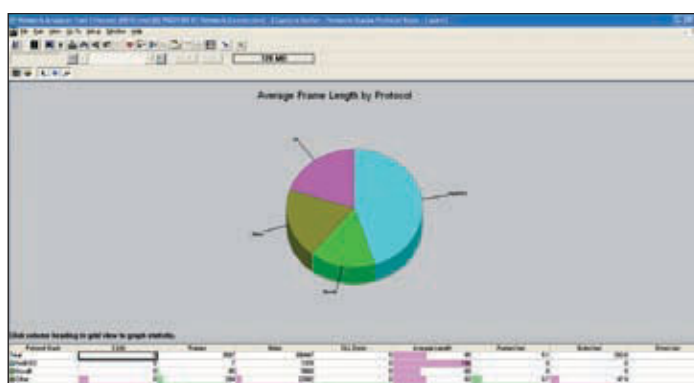


Fig. 2 - Protocol statistics

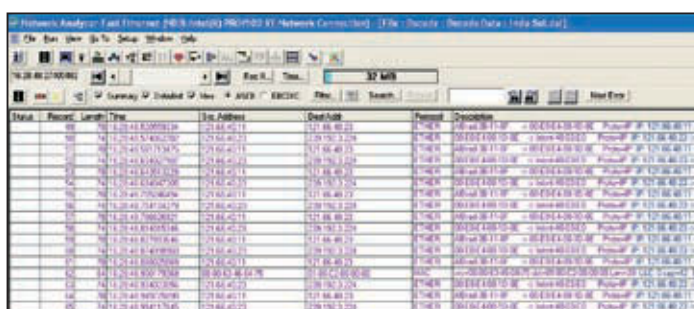


Fig. 3 - Telegram mode

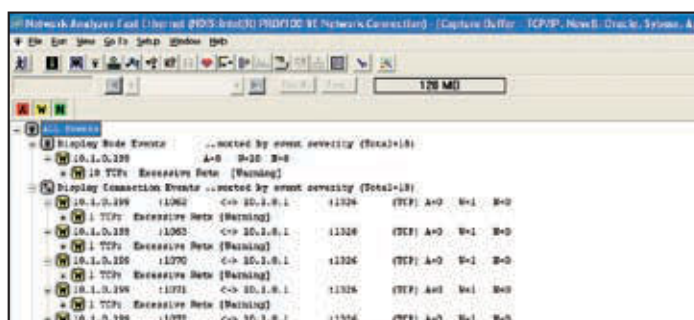


Fig. 4 - List of subscribers

Ordering details

Art. No.

ETHERscope®

020150

Accessories:

Active measuring point „ETMA“

020101

Mapping Software „PROscan®“

Function

The PROscan® software is designed to prepare a simple and easy-to-survey Ethernet topology. Irrespective of the manufacturer and type of device of the network components used, such as switches, hubs, PCs, printers or control systems, the network scan is started after an IP address range has been entered. The only prerequisite for a clear network hierarchy is the use of components that have an LLDP function.

After the network scan connection the data are graphically displayed. The software provides the user with the following information that is essential for network maintenance and troubleshooting:

- Display of network devices in their actual wiring order
- Indication of the current IP address for every network component
- Extended information (e.g. system designation, location, ...) for every SNMP network component
- port-specific localization of connected terminals

On user's request the topology can be displayed in different ways (hierarchically, symmetrically, circular). Network nodes already determined, can be edited subsequently.

Operating systems

- Windows 2000
- Windows XP
- Windows 2003 Server
- Windows Vista

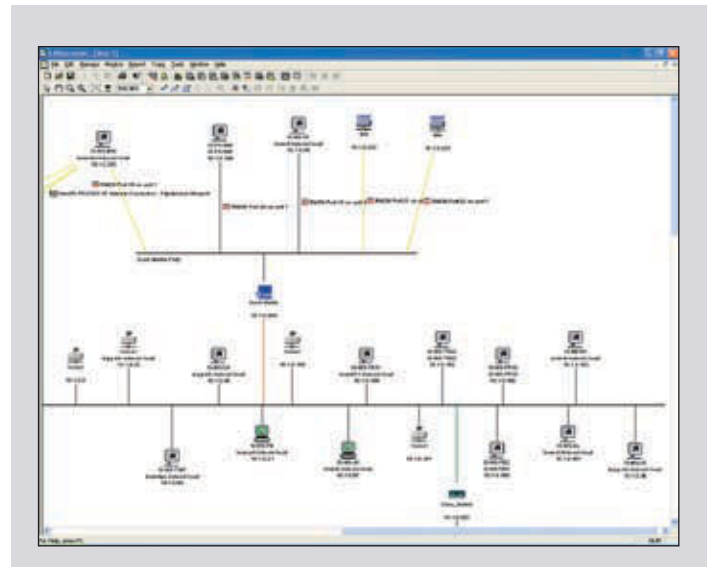


Fig. 1 - Mapping software „PROscan®“ - Topology scan

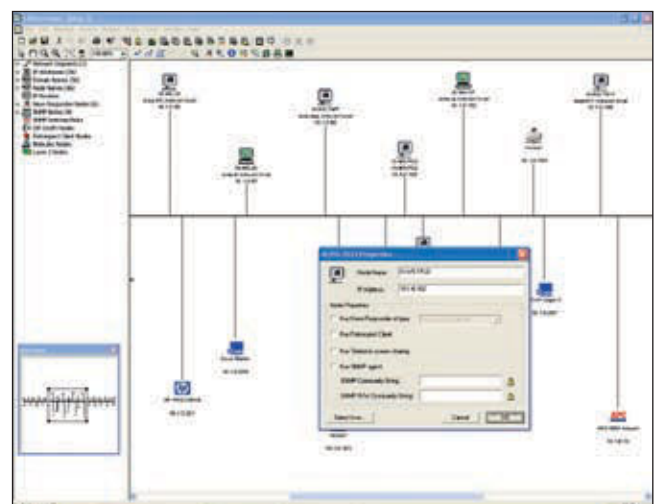


Fig 2. - Qualities of a network component

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Shield current clamp

Function

The shield current clamp is specially designed to measure shield currents in the frequency ranges of 50/60 Hz and 40 Hz to 1 KHz. It features a large opening (3 cm) for the cable to be led through so that measuring is also possible in less convenient mounting positions. The measuring tool features a broad measuring range from 10µA to 60A with the lower range being of particular interest. Through the holding-function it is possible to perform permanent measurements, such as maximum current. Shield currents are a problem for high frequent field bus cables. Reason is a often missing or bad potential equalization respectively a magnetic interference by a power supply cable.

Advantages

- Shield current measurement
- Measuring range up to 60 A
- Wide opening of shield current clamp (up to 3 cm)
- Holding functions allow a permanent measurement at maximum current can be carried out
- Frequency selector switch (50/60 Hz - 40 Hz ... 1 kHz)

Tool information

- Manual selection of measuring range
- Integrated data storage
- Auto power-off

Measuring range

- AC current: 10µA ... 60A
Tolerance: ± (1.5% v.M. + 5 digits)
- AC voltage: 0.1 ... 400 V
Tolerance: ± (2% v.M. + 4 digits)
- Input resistance: 10 MOhm
- Resistance: 0.1 ... 400 Ohm
Tolerance: ± (2% v.M. + 4 digits)
- Continuity: < 40 Ohm

Frequency range

- AC current / voltage: 40 Hz ... 1 kHz

Technical Data

- Safety in accordance with: IEC61010 / EN61010 / DIN VDE 0411
- Overvoltage category: CAT II / 600 V (against ground)
- Pollution degree: 2
- Display: 3.5 digit LCD; 3999 digits
- Probe opening: ø 30 mm
- Power supply: 2 x 1.5 V; IEC LR 6
- Dimensions (L x H x W): 210 x 62 x 36 mm
- Weight: 234 g

Ordering details

Shield current clamp

Art. No.

010612



Fig. 1 - Shield current clamp PB C3



Fig. 2 - Example of use

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Mobile power supply unit „MoSt“

Function

The mobile power supply unit „MoSt“ is a very practical accessories for measuring and test equipment, such as PROFview XL®. In a rough industrial environment the necessity of a 230 V supply may create a problem since not every application is arranged in a cubicle or in the vicinity of the same. Extension cords and cable drums are a way out but finally become an obstacle. The mobile 24 V DC battery power supply „MoSt“ is extremely versatile and its high degree of protection, IP64, makes it ideal for industrial uses. A purpose-tailored adaptor foot station with electronic internal switch and a commercially available NiCd battery with charger form the entire „MoSt“ package. Depending on the need either the whole package or individual components may be supplied. On request the 24 V DC plug connector is also available in different types.

Electrical parameters

- Capacity: 1.5 Ah
- Determined operating time at 0.2 A load: approx. 8 h
- Visual operation display
 - green - $U_B = 24\text{ V} - 20\text{ V}$
 - yellow - $U_B = 20\text{ V} - 18\text{ V}$
 - red - $U_a = <18\text{ V}$

Design

- Dimensions (H x W x D):
 - battery: 135 x 130 x 80 mm
 - battery charger: 80 x 130 x 75 mm
 - adaptor station: 85 x 155 x 10 mm
- Weight:
 - battery: 1100 g
 - battery charger: 1300 g
 - adaptor station: 300 g
- Case: plastic material

Ordering details	Art. No.
„MoSt“-Set	010405
comprising:	
Battery 24 V - 1,5 Ah	010401
Bag	010402
Adapter station	010403
Battery charger	010404



Fig. 1 - MoSt



Fig. 2 - Battery charger

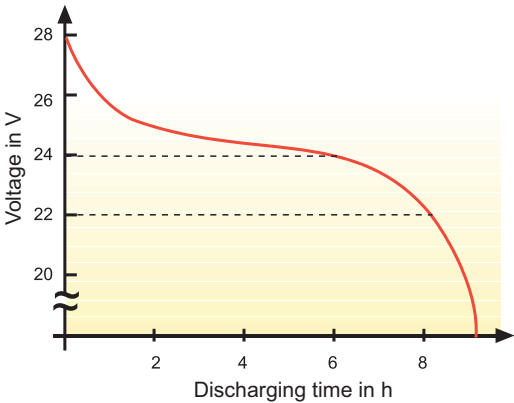


Fig. 3 - Performance chart of battery

PROFIBUS special-purpose measuring and programming adapter

Function

The M12 measuring and programming adapter is used for the connection of an active programming cable to a M M12 interface, e.g. „PBMX“.

The M12 Y measuring adapter is used to connect the measuring devices PROFtest II and PROFview XL®.

The ET200X measuring adapter is used to connect the measuring devices PROFtest II and PROFview XL® to the sub-assembly ET200X.

Electrical parameters

- Baud rate: 9.6 kbps to 12 Mbps
- Rated voltage: 24 V DC

Ambient conditions

- Temperature range: -20 °C to +40 °C
- Protective system: IP20

Pin assignment

M12 Y measuring adapter

- Pin 1: not assigned
- Pin 2: A-Line
- Pin 3: not assigned
- Pin 4: B-Line
- Pin 5: shield

M12 measuring and programming adapter

- Pin 1: 5 V
- Pin 2: A-line
- Pin 3: GND
- Pin 4: B-line
- Pin 5: Shield

ET200X measuring adapter

- Pin 1: B-line
- Pin 2: shield
- Pin 3: PE
- Pin 4: A-line
- Pin 5: not assigned
- Pin 6: not assigned

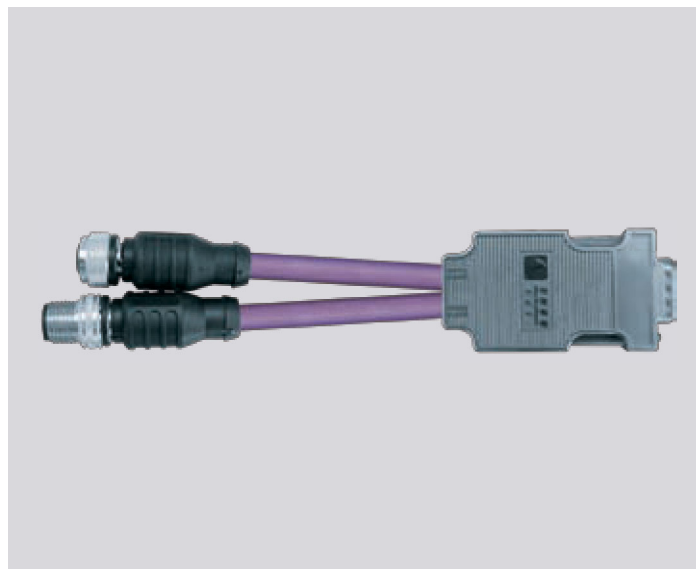


Fig. 1 - M12 Y measuring adapter

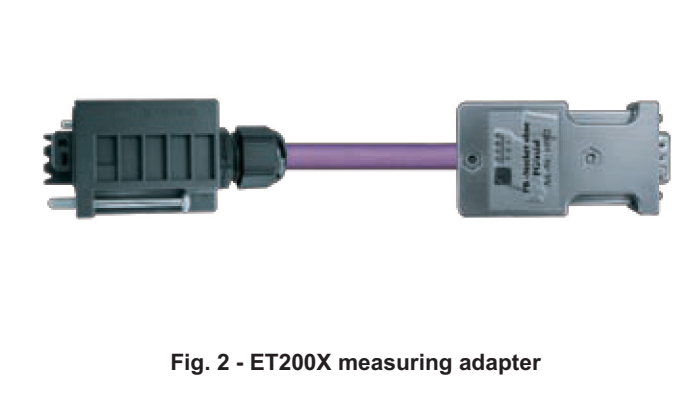


Fig. 2 - ET200X measuring adapter

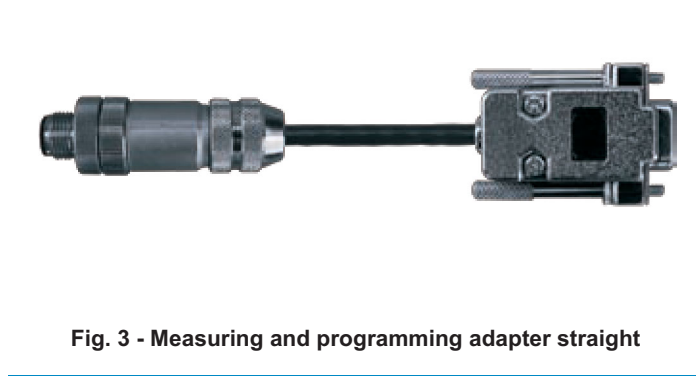


Fig. 3 - Measuring and programming adapter straight

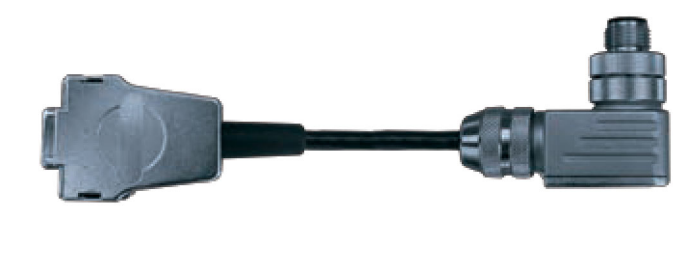


Fig. 4 - Measuring and programming adapter angled

Ordering details	Art. No.
M12 Y measuring adapter	010580
ET200X measuring adapter	010582
M12 measuring and programming adapter straight	010583
M12 measuring and programming adapter angled	010584

Fast Connect Stripping Tool

Function

The Fast Connect Stripping Tool is used for PROFIBUS / Ethernet cable stripping. The line end is prepared in one go ready for connection according to the „Fast Connect“ standard.

Instructions of use

- 1. Adjust the knives at the side of the stripping tool using a hexagon key.
- 2. Place the PROFIBUS or Ethernet cable into the stripping tool.
Note: Leave the stripped line a bit longer. If need be, it can cut off later.
- 3. Hold the line tight and rotate the stripping tool around the line. Depending on the line type and the adjustment of the knives 2 to 4 rotations are necessary.
Note: Make sure that the line ends to be stripped for assembly are not wrenched.
- 4. If properly used, the PROFIBUS or Ethernet cable is almost ready for connection so that only the data line needs to be stripped still. Infinitely variable steel blades provide for accurate stripping. Stripping of the cable sheath, braided screen and filler in one go.



Fig. 1 - Stripping Tools (PROFIBUS and Ethernet)



Fig. 2 - PROFIBUS Fast Connect Stripping Tool

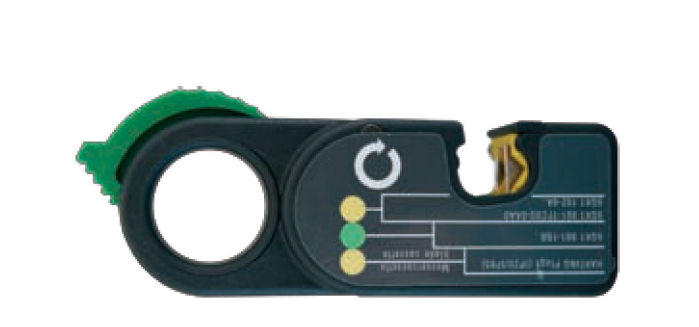


Fig. 3 - Ethernet Fast Connect Stripping Tool

Ordering details	Art. No.
PROFIBUS Fast Connect Stripping Tool	00010560
Ethernet Fast Connect Stripping Tool	02051011

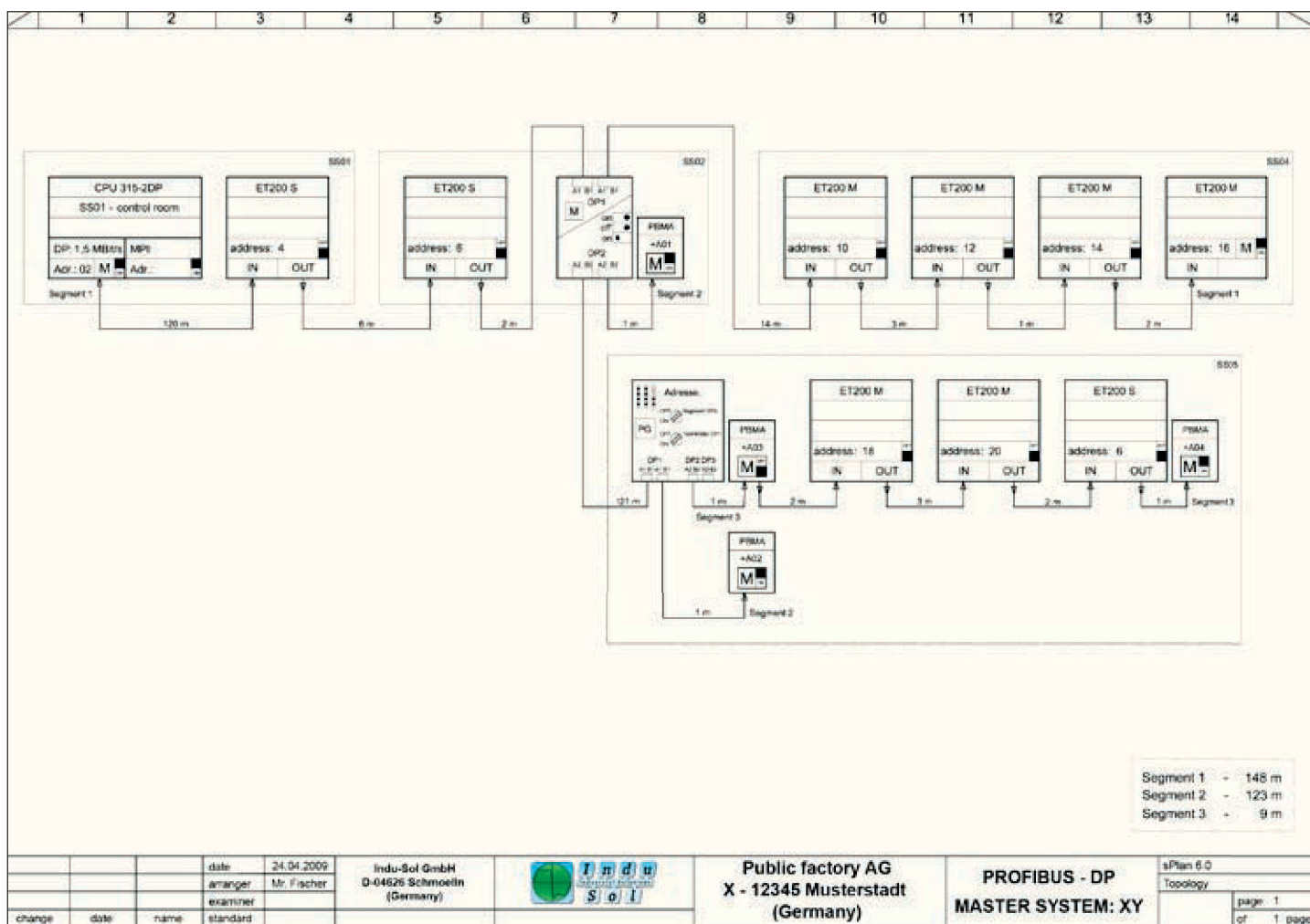
Topology plan software „TOPOCAD“

Function

CAD - software for the development, commissioning and maintenance of automated systems.

„TOPOCAD“ is used to create topology plans on the computer. A comprehensive macrolibrary, for PROFIBUS components for example, allows fast working.

Even unexperienced users will be able to create topology plans after a short period of familiarization. On a clearly arranged user interface the required components are put on the circuit diagram by Drag & Drop. Thanks to a freely definable grid the individual elements can be easily placed and wired. Components can be combined to form groups.



Operating systems

- Windows 98, ME
- Windows NT
- Windows 2000
- Windows XP
- Windows Vista

Ordering details

Art. No.

TOPOCAD

010190

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Active measuring point „PBMA“ IP20 - Active bus termination

Function

For the purpose of physical determination of the signal-to-noise ratio of the PROFIBUS communication feedback-free measuring points are required in every segment of a master system. To get optimal information on the physical transfer quality, the measuring points have to be provided at the two ends of a segment.

The „PBMA“ type meets not only the requirements of a feedback-free measuring point but also fulfils the requirements and the function respectively of an active bus termination.

The „Power-LED“ signals the 24V connection and ensures the 5 V voltage supply for the terminating resistor via an internal DC/DC transformer. The diagnostic tool is connected via the PG / diagnosis interface at the connector.

For a feedback-free connection of a programming device (laptop / field PG) the use of an active programming cable „APKA“ is basically recommended.

Bus connection

- Screw terminal technique „Fast Connect“ (needs Fast Connect lines)
- may also be used for highly flexible bus cables
- connection by screw terminals possible on request
- 90° cable outlet

Electrical parameters

- Integrated terminating resistance, externally switchable via the sliding switch of the plug
- Baud rate: 9,6 kbps bis 12 Mbps
- Input voltage: 24 V DC (20-28 V, pole-proof)
- Output voltage: 5 V DC/ 100 mA; short-circuit proof
Pin 5 (GND); Pin 6 (+5V)
- Voltage supply through screw terminals

PE connection (functional earthing) is absolutely necessary!

Ambient conditions

- Operating temperature: 20 °C to +60 °C
- Industrial protection: IP20

Design

- Dimensions (H x W x D): approx. 77 x 22 x 73 mm
- Weight: approx. 112 g
- Casing: active adapter of plastic material
- Diagnostic plug: plastic material metallized
- Plug w. PG: zinc die cast
- Fastening: snapped on the DIN rail according to EN50022



Fig. 1 - Active measuring point „PBMA“ IP 20

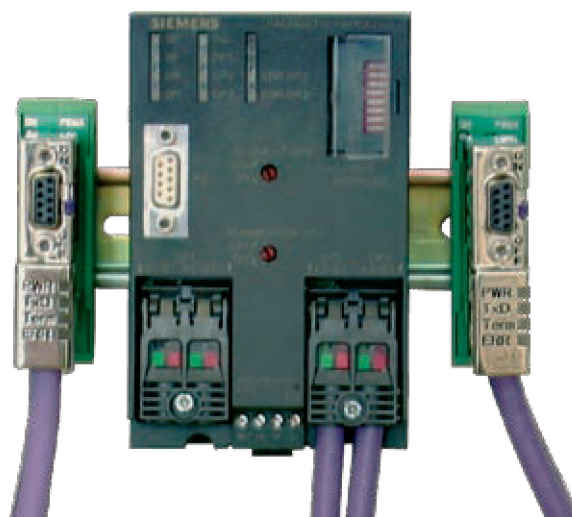


Fig. 2 - Example of use

Ordering details	Art. No.
PBMA (Active adapter + diagnostic connector with PG)	010515
PBMB (Active adapter)	010516
Diagnostic connector „PG/90“ Fast Connect	010503
Diagnostic connector „PG/90“ screw terminal	010603

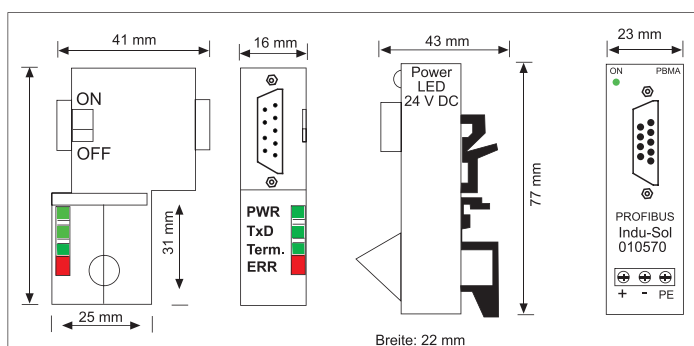


Fig. 3 - Engineering drawing

Active measuring point „PBMX“ IP67 - Active bus termination

Function

For the purpose of physical determination of the signal-to-noise ratio of the PROFIBUS communication feedback-free measuring points are required in every segment of a master system. To get optimal information on the physical transfer quality, the measuring points have to be provided at the two ends of a segment

As „PBMX“ type with the protective system IP 67 it can be used without protective casing in a rough production environment. The „PBMX“ meets not only the requirements of a feedback-free measuring point but also fulfils the requirements and the function respectively of an active bus termination.

The 24V connection ensures the 5 V voltage supply for the terminating resistor via an internal DC/DC transformer.

The diagnostic tools are connected via the free M 12 measuring socket.

Bus connection

- Power: socket D (M12, standard with LED)
- Bus: socket A (M12, B-coded) - „incoming“
socket C (M12, B-coded) - „outgoing“
(or bus terminating resistor)
- PG / Diagnosis: socket B (M12, B-coded)

Electrical parameters

- Baud rate: 9,6 kbps to 12 Mbps
- Rated voltage: 24 V DC
- Rated current: Pin 2 / 4 0,25 A
Pin 1 / 3 / 5 2,00 A
- Input voltage: 24 V DC (18 - 30 V DC, pole-proof)
- Output voltage: 5 V DC (100 mA) Pin 1/3
(5V tapping at sockets B and C)

Ambient conditions

- Temperature range: -20 °C to +80 °C
- Industrial protection: IP67
- Degree of pollution: 3

Design

- Casing: nickel-plated zinc die cast
- Input / Output: EMV electromechanical screw-joint
- Outlet: M12 plug-and-socket connector
- Number of contacts: 5 gilt copper
- Weight: approx. 210 g
- Fastening: M5 x 1 bolt (thread at the back)

Ordering details

Art. No.

PBMX-Set „all inclusive“

010519

The PBMX-Set compromises (ready-to-install items):

- 1 x active measuring adapter „PBMX“ (bus termination)
- 1 x power cable M12 (female), standard length 3 m
- 1 x unilaterally converted PROFIBUS cable (female) 2 m
- 1 x M12 bus termination (male)
- 1 x M12 blind closure

PBMX - „single“

010518



Fig. 1 - Active measuring point „PBMX“ IP67

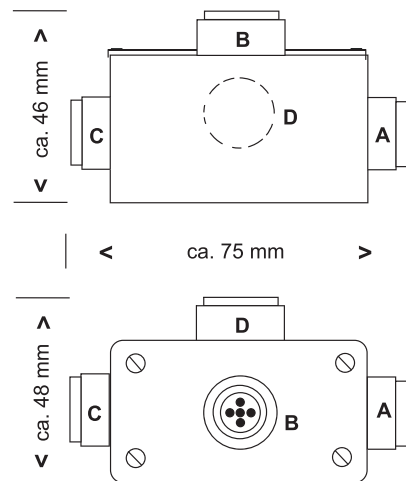


Fig. 2 - Engineering drawing





A	Bus "coming"		1: not used 2: A-Line (green) 3: not used 4: B-Line (red) 5: shield
B	diagnostic and programmer interface		1: 5 V 2: not used 3: 0 V 4: B-Line (red) 5: shield
C	Bus "going"		1: 5 V 2: not used 3: 0 V (blue) 4: not used 5: not used
D	Power (24 V DC)		1: 24 V (brown) 2: not used 3: 0 V (blue) 4: not used 5: not used

Fig. 3 - Pin assignment

Active measuring point „PBMS“ IP64 - Active bus termination

Function

The measuring and programming interface „PBMS“ for front mounting in the control cabinets and terminal boxes provides for a simple and optimal access to the internal MPI or PROFIBUS interface. The integrated electronic system allows a feedback-free plugging of PROFIBUS analyzers while the system is running. To get an optimal understanding of the physical transfer quality, it is necessary to arrange the measuring points at the two ends of a segment. The PROFIBUS connector located on the rear side (inside the cabinet) meets the requirements and fulfils the function of an active bus termination. The diagnostic tool is connected via the 9-pin sub-D PG / diagnosis interface at the front under the cover. Depending on requirements the USB or RJ 45 type can be requested, too. For a feedback-free connection of a programming device (laptop / field PG) to the sub-D socket an active programming cable APKA is basically recommended. The type PBMS-D (double) has a mains socket-outlet next to the measuring socket. The socket is available in different versions depending on the local standard.

Bus connection

The connection to the PROFIBUS is executed through a commercially available PROFIBUS plug including a terminating resistor that can be switched on.

Electrical parameters

- Baud rate: 9,6 kbps to 12 Mbps
- Input voltage: 24 V DC (18 - 30 V, pole-proof)
- Output voltage: 5 V DC / 100 mA; short-circuit proof
Pin 5 (GND); Pin 6 (+5V)
- Connections fed through screw-type terminals

Electrical parameters - Socket outlet

- | Norm: | D VDE | USA NEMA | F UTE |
|-------------------------|----------|----------|----------|
| • Rated voltage (max.): | 250 V AC | 125 V AC | 250 V AC |
| • Frequency: | 50 Hz | 60 Hz | 50 Hz |
| • Rated current (max.): | 16 A | 15 A | 16 A |

• Further on request

Ambient conditions

- Industrial protection: IP64

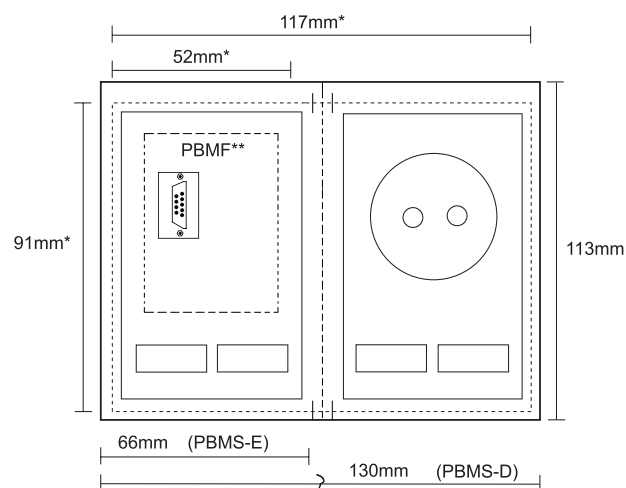
Design

- Dimensions (H x W x D): PBMS-E 113 x 66 x 35 mm (single)
PBMS-D 113 x 130 x 35 mm (double)
- Weight: PBMS-E = 340 g
PBMS-D = 800 g
- Frame: metal
- Cap: metal, black coated

Ordering details	Art. No.
PBMS-E black (single)	010527
PBMS-D black (double with german socket)	010528
PBMS-B black „International“ (double)	010529
PBMF PB interface electronics (retrofit kit)	010517



Fig. 1 - Active measuring point „PBMS“ IP64



*) size matches section

**) electronic PBMF connection back-mounted

Fig. 2 - Engineering drawing

The local type of socket must be indicated separately in the order (PBMS black „International“):

- e.g.
- | | |
|------------|----------------|
| USA | USA |
| D | Germany |
| F | France |

To avoid reflections, we recommend to connect PG / PC devices always via active programming cables APKA.

Accessories

Active programming cable „APKA“	010530
---------------------------------	--------

PBMF PB interface electronics (retrofit kit)

Function

The retrofit kit „PBMF“ is the electronic unit of the measuring and programming interface „PBMS“ IP64 - active termination. This kit must always be installed with a specially developed metal frame for use in control cabinets and terminal boxes.

By this electronic unit the requirements of a feedback-free measuring point and the requirements and function resp. concerning an active bus termination are met.

The connection to the PROFIBUS DP/MPI on the rear side is rendered by a commercially available PROFIBUS connector with a selectable terminating resistor. The diagnostic tools are connected via the 9-pole sub-D socket.

For the feedback-free connection of a programming cable (laptop / field PG) to the sub-D receptacle an active programming „APKA“ is basically recommended.

Bus connection

The connection to the PROFIBUS is rendered through a commercially available PROFIBUS connector with selectable terminating resistor.

Electrical parameters

- Baud rate: 9,6 kbps to 12 Mbps
- Input voltage: 24 V DC (18 - 30 V, pole-proof)
- Output voltage: 5 V DC / 100 mA short-circuit proof
Pin 5 (GND); Pin 6 (+5V)
- Connections: screw terminal

Design

- Dimensions (H x W x D): 88 x 51 x 25 mm
(single)
- Weight: 48 g



Fig. 1 - PBMF PB interface electronics (retrofit kit)



Fig. 2 - PBMF

Ordering details

Art. No.

PBMF PB interface electronics (retrofit kit)

010517

To avoid reflections, we recommend to connect PG / PC devices always via active programming cables APKA.

Accessories

Active programming cable „APKA“

010530

Active programming cable „APKA“

Funktion

By the repeater integrated in the plug, the active programming cable „APKA“ facilitates a reactionless plugging on the PROFIBUS to program and check the logic communication quality. The 5 V supply required for repeater operation shall be made available through the pin 5 (GND) and the pin 6 (+5 V) of the contacted 9-pin sub-D socket. It can be basically assumed that all slaves of the PROFIBUS norms support the relevant pin assignment.

Application instruction

The connector X1 with repeater function has to be plugged on the PROFIBUS and MPI interface respectively.

Important:

The active programming cable can not be used for connecting a bus user through a stub line. For this purpose the active stub line ASTL is to be used.

Connection

- 9-pin sub-D plug with integrated repeater (cable outlet 70°)
- 9-pin sub-D plug (axial cable outlet)

Electrical parameters

- Baud rate: 9,6 kbps to 12 Mbps
- Supply voltage: 4.75 - 5.25 V DC
has to be provided by each PROFIBUS user (Pin 5 GND, Pin 6 +5V)

Design

- Weight: approx. 250 g
- Length: 3 m

Pin assignment

Connector X1, connection measuring (repeater function)

Pin	Function	Note
1	not used	
2	M24	connects to X2 Pin 2
3	B	RS 485 data
4	RTS - AS	connects to X2 Pin 4
5	GND	connects to X2 Pin 5
6	VCC	supply voltage +5V
7	P24	connects to X2 Pin 7
8	A	RS 485 data reversed
9	not used	

Connector X2, connection slave

Pin	Function	Note
1	not used	
2	M24	connects to X1 Pin 2
3	B	RS 485 data
4	RTS - AS	connects to X2 Pin 4
5	GND	connects to X1 Pin 5
6	not used	
7	P24	connects to X1 Pin 7
8	A	RS 485 data reversed
9	RTS - RG	used for switching between send / receive

Ordering details

Active Programming Cable „APKA“

Art. No.

010530



Fig. 1 - „APKA“

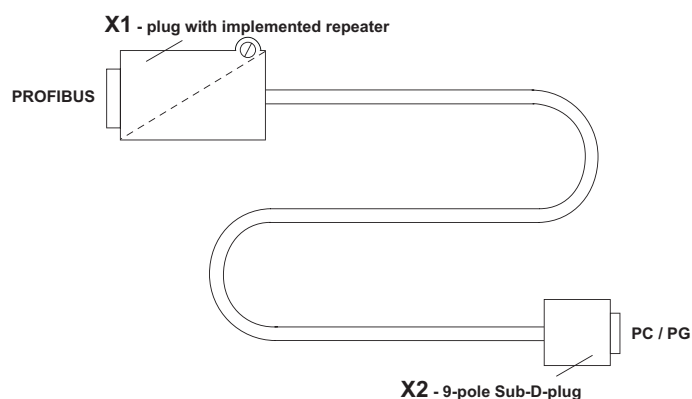


Fig. 2 - Engineering drawing

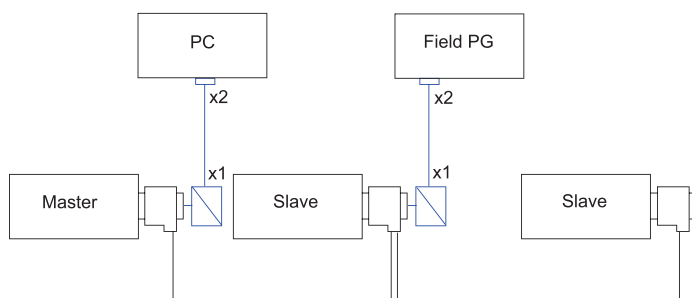


Fig. 3 - Example of use

Active stub line „ASTL“

Function

The „ASTL“ allows the feedback-free connection of a subscriber as an active stub line. This is possible because of the integrated repeater function in the connector. The 5 V supply required for repeater operation shall be made available through the pin 5 (GND) and the pin 6 (+5 V) of the contacted 9-pin sub-D socket. It can be basically assumed that all slaves of the PROFIBUS norms support the relevant pin assignment. It can be basically assumed that all slaves of the PROFIBUS norms support the relevant pin assignment.

Connection

- 9-pin sub-D plug with integrated repeater (cable outlet 70°)
- 9-pin sub-D plug (axial cable outlet)

Electrical parameters

- Baud rate: 9,6 kbps to 12 Mbps
- Supply voltage: 4.75 - 5.25 V DC
has to be provided by each PROFIBUS user (Pin 5 GND, Pin 6 +5V)

Design

- Weight: ca. 250 g
- Length: 3 m and 10 m

Ambient conditions

- Operating temperature: 0 °C to +60 °C
- Transport / storage temperature: -20 °C to +60 °C
- Industrial protection: P20
- Relative humidity: max. 75 % (non-condensing)

Pin assignment

Connector X1, connection measuring (repeater function)

Pin	Function	Note
1	not used	
2	M24	connects to X2 Pin 2
3	B	RS 485 data
4	not used	
5	GND	connects to X2 Pin 5
6	VCC	supply voltage +5V
7	P24	connects to X2 Pin 7
8	A	RS 485 data reversed
9	not used	

Connector X2, connection slave

Pin	Function	Note
1	not used	
2	M24	connects to X1 Pin 2
3	B	RS 485 data
4	RTS - AS	directional control from slave
5	GND	connects to X1 Pin 5
6	not used	
7	P24	connects to X1 Pin 7
8	A	RS 485 data reversed
9	not used	

Ordering details

Active stub line „ASTL“

Art. No.

010531



Fig. 1 „ASTL“

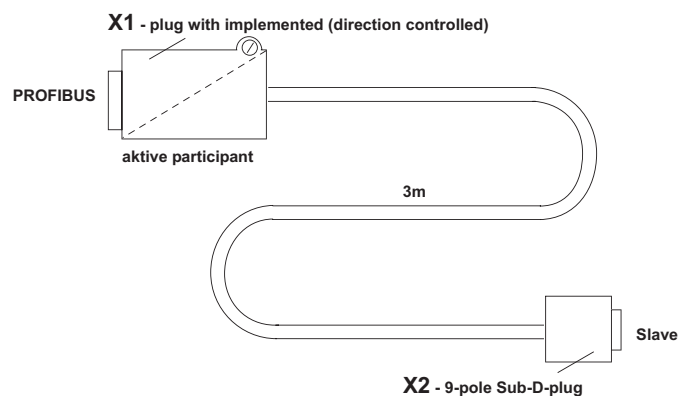


Fig. 2 - Engineering drawing

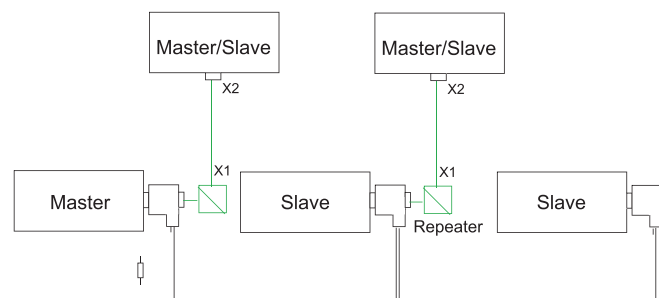


Fig. 3 - Example of use

Diagnostic connector „PG/90°“ screw terminal

Function

The PG / Service interface serves as feedback-free measuring point for measurements with **PROFtest II / PROFview XL® / PROFI-TM** and can also be used as programming interface. The plug is completely shielded by the metal-coated casing. The plug for the terminating resistor that is accessible from outside, disconnects the outgoing segment when being in ON position.

The integrated three LEDs are used for the quick diagnosis of the bus status.

Bus connection

- 9-pin sub-D interface
- Screw terminal connection
- 90° cable outlet

Electrical parameters

- Terminating resistor: integrated, can be switched with a sliding switch from outside
- Baud rate: 9.6 kbps to 12 Mbps
- Supply voltage: 4.75 - 5.25 V DC
has to be provided by each PROFIBUS user (Pin 5 GND, Pin 6 +5V)
- Current drain: 35 mA
- Diagnostic display through LED status

Ambient conditions

- Operating temperature: 0 °C to +60 °C
- Transport / storage temperature: -25 °C to +80 °C
- Relative humidity: max. 75 % at a temperature of +25 °C
- Industrial protection: IP20

Design

- Dimensions (H x W x D): 64 x 17 x 40 mm
- Interface: 9-pin sub-D
- Weight: approx. 40 g
- Casing: plastic material metallized

Status display for diagnostic function

- | | | |
|---------|---------------------|---|
| TxD-LED | (blue - static) | - Active subscriber „OK“ |
| | (green - flashing) | - Communication „OK“ |
| „R“-LED | (orange - flashing) | - terminating resistors active bus termination „OK“ |



Fig. 1 - Diagnostic connector „PG/90°“ screw terminal

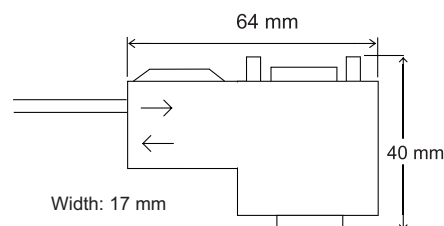


Fig. 2 - Engineering drawing

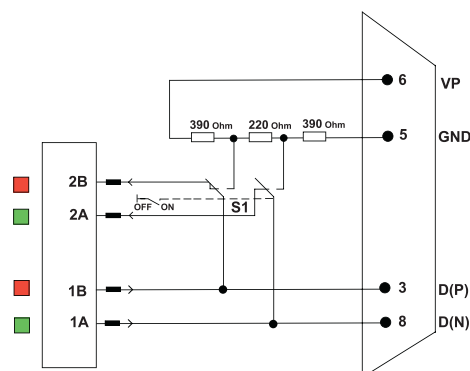


Fig. 3 - Functional diagram

Ordering details

Art. No.

Diagnostic connector „PG/90°“ screw terminal

010603

Diagnostic connector „PG/90°“ Fast Connect

Function

The PG / Service interface serves as feedback-free measuring point for measurements with **PROFtest II / PROFview XL® / PROFI-TM** and can also be used as programming interface. The plug is completely shielded by the metal-coated casing. The plug for the terminating resistor that is accessible from outside, disconnects the outgoing segment when being in ON position. The design meets the „Fast Connect“ requirement.

The integrated 4 LEDs (Power, TxD, Termination, Error) allow a quick diagnosis of the bus status. With the Error LED, for example reflections and missing terminating resistors are signalled.

Bus connection

- 9-pin sub-D interface
- Insulation piercing terminal (suitable for „Fast Connect“ cable)
- 90° cable outlet

Electrical parameters

- Terminating resistor: integrated, can be switched with a sliding switch from outside
- Baud rate: 9.6 kbps to 12 Mbps
- Supply voltage: 4.75 - 5.25 V DC
has to be provided by each PROFIBUS user (Pin 5 GND, Pin 6 +5V)
- Current drain: max. 30 mA
- Diagnostic display through LED status

Ambient conditions

- Operating temperature: -20 °C to +75 °C
- Industrial protection: IP20

Design

- Dimensions (H x W x D): 66 x 15,7 x 40 mm
- Interface: 9-pin sub-D
- Weight: approx. 80 g
- Casing: zinc die cast
- Max. fastening torque: 0,4 Nm

Status display for diagnostic function

PWR-LED (green) -	Voltage supply - bus termination 5 V „OK“
TxD-LED (green) -	Bus communication „OK“ (flashing)
Term.-LED (green) -	Terminating resistors active - bus termination „OK“ terminating resistors defective (flashing)
ERR-LED (red) -	„OFF“ bus status „OK“ „flashing“-fault! (reflection or no termination)

Ordering details

Diagnostic connector „PG/90°“ Fast Connect

Art. No.

010503



Fig. 1 - Diagnostic connector „PG/90°“ Fast Connect

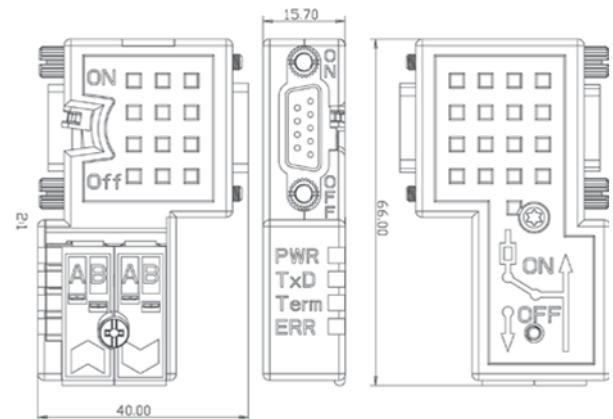


Fig. 2 - Engineering drawing

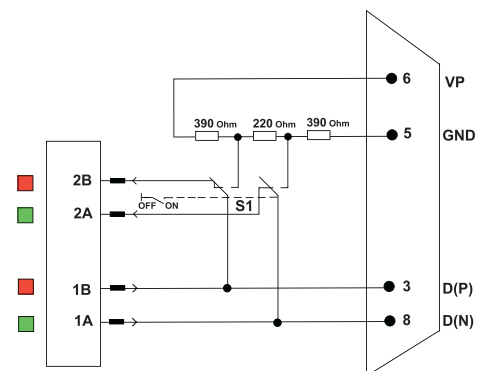


Fig. 3 - Functional diagram

Diagnostic connector „PG/45°“ Fast Connect

Function

The PG / Service interface serves as feedback-free measuring point for measurements with **PROFtest II** / **PROFview XL®** / **PROFI-TM** and can also be used as programming interface. The plug is completely shielded by the metal-coated casing.

The plug for the terminating resistor that is accessible from outside, disconnects the outgoing segment when being in ON position.

The design meets the „Fast Connect“ requirement.

The integrated 4 LEDs (Power, TxD, Termination, Error) serve for a quick diagnosis of the bus status. With the Error LED, for example reflections and missing terminating resistors are signalled.

Because of the very space-saving routing of the PROFIBUS line (45° cable outlet) this connector can also be used in densely structured control cabinets.

Bus connection

- 9-pin sub-D interface
- Insulation piercing terminal (suitable for „Fast Connect“ cable)
- 45° cable outlet

Electrical parameters

- Terminating resistor: integrated, can be switched with a sliding switch from outside
- Baud rate: 9.6 kbps to 12 Mbps
- Supply voltage: 4.75 - 5.25 V DC
has to be provided by each PROFIBUS user (Pin 5 GND, Pin 6 +5V)
- Current drain: max. 30 mA
- Diagnostic display through LED status

Ambient conditions

- Operating temperature: -20 °C to +75 °C
- Industrial protection: IP20

Design

- Dimensions (H x W x D): 61 x 15,8 x 52 mm
- Interface: 9-pin sub-D
- Weight: approx. 80 g
- Casing: zinc die cast
- Max. fastening torque: 0,4 Nm

Status display for diagnostic function

PWR-LED (green)	-	Voltage supply - bus termination 5 V „OK“
TxD-LED (green)	-	Bus communication „OK“ (flashing)
Term.-LED (green)	-	Terminating resistors active - bus termination „OK“ terminating resistors defective (flashing)
ERR-LED (red)	-	„OFF“ bus status „OK“ „flashing“-fault! (reflection or no termination)

Ordering details

Art. No.

Diagnostic connector „PG/45°“ Fast Connect

010601

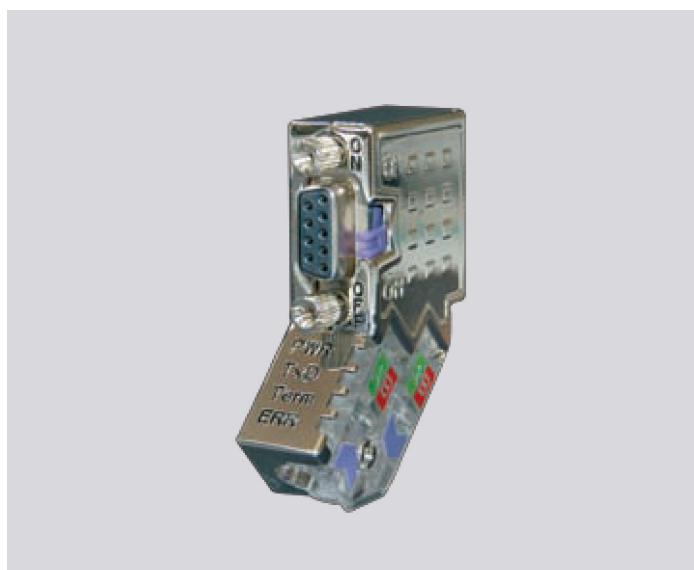


Fig. 1 - Diagnostic connector „PG/45°“ Fast Connect

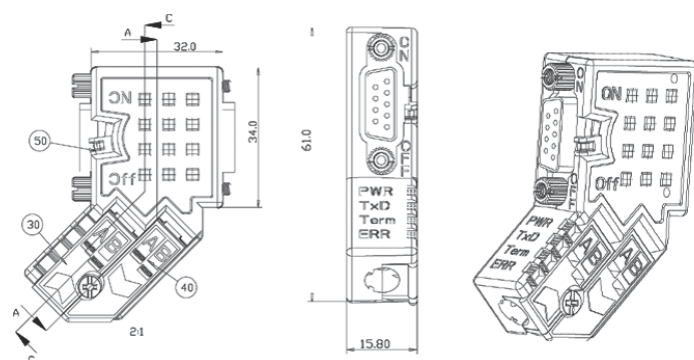


Fig. 2 - Engineering drawing

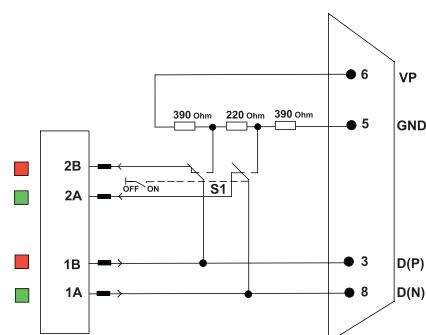


Fig. 3 - Functional diagram

Diagnostic connector „axial“ Fast Connect

Function

The PG / Service interface serves as feedback-free measuring point for measurements with **PROFtest II / PROFview XI® / PROFi-TM** and can also be used as programming interface. The plug is completely shielded by the metal-coated casing.

The plug for the terminating resistor that is accessible from outside, disconnects the outgoing segment when being in ON position.

The design meets the „Fast Connect“ requirement.

The integrated 4 LEDs (Power, TxD, Termination, Error) serve for a quick diagnosis of the bus status. With the Error LED, for example reflections and missing terminating resistors are signalled.

Bus connection

- 9-pin sub-D interface
- Insulation piercing terminal (suitable for „Fast Connect“ cable)
- Axial cable outlet

Electrical parameters

- Terminating resistor: integrated, can be switched with a sliding switch from outside
- Baud rate: 9.6 kbps to 12 Mbps
- Supply voltage: 4.75 - 5.25 V DC
has to be provided by each PROFIBUS user (Pin 5 GND, Pin 6 +5V)
- Current drain: max. 30 mA
- Diagnostic display through LED status

Ambient conditions

- Operating temperature: -20 °C to +75 °C
- Industrial protection: IP20

Design

- Dimensions (H x W x D): 34 x 15,8 x 64 mm
- Interface: 9-pin sub-D
- Weight: approx. 80 g
- Casing: zinc die cast
- Max. fastening torque: 0,4 Nm

Status display for diagnostic function

PWR-LED (green) -	Voltage supply - bus termination 5 V „OK“
TxD-LED (green) -	Bus communication „OK“ (flashing)
Term.-LED (green) -	Terminating resistors active - bus termination „OK“ terminating resistors defective (flashing)
ERR-LED (red) -	„OFF“ bus status „OK“ „flashing“-fault! (reflection or no termination)



Fig. 1 - Diagnostic connector „axial“ Fast Connect

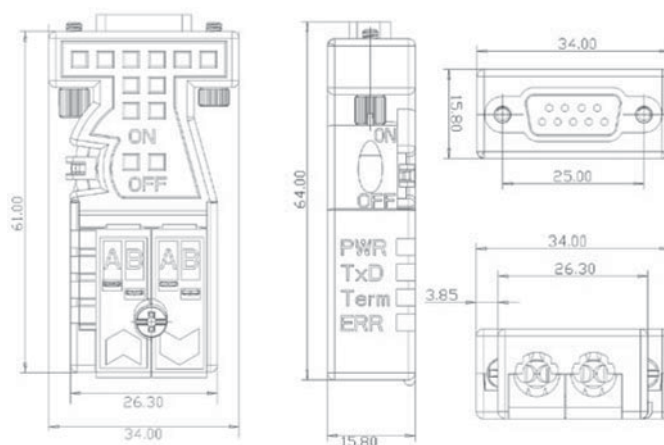


Fig. 2 - Engineering drawing

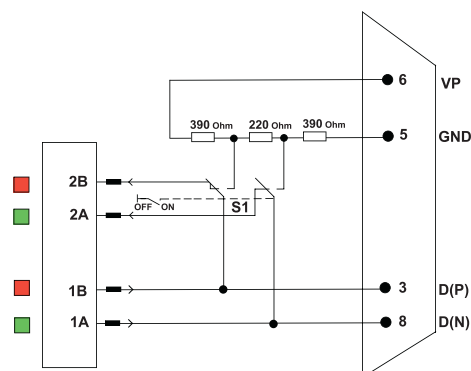


Fig. 3 - Functional diagram

Ordering details	Art. No.
Diagnostic connector „axial“ Fast Connect	010602

Connector „PG/90°“ Fast Connect

Function

The PG / Service interface serves as feedback-free measuring point for measurements with **PROFtest II** / **PROFview XL®** / **PROFI-TM** and can also be used as programming interface. The plug is completely shielded by the metal-coated casing.

The plug for the terminating resistor that is accessible from outside, disconnects the outgoing segment when being in ON position. The design meets the „Fast Connect“ requirement.

Bus connection

- 9-pin sub-D interface
- Insulation piercing terminal (suitable for „Fast Connect“ cable)
- 90° cable outlet

Electrical parameters

- Terminating resistor: integrated, can be switched with a sliding switch from outside
- Baud rate: 9.6 kbps to 12 Mbps
- Supply voltage: 4.75 - 5.25 V DC
has to be provided by each PROFIBUS user (Pin 5 GND, Pin 6 +5V)
- Current drain: 12,5 mA

Ambient conditions

- Operating temperature: -20 °C to +75 °C
- Transport / storage temperature: -25 °C to +80 °C
- Industrial protection: IP20

Design

- Dimensions (H x W x D): 65 x 16 x 41 mm
- Interface: 9-pin sub-D
- Weight: approx. 40 g
- Casing: zinc die cast



Fig. 1 - Connector „PG/90°“ Fast Connect

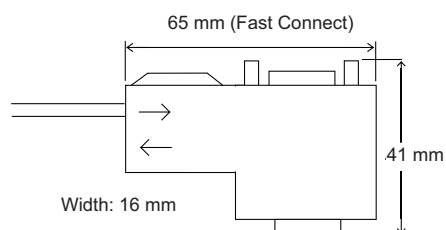


Fig. 2 - Engineering drawing

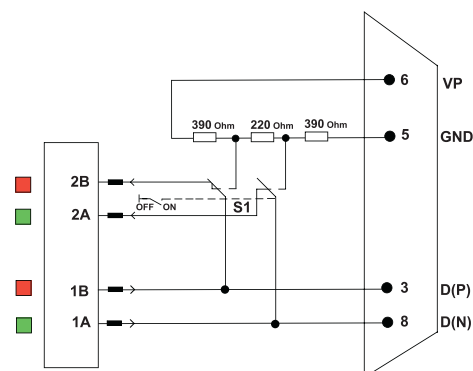


Fig. 3 - Functional diagram

Ordering details

Art. No.

Connector „PG/90°“ Fast Connect

010536

Connector „PG/90“ screw terminal

Function

The PG / Service interface serves as feedback-free measuring point for measurements with **PROFtest II** / **PROFview XL®** / **PROFI-TM** and can also be used as programming interface. The plug is completely shielded by the metal-coated casing.

The plug for the terminating resistor that is accessible from outside, disconnects the outgoing segment when being in ON position. When using the screw terminal all commercially available line types can be connected.

Bus connection

- 9-pin sub-D interface
- Screw terminal connection
- 90° cable outlet

Electrical parameters

- Terminating resistor: integrated, can be switched with a sliding switch from outside
- Baud rate: 9.6 kbps to 12 Mbps
- Supply voltage: 4.75 - 5.25 V DC
has to be provided by each PROFIBUS user (Pin 5 GND, Pin 6 +5V)
- Current drain: 12,5 mA

Ambient conditions

- Operating temperature: 0 °C to +60 °C
- Transport / storage temperature: -25 °C to +80 °C
- Relative humidity: max. 75 % at a temperature of +25 °C
- Industrial protection: IP20

Design

- Dimensions (H x W x D): 64 x 17 x 40 mm
- Interface: 9-pin sub-D
- Weight: approx. 40 g
- Casing: plastic material metallized



Fig. 1 - Connector „PG/90“ screw terminal

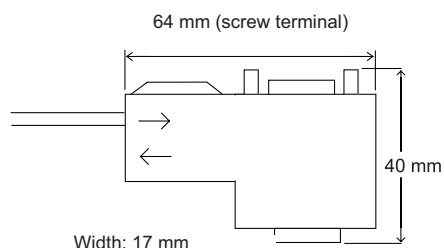


Fig. 2 - Engineering drawing

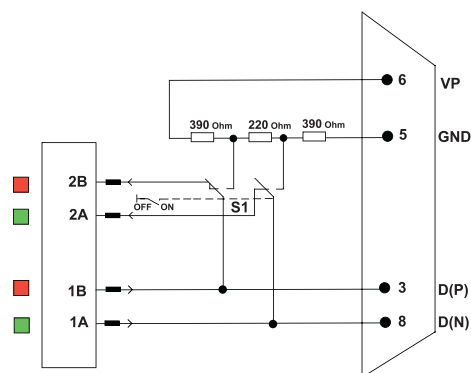


Fig. 3 - Functional diagram

Ordering details

Art. No.

Connector „PG/90“ screw terminal

010501

Connector „PG/35“ screw terminal

Function

The PG / Service interface serves as feedback-free measuring point for measurements with **PROFtest II** / **PROFview XL®** / **PROFI-TM** and can also be used as programming interface. The plug is completely shielded by the metal-coated casing.

The plug for the terminating resistor that is accessible from outside, disconnects the outgoing segment when being in ON position. When using the screw terminal all commercially available line types can be connected.

Bus connection

- 9-pin sub-D interface
- Screw terminal connection
- 35° cable outlet

Electrical parameters

- Terminating resistor: integrated, can be switched with a sliding switch from outside
- Baud rate: 9.6 kbps to 12 Mbps
- Supply voltage: 4.75 - 5.25 V DC
has to be provided by each PROFIBUS user (Pin 5 GND, Pin 6 +5V)

Ambient conditions

- Operating temperature: 0 °C to +60 °C
- Transport / storage temperature: -25 °C to +85 °C
- Relative humidity: max. 75 % at a temperature of +25 °C
- Industrial protection: IP20

Design

- Dimensions (H x W x D): 54 x 17 x 40 mm
- Interface: 9-pin sub-D
- Weight: approx. 35 g
- Casing: plastic material metallized



Fig. 1 - Connector „PG/35“ screw terminal

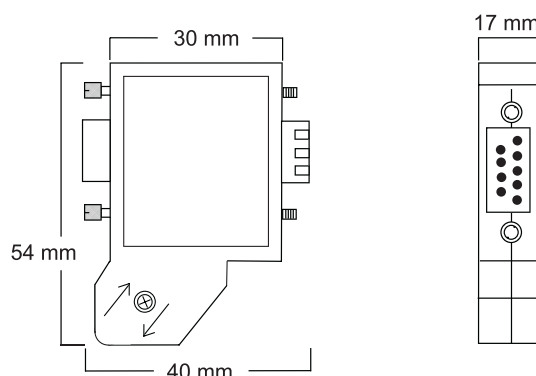


Fig. 2 - Engineering drawing

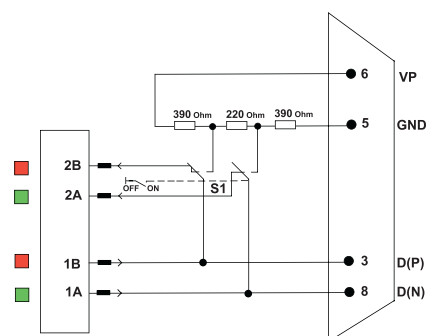


Fig. 3 - Functional diagram

Ordering details

Art. No.

Connector „PG/35“ screw terminal

010504

Connector „axial“ screw terminal

Function

The PG / Service interface serves as feedback-free measuring point for measurements with **PROFtest II** / **PROFview XL®** / **PROFI-TM** and can also be used as programming interface. The plug is completely shielded by the metal-coated casing.

The plug for the terminating resistor that is accessible from outside, disconnects the outgoing segment when being in ON position. When using the screw terminal all commercially available line types can be connected.

Bus connection

- 9-pin sub-D interface
- Screw terminal connection
- Axial cable outlet

Electrical parameters

- Terminating resistor: integrated, can be switched with a sliding switch from outside
- Baud rate: 9.6 kbps to 12 Mbps
- Supply voltage: 4.75 - 5.25 V DC
has to be provided by each PROFIBUS user (Pin 5 GND, Pin 6 +5V)
- Current drain: 12,5 mA

Ambient conditions

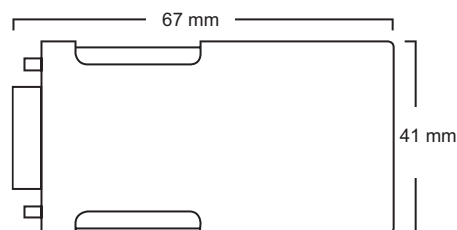
- Operating temperature: 0 °C to +60 °C
- Transport / storage temperature: -25 °C to +75 °C
- Relative humidity: max. 75 % at a temperature of +25 °C
- Industrial protection: IP20

Design

- Dimensions (H x W x D): 41 x 17 x 67 mm
- Interface: 9-pin sub-D
- Weight: approx. 30 g
- Casing: plastic material metallized



Fig. 1 - Connector „axial“ screw terminal



Width: 17 mm

Fig. 2 - Engineering drawing

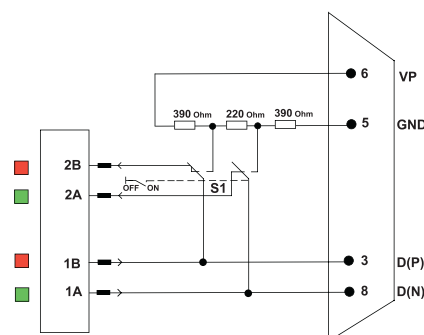


Fig. 3 - Functional diagram

Ordering details

Art. No.

Connector „axial“ screw terminal

010502

Circular connector M12 (B-encoded)

Function

The convertible plug-and-socket connector (straight, angled) is used for connecting the PROFIBUS cable to the PROFIBUS users in extremely rough conditions.

Application instruction

The convertible plug-and-socket M12x1 connector allows for an easy on-site installation. According to the PROFIBUS User Organization (PNO), the plug-and-socket connectors have to be 5-pin plugs inversely encoded featuring a brass casing that can be shielded.

Bus connection

- M12 (B-coded)
- Screw terminal connection
- axial or 90° cable outlet

Electrical parameters

- Rated current / contact: 4 A (IEC 60512- 3)
- Rated voltage / contact: 30 V AC, 36 V DC (VDC 0110)

Ambient conditions

- Operating temperature: -40 °C to +85 °C
- Industrial protection: IP67 when plugged and screwed (DIN VDE 0470)

Design

- Weight: straight: 46 g
angled: 68 g
- Casing: brass (CuZn), surface nickel-plated
- Contact surface: brass alloy (CuSnZn)
- Conductor size: max. 0.75 mm²



Fig. 1 - Circular connector M12 (B-encoded)



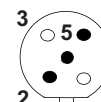
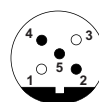
Fig. 2 - Connector angled



Fig. 3 - Exploded drawing

M12x1 connector

M12x1 socket



- Pin 1: not used
Pin 2: Line A (green)
Pin 3: not used
Pin 4: Line B (red)
Pin 5: shield

Fig. 4 - Pin assignment

Ordering details	Art. No.
Connector straight	010511
Socket straight	010512
Connector angled	010505
Socket angled	010506

Built-in repeater „DLP30“

Function

The built-in repeater „DLP30“ is a RS 485 repeater for feedback-free connection of a PROFIBUS slave as an active spur.

The main field of application of this product is instrument manufacture. It may happen that the internal PROFIBUS interfacing has to be installed at a certain distance from the PROFIBUS module location proper.

Often the connection is rendered through a line section which from a length of >10 cm as passive spur line has a negative impact on the data communication quality.

If several of these subscribers are in one segment, the lengths of the internal spurs must be added together.

Although according to PNO the sum of spur lines in the PROFIBUS of 6.6 m is admissible with a Baud rate of up to 1.5 Mbps, passive spur lines of any length should not be used for the sake of a long-term, safe and reliable data communication.

Installation recommendation

The external PROFIBUS connection is rendered through a relevant casing cut-out for a 9-pin sub-D connector. Should an additional mechanical protection be needed, a suitable guard plate can be provided.

Bus connection

- 9-pin standard PROFIBUS connector
- The slave is connected via a 10-pin ribbon cable.
- Total length 2 0 m must not be exceeded.
- A shielded type is recommended from a length of 0.3 m.
- The internal connecting cable is not included in the scope of supply.

Upon request delivery/assembly will be customized (line lengths and connector design).

Electrical parameters

- +5 V and RTS signal must be available at slave
- Baud rate: 9.6 kbps to 12 Mbps

Ambient conditions

- Operating temperature: 0 °C to +60 °C
- Transport / storage temperature: -20 °C to +60 °C
- Relative humidity: max. 75 %
(non-condensing)
- Protective system: IP20

Testing

It is recommended to test the proper function after installation by measurements.

Ordering details	Art. No.
Built-in repeater DLP30	010532
Socket connector for DLP30	010539
Ribbon cable unshielded*	010537
Ribbon cable shielded*	010538

*) Length on request

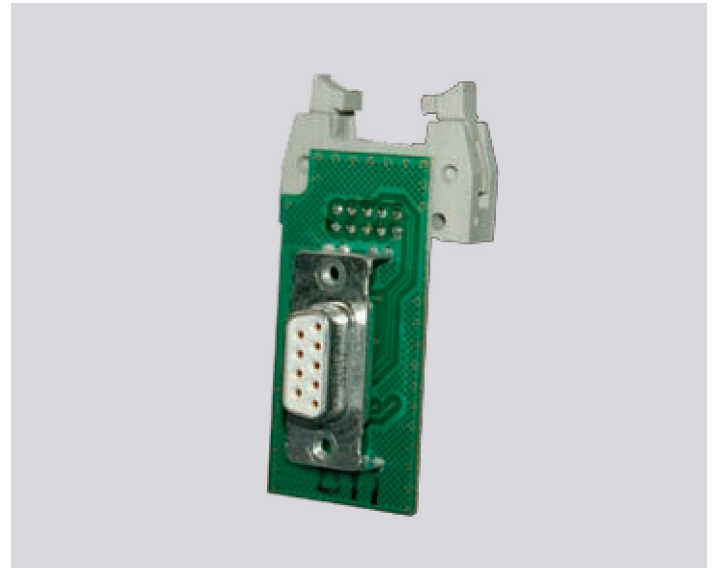
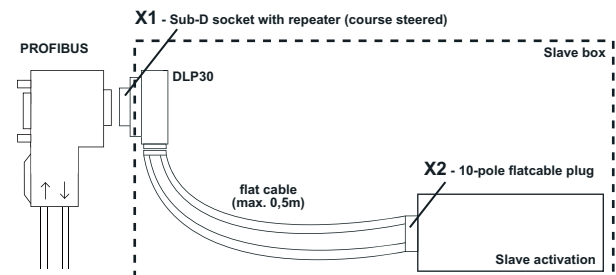


Fig. 1 - Built-in repeater „DLP30“

Engineering drawing



Pin assignment

Connector X1 (sub-D), connection measuring (repeater function)

Pin	Function	Note
1	not used	
2	M24	connects to X2 Pin 3
3	B	RS-485 Daten
4	not used	
5	GND	connects to X2 Pin 9
6	VCC	supply voltage +5V
7	P24	connects to X2 Pin 4
8	A	RS-485 data reversed
9	not used	

Connector X2 (ribbon cable connector), connection slave

Pin	Function	Note
1	not used	
2	VCC	supply voltage +5V
3	M24	connects to X1 Pin 2
4	P24	connects to X1 Pin 7
5	B	RS-485 datan
6	A	RS-485 data reversed
7	RTS-AS	connects to X1 Pin 7
8	not used	
9	GND	connects to X2 Pin 5
10	not used	

Standard repeater IP20

Function

Repeaters make it possible to extend the PROFIBUS network to a maximum of 126 users the speed-dependent line length. The voltage signal is regenerated in both directions by the repeater whereas the signal content remains the same. From the physical point of view two segments are created that are metalically separated from each other. Each segment can have up to 32 users.

The repeater regenerates the voltage signal in both directions and elevates it to the standard PROFIBUS level. The signal content remains unchanged, however.

From the physical point of view two segments are created by the use of a repeater that are galvanically isolated.

Application instruction

Up to max. 4 repeaters (with „Siemens“ up to 9 repeaters) can be connected in series. The repeater has no PROFIBUS address, but should be considered in the hardware configuration under „Network settings“.

For the purpose of diagnostic measurements a measuring point should be provided at the beginning and end of the two segments. The 9-pin sub-D interface at the repeater can only be used for the incoming segment (DP1).

If a segment ends or begins directly at the connections of the repeater, it is necessary to activate the bus terminating resistors for DP1 and DP2 by the slide switch.

Bus connection

The PROFIBUS is connected by a screw-type terminal either at the top side or the bottom of the repeater and split into two segments. The voltage is also supplied at the top of the repeater.

Electrical parameters

- Supply voltage (rated voltage): 24 V DC (20,4 V - 28,8 V)
- Current drain at rated voltage
 - without users at the diagnosis interface: 200 mA
 - with users at the diagnosis interface: 230 mA (5 V / 90 mA)
 - with users at the diagnosis interface: 300 mA (24 V / 90 mA)
- Permissible transmission rate: 9.6 kbps - 12 Mbps

Ambient conditions

- Operating temperature: 0 °C to +60 °C
- Transport / storage temperature: -40 °C to +70 °C
- Relative humidity: max. 95 %, up to +25 °C
- Industrial protection: IP20

Mechanical and technical properties

- Dimensions (H x W x D): 128 x 45 x 67 mm
- Weight: approx. 350 g
- Installation: the repeater is snapped onto a „high“ top hat rail.

Ordering details

Standard repeater IP20

Art. No.

010520



Fig. 1 - Standard repeater IP20

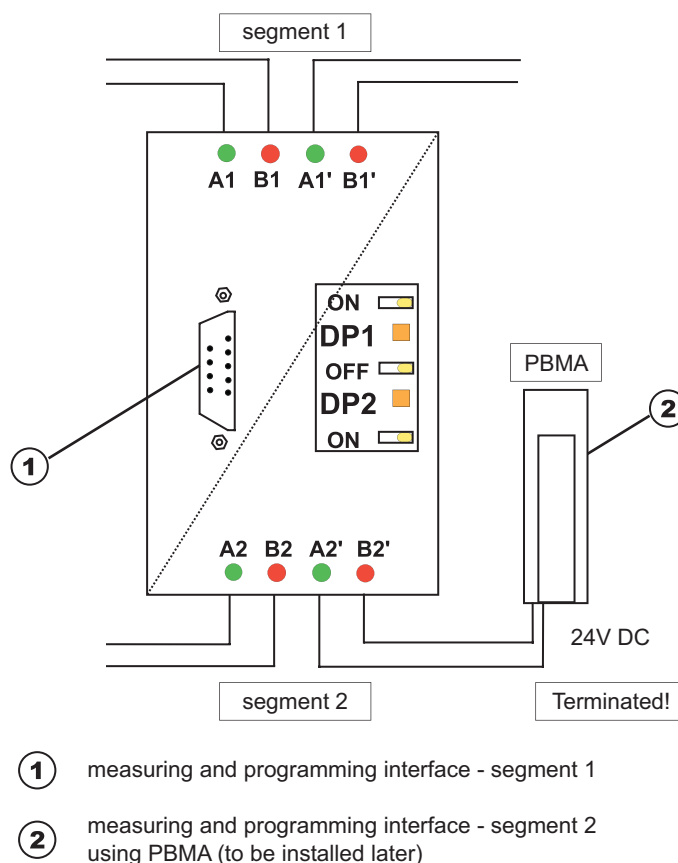


Fig. 2 - Engineering drawing

Diagnostic repeater IP20

Function

The repeaters make it possible to extend the PROFIBUS network to maximum 126 users including the repeaters. The voltage signal is re-generated in three directions by the diagnostic repeater. But the signal content remains the same. From the physical point of view three segments are created that are metalically separated from each other. Up to 32 users are permissible per segment. According to the PROFIBUS guideline, the termination is performed at the start as well as the end of each segment.

The diagnostic repeater features a PROFIBUS address and thus a, has to be integrated into the hardware configuration of the master.

Application instruction

When using a diagnostic repeater, a maximum of three metalically separated segments are created. It should therefore be ensured that there is a measuring point at the start as well as the end of this just created segment when diagnostic measurements are necessary. The sub-D interface placed on the repeater can not be used for the physical diagnostic measurements. Application only for masters from Siemens!

Bus connection

The PROFIBUS is connected through the Fast Connect IDC method of terminatin on the bottom side of the repeater and can be split into three segments. The voltage is also supplied from the bottom of the repeater.

Electrical parameters

- Supply voltage: 24 V DC (20,4 V - 28,8 V)
- Permissible transmission rate: 9.6 kbps - 12 Mbps

Ambient conditions

- Operating temperature: 0 °C to +60 °C
- Transport / storage temperature: -40 °C to +70 °C
- Relative humidity: max. 95 % at a temperature of +25 °C
- Industrial protection: IP20

Mechanical and technical properties

- Dimensions (H x W x D): 125 x 80 x 67,5 mm
- Weight: approx. 300 g
- Installation: the repeater is snapped onto a „high“ top hat rail.
- Electrical isolation: The PROFIBUS segments 1, 2 and 3 are opto-galvanically separated from each other.

Diagnostics

The repeater diagnoses and reports the following data to the master:

- Line interruption
- Short circuit
- Line length
- Topology

Ordering details

Diagnostic repeater IP20

Art. No.

010526



Fig. 1 - Diagnostic repeater IP20

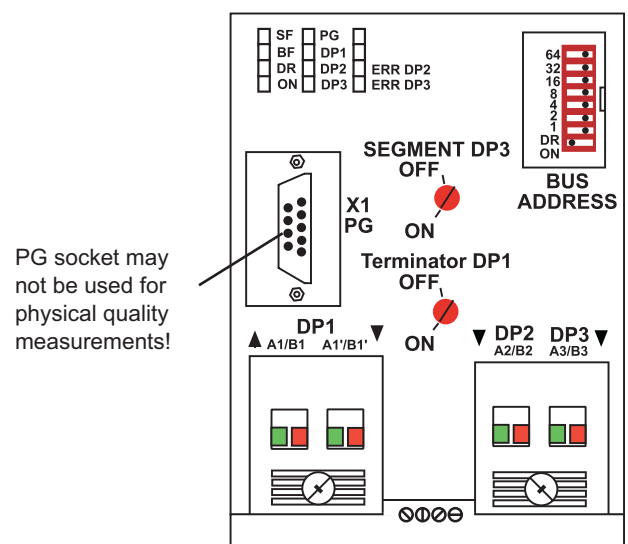


Fig. 2 - Engineering drawing

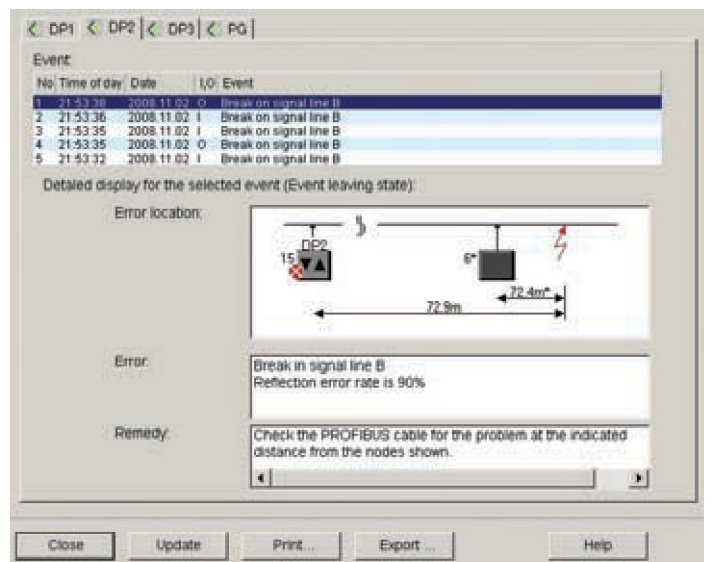


Fig. 3 - Diagnostic function

Repeater IP67 TK (rough conditions)

Function

With the repeater IP67 it is possible to build up two galvanically separated PROFIBUS-DP segments. By using repeaters, up to 126 PROFIBUS-DP users can operate via one master (maximum 32 users per segment). The transmission rate can either be set manually or detected automatically. According to the PROFIBUS guidelines, the termination is performed at the beginning as well as the end of a segment.

Application instruction

When using IP67 repeaters, two metalically separated segments are created. For diagnostic measurements the M12 test socket can be used.

Bus connection

According to the PROFIBUS guidelines, the PROFIBUS-DP is connected through inversely encoded M12x1 plug-and-socket connectors. The supply voltage is fed via a standard 7/8" plug-and-socket connector.

Electrical parameters

- Supply voltage: 24 V DC (18 - 30, 2 V)
- Permissible transmission rate: 9.6 kbps - 12 Mbps
- Earthing / shielding: via external ground screw
The shield may additionally be earthed directly through the ground loop.

Ambient conditions

- Operating temperature: 0 °C to +55 °C
- Industrial protection: IEC 60529 / EN 60529
IP67 and NEMA 1, 3, 4, 12, 13

Not needed plug-and-socket connectors have to be screwed with the plastic caps provided for that purpose.

Design

- Casing: Dimensions (H x W x D):
148 x 60 x 45 mm
- Material: PA6-GF30, nickel-plated brass
(plug-and-socket connectors)
- Installation: via 3 through holes, \varnothing 5,4 mm
- Connections: main power supply through 7/8" plug
PROFIBUS through M12 plug
(B-encoded)
- Electrical isolation: The PROFIBUS segments 1 and 2 are optogalvanically separated from each other.



Fig. 1 - Repeater IP67 TK (rough conditions)

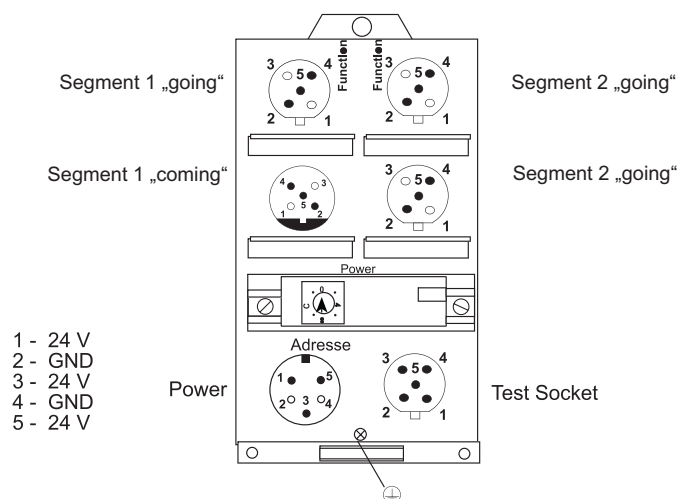


Fig. 2 - Engineering drawing

Ordering details

Art. No.

Repeater IP67 TK (rough conditions)

010521

Repeater IP67 MR (rough conditions)

Function

With the repeater IP67 it is possible to build up two galvanically separated PROFIBUS-DP segments. By using repeaters, up to 126 PROFIBUS-DP users can operate via one master (maximum 32 users per segment). The transfer rate is automatically recognized. According to the PROFIBUS guideline the termination is done at the beginning and end of a segment.

The use of IP67 repeaters creates two galvanically isolated segments.

Bus connection

According to the PROFIBUS guidelines, the PROFIBUS-DP is connected through inversely encoded M12x1 plug-and-socket connectors. The supply voltage is fed via a standard 7/8" plug-and-socket connector.

Electrical parameters

- Supply voltage: 24 V DC (18 - 30,2 V)
- Permissible transmission rate: 9.6 kbps - 12 Mbps

Ambient conditions

- Operating temperature: 0 °C to +55 °C
- Industrial protection: IEC 60529 / EN 60529
IP67 and NEMA 1, 3, 4, 12, 13

Not needed plug-and-socket connectors have to be screwed with the plastic caps provided for that purpose.

Design

- Casing: Dimensions (H x W x D):
36 x 151 x 30 mm
- Installation: 2-hole screw fixing
- Connections: main power supply through 7/8" plug
PROFIBUS through M12 plug
(B-encoded)
- Electrical isolation: The PROFIBUS segments 1 and 2 are galvanically isolated.

Status display

- Communication to fieldbus: LED green static - „i.O.“
- Internal communication US:
LED static - „OK“
LED flashing - no data exchange



Fig. 1 - Repeater IP67 MR (rough conditions)

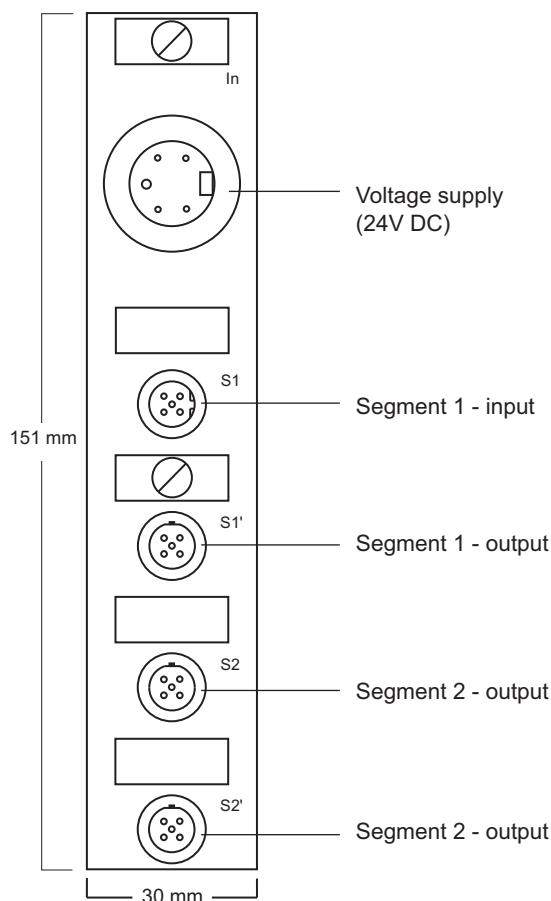


Fig. 2 - Engineering drawing

Ordering details

Art. No.

Repeater IP67 MR (rough conditions)

105010

Line „Standard“

Function

This line is used for field bus systems, such as PROFIBUS DP; PROFIBUS FMS, Siemens SIMATEC NET which are all in accordance with DIN 19245, section 3 and EN 50170 cable type A as well as for the high-performance network bus line that has a rated impedance of 150 ohm. The fieldbus line is rated for transmission speeds of up to 12 Mbps. This line type is designed for a routed line laying either in dry or damp locations. The dual-shielding makes this line particularly suitable for use in electromagnetically loaded areas.

Application instruction

The standard field bus line is suitable for applications where the mechanical/chemical loads are low. It is also designed for system-related transmission rates between 1.5 Mbps and 12 Mbps. The transfer characteristics are system-confirming and thus ensure a high secure of data transmission. Together with the FastConnect stripping tool it can be used for rapid contacting. The line end can be prepared for a ready-to plug connection in one work step, particularly for the IDC (Insulation Displacement Connector) method of termination.

Electrical properties

- Surge impedance: 150 \pm 15 Ohm
- Loop resistance: max. 115 Ohm / km
- Rated voltage: 30 V

Design

- Line type: cable line A
- Conductor: single-wire copper conductor, blank, \varnothing 0,64 mm
- Insulating sheath: foam - skin (02YS)
- Innenmantel: zwickelfüllend extrudiert
- Shield: plastics-coated aluminium foil, metal side outside, braid of tin-plated copper wires
- Jacket: PE flameproof; outer diameter approx. 7,8 mm
- Colour: violet
- Line weight: 60 kg / km

Mechanical and thermal properties

- Minimum bending radius: for one-off usage: 75 mm
for repeated usage: 150 mm
- Temperature range: moved: -5 °C to +50 °C
fixed: -40 °C to +80 °C
- Admissible pull: 100 N
- Halogen-free: no
- Oil resistant: depending
- UV resistant: no

Ordering details

Art. No.

Line „Standard“

010540

Accessories

PROFIBUS Fast Connect stripping tool

010560



Fig. 1 - Line „Standard“

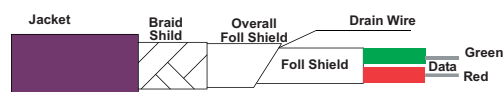


Fig. 2 - Engineering drawing

Line „Flexible“

Function

The PROFIBUS line „Flexible“ is used for highly flexible energy chains and constantly moving machine parts. The dual shielding makes this line type perfectly for electromagnetically loaded areas.

Application instruction

Highly flexible bus lines used for the PROFIBUS standard according to DIN 19249, section 3 and EN 50170 as well as high-performance data networks with a rated impedance of 150 W. This field bus line is rated for transmission rates of up to 12 Mbps.

Electrical properties

- Surge impedance: 150 Ohm \pm 15 Ohm
- Loop resistance: max. 145 Ohm / km
- Rated voltage: 30 V

Design

- Line type: cable line A
- Conductor: copper wire blank, (19 ' 0,13), 0,25 mm² (24 AWG)
- Insulating sheath: PE or foam-skin (02YS)
- Shield: plastic-laminated aluminium foil metal side outside. braid made of tin-plated copper wires
- Jacket: PE flameproof, outer diameter approx. 8,0 mm
- Colour: violet
- Line weight: 64 kg / km

Mechanical and thermal properties

- Minimum bending radius: 65 mm
- Temperature range: -40 °C to +80 °C
- Admissible pull: 100 N
- Halogen-free: yes
- Oil resistant: resistant to mineral oils and fats
- UV resistant: yes



Fig. 1 - Line „Flexible“

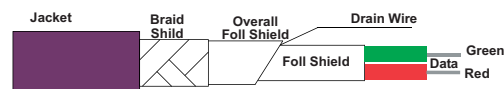


Fig. 2 - Engineering drawing

Ordering details

Art. No.

Line „Flexible“

010542

Accessories

PROFIBUS Fast Connect stripping tool

010560

Line „Extreme“

Function

The PROFIBUS line „Extreme“ has a very high abrasive resistance accompanied by an almost unlimited oil resistance. The data transmission reliability is guaranteed by the special overall braided screen.

Application instruction

The PROFIBUS line „Extreme“ is meets highest demands when it comes to laying. The extremely high bending resistance of both the conductor material and braided screen provide for optimal and reliable use in energy chains.

Its resistance to oils, fats and coolants makes this line type also ideal for permanent installation in machine tool workshops.

Electrical properties

- Surge impedance: 150 Ohm \pm 15 Ohm
- Loop resistance: approx. 78 Ohm / km
- Rated voltage: 30 V

Design

- Line type: cable type A, PCV and halogen-free
- Conductor: extra finele stranded wire conductor in extremely bending-resistant type of blank copper wires
- Insulating sheath: PE foam skin, radially distributed
- Interior lining: TPE mixture tailored to e-chains requirements, halogen-free,
- Shield: extremely bending-resistant tin-plated copper shield coverage about 70%, linear > 85% optical
- Jacket: TPE extremely abrasion-resistant, highly bending-resistant, oil and coolant-resisting mixture
Außendurchmesser ca. 8,5 mm
- Colour: violet (comparable with RAL 4001)
- Line weight: 80 kg / km

Mechanical and thermal properties

- Minimum bending radius (for use in e-chain):
moved: 10 x line diameter
fixed: 5 x line diameter
- Temperature range:
moved: -35 °C to +70 °C
fixed: -40 °C to +70 °C
- Halogen-free: yes
- Oil resistant: resistant to oils and bio-oils
- UV resistant: high
- Regulations: Made according to the EU Directive (RoHS) 2002/95/EC.

Ordering details

Line „Extreme“

Art. No.

010543

Accessories

PROFIBUS Fast Connect stripping tool

010560



Fig. 1 - Line „Extreme“

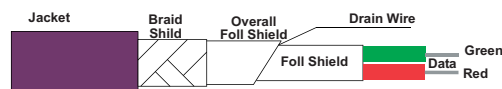


Fig. 2 - Engineering drawing

Line „ready made-up“ M12 (B-encoded)

Function

Ready made-up fieldbus lines ensure easy and safe wiring of the fieldbus components.

Time-consuming single wiring and possible bus problems due to distortions or a lack of allover screening are thus things of the past.

The lines are available with sprayed-on plug connectors on one or either side. The preferential lengths of one-sided connections is 10 m and 0.3 m and 0.6 m for the double-sided types.

Electrical parameters

- Surge impedance: at 20 MHz: 150 Ohm \pm 15 Ohm
- Rated voltage: 4,0 A
- Line resistance: \leq 93,3 Ohm / km

Ambient conditions

- Operating temperature: -40 °C to +70 °C
- Industrial Protection: IP67 and NEMA 1, 3, 4, 6, 13

Design

- Bus connection: M12x1, inversely encoded in accordance with PNO guidelines)
- Casing: uncast polyurethane, creepage and clearance in air acc. to VDE c110, size C (250 V 1c / 300 V DC)
- Contact: gold-plated brass
- Cap nut: nickel-plated brass

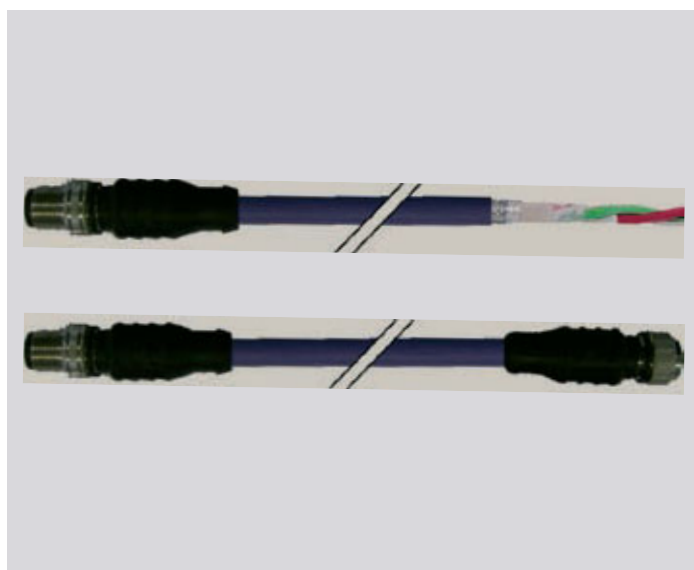


Fig. 1 - Line „ready made-up“ M12 (B-encoded)

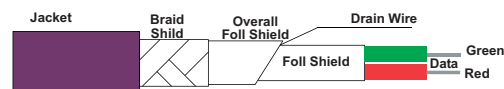


Fig. 2 - Engineering drawing

M12x1 connector



M12x1 socket



Pin 1 : not used
Pin 2 : line A (green)
Pin 3 : not used
Pin 4 : line B (red)
Pin 5 : shield

Fig. 3 - Pin assignment

Ordering details

Art. No.

Line M12 (B-encoded), ready made-up on both ends

0,3 meter (socket, plug) 010544

0,6 meter (socket, plug) 010545

Line M12 (B-encoded), ready made-up on one end

10 meter (socket) 010546

10 meter (plug) 010547

Bus termination M12 (B-encoded) - IP67

Function

The bus termination IP67 is used to properly terminate a PROFIBUS DP segment. Because of its external voltage supply, as many users as required can be either connected or disconnected without creating any disturbances on the bus.

Electrical parameters

- Supply voltage: max. 24 V AC/DC

Ambient conditions

- Operating temperature: -40 °C to +85 °C
- Industrial protection: IP67 and NEMA 1, 3, 4, 6 P

Design

- Bus connection: plug, M12x1 (B- encoded)
- Casing: plastic
M12 plug, oil-resisting
- Contact carrier: M12 plug PA6 (plastic mat.)
- Contact material: gold-plated brass



Fig. 1 - Bus termination M12 (B-encoded) - IP67

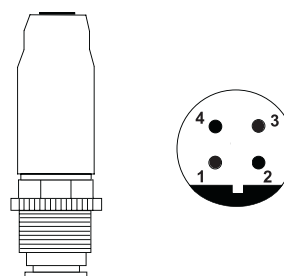


Fig. 2 - Engineering drawing

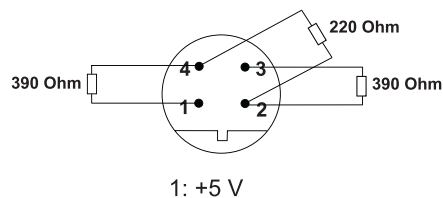


Fig. 3 - Pin configuration

Ordering details

M12 bus termination IP67 (B- encoded)

Art. No.

010514

Control cabinet bushing M12 (B-encoded)

Function

The cable entry into switchgear cubicles or terminal box is rendered through a bushing. The bus lines are connected via B-encoded M12 plug-and-socket connectors.

Application instruction

The M12x1 bushing is designed for PROFIBUS lines to be laid in switchgear cubicals, terminal boxes etc. The connection is realised by B-encoded plug-and-socket connectors. Holes of 12.7 mm diameter are needed for the M12x1 bushings.

Ambient conditions

- Operating temperature: -40 °C to +80 °C
- Industrial Protection: IP67 and NEMA 1, 3, 4, 6

Design

- Casing for plug-and socket connector: nickel-plated brass, creepage and clearance in air to VDE 0110, size C (250 V AC /300 V DC)
- Contact carrier: PA6 (plastic)
- Contact material: gold-plated brass



Fig. 1 - Control cabinet bushing M12 (B-encoded)

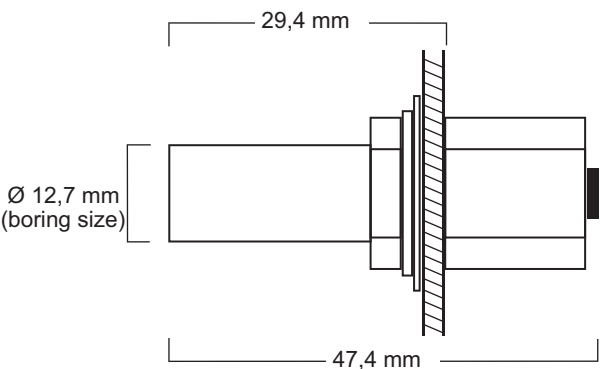


Fig. 2 - Engineering drawing

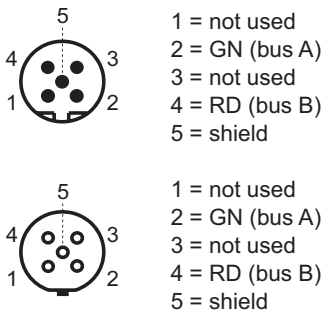


Fig. 3 - Pin assignment

Ordering details	Art. No.
M12 control cabinet bushing (B-encoded)	010513

T-piece M12 Compact

Function

The T-piece M12 compact is used to connect PROFIBUS subscribers.

Technical data

- Rated current: (TU = 40 °C), 4 A
- Volume resistance: $\leq 5 \text{ m}\Omega$
- Rated transient voltage: 2 kV
- Test voltage: 1 kV
- Insulation resistance: $\geq 10^9 \Omega$
- Pin diameter: 1 mm

Ambient conditions

- Working temperature: -25 °C to +80 °C
- Protective system: IP68
- Pollution degree: 3

Design

- Pole number: 5
- Operating voltage [V]: 5-pol. 30 V ~ / 36 V ~
- Contacts: copper alloy
- Cap nut: CuZn with Ni surface
- Mechanical life: ≥ 500 plug cycles



Fig. 1 - T-piece M12 Compact

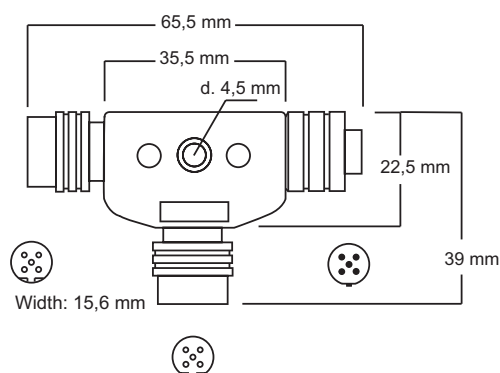


Fig. 2 - Engineering drawing

Ordering details

M12 T-piece Compact

Art. No.

010650

Shielding terminal „SKL“

Function

The „SKL“ shielding terminal is used to connect the PROFIBUS shield with the control cabinet. According to the PNO installation guideline the shield of the PROFIBUS cable must be connected with the equipotential bonding conductor over a large area at the inlet and outlet. Also today much attention is to be attached to the electromagnetic compatibility (EMC) when it comes to electrical machines and systems. Indu-Sol faces up this issue with shield connecting terminals.

Note

Make sure not to damage the shield when stripping the insulation of the PROFIBUS cable.

Construction

- M12 connector: oil resistant
- Type of connection: socket connector
- Cable diameter: 4.0 - 13.5 mm

Installation instruction

The shielding terminal can be screwed onto a kind of a „foot“. This foot supports the mounting on the top-hat rail as a single or double version. The shielding terminal mounting tool facilitates the clamping of the line in the shielding terminal.

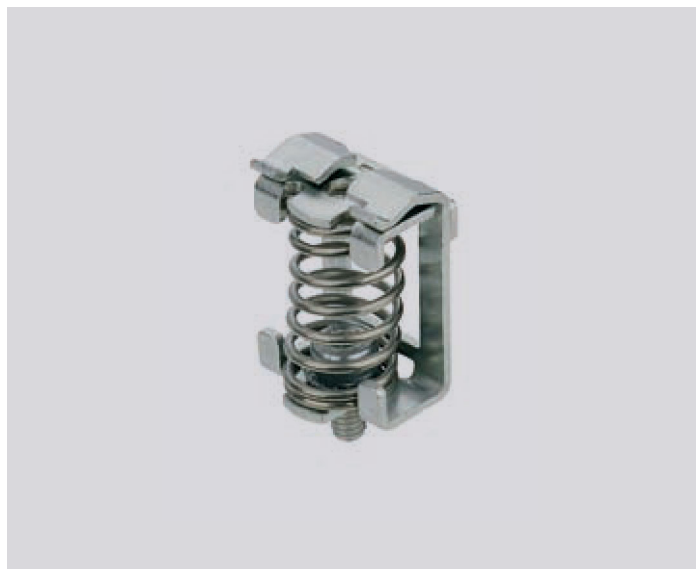


Fig. 1 - Shielding terminal „SKL“

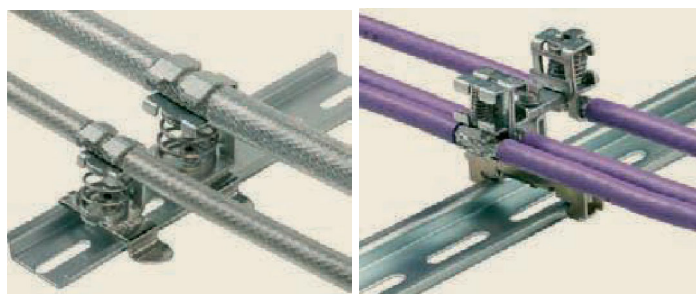


Fig. 2 - Types (single and double)

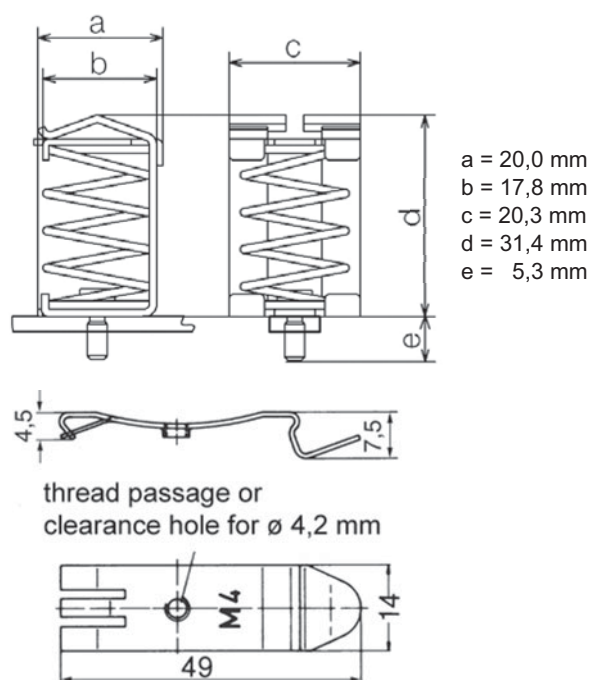


Fig. 3 - Engineering drawing

Ordering details

Shielding terminal single „SKL-EF“

Art. No.

109007

Shielding terminal double „SKL-DF“

109008

Accessories

Mounting tool

109009

Power line M12 (socket)

Function

This power line is used to connect the measuring adapter PBMX IP67. It also meets all requirements necessary for connection of a standard M12 sensor.

Electrical parameters

- Conductor cross-section: 3 x 0,34 mm²
- Rated current: 4 A
- Voltage: max. 30 V

Ambient conditions

- Operating temperature:
 - fixed: -30 °C to +70 °C
 - moved: -5 °C to +70 °C
- Drag-chain capable: yes
- Halogen-free: no
- Industrial protection: IP67 (plugged state)

Design

- Cable material: PUR / PVC
- Outer jacket: grey

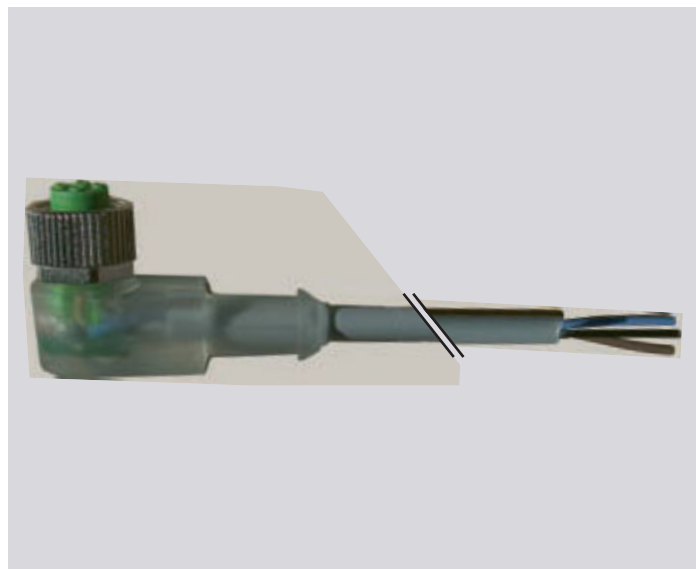


Fig. 1 - Power line M12 (socket)

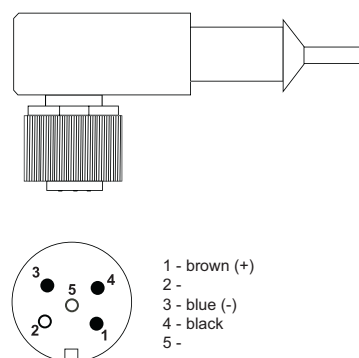


Fig. 2 - Engineering drawing

Ordering details	Art. No.
Power line M12 (socket) 3 meters	010555
Power line M12 (socket) 5 meters	010550
Power line M12 (socket) 10 meters	010551

Power line 7/8" (socket)

Function

This power line is used to connect the repeater IP67 in a rough environment. The 7/8" socket connects to the bus module.

Electrical parameters

- Conductor cross-section: 5 x 1,5 mm²
- Rated current: 8 A
- Operating voltage: 600 V AC / DC

Ambient conditions

- Operating temperature: -20 °C to +80 °C
- Drag-chain capable: yes
- Halogen-free: yes
- Industrial protection: IP67

Design

- Cable material: PUR
- Outer jacket: grey

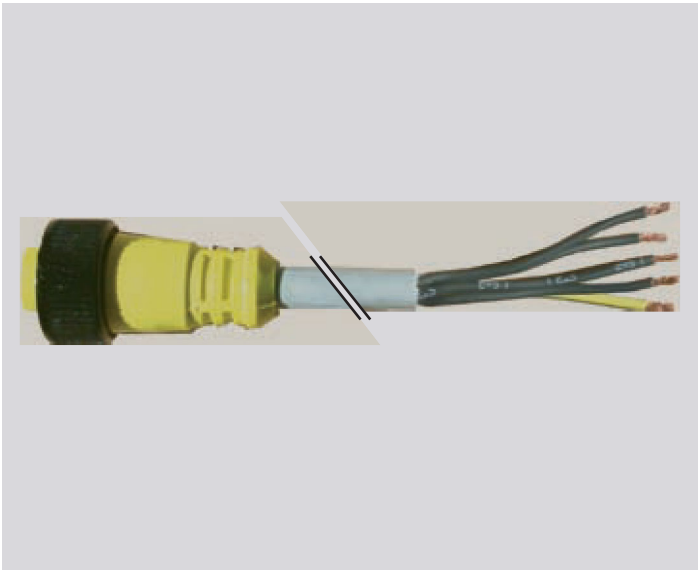


Fig. 1 - Power line 7/8" (socket)

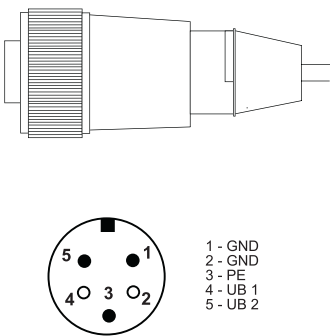


Fig. 2 - Engineering drawing

Ordering details	Art. No.
Power line 7/8" (socket) 5 Meter	010552
Power line 7/8" (socket) 10 Meter	010553

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Connectors	CAN connector „PG 90°“ screw terminal	sheet 72
	CAN connector „axial“ screw terminal	sheet 73
	SafetyBUS p connector „PG 90°“ screw terminal	sheet 74
	SafetyBUS p connector „PG 90°“ Fast Connect	sheet 75
Measuring points	Active measuring point „DNMA“ IP68	sheet 76
Repeater	CANbridge	sheet 77

Connector „PG/90°“ screw terminal

Function

This connector allows for a quick and comfortable connection of incoming and outgoing bus lines. The connector contacts are routed on colour-labeled screw-type terminals. In position ON, the integrated terminating resistor switches off the outgoing segment.

Bus connection

- 9-pin sub-D interface
- Screw terminal connection
- 90° cable outlet

Electrical parameters

- Terminating resistor integrated, selectable from outside by switch
- Baud rate: up to 1.0 Mbps

Ambient conditions

- Operating temperature: 0 °C to +60 °C
- Transport / storage temperature: -25 °C to +75 °C
- Relative humidity: max. 75 % at a temperature of +25 °C
- Industrial protection: IP20

Design

- Dimensions (H x W x D): 17 x 40 x 65 mm
- Interface: 9-pin sub-D
- Weight: approx. 40 g
- Casing: plastic material metallized

Pin assignment

- | | | |
|----------|------------|---------------|
| • A1 | = CAN Low | = Pin 2 sub-D |
| • B1 | = CAN High | = Pin 7 sub-D |
| • C1 | = CAN GND | = Pin 3 sub-D |
| • GND | | = Pin 6 sub-D |
| • CAN V+ | | = Pin 9 sub-D |



Fig. 1 - Connector „PG/90°“ screw terminal

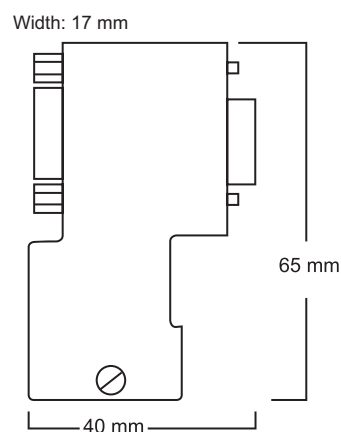


Fig. 2 - Engineering drawing

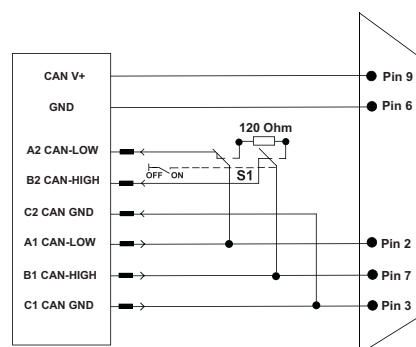


Fig. 3 - Functional diagram

Ordering details

Art. No.

Connector „PG/90°“ screw terminal

030502

Connector „axial“ screw terminal

Function

This connector allows for a quick and comfortable connection of incoming and outgoing bus lines. The connector contacts are routed on colour-labeled screw-type terminals. In position ON, the integrated terminating resistor switches off the outgoing segment.

Bus connection

- 9-pin sub-D interface
- Screw terminal connection
- axial cable outlet

Electrical parameters

- Terminating resistor integrated, selectable from outside by switch
- Baud rate: up to 1.0 Mbp

Ambient conditions

- Operating temperature: 0 °C to +60 °C
- Transport / storage temperature: -25 °C to +75 °C
- Relative humidity: max. 75 % at a temperature of +25 °C
- Industrial protection: IP20

Design

- Dimensions (H x W x D): 67,5 x 40 x 17 mm
- Interface: 9-pin sub-D
- Weight: approx. 40 g
- Casing: plastic material metallized

Pin assignment

- | | | |
|------|------------|---------------|
| • A1 | = CAN Low | = Pin 2 sub-D |
| • B1 | = CAN High | = Pin 7 sub-D |
| • C1 | = CAN GND | = Pin 3 sub-D |



Fig 1 - Connector „axial“ screw terminal

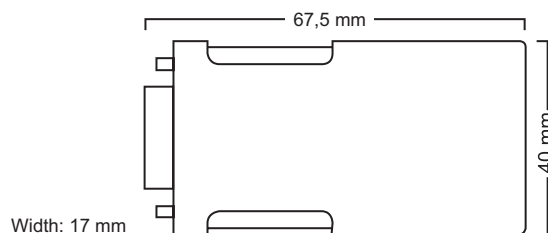


Fig. 2 - Engineering drawing

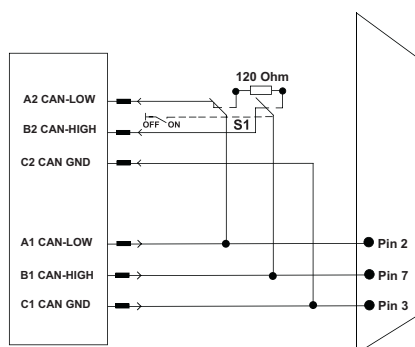


Fig. 3 - Functional diagram

Ordering details

Art. No.

Connector „axial“ screw terminal

030503

Connector „PG/90°“ screw terminal

Function

The connector allows a quick and comfortable connection of incoming and continuing bus lines. The plug contacts are highlighted in colours on screw terminals.

The terminating resistor is integrated and disconnects the outgoing segment in ON position. When using the screw terminal all commercially available line types can be connected.

Bus connection

- 9-pin sub-D interface
- Screw terminal connection
- 90° cable outlet

Electrical parameters

- Terminating resistor integrated, selectable from outside by switch
- Baud rate: up to 1.0 Mbps

Ambient conditions

- Operating temperature: -20 °C to +70 °C
- Industrial protection: IP20

Design

- Dimensions (H x W x D): 17 x 46 x 77 mm
- Interface: 9-pin sub-D
- Weight: approx. 40 g
- Casing: thermoplastic

Pin assignment

Pin	Denotation	Wire colour
1	V+	yellow
2	CAN-LOW	brown
3	CAN-GND	white
4	V-	grey
5	CAN-SHLD	
6	V-	grey
7	CAN-HIGH	green
8		
9	V+	yellow



Fig. 1 - SafetyBUS p Connector „PG/90°“ screw terminal

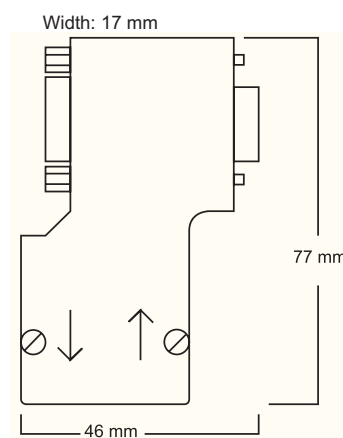


Fig. 2 - Engineering drawing

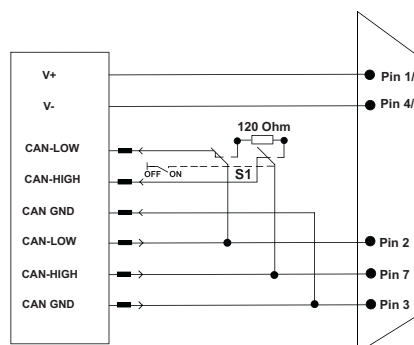


Fig. 3 - Functional diagram

Ordering details

Art. No.

Connector „PG/90°“ screw terminal

030902

Connector „PG/90°“ Fast Connect

Function

The connector allows a quick and comfortable connection of incoming and continuing bus lines.

The contacts are highlighted in colours on labelled contact clamps. The terminating resistor is integrated and disconnects the outgoing segment in ON position.

The easy-to-install connection through an insulation piercing terminal requires a Fast Connect type of line construction.

Bus connection

- 9-pin sub-D interface
- Insulation piercing terminal
- 90° cable outlet

Electrical parameters

- Terminating resistor integrated, selectable from outside by switch
- Baud rate: up to 1.0 Mbps

Ambient conditions

- Operating temperature: -25 °C to +70 °C
- Industrial protection: IP20

Design

- Dimensions (H x W x D): 47 x 80 x 16 mm
- Interface: 9-pin sub-D
- Weight: approx. 40 g
- Casing: thermoplastic

Pin assignment

Pin	Denotation	Wire colour
1		
2	CAN-LOW	brown
3	CAN-GND	white
4		
5	CAN-SHLD	
6		
7	CAN-HIGH	green
8		
9		



Fig. 1 - SafetyBUS p Connector „PG/90°“ Fast Connect

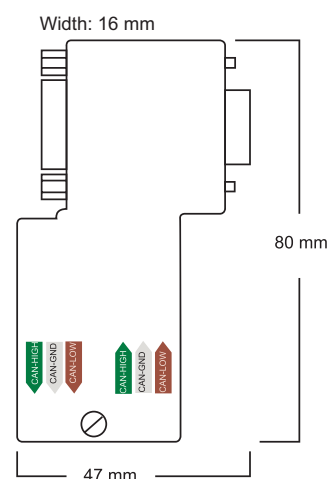


Fig. 2 - Engineering drawing

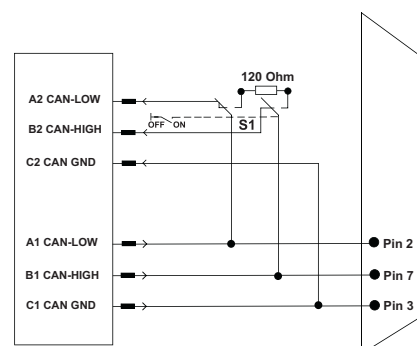


Fig. 3 - Functional diagram

Ordering details

Art. No.

Connector „PG/90°“ Fast Connect

030903

Active measuring point „DNMA“ IP68

Function

To determine physically the signal-to-noise ratio of the DeviceNet communication, it is necessary to provide a feedback-free measuring point „DNMA“ in every master system at the segment ends each. The diagnostic tools are connected via the M 12 or 7/8" measuring socket provided at the „DNMA“.

Bus connection

- 7/8" (5-pin)

Measuring sockets

- M12 (5-pin)
- 7/8" (5-pin)

Electrical parameters

- Current carrying capacity 8 A (thick)
4 A (thin)
- Operating voltage: 30 V AC
36 V DC

Ambient conditions

- Operating temperature: -40 °C to +90 °C
- Industrial protection: IP68 (Nema 6P)

Design

- Dimensions (H x W x D): approx. 65 x 94 x 29 mm
- Casing: plastic
- Contact: CuZn, nickel sublayer and gold-plated acc. to DeviceNet specification
- Fastening: bore holes (Ø 5mm)



Fig. 1 - Active measuring point „DNMA“ IP68

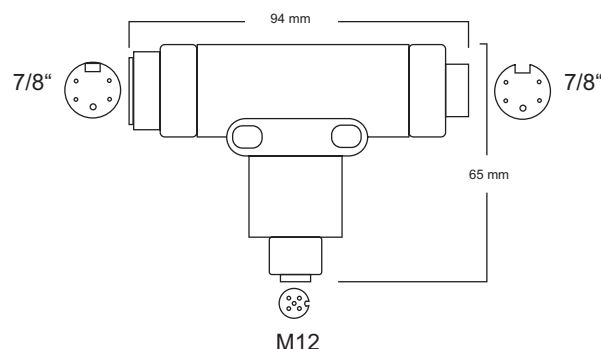


Fig. 2 - Engineering drawing

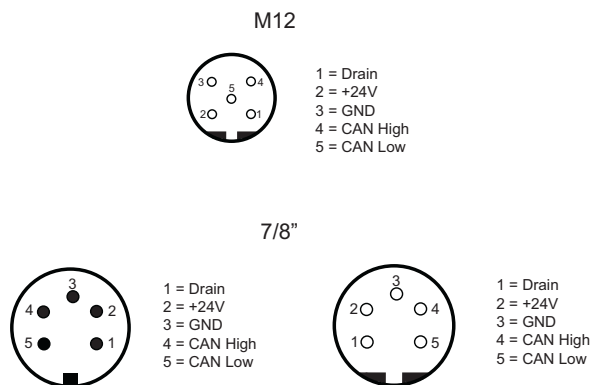


Fig. 3 - Pin assignment

Ordering details	Art. No.
Measuring adapter „DNMA“ 7/8"	030504
Measuring adapter „DNMA“ M12	030501

CANbridge

Function

The CANbridge allows the coupling of two CAN networks that have different bit rates and frame formats (CAN 2.0 A or CAN 2.0 B). Adjustable filter and turnover rules provide for a controlled data traffic between the two CAN networks. It can be determined, for example, that only the necessary CAN information is to be transferred to the other CAN network which keeps the bus load low. Under consideration of the maximally possible line length per CAN network the CAN network can be extended by the CANbridge.

Application instruction

The use of the CANbridge creates two galvanically isolated independent CAN networks and have to be regarded as independent of each other when it comes to their real-time behaviour. The two CAN networks have to be terminated at the CANbridge by a terminating resistor (120 Ohm each).

For the purpose of diagnostic measurement measuring points should be available at the beginning and end of the two CAN networks.

All settings to the CANbridge are made in an ASCII configuration file which is then transmitted by download to the CANbridge through a serial interface.

Bus connection

The CAN bus is connected by the screw terminal to the upper side and underside respectively of the CANbridge and split into two independent CAN networks. The voltage is also supplied to the upper side of the CANbridge.

Technical data

- Supply voltage:
(rated voltage) 9 V - 36 V
- Wattage: approx. 1.5 W
- Baud rate: 20 kbps - 1 Mbps
- CAN controller: 2 x CAN on Chip, CAN2.0A, CAN2.0B
- CAN bus interface: 2 x ISO 11898-2 (high speed), galvanically isolated
- Serial interface: RS232
- Certificates: CE
- Casing: plastic top-hat rail
- Dimensions (H x W x D): 102 x 23 x 120 mm

Ambient conditions

- Operating temperature: -20 °C to +70 °C
- Transport / storage temperature: -40 °C to +85 °C
- Relative humidity: 10 - 95 %, no moisture condensation
- Industrial protection: IP20

Ordering details

CANbridge

Art. No.

030510



Fig. 1 - CANbridge

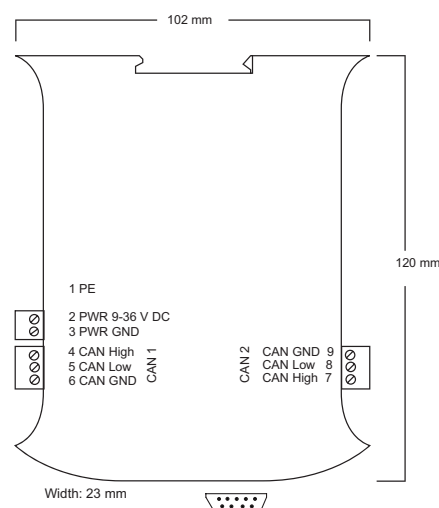


Fig. 2 - Engineering drawing

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Power packs	ASi power pack 4A	sheet 81
	ASi power pack 4Ae	sheet 81
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Repeater	ASi repeater IP20	sheet 83
	ASi tuner incl. bus termination	sheet 84
Bus termination	ASi plug	sheet 85
Cables	ASi bus cable	sheet 86
	ASi power cable	sheet 87

Active measuring point „ASiMA“ IP67

Function

The PG / Service interface is the feedback-free measuring point for measurements with ASi Scope and can also be used as programming interface.

The ASi measuring point is based on a reusable access technology according to IEC 60352-6 and can be used as distribution of connections or connector. The ASi connector 0911 ANC 406 is included in the scope of supply.



Fig. 1 - Active measuring point „ASiMA“

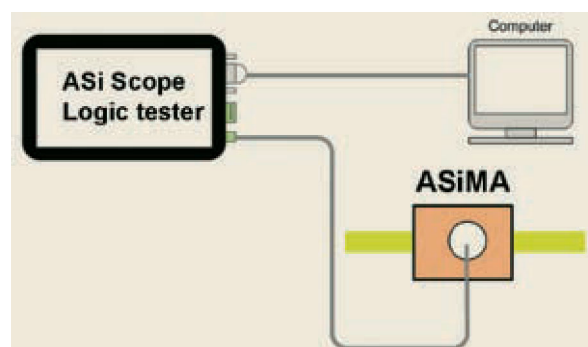


Fig. 2 - Example of connection

Ordering details

Art. No.

Active measuring point „ASiMA“

010581

ASi power pack 4A / 4Ae / 8A

Function

The primary switched power supply is designed for field bus applications transporting energy and data at the same time via a two-wire line.

The power pack for the ASi supplies a completely removed ASi system with an output current of 4 A and 8 A respectively. The sinusoidal current drain from the network avoids the formation of harmonics. In addition to energy supply the power pack has the function of data disconnection to the supply source and balancing of the two ASi output lines towards the machine mass (shield).

Because of the exact and transformer coupling unshielded load lines can be used.

Technical data

	4A		8A	
Input				
Power factor	approx. 0,6 (according to input voltage)			
Input frequency	47 - 63 Hz			
Efficiency	approx. 90%			
Voltage range	90 - 265V AC		115/230V AC	
Input current	without idle current at 230V DC			
	approx. 0,6A		approx. 1,2A	
Input fuse	electronic fuse against external short circuits internal fuse			
Output				
Output Voltage	29,5V - 31,6V DC			
Remaining ripple	according to ASi-Specification			
Output current	4A		8A	
Current limitation	ca. 4,5A		ca. 8,5A	
Display				
LED green (PWR)	power on (at frontside)			
LED red (Overload)	overload error (at frontside)			
Standard conformity				
Standard	EN 60 950, UL 60 950			
Operating temp.	-10 °C ... +55 °C			
Storage temperture	-40 °C ... +85 °C			
Dimensions (LxWxH)	126 x 70 x 129 mm		141 x 70 x 151 mm	



Fig. 1 - ASi power pack 4A / 4Ae / 8A

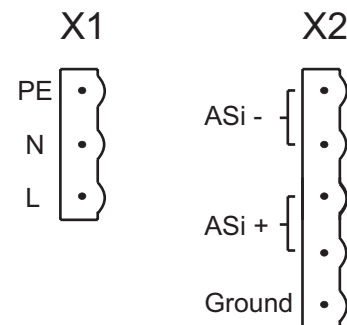


Fig. 2 - Pin assignment (ASi power pack 4A)

Ordering details	Art. No.
ASi power pack 4A	050505
ASi power pack 4Ae (integrated earth-leakage monitor)	050508
ASi power pack 8A	050507

ASi line insulation monitor

Function

Due to the fact that current supply and information run through the ASi cables at the same time, body contact cannot be excluded that may lead to communication failures. To prevent this happening, the insulation monitor monitors the two lines for body contact and signals the same. Both non-symmetrical and symmetrical insulation faults are detected.

Technical data

- Connections: screw terminals up to 0.75 mm²
- Supply voltage: 26.5 - 31.6 V DC
- Operating current: < 40 mA
- Number of required ASi power packs: none
- Display (2 LEDs): LED yellow - function
LED green - operation
- Operating temperature: -25 °C to 60 °C
- Storage temperature: -40 °C to 70 °C
- Industrial protection: IP20
- Insulation voltage: EN 61557-8 (1997)
EN 61326/A2 (2001)
- Dimensions (H x W x D): 74 x 22 x 110 mm

Note

The application range is limited to isolation monitoring in non-earthed ASi and 24 DC voltage networks (IT system). Active symmetrical and passive measuring technique, 2 signalling contacts.
Contact 11/24 is triggered by symmetrical faults and asymmetrical faults.
Contact 11/14 is triggered additionally by asymmetrical faults. The contacts are closed when the ASi voltage is applied and there is no fault.



Fig. 1 - ASi line insulation monitor

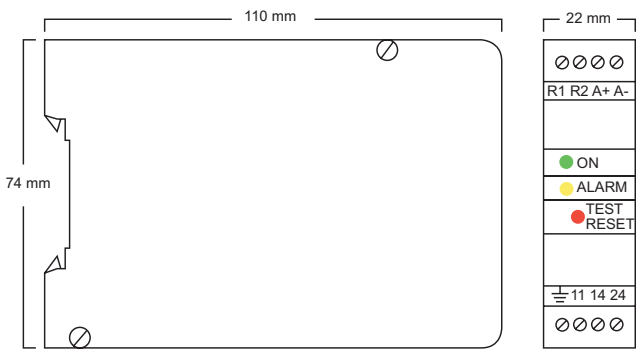


Fig. 2 - Engineering drawing

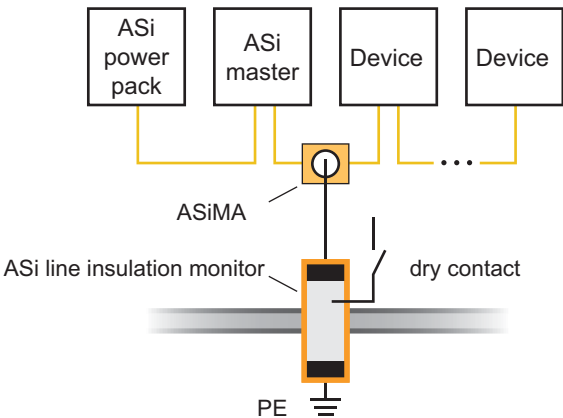


Fig. 3 - Example of connection

Ordering details

ASi line insulation monitor

Art. No.

050509

ASi repeater IP20

Function

The ASi-Repeater with local diagnosis indicates separately ASi communication faults in addition to the voltage supply. The red ASi Fault-LED lights up as long as no ASi communication takes place. The communication fault LED helps the user to detect basic installation problems within a short period of time. The new ASi repeaters are compatible with all ASi repeaters available on the market. Especially the IP 20 ASi repeaters can be easily installed in control cabinets or primary switchgear cabinets together with the ASi power pack.

Application

The ASi bus permits a maximum line length of 100 m (incl. all spur lines). If this length is reached, a repeater has to be installed. The installation of the ASi repeater requires another power pack to be installed in the newly created ASi segment (see installation drawing).

Technical data

- Connections: Combicon clamp-type terminals
- Supply voltage: Operating voltage from ASi
- Operating current: 60 mA (per phase segment), 120 mA (total)
- Number of necessary ASi power packs: one additional power pack (as with every ASi repeater)
- Display (4 LEDs):
 1. PWR1 ASi-Power circuit 1
 2. FAULT1 ASi communication fault
 - circuit 1
 3. PWR2 ASi-Power circuit 2
 4. FAULT2 ASi communication fault
 - circuit 2
- Insulation voltage: ≥ 500 V
EMC acc. to EN61000-6-3, EN61000-6-2
- Dimensions (L x W x D): 105 x 25 x 114 mm

Ambient conditions

- Operating temperature: 0 °C to +55 °C
- Storage temperature: -25 °C to +75 °C
- Industrial protection: EN 60529 IP20

Note

The ASi repeater takes no slave address. The total number of slaves (31 and 62 resp. per master phase remains unchanged. No parameterization is required.

For the segment created when the repeater is installed an additional power pack will be needed.

Ordering details

ASi repeater IP20

Art. No.

050503



Fig. 1 - ASi repeater IP20

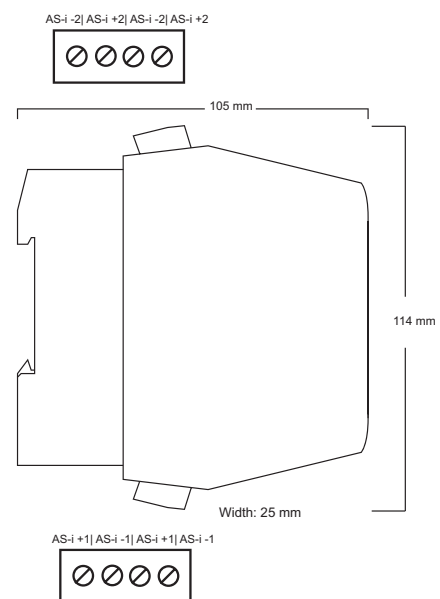


Fig. 2 - Engineering drawing

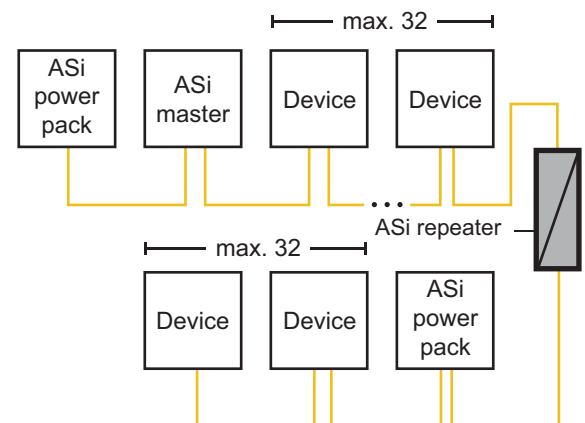


Fig. 3 - Example of connection

ASi tuner

Function

The primary task of the ASi tuner is the length adjustment in the ASi networks without repeater.
The ASi tuner can be completely switched off by a switch or set to a default. The ASi tuners provide for a stable communication in network of 300 m in length without the need of a repeater and additional power pack. This means a triplication of the ASi line lengths.

Technical data

- Connections: ASi ribbon cable / ASi round cable
- Supply voltage: ASi (30 V DC)
- Operating current: 60 mA
- Display (5 LEDs): LED-Power green voltage OK
LED green tuning active
LED red fault (ASi analyzer)
LED yellow warning (ASi analyzer)
LED green fault (ASi analyzer)
- EMC EMc acc. to EN61000-6-3,
EN61000-6-2
- Dimensions (H x W x D): 80 x 90 x 43 mm

Ambient conditions

- Operating temperature: 0 °C to +55 °C
- Storage temperature: -25 °C to +75 °C
- Industrial protection: IP65

Meaning of LED

- Description
 - red = severe fault
 - yellow = frequent repeats that should be clarified depending on application
 - green = almost repeat-free communication



Fig. 1 - ASi tuner

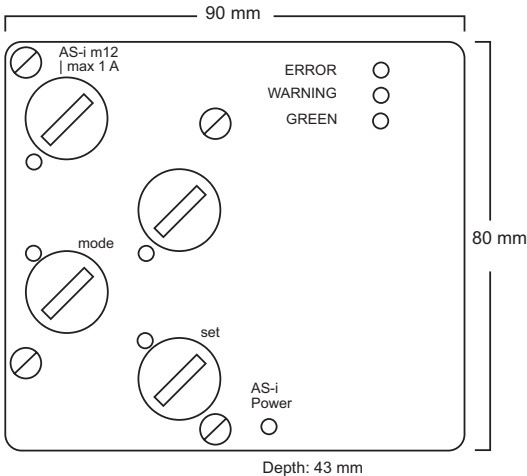


Fig. 2 - Engineering drawing

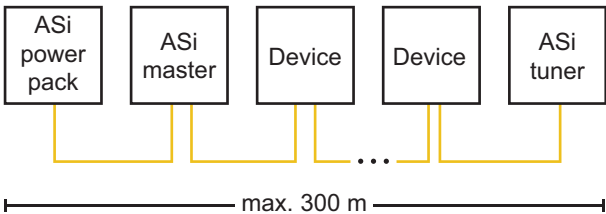


Fig. 3 - Example of connection

Ordering details	Art. No.
ASi tuner	050504

ASi plug

Function

The ASi bus termination allows a doubling of the ASi line length. The passive bus termination allows a line extension up to about 200 m. It is installed at the end of a line. The system will thus become more flexible.

Technical data

- Connections: ASi circular plugs
- Supply voltage: ASi (30 V DC)
- Operating current: 10 mA
- Display (2 LEDs): LED green ASi voltage > 26 V
LED yellow ASi voltage > 18.5 V
- Dimensions (H x W x D): 19 x 46 mm

Ambient conditions

- Operating temperature: 0 °C to +55 °C
- Storage temperature: -25 °C to +75 °C
- Industrial protection: IP65



Fig. 1 - ASi plug

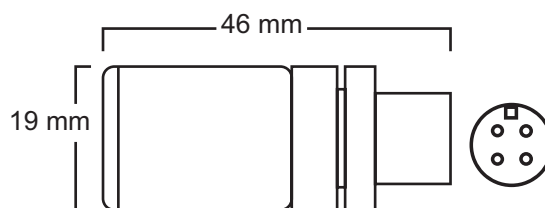


Fig. 2 - Engineering drawing

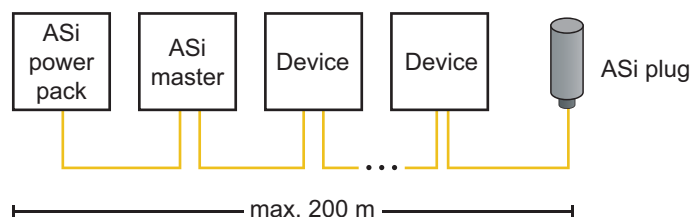


Fig. 3 - Example of connection

Ordering details

ASi plug

Art. No.

050506

ASi bus cable

Function

The ASi bus cable is a two-core, flat fieldbus line for AS interface (Actuator-Sensor Interface) and network systems of the lower field range.

The data for ASi slaves, masters, repeaters, extenders and sensors are transferred through the unshielded, geometrically coded two-wire flat line. The contacting of the conductors is rendered without stripping by means of access technology of the ASi modules.

The line is suitable for permanent installation and flexible use in rooms.

Electrical parameters

- Surge impedance at 167 kHz: 70 ... 140 Ohm
- Conductor resistance acc. to VDE 0295 in max.: 27.4 Ohm / km
- Capacity in max.: 80 nF / km
- Inductivity in: 0.5 ... 0.75 mH / km
- Volume resistivity: min. 10 Ohm x cm

Design

- Conductor: copper litz wire, tin-plated, 2 x 1.5 mm², extra finely stranded acc. to VDE 0295, class 6
- Single-wire diameter: 0.16 mm.
- Insulating cover: rubber mixture EM3 acc. to DIN VDE 0207, Part 21, wall thickness 0.5 mm, core diameter: 2.5 mm sheath colour yellow, RAL 1012 sheath colour black, RAL 9005
- Core arrangement: 2 cores in parallel, brown core arranged at the profile nose side

Mechanical and technical properties

- Operating temperature: moved: -30 °C to 85 °C
perman. laid: -40 °C to 85 °C
- Min. bending radius: moved: 3 x line diameter
perm. laid: 6 x line diameter
- Burning behaviour: flame retardant based on IEC 707 VDE 0304, Part 3 FH 2-25
- Allowable pulling force for laying: max. 150 N

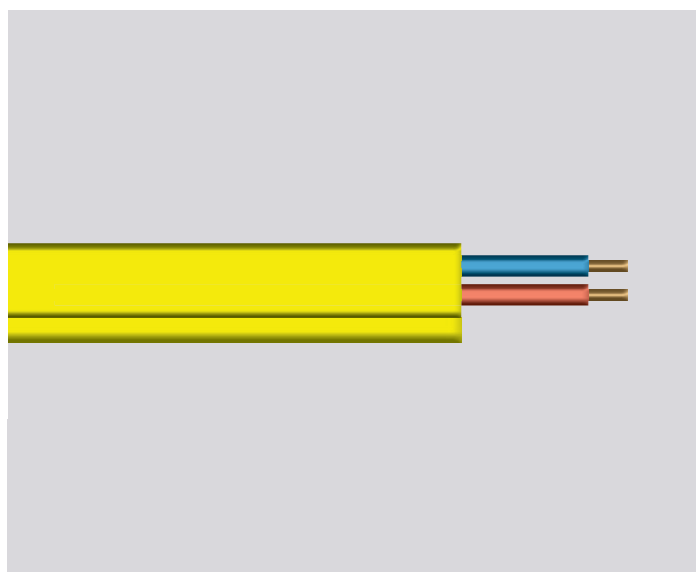


Fig. 1 - ASi bus cable

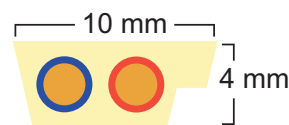


Fig. 2 - Engineering drawing

Ordering details

Art. No.

ASi bus cable

050501

ASi power cable

Function

ASi power cables have been specifically developed for industrial automation equipment to supply components, such as pushbuttons, sensors etc. with auxiliary power.

The polarity cannot be exchanged because of the cable structure. Thus, the ASi power cable can be easily and safely connected to the slave interfaces.

Electrical parameters

- Line resistance: 13.7 Ohm / km
- Insulation resistance: 1 MOhm / km
- Operating voltage: max. 300 V

Design

- Conductor: copper litz wire tin-plated, stranded
8.4 x 0.15, dia.: 2.5 mm
- Sheath: thermoplastic elastomer (TPE)
- Colour: black
- Insulating covering: TPE insulation
wall thickness: approx. 0.5 mm
core diameter: 2.5 mm

Mechanical and technical properties

- Burning behaviour: flame-retardant acc. to IEC 60332-1-2
- Oil resistance: oil and cutting oil resistant
- Cold bending resistant: depending on IEC 60811-1-4

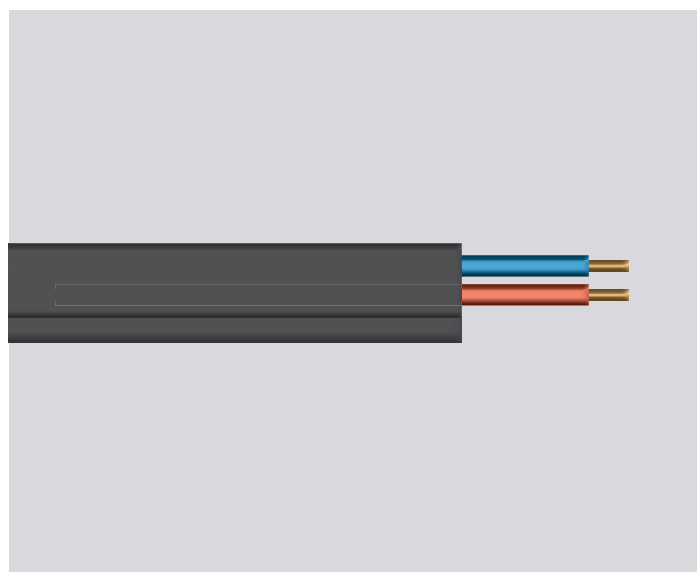


Fig. 1 - ASi power cable

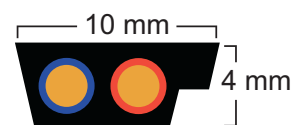


Fig. 2 - Engineering drawing

Ordering details

ASi power cable

Art. No.

050502

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	Control cabinet bushing „SSD“	sheet 91
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	Light patch cable Cat 5e - to assemble	sheet 100
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	Twisted pair cable Cat 5e - STP	sheet 103
	Twisted pair cable Cat 5e - S-FTP	sheet 104
Connectors	Connector RJ45 / M12 - to assemble	sheet 105

Active measuring point „ETMA“

Function

The „ETMA“ measuring point serves for feedback-free telegram recording in Ethernet / PROFINET networks under production conditions. A permanent installation of the measuring point in the network connection between the automation equipment (SPC) and the first switch is recommended because typically the greater part of the communication converges in this connection.

Two USB sockets are available at the unit. If possible, the ETMA should be connected to the recording device (PC, PG, laptop) with two network interface cards. These two cards make it possible to read out and record in parallel the full duplex data traffic via an expert telegram monitor (e.g. „ETHERscope®“, Art.No: 020150) without telegram loss. To analyse and evaluate the measuring results, the telegrams from both communication directions can be superimposed in terms of time. Error telegrams are not rejected by the ETMA but forwarded. Because of the very high network load of the industrial Ethernet, especially at upstream port of the SPC, a complete recording via bidirectional mirror ports is not possible.

Task: Telegram recording while the system is running

Normal recording by port mirroring

- | | |
|----------------|--|
| Advantages: | • no additional hardware required (no ETMA) |
| Disadvantages: | • time-consuming creation of mirror port at switch |
| | • high load of switch by mirror port |
| | • package losses at high data rates |
| | • bidirectional mirror port urgently required |
| | • defective telegrams are not mirrored |

Recording through ETMA

- | | |
|----------------|--|
| Advantages: | • no costly provision of measuring point |
| | • unconditionally bidirectional up to 100 Mbps |
| Disadvantages: | • additional hardware |
| | • expert analyzer required |

Technical data

- | | |
|---------------------------|-----------------------------|
| • Installation: | 35 mm DIN top-hat rail |
| • Dimensions (H x W x D): | 110 x 30 x 85 mm |
| • Power supply: | external 24 V DC |
| • Connector: | RJ45 |
| • Delay time: | less than 1 Bps at 100 Mbps |
| • Cable: | Cat5 / Cat5E, max. 100 m |
| • Operating temperature: | -15 °C to 75 °C |
| • Storage temperature: | 0 °C to 50 °C |
| • Air humidity: | 10 to 90 %, non-condensing |
| • Approvals: | CE, FCC class B |

Ordering details

ETMA (stand-alone in casing)

Art. No.

02051012

ETMA (for top-hat rail)

02051013



Fig. 1 - Active measuring point „ETMA“

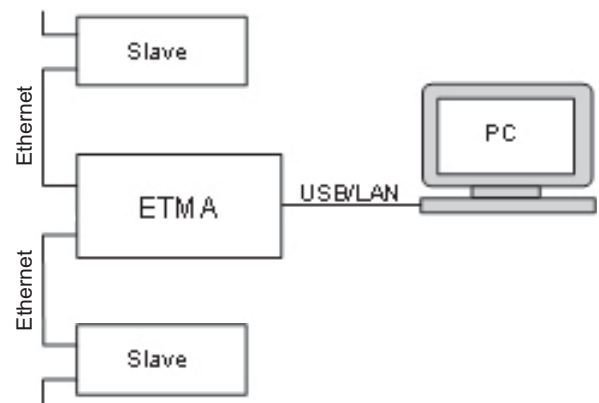


Fig. 2 - Example of connection for Ethernet

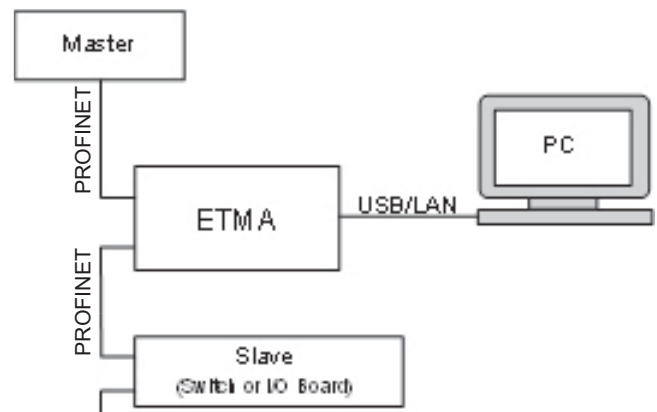


Fig. 3 - Example of connection for PROFINET

Control cabinet bushing „SSD“

Function

With the SSD bushing for front mounting in control cabinets and terminal boxes you provide an easy and optimal access to your control cabinet by RJ 45 or USB.

Via the Ethernet and USB interfaces SPC and measuring point (ETMA) can be easily accessed from outside

Connections

The SSD control cabinet bushing is available in two versions with connection for:

- Version 1 2 x RJ45
- Version 2 USB ad RJ45

Electrical parameters

Max. rated voltage / rated current: RJ45 - 48 V AC/DC / 1 A
USB - 30 V AC/DC / 1 A

- Interlocking type: RJ45 - locking hook
USB - snap-in

- Specification: RJ45 CAT5e;
USB 2.0 / Type 2

Electrial parameters - mains socket-outlet

- | | | | |
|-------------------------|----------|----------|----------|
| • Norm: | D VDE | USA NEMA | F UTE |
| • Rated voltage (max.): | 250 V AC | 125 V AC | 250 V AC |
| • Frequency: | 50 Hz | 60 Hz | 50 Hz |
| • Rated current (max.): | 16 A | 15 A | 16 A |

- **Other on request**

Ambient conditions

- Industrial protection: IP64

Design

- Dimensions (H x W x D): SSD-E: 113 x 66 x 35 mm (single)
SSD-D: 113 x 130 x 35 mm (double)
- Frame: metal
- Lid: design: metal, black varnish



Fig. 1 - Control cabinet bushing „SSD“

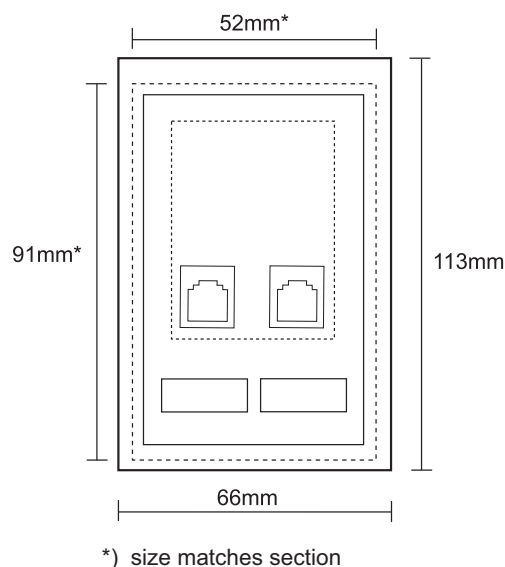


Fig. 2 - Engineering drawing

Ordering details	Art. No.
SSD-E RJ45 (single, 2 x RJ45)	010587
SSD-D RJ45 (double with socket-outlet German, 2 x RJ45)	010586
SSD-DB RJ45 (double w. customized. mains socket-outlet, 2 x RJ45)	105060
SSD-E USB (single, 1 x USB + 1 x RJ45)	105062
SSD-D USB (double w. socket outlet German, 1 x USB + 1 x RJ45)	105061
SSD-DB USB (double w. customized mains socket-outlet, 1 x USB + 1 x RJ45)	105063

Modular Industrial Switches IP20 (manageable)

Connection

- Interface: Ethernet RJ45
- Number of ports: max. 28 ports
- Transmission cable: 10 / 100 / 1000 twisted pair
- Transmission speed: 10 / 100 / 1000 Mbps
- Transmission length: 100 m (per segment)
- Signal LED's: data reception, link status
- Interface: Ethernet LWL (ST, SC, LC)
- Contact termination: 100 / 1000 BASE-FX
- Transmission cable: Single / Multimode glass fiber
- Transmission speed: 100 / 1000 Mbps (full duplex)
- Transmission length: up to 10000 m

Electrical parameters

- Input voltage: 24 V DC (18 - 30 V DC)
- Current consumption: 0.35 - 3.25 A;
depends on the configuration
- Voltage supply via screw-type terminal block

Switching functions

- Manageable
- Multi-addressable
- Learning addresses
- Prioritization
- Tagging
- Flow control
- Port mirroring
- Broadcast limiter
- Modules upgradeable

Configuration options

Extensions	Terminal station		
	IE - MMS	IE - MMH	IE - MMP
Max. number of ports	26	28	24
Number of terminal station ports	16	16	8
Max. number of extension modules	1	1	2
Max. number of extension ports	8	8	16
Interface-Modul TX ports	x	x	x
Interface-Modul optical fibre ports	SC/ST	LC	SC
Interface-Modul HCS ports			x
Interface-Modul POF ports			x
Interface-Modul 1 GBit TX ports	2	4	
Interface-Modul 1 GBit optical fibre ports	2	4	
Number of ports per interface module	2	4	2

Ambient conditions

- Operating temperature: 0 °C to +55 °C
- Transport / storage temperature: -20 °C to 70 °C
- Relative humidity: max. 95 % (non condensing)
- Industrial protection: IP20

Ordering details

Ordering details	Art. No.
Terminal station IE-MMH	02050310
Terminal station IE-MMS	02050300
Terminal station IE-MMP	02050320

When ordering, always indicate your terminal station and the required extensions.



Fig. 1 - IE-MMH



Fig. 2 - IE-MMS



Fig. 3 - IE-MMP

Design

- Dimensions (H x W x D)
Terminal station: approx. 95 x 214 x 107 mm
Terminal station + 1 ext. module: approx. 95 x 341 x 107 mm
Terminal station + 2 ext. module: approx. 95 x 468 x 107 mm
- Attachment: snapable on DIN rail in accordance with EN50022

Compact Industrial Switches IP20 (manageable)

Function

The compact industrial switches IP20 are installed in casings and have a variable number of Cu / LWL ports.
The devices meet the elevated requirements of industrial uses e.g. (EMV / temperature / 24 V DC).
All devices are fully manageable and can thus be used for ISI (commissioning / Service / Maintenance).

Design

- Casing: plastics, aluminum die cast
- Installation: wall-mounted upright and flat; on 35 mm hat rail in accordance with EN 60 715
- Dimensions (H x W x D): 131 x 47 x 111 mm

Electrical parameters

- Supply voltage: 24 V DC (20,4 V - 28,8 V)
- Current consumption: max. 283 mA

Switching functions

- Manageable
- Store and forward
- Multi-addressable
- Learning addresses
- Prioritization
- Tagging
- Flow control
- Port mirroring
- Broadcast limiter

Configuration options

	IE - MH	IE - MS	IE - MM
Max. speed	100 MBit/s	100 MBit/s	100 MBit/s
Max. number of TX ports	16	8	8
Max. number of SC ports	2		2
max. number of ST ports	2	4	
Combination of SC and ST ports	x		
Combination of OWG and TX ports	x	x	x

Ambient conditions

- Operating temperature: 0 °C to 60 °C
- Transport / storage temperature: -40 °C to 85 °C
- Relative humidity: max. 95 % (non condensing)
- Industrial protection: IP20

Ordering details	Art. No.
Basic unit IE-MH	02050200
Basic unit IE-MS	02050206
Basic unit IE-MM	02050204

When ordering always indicate the basic unit combined with the required ports.



Fig. 1 - IE-MH



Fig. 2 - IE-MS



Fig. 3 - IE-MM

Compact Industrial Switches IP67 (manageable)

Function

The M12 and RJ45 switches IP67 both allow for a connection of up to five IP67-protected terminals via shielded, twisted-pair cables in accordance with IEC 802.3. The temperature range as well as the mechanical stability both meet highest demands. Thus, the FastEthernet switch is perfectly suitable for industrial application. By using these switches, the cabling efforts can be reduced especially in industrial network applications. The RJ45 and M12 switches both also allow for any network configuration. So the pluggable version of all the connectors makes a quick and safe installation of the switches possible. All Ethernet interfaces are protected against over-voltage.

Design

- Casing: zinc die cast
- Dimensions (H x W x D): 87 x 45 x 120 (connector assembly)
- Installation: wall-mounted upright and flat; on 35 mm hat rail in accordance with EN 60 715
- Industrial protection: IP65 / IP67

Electrical parameters

- Input voltage: 24 V DC (18 - 30 V DC)
- Current consumption: 100 mA bei 24 V DC
- Connections: pluggable with Han-4A plug-and socket connectors redundant voltage supply

Ambient conditions

- Operating temperature: -40 °C to +70 °C
- Relative humidity: max. 95 % (non condensing)

Ethernet interfaces

- Ports: 5 x 10 / 100 Base TX, twisted pair
- Data transmission rate: 10 / 100 Mbps
- Cables: STP and UTP with Cat 5
- Number of cascades: optional
- Line lengths: max. 100 m acc. to Cat 5 in EN 50 173-1

Mechanical stability

- Shock/vibrations: IEC 68-2-27-Ea / IEC 68-2-6-Fc

EMC

- Signal-to-noise ratio: EN 61000-4-2 ... EN 61000-4-6
- Electromagnetic emission: EN 50011 class A

Ordering details

Art. No.

Switch IP67 5'M12-port

2050203

Switch IP67 5'RJ45-port

2050202



Fig. 1 - M12 switch



Fig. 2 - RJ45 switch

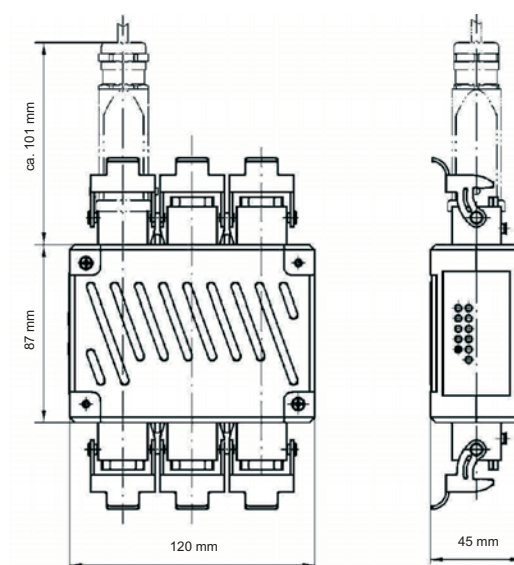


Fig. 3 - Engineering drawing

Security modules

Function

These devices control the transfer between the networks and the access to the networks respectively using given rules. It is possible to grant access to the secured network to a limited number of users only. (e.g. für remote maintenance/network administration).

Netzwerklast und Netzwerkaktionen, wie übermäßigen Broadcast, lassen sich auf das jeweilige Netzwerk begrenzen. Der gesamte Datenverkehr, welcher das Security Modul passieren darf, wird darüber hinaus auf Viren / Würmer überprüft.

Design

- Casing: plastics / aluminium die cast
- Installation: 35 mm DIN rail acc. to DIN 60715
wall-mounted upright and flat
- Dimensions (H x W x D): 131 x 47 x 111 mm

Electrical parameters

- Supply voltage: 24 V DC (20,4 V - 28,8 V)
- Current consumption: max. 400 mA

Security features

- VPN (Virtual Private Network)
 - authentication
 - data encoding
 - NAT-T support
 - firewall rules for each VPN connection
- Firewall
 - status check
 - configurable firewall rules
 - IP masquerading, 1 to 1 NAT
 - IP spoofing protection

Configuration options

Port 1 (protected)	- Port 2 (unprotected)	IE - SMH	IE - SMS
Max. speed		100 MBit/s	100 MBit/s
TX	- TX	x	x
TX	- SC (Multimode)	x	
TX	- SC (Singlemode)	x	
SC (Multimode)	- TX	x	
SC (Singlemode)	- TX	x	
SC (Multimode)	- SC (Multimode)	x	

Ambient conditions

- Operating temperature: 0 °C to 55 °C
- Transport / storage temperature: -40 °C to 80 °C
- Relative humidity: max. 95 % (non condensing)
- Industrial protection: IP20

Ordering details

Art. No.

Basic station IE-SMH

02050004

Basic station IE-SMS

02050005

When ordering, always indicate the basic station and the required ports.



Fig. 1 - IE-SMH



Fig. 2 - IE-SMS

RJ45 socket IP67

Function

The Fast Ethernet „RJ45/M12 Switch IP67“ allows the connection of up to five terminal devices via shielded twisted cables acc. to IEC 802.3 in IP67.

Temperature range and mechanical stability meet highest requirements. The Fast Ethernet Switch can thus be used directly in an industrial environment.

Its use reduces the amount of cabling in industrial networks. Any type of network configuration is possible with the „RJ45/M12 Switch IP67“.

The plug-type design of all connections provides for a safe and quick installation. All Ethernet interfaces are protected against overvoltage.

Design

- Case: Zinc pressure die casting
- Dimensions (H x W x D): 120 x 105 x 42 mm (without caps and cable screw connection)
- Installation: wall-mounted
- Weight: approx. 0.6 kg
- Industrial protection: IP67 / IP65

Ethernet interface

- Suitable for: Ethernet, Fast Ethernet
- Transmission: acc. to Category 5, ISO / IEC 11801:2002 / EN 50173-1
- cable connection: 2 x LSA + 2 x pluggable outlets (RJ45)

Ambient conditions

- Operating temperature: 0 °C to +55 °C
- Relative humidity: 30 % - 95 %, not condensing

Mechanical stability

- Shock / vibration: IEC 68-2-27-Ea / IEC 68-2-6-Fc

EMC

- Noise immunity: EN 61000-4-2 ... EN 61000-4-6

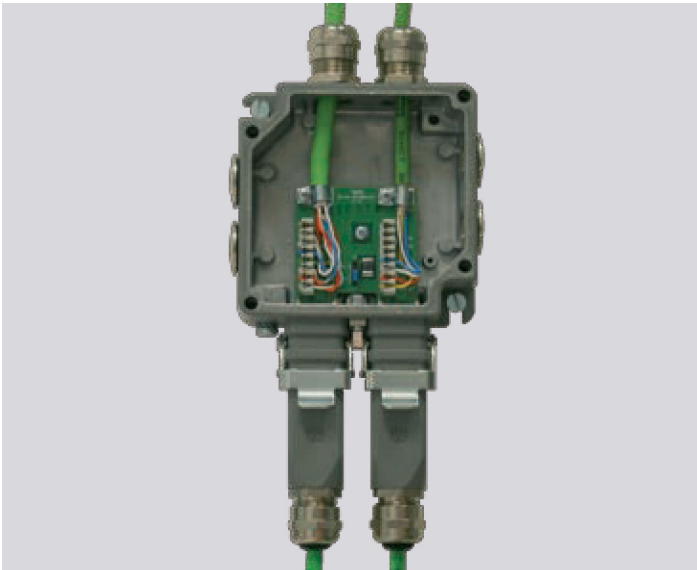


Fig. 1 - RJ45 socket IP67

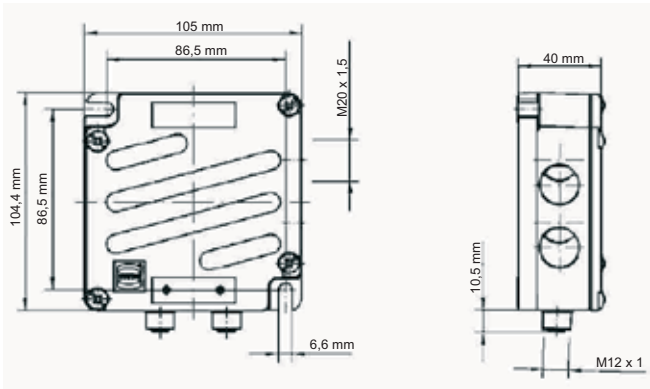


Fig. 2 - Engineering drawing

Ordering details	Art. No.
RJ45 socket IP67	02051002

RJ45 patchfield Fast Connect

Function

The RJ45 patchfield serves for the transfer of the robust Industrial Ethernet / PROFINET lines used in industrial environment to ready made-up Ethernet lines (10 / 100 Mbps) by means of RJ45 sockets. By using several patch fields RJ45 in a row it is possible to built up a patch field of any number of connections. RJ45 patchfield with RJ45 LAN socket and ID contacts to connect the RJ 45 with the Ethernet line in an industrial environment. All connectors used for PROFINET are shielded and designed for a row industrial environment.

Technical data

- Transmission characteristics: CAT 5
- Pin arrangement as per PROFINET geometry
- Geometry: RJ45
- Industrial protection: IP20
- Connection of industrial Ethernet FC lines: 4 ID termination for all IE cables 2 x 2
- Core diameters: AWG 22 - 24 flexible
AWG 22 - 23 solid
- Core insulation: max. 1,6 mm Ø
- Operating temperature: 20 °C to +75 °C
- Cable jacket diameter: 6,5 mm - 6,9 mm
- Contact durability: min. 750
- Casing: cast metal
- Dimensions (H x W x D): 108 x 31 x 37 mm
- Installation: standard sectional rail or wall-mounted

Pin assignment

Signal	denotation	Wire colour	configuration RJ45
TD+	Transmission Data +	yellow	1
TD-	Transmission Data -	orange	2
RD+	Receive Data +	white	3
RD -	Receive Data -	blue	6



Fig. 1 - RJ45 Patchfield Fast Connect

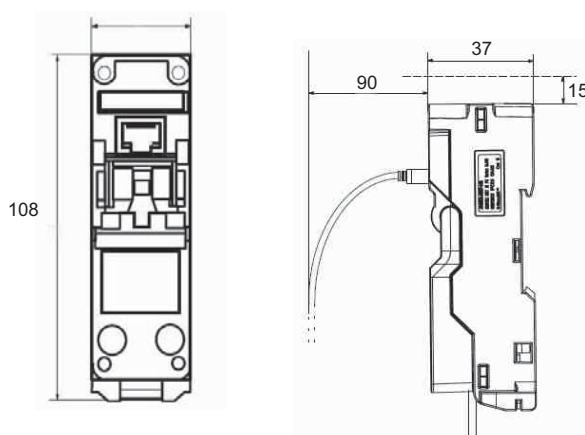


Fig. 2 - Engineering drawing

Ordering details

RJ45 patchfeld Fast Connect

Art. No.

02051006

Light patch cable Cat 5e ready made-up

Function

Patch cables, in contrast to installation cables are due to their line structure considerably more flexible. They are used to connect between patch field and network node (switch/hub) [straight through], or between patch field and terminal [cross over]. Aufgrund der vielfältigen Leitungslängen und Steckverbindungen bietet Indu-Sol eine kunden- und anwendungsspezifische Produktvielfalt.

Cable construction

- PVC jacket
- 4-paired strand
- Twisted paired

Wire diameter

- 32 AWG (Cat 5e) (AWG = American Wire Gauge)

Wiring

- TIA / EIA 568-B / straight through

Connections

- Both ends RJ45
- Molded ends

Shielding

- FTP (Cat 5e):
 - no shielding of single wires to each other
 - overall layer foil / braid

Properties

- Wave impedance $100 \pm 15 \text{ Ohm}$
- NEXT \
- Attenuation - acc. ISO / IEC 11801
- ELFEXT /
- Return Losses

Assortment variety



_xxx (The line length is to be added to the article No. in purchase orders)

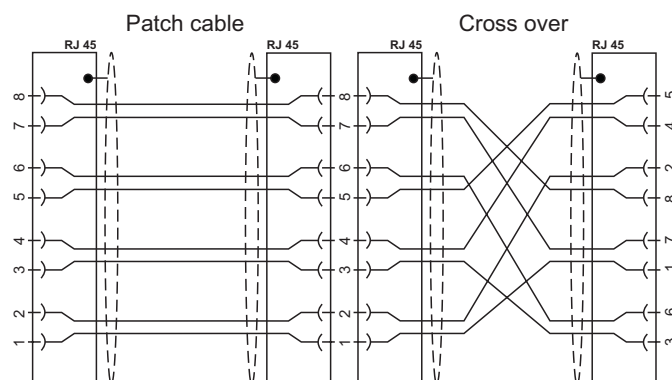
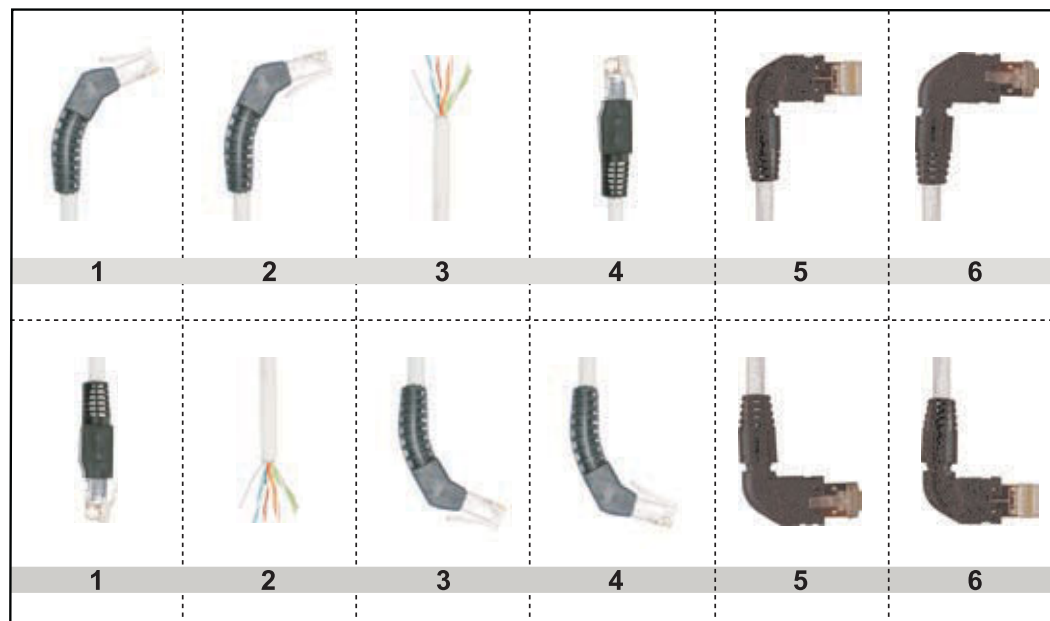


Fig. 2 - Engineering drawing

Light patch cable Cat 5e ready made-up

Ordering instruction

Cable end 1



Cable end 2

			Cable length
Patch cable			
Article No.: 00216 -	x	x -	xxx
Cross over			
Article No.: 00215 -	x	x -	xxx

Note

All versions are combinable on request and will be made according to the required cable length!

Ordering details	Art. No.
Light patch cable Cat 5e	00216-xx-x
Light patch cable Cat 5e „Cross over“	00215-xx-x

The first two digits (xx) following the standard item number define the cable ends. The last digits (xxx) define the length of the cable. Any length can be selected (indicate in meters).

Light patch cable Cat 5e - to assemble

RJ45 connector with crease protection

- Crease protection / rest lever protection: yes
- Jacket diameter,, min.-max.: 5,5 - 7,1 mm
- Connector acc. to IEC 60603-7-5 (Norm): yes, to 250 Mhz
- Life cycle / contact durability : 750
- Diameter, solid: AWG 27/1 AWG 24/1
- Diameter, flexible: AWG 27/7 AWG24/7
- Cable withdrawing force: 89 N
- Electric strength, contact to contact: 1000 V DC
- Electric strength, contact to shield: 1500 V DC

Patch cable Cat 5e

- Two-core laid-up as pair
- 4 pairs stranded
- 4 x 2 x AWG 26 / 19
- Copper strand: 19 x 0,1ø 0,5 mm
- PP insulation: ø 1,0 mm
- Braided shield by tinned copper wires
- Loop impedance: 260 W / km
- Surge impedance: 85 ... 115 W
- Drag-chain capable
- Permissible temperature range: -40 °C to +80 °C

Crimping tool

- Press moulding tool for 8-pole, shielded RJ45 connector
- Crosscut AWG 27 - 24

Scope of delivery

- 10 x RJ45 connector
- 10 m cable
- Crimping tool
- Quickstart guidance



Fig. 1 - RJ45 connector

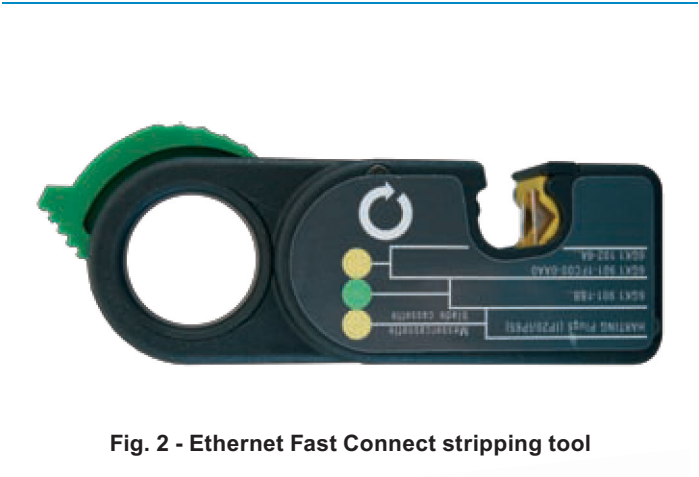


Fig. 2 - Ethernet Fast Connect stripping tool



Fig. 3 - Crimping tool

Ordering details	Art. No.
Starter kit	
RJ45 connector	02051008
Cable	00021674
Crimping tool	02051010
Ethernet Fast Connect stripping tool	02051011

Heavy patch cable Cat 5e ready made-up

Function

Patch cables, in contrast to installation cables are due to their line structure considerably more flexible. They are used to connect between patch field and network node (switch/hub) [straight through], or between patch field and terminal [cross over].

Cable construction

- Two cores laid up as pair
- Four pairs stranded
- Filler
- Semi-conducting overlapped plastic film
- PE (PUR) jacket

Wires

- 4 × 2 AWG 26 / 19
- Copper strand: 19 × 0,1 Ø 0,5 mm
- PP insulation : Ø 1,0 mm
- Pairs of wires: brown / brown and white
blue / blue and white
green / green and white
orange / orange and white

Shielding

- STP (Cat 5e):
 - no shielding of single wires to each other
 - overall layer foil / braid

Connections

- RJ45 connector sprayed at both ends and additional cable relief

Electrical properties

- Loop impedance: 260 W / km
- Resistance difference: 3 %
- Signal delay time: 5,55 ns / m
- Insulation resistance: 150 MW × km
- Surge impedance: 85 ... 115 W
- Capacity: 50 nF / km
- Attenuation: 23 dB

Properties

- Flameproof according to IEC 60332-1
- Oil-resisting according to IEC 60811-2-1
- Halogen-free
- Admissible pull: 100 N
- Permissible temperature range: -40 °C to +80 °C
- Fast Connect strippable
- Drag-chain capable and following properties:
 - 10 million bending cycles
 - min. bending radius 7,5 × max. Ø
 - max. speed 180 m / min
 - max. acceleration 5 m / s²

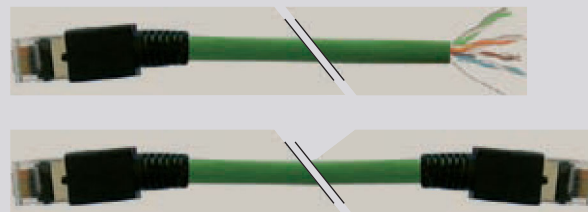


Fig. 1 - Heavy patch cable Cat 5e ready made-up

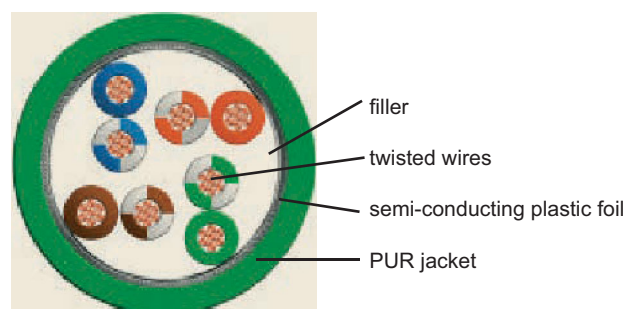


Fig. 2 - Engineering drawing

Ordering details	Art. No.
Patch cable CAT 5e* - connectors at both ends	00021670
Patch cable CAT 5e* - connector at one end	00021672
Patch cable CAT 5e* - without connector	00021674

Accessories

RJ45 connector protection cap	02051001
RJ45 connector IP20 field-wirable	02051003
M12 connector IP20 field-wirable	02051004
Ethernet Fast Connect stripping tool	02051011

*) length on request

PROFINET cable assemblies

Function

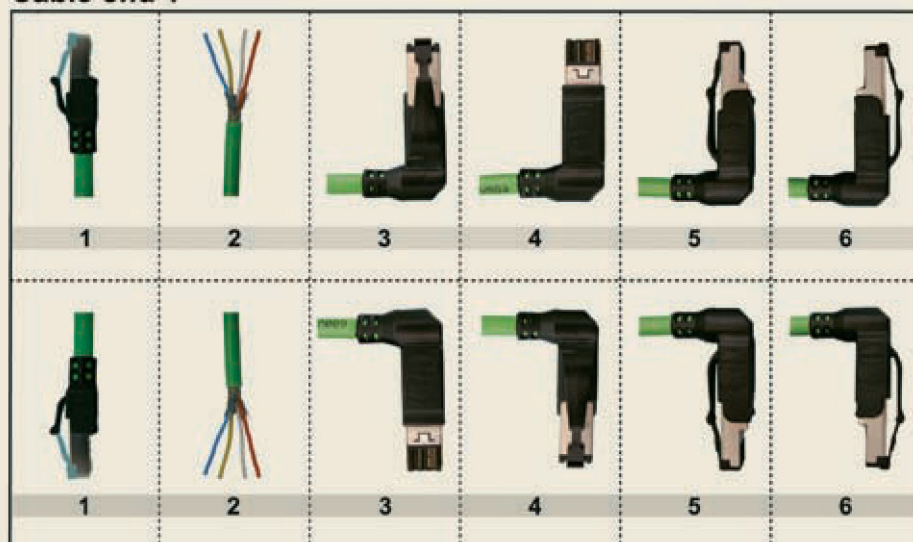
Because of the line construction industrial PROFINET cables are clearly more robust and safe when it comes to data communication. Since a large range of line and plug-type connectors is available, Indu-Sol provides a product range that meets the individual customer and application needs.

Cable design

- Solid
 - Jacket material: PVC
 - Conductor cross section: 4 cores AWG 22/1
 - Operating temperature: -40 °C to +70 °C
 - Colour: green
- Flexible
 - Jacket material: PVC
 - Conductor cross section: 4 cores AWG 22/7
 - Operating temperature: -40 °C to +70 °C
 - Colour: green
- Schleppkettentauglich
 - Jacket material: PUR
 - Conductor cross section: 4 cores AWG 22/7
 - Operating temperature: -40 °C to +70 °C
 - Colour: green
- Outdoor
 - Jacket material: PVC
 - Conductor cross section: 4 cores AWG 22/7
 - Operating temperature: -45 °C to +60 °C
 - Colour: black

Ordering instruction

Cable end 1



Cable end 2

Wiring

- 4-pin, 1:1 (RJ45 contacts 1/2 and 3/6)

Shielding

- S/FTP (full shielding + core shielding)

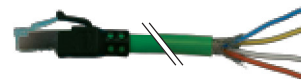
Baud rate

- 10 / 100 Mbps

Sortiment variety



Art. No.: 00301-11-xxx



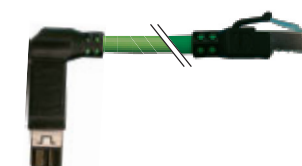
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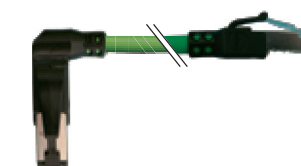
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Art. No.: 00301-51-xxx



Art. No.: 00301-41-xxx



Art. No.: 00301-31-xxx

_xxx (The line length is to be added to the article No. in purchase orders)

Cable length (indicate in meters, without unit)

Solid			
Article No.:	020516 - x	x	- xxx
Flexible			
Article No.:	020517 - x	x	- xxx
Suitable for use with drag chains			
Article No.:	020518 - x	x	- xxx
Outdoor			
Article No.:	020519 - x	x	- xxx

Twisted pair cable Cat 5 - STP

Function

For a PROFIBUS network in an industrial environment only shielded cabling and connecting elements are permissible. Industry-suitable cables can be exposed to extremely mechanical load requiring a special structure. Plug-and-socket connectors and cables from a well-coordinated system. Only those elements that have proven their compatibility are called PROFIBUS units.

Installation instruction

To avoid crosstalk at the maximum baud rate of 100 MBit, the laying length should not exceed 10 m.

Cable design

- Filler
- Twisted cores
- Aluminium foil, overlapping
- Shield braid consisting of tin-plated wires
- Jacket, PUR green

Connections

- RJ45 connectors at both ends sprayed with additional cable relief

Electrical properties

- Loop resistance: max. 260 W / km
- PE insulation: Ø 1.0 mm
- Surge impedance: 85 ... 115 W

Properties

- Flameproof acc. to IEC 60332-1
- Halogen-free
- 750 plug cycles
- Permissible temperature range: -20 °C to +70 °C
- Fast Connect can be stripped



Fig. 1 - Twisted pair cable CAT 5

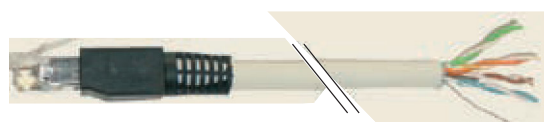


Fig. 2 - Twisted pair cable CAT 5

Ordering details	Art. No.
Cable CAT 5* - connectors at both ends	00021670
Cable CAT 5* - connector at one end	00021672
Cable CAT 5* - without connectors	00021674

*) length on request

Twisted pair cable CAT 5e - S-FTP

Function

For a PROFIBUS network in an industrial environment only shielded cabling and connecting elements are permissible. Industry-suitable cables can be exposed to extremely mechanical load requiring a special structure. Plug-and-socket connectors and cables from a well-coordinated system. Only those elements that have proven their compatibility are called PROFIBUS units.

Wires

- 4 ' AWG 22/ 7
- Copper strand: 19' 0,15 / Ø 0,76 mm
- PE insulation: Ø 1,5 mm
- Wire colors: yellow
orange
white
blue

Shielding

- Shield braid made of tinned copper wires
- Aluminum foil overlapping

Connections

- RJ45 connectors at both ends sprayed with additional cable relief

Electrical properties

- Loop resistance: max. 120 W / km
- Signal propagation delay: 5,3 ns / m
- Insulation resistance: min. 500 MW ' km
- Surge impedance: 85 ... 115 W
- Capacity: 50 nF / km
- Near-end cross-talk attenuation: 50 dB / 100 m
- Far-end cross-talk attenuation: 45 dB / 100 m
- Wave attenuation: 22 dB / 100 m

Properties

- Flameproof acc. to IEC 60332-1
- Halogen-free
- Oil resisting acc. to IEC 60811-2-1
- Oil resisting acc. to VDE 0473 Section 811-2-1
- Admissible pull: 150 N
- Permissible temperature range: -40 °C to +70 °C
- Fast Connect can be stripped
- Permissible line length: max. 100 m (acc. to AWG 22)
- Drag-chain capable of following properties:
 - Bending radius for repeated usage: 15' max. Ø
 - Bending radius for single usage: 10' max. Ø

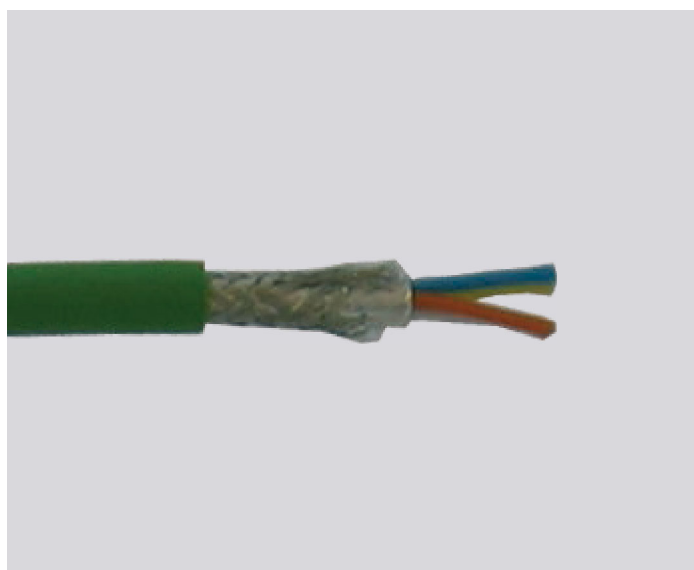


Fig. 1 - Twisted pair cable CAT 5e

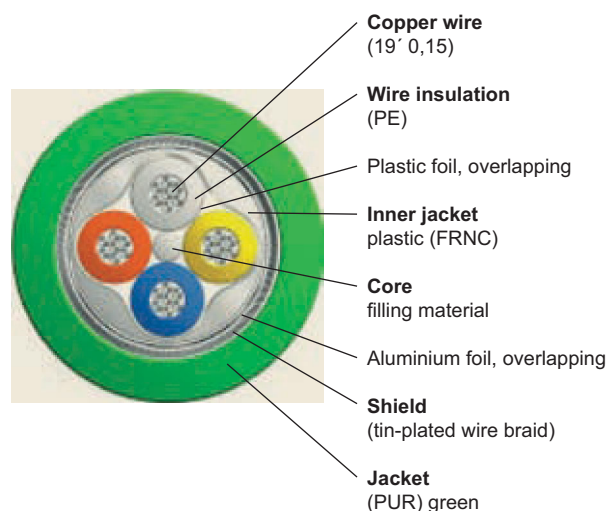


Fig. 2 - Engineering drawing

Ordering details	Art. No.
Quad cable CAT 5e* - connectors at both ends	00021770
Quad cable CAT 5e* - connector at one end	00021772
Quad cable CAT 5e* - without connectors	00021774

*) length on request

Connectors RJ45 / M12 - to assemble

Function

For PROFINET networks it has become usual to use two kinds of faces (RJ45, M12). The most well known connector type RJ45 is available as IP20 solution for use in switchgear cabinets.

For IP65/67 applications 4-pin M12 connectors with D coding are used. The PROFINET installation line (AWG22) can be connected to all other connectors.

All connectors used for PROFINET are shielded and laid out for rough industrial applications.

Technicle data

- Transmission characteristic: RJ45 / 4 A - CAT 5e
RJ45 / 8 A - CAT 5e
M12 - CAT 5
- Pin configuration agree with PROFINET
- Geometry: RJ45 / M12
- Industrial protection: RJ45 - IP20
M12 - IP67
- Wire diameter: AWG 22 - 24 flexible
AWG 22 - 23 solid
- Wire insulation: max. 1,6 mm Ø
- Operating temperature: RJ45 -20 °C to +70 °C
M12 -25 °C to +85 °C
- Cable jacket diameter: RJ45/4A 6,5 mm - 6,9 mm
RJ45/8A 4,5 mm - 8,0 mm
M12 5,5 mm - 7,2 mm
- Connector cycle: RJ45/4A min. 750
RJ45/8A min. 1000
- Casing material: RJ45 cast metal
RJ45 plastic
M12 cast metal

Pin assignment

Signal	denotation	Wire colour	configuration	
			RJ45	M12
TD+	Transmission Data +	yellow	1	1
TD-	Transmission Data -	orange	2	3
RD+	Receive Data +	white	3	2
RD -	Receive Data -	blue	6	4

Ordering details	Art. No.
Connector RJ45 metal	02051003
Connector RJ45 plastic	02051005
Plug M12	02051004
Plug socket M12	02051014



Fig. 1 - Connector RJ45 metal

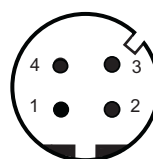


Fig. 2 - Connector RJ45 plastic



Fig. 3 - M12 circular connector Fast Connect

M12x1 connector



M12x1 socket

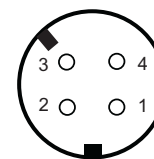


Fig. 4 - Pin assignment

Optical fibre cable

General

Optical wave guides (OWG) are cables and lines consisting or composed of light guides that are partially assembled with connectors and transmit light in the visible and ultraviolet or infrared range. Optical fibre cables are more or less flexible connections to transmit optical signals. The light guides in which the light is carried are made of glass or organic plastic material depending on the application.

Design and function

Optical fibre cables consist of highly transparent glass fibres sheathed by a glass of low refractive index. The fibre consists of a core, a sheath and a protective coating. The light-guiding core transmits the signals. The sheath has a lower refractive index (density) than the core, thus effecting a total reflection at the interface and guidance of the light in the core of the optical fibre cable. The outer coating serves as protection against mechanical damage and consists mostly of a 150-500 µm coating of special plastic protecting the fibre also against moisture.

Types

There are two types of OWG fibres, i.e. the graded index fibre and step index fibre. With graded index fibres the refractive index decreases in radial direction to the outside, whereas with the step index fibre the refractive index changes abruptly from the core to the sheath glass. The differentiation between the graded index fibres and step index fibres is made with multimode fibres only. The counterpart of the latter, the single mode fibre, exists as step index fibre only.

Applications

- Indoor cable
- Universal cable
- Outdoor cable
- Optical fibre cable for special applications
- Optical fibre cables with UL approval (US norm)

Pictograms

- *Flame retardant and halogen-free sheath*
The outer cable sheath is self-extinguishing and non-flame propagating. In case of fire the halogen-free sheath material develops neither toxic nor corrosive gases.
- *Rodent protection*
The cable core is protected against damage by rodents.
- *Longitudinal water tight*
Water cannot propagate in longitudinal direction in the cable core.
- *UV resistant*
The outer cable sheath is resistant to ultraviolet rays.
- *Suitable for use with drag chains*
The cable has been tested for use with drag chains and approved.
- *Oil resistant*
There is a general good resistance to oil, petrol, acids and liquors.
- *Transversal water tight*
The diffusion of water in transverse direction to the cable core is prevented.



Optical fibre cable

Note

With the help of the line tester „ETHERtest“ commonly available optical fibre cables can be checked, evaluated and documented for attenuation, crosstalk, cable breaks etc. This includes the multimode fibres (Fig. 1/ Fig. 2) and single mode fibres (Fig. 3).

Multimode fibres 50/125 µm

Geometric/Mechanical properties

- Core diameter: $50 \pm 2.5 \mu\text{m}$
- Sheath diameter: $125 \pm 2 \mu\text{m}$
- Protective coating: $245 \pm 10 \mu\text{m}$
- Wavelength: $850 / 1,300 \text{ nm}$

Application

- This cable can be used up to a length of several hundred meters.

Multimode fibres 62.5/125 µm

Geometric/Mechanical properties

- Core diameter: $62,5 \pm 2,5 \mu\text{m}$
- Sheath diameter: $125 \pm 2 \mu\text{m}$
- Protective coating: $245 \pm 10 \mu\text{m}$
- Wavelength: $850 / 1300 \text{ nm}$

Application

- This cable can be used up to a length of several hundred meters.

Single mode fibres 9/125 µm

Geometric/Mechanical properties

- Core diameter: $9 \pm 0,1 \mu\text{m}$
- Sheath diameter: $125 \pm 0,7 \mu\text{m}$
- Protective coating: $245 \pm 10 \mu\text{m}$
- Wavelength: $1310 / 1550 \text{ nm}$

Application

- This cable can be used up to a length of several thousand meters.

More optical fibre cables are available on request, e.g. multifibre cables and cables for special ambient and installation requirements!



Fig. 1 - Multimode fibres 50/125 µm



Fig. 2 - Multimode fibres 62.5/125 µm



Fig. 3 - Single mode fibres 9/125 µm

EMC Suppression Modules for Contactors



A0



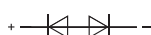
AD



CF



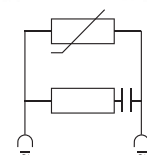
Diode



Diode/Z-Diode



VDR



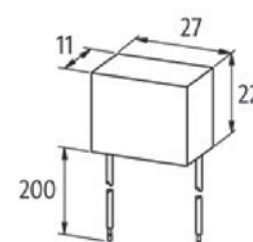
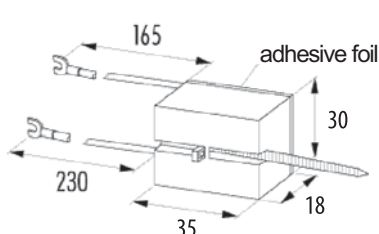
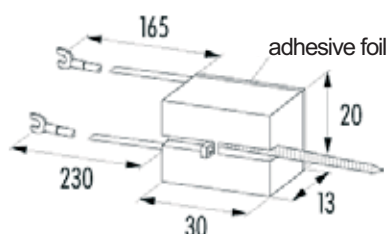
VDR-RC



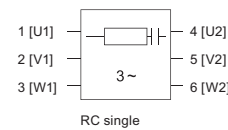
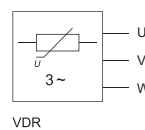
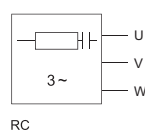
RC

Order data			Art. No.		Art. No.		Art. No.		Coil holding power		
Voltage	Suppression circuit	Approval		Approval		Approval			A0	AD	CF
Max. 240 V DC	Diode	CSA	050001						15 W		
24 V DC	Z-Diode	CSA	050002	CSA	050010				25 W	75 W	
24 V AC/DC	VDR	UL+CSA	050003	CSA	050011				50 VA/W	200 VA/W	
	RC					CSA	050019				15 VA
48 V AC	VDR	UL+CSA	050004	CSA	050012				70 VA/W	200 VA/W	
	RC	UL+CSA	050005	UL+CSA	050013				10 VA	15 VA	
110 V AC/DC	VDR	UL+CSA	050006	CSA	050014				100 VA/W	200 VA/W	
	VDR-RC										
	RC										
230 V AC/DC	VDR	UL+CSA	050007	CSA	050015				200 VA/W	200 VA/W	
	VDR	UL+CSA	050008						200 VA/W		
	RC			CSA	050016	CSA	050020			25 VA	15 VA
	RC	UL+CSA	050009	UL+CSA	050017	CSA	050021		20 VA	75 VA	20 VA
	RC			UL+CSA	050018	CSA	050022			100 VA/W	50 VA

Engineering drawings

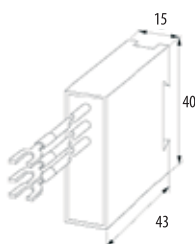
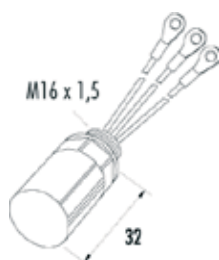


EMC Suppression Modules for Motors

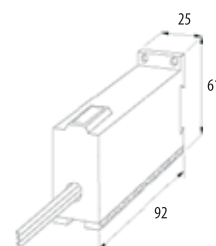


Order data		Art. No.		Art. No.		Art. No.	
	Motor output	Suppression circuit Approval		Motor output	Suppression circuit Approval		
3 x 400 V AC	4 kW	VDR/UL	050030	4 kW	RC/UL	050034	RC
	4 kW			4 kW			VDR
	4 kW			4 kW	VDR/UL	050035	
	7,5 kW	VDR	050031	7,5 kW	VDR/UL	050036	RC
	10 kW			10 kW			RC
	10 kW			10 kW	VDR/UL	050037	
	20 kW			20 kW	VDR/UL	050038	
	20 kW			20 kW			
3 x 575 V AC	4 kW	VDR/UL	050032	4 kW	RC/UL	050039	
	7,5 kW	VDR/UL	050033	7,5 kW			RC
	10 kW			20 kW			VDR
	20 kW			45 kW			RC single

Engineering drawings



A snap adapter is required to snap them onto supporting rail.
Article No.: 050040



Two snap adapter are required to snap them onto supporting rail.
Article No.: 050040

Switched-mode power supply unit, single-phase 0.6 / 1.3 / 2.5 A „ICS-B“

Function

The single-phase, primary switched power supply units with basic functionality are shock-hazard protected (EN 60529; IP20), short-circuit and overload-proof.

The power supply units can be easily snapped onto the top-hat rail. Because of the small size, they require little space.

Technical data sheet

	ICS-B 0,6 A	ICS-B 1,3 A	ICS-B 2,5 A
Input			
Input voltage	90...265 V AC 110...300 V DC		95...265 V AC 110...300 V DC
Input current	0,3A (100 V AC) 0,2A (230 V AC)	0,6A (100 V AC) 0,4A (230 V AC)	1,0A (110 V AC) 0,6A (230 V AC)
Primary fusing	max. 10 A		
Frequency	50 / 60 Hz		
Output			
Output voltage	24 V DC SELV -1% / +3%		
Output current	0,6 A	1,3 A	2,5 A
Efficiency	0,81	0,82	0,85
Mains failure bridging	>25 ms (100 V AC)	>15 ms (100 V AC)	>15 ms (100 V AC)
LED display	LED (green) for output voltage		
General data			
Standards	EN 60950-1, EN 61203-4, EN 55022 B, EN61000-3-2		
Temperature range	0...+50°C, to 60°C Derating		0...+40°C, to 55°C Derating
Relative humidity	5...95%, no condensation		
Weight	0,11 kg	0,16 kg	0,23 kg
Dimensions H x W x D	76 x 38 x 80 mm		76 x 38 x 100,5 mm



Fig. 1 - Switched-mode power supply unit 0.6-2.5 A

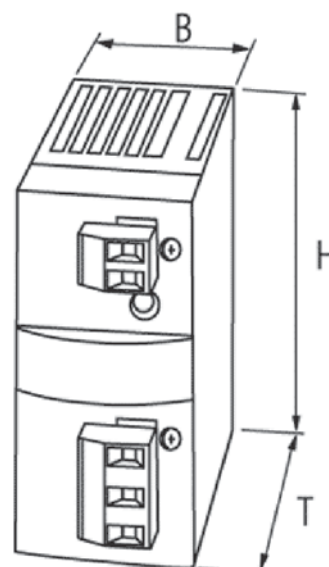


Fig. 2 - Engineering drawing

Ordering details	Art. No.
ICS-B 0.6 A 15 W	010949
ICS-B 1.3 A 30 W	010950
ICS-B 2.5 A 60 W	010951

Switched-mode power supply unit, single-phase 5 / 7.5 / 10 A „ICS-B“

Function

The single-phase, primary switched power supply units with basic functionality are shock-hazard protected (EN 60529; IP20), short-circuit and overload-proof.

The power supply units can be easily snapped onto the top-hat rail. Because of the small size, they require little space.

Technical data sheet

	ICS-B 0,6 A	ICS-B 1,3 A	ICS-B 2,5 A
Input			
Input voltage	90...265 V AC 110...300 V DC		95...265 V AC 110...300 V DC
Input current	0,3A (100 V AC) 0,2A (230 V AC)	0,6A (100 V AC) 0,4A (230 V AC)	1,0A (110 V AC) 0,6A (230 V AC)
Primary fusing	max. 10 A		
Frequency	50 / 60 Hz		
Output			
Output voltage	24 V DC SELV -1% / +3%		
Output current	0,6 A	1,3 A	2,5 A
Efficiency	0,81	0,82	0,85
Mains failure bridging	>25 ms (100 V AC)	>15 ms (100 V AC)	>15 ms (100 V AC)
LED display	LED (green) for output voltage		
General data			
Standards	EN 60950-1, EN 61203-4, EN 55022 B, EN61000-3-2		
Temperature range	0...+50°C, to 60°C Derating		0...+40°C, to 55°C Derating
Relative humidity	5...95%, no condensation		
Weight	0,11 kg	0,16 kg	0,23 kg
Dimensions H x W x D	76 x 38 x 80 mm		76 x 38 x 100,5 mm



Fig. 1 - Switched-mode power supply unit 5-10 A

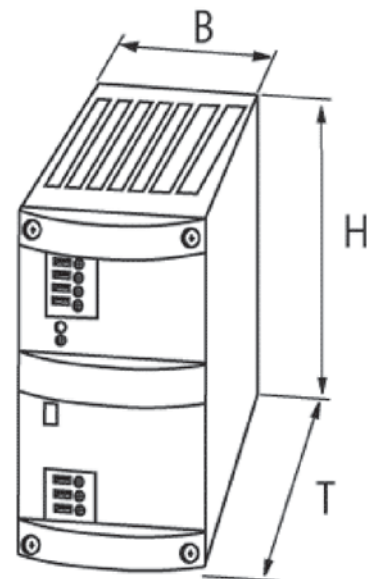


Fig. 2 - Engineering drawing

Note

Power supply units 3 x 340 ... 460 V:
Primary switched-mode regulators, three-phase 10 A / 20 A / 40 A are available on request!

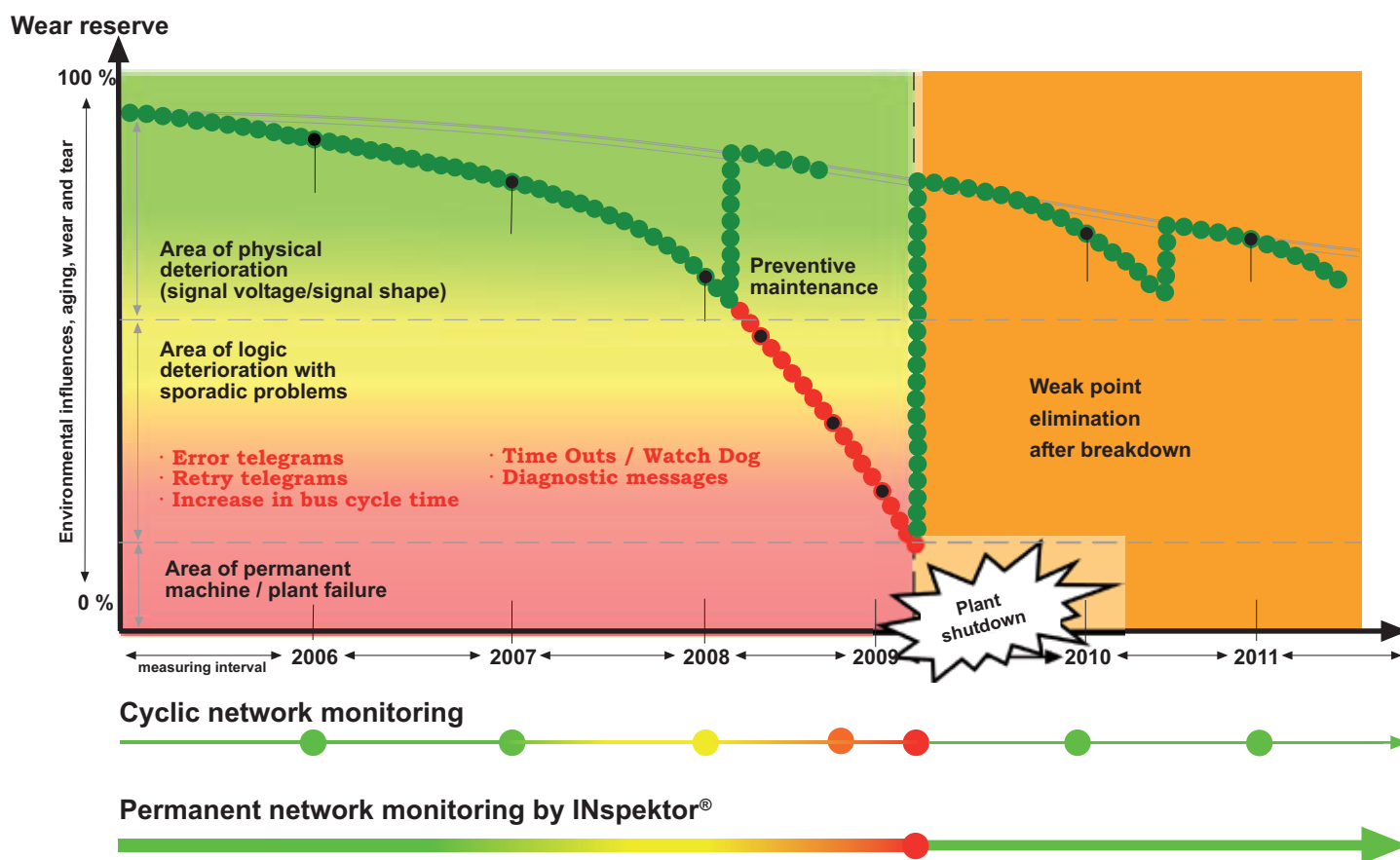
Ordering details	Art. No.
ICS-B 5 A 120 W	010952
ICS-B 7.5 A 180 W	010953
ICS-B 10 A 240 W	010954

Permanente fieldbus monitoring enhances availability

*„Status-oriented maintenance - condition monitoring - asset management“
are buzz words in automation technology.*

These concepts have something similar in mind: To be able to guarantee smooth production, it is essential to permanently monitor critical components. If their current status is known, the plant operator can take suitable action, before a component fails and production comes to a halt. But what is status-oriented maintenance of individual components good for if the element linking these components, the field bus, is left out of this monitoring process?

Network status graphic ~ Condition Monitoring (status-oriented maintenance)



Continuous production can only be ensured and out of the blue failures avoided if beside the individual components the bus is considered a wear part and its status known. In many a case the regular maintenance of the field bus would make sense. But this is not easy to achieve because the number of maintenance staff is decreased for economic reasons.

So, the „INspector“ of Indu-Sol comes in as the ideal partner. It is integrated in the respective network on a permanent basis and monitors constantly the logical data traffic. As a first step Indu-Sol

offers inspectors for PROFIBUS, CAN bus and ASi nets as well as analyzers for Industrial Ethernet. A central software informs the plant operator both on the current and historical network status. As soon as the communication has exceeded or fallen short of certain quality parameters, the maintenance personnel gets a visual, acoustic or other form of modern warning.

Thus, it is possible to eliminate causes of fault before a trouble arises and becomes apparent by a plant shutdown.

INspektor® assesses quality of the industrial communication

After the communication quality has been checked completely the threshold values can be set individually for the network concerned. Criteria used to assess the bus quality are events like faulty telegram, repeats, collisions as well as module failures and diagnostic data. The permanent network monitoring can be carried out on different networks parallel to stationary operation. The determined quality criteria are saved as events in „INspektor®“ and the Ethernet is used to graphically display the same in the electrical workshop or control station over the entire life cycle of a plant with

help of an SNMP query on a central web-based software. The database can be used to create various graphical reports showing current and historical data. To assess the network status typical values for the different field busses or networks have turned out to be useful. Longterm statistics put us in the position for the first time to answer questions on aging, wear and wear reserves, and it is thus possible to determine maintenance intervals that are well-founded in terms of metrology.

PROFIBUS

INspektor® family »Premium-Line«

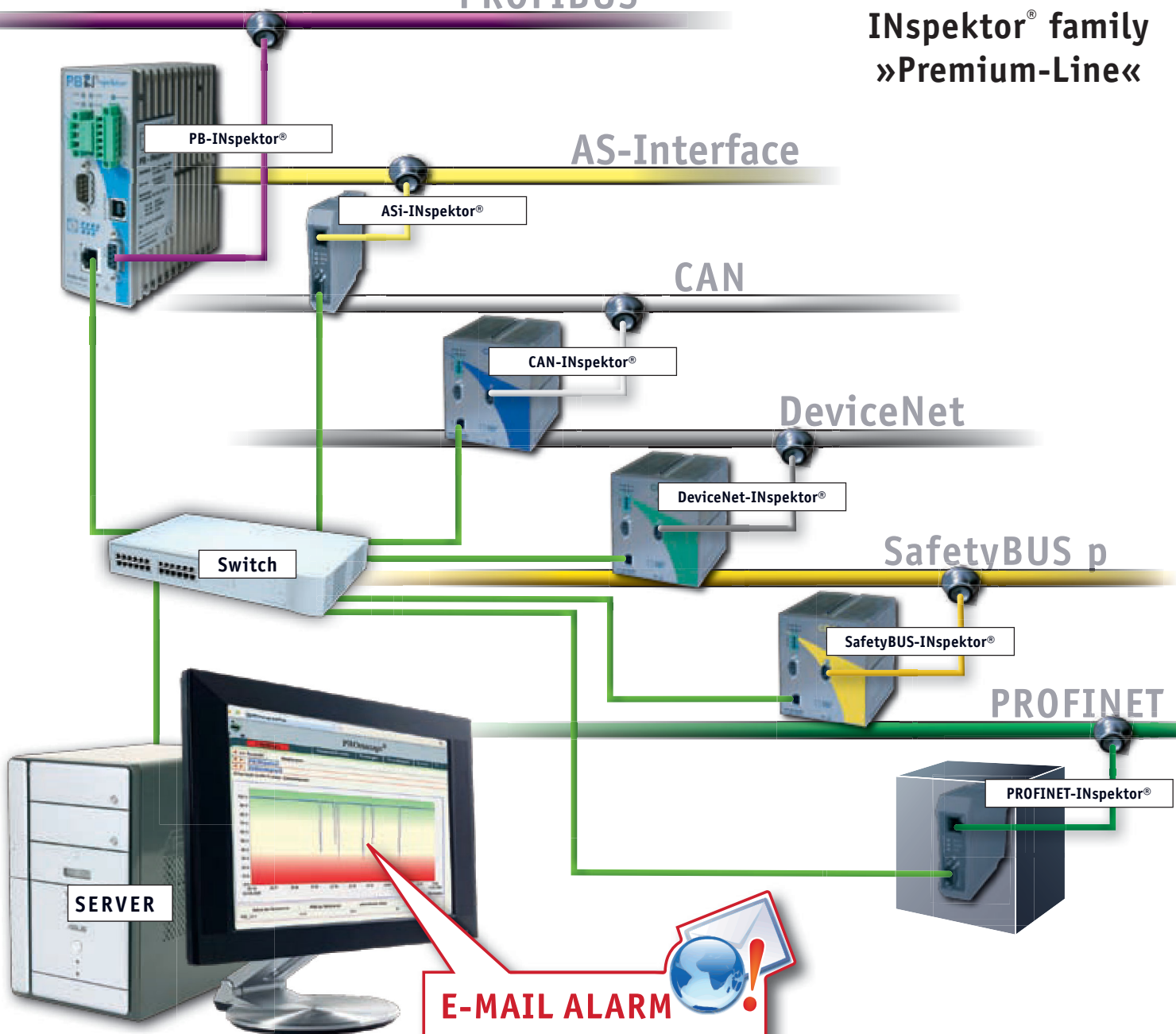
AS-Interface

CAN

DeviceNet

SafetyBUS p

PROFINET



Network monitoring software „PROmanage®“

Function

PROmanage® is a central software (incl. database) to analyze, manage and store data of the communication quality in industrial networks. By using the standard SNMP queries all port statistics of the manageable switches can be queried at minute intervals and stored with a time stamp, for example. With this sophisticated analytical technique irregularities can be detected immediately and adjustable thresholds trigger an alarm. Through this statistics function the data are available to the minute up to one year. Thus historic events, such as sporadic failures, can be tracked at any time and used for cause study. For the fieldbus, e.g. PROFIBUS, CAN, ASI, fieldbus controllers, **INSpektors®**, have to be installed locally, which are then interrogated centrally by PROmanage®. Thus it is possible to get from this central software at any time information on the condition of the controlled fieldbus, incl. Ethernet. Bottlenecks, gradual deterioration due to component ageing or wear as a result of the production environment can be monitored and displayed in a clearly laid out manner and remedial action taken before failures occur.

Logging of network data (SNMP)

The network data are logged by the standardized Ethernet protocol „SNMP“ (Simple Network Management Protocol). At a pre-defined interval all INSpektors® and switches are queried cyclically by the management software PROmanage® (standard: 1 minute) and the data stored in a MySQL database.

Display of network data

All collected network data can be displayed on every PC in the network via a web-based interface. The existing Internet browser (Microsoft Internet Explorer or Mozilla Firefox) is used for this purpose. No other software needs to be installed to display the network data. These data are available to the user as statistics (reports) and event messages (event lists).

Statistics (reports)

Based on PROmanage® a large number of graphic reports with current and historic data can be produced. Depending on the application chronological sequences of the network performance and device-related fault rate can be shown.

Event messages

With the integrated threshold management limits can be defined for every network parameter. When these limits are reached the event is entered in the event list together with a time and description. Network faults can thus be retrieved by fast click.

Alarms

An implemented alarm management forwards event messages automatically. By selecting a modern information medium (e-mail, news service) all messages can be transferred to the responsible unit in a timely manner. Transmitting routes can thus be shortened and undesired plant shutdowns avoided.

Note

The scope of the software depends on the number of Devices to be monitored. In the Ethernet one Device is equal to eight switch ports. *Example Ethernet:* For one manageable switch of 32 ports the resources of 4 Devices have to be reserved in the PROmanage® software. *Example fieldbus:* In the fieldbus one Device is to be reserved in PROmanage® for one INSpektor® (distributed data logger).



Fig. 1 - Network monitoring software „PROmanage®“

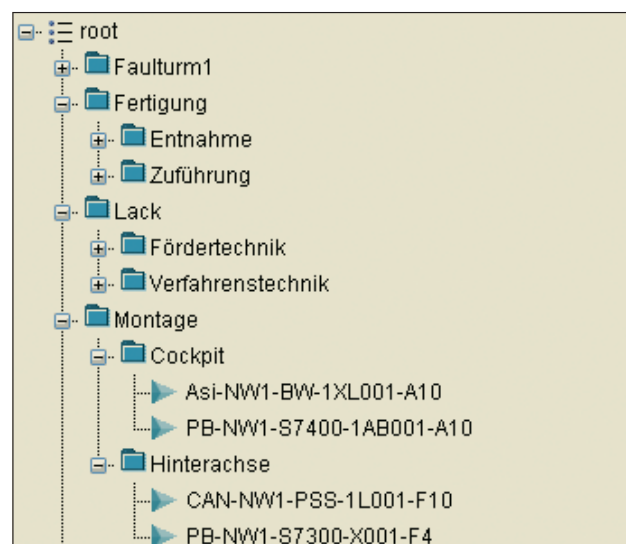


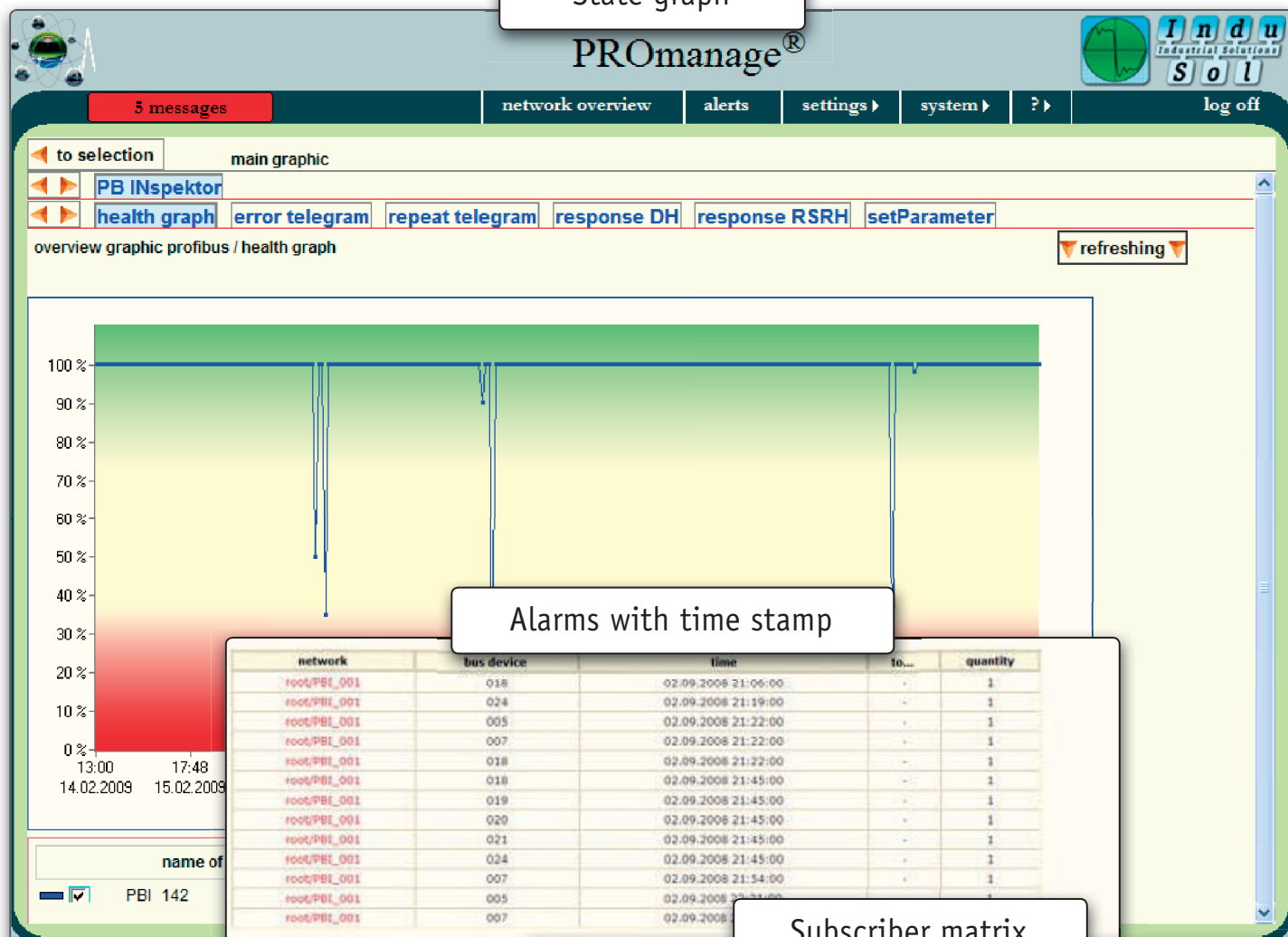
Fig. 2 - Tree structure

Ordering details	Art. No.
PROmanage® max. 5 devices (SNMP-capable)	020155
PROmanage® max. 20 devices (SNMP-capable)	020154
PROmanage® max. 40 devices (SNMP-capable)	020161
PROmanage® max. 60 devices (SNMP-capable)	020162

Others available on request!

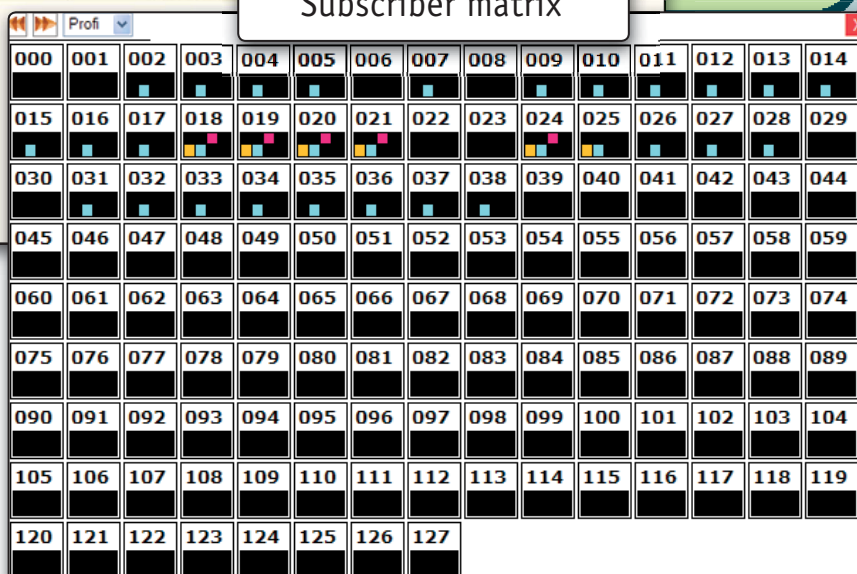
State graph

PROmanage®

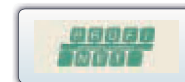


Alarms with time stamp

Subscriber matrix



The "Subscriber matrix" window displays a grid of addresses from 000 to 127. Each address is represented by a small square icon. The grid is organized into rows and columns, with addresses 000-014 in the first row, 015-029 in the second, and so on, up to 120-127 in the last row. The icons represent different subscriber states or configurations.



Decentralized data logger INspektor® - the traffic light for the PROFIBUS

Basic Line

Now as before most failures of the communication bus and the related plant shutdowns come as a surprise simply because only few plant operators know the actual condition of the bus. Reasons for it are the lack of or difficult to operate tools for bus analysis or the lack of time and personnel. With the new hardware solution INspektor® it is possible now to analyse the condition of all bus subscriber in the form of traffic lights. The INspektor®, the „traffic lights for the PROFIBUS“, is a passive data logger that permanently analyses the telegram traffic in the PROFIBUS networks regarding events, such as

- error telegrams
- telegram repeats
- device diagnosis and failures.

Pre-defined trigger functions sum up events and an integrated potential-free contact „raises“ an alarm as soon as a pre-defined threshold is exceeded. Thanks to a hardware-integrated web server the network condition can be displayed on the PC by the internet browser obviating the need of any additional software.

Comfort Line

The PROFIBUS stand-alone INspektor® is a simple, easy-to-handle diagnostic tool that could well be compared with the ECG used in medicine. If more functionality is desired after the stand-alone version, the Comfort Line of the PB-INspektor® family allows an in-depth fault analysis thanks to its telegram analyzer. Every telegram is recorded and evaluated cyclically. Through the access to the GSD files fault messages in the protocol can be displayed as plain text.

Premium Line

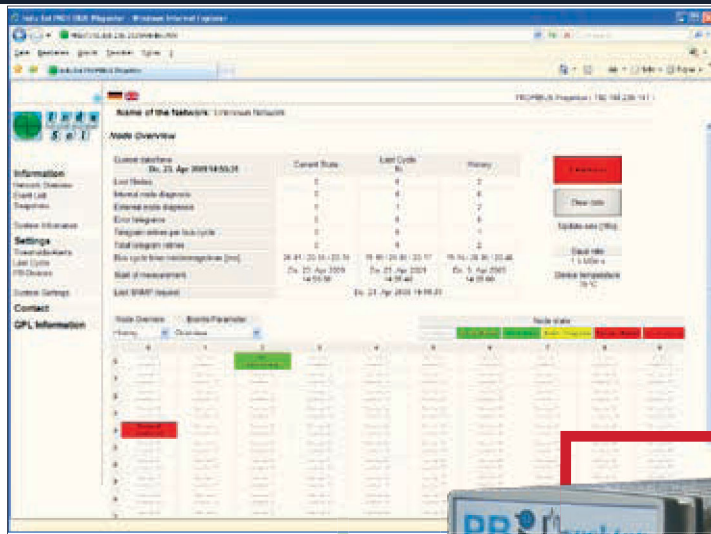
With the Premium Line version and use of the PROmanage® software it is possible to check and analyse at the same time from a central location several fieldbus networks, such as PROFIBUS, ASi, CAN / CANopen, DeviceNet or SafetyBUS p. All events provided with a time stamp are stored in a database. As soon as the pre-defined thresholds are exceeded a warning is sent by email to the service technician. It makes troubleshooting easier and irregularities can be detected at an early stage and relevant action taken thanks to a permanent fieldbus diagnosis, i.e. permanent control of the logical data traffic. So, a status-oriented „intervention prior to failure“ maintenance based on the „permanent network monitoring“ principle can be implemented.

Installation

Operators interested to know how well the communication bus actually works should integrate the PROFIBUS-INspektor® of the Basic Line under production conditions for a certain period of time and read the data.

No expert knowledge and additional software are required for connection to the existing PROFIBUS network. A simple snap on the top-hat rail, a 24V connection and a direct, feedback-free connecting cable to the PROFIBUS are everything needed to start the bus analysis under production conditions.

Basic Line

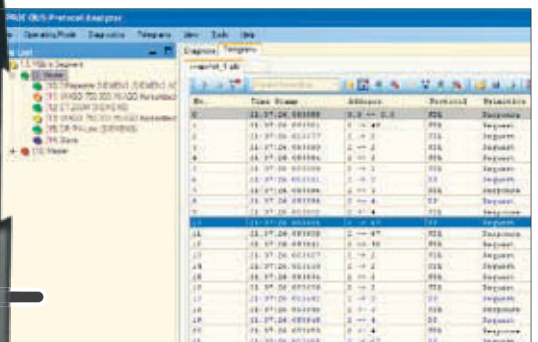


- Recognizing communication faults and device failures
- Display of PROFIBUS data via a web interface
- Indication of PROFIBUS errors via potential-free contact



Comfort Line

+ Integrated telegram analyzer



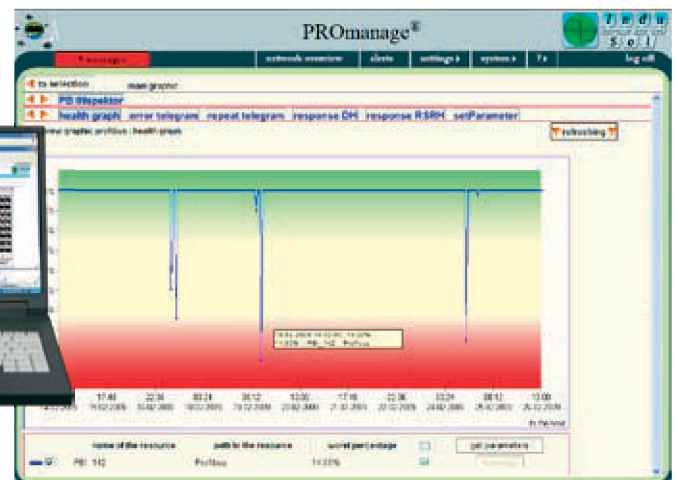
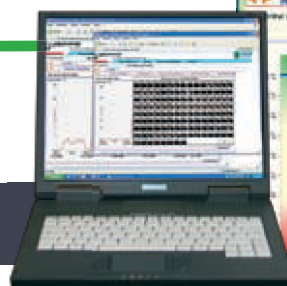
Telegram analyzer

Premium Line



Long-term statistic from the PROFIBUS data

- + Automatic query by PROmanage®
- + Snapshot to event



Decentralized data logger „PB-INSpektor®“

Function

The PB-INSpektor® is a passive data logger, analyzing the telegram traffic in the PROFIBUS regarding

- error telegrams
- telegram repeats
- device diagnosis and
- device failures.

This information reflects the current status of the communication quality in the PROFIBUS and is the basis for status-oriented maintenance. For this purpose the user may choose one of the three stages of PB-INSpektors®.

Basic Line

The Basic Line is the basic version of the INSpektor® family. Depending on the pre-defined trigger functions the events are registered in the PB-INSpektor® and summed up and stored per subscriber. The collected network data can be displayed via the Ethernet interface on a local PC. For this purpose the INSpektor® has an integrated web server with a graphic web interface. The traffic light colours (green, yellow, red) mark the status of the subscriber and give detailed information on faults. Such faults are indicated via a potential-free contact, e.g. a signal lamp or by visualization.

Comfort Line

For the purpose of an in-depth fault analysis the Comfort Line provides an integrated, fully functional telegram analyzer. The necessary hardware is included in the PB-INSpektor® and the external PC is only used for visualization and operation respectively. The telegram analyzer is connected locally via the integrated USB interface.

Premium Line

Based on the Basic Line the Premium Line provides in connection with the PROmanage® software a central control and analysis function. The communication takes place via Ethernet. The central PROmanage® software incl. database can communicate with up to 80 INSpektors®. All events are available up-to-date on the database server and are provided for an alarm management „Warning of failure“.

Technical data

- Voltage supply: 24 V DC +/-20 %, typ. 0.3 A
- PROFIBUS
 - Protocols: DP, DPV1, FMS, MPI
 - Connection: 9-pole sub-D
 - Baud rate: 9.6 kbps - 12 Mbps
- Ethernet
 - Baud rate: 100BASE-TX / 10BASE-TX
 - Connection: RJ45

General data

- Installation: 35 mm DIN top-hat rail
- Dimensions (H x W x D): 131 x 47 x 111 mm
- Industrial protection: IP20
- Ambient temperature: 5 °C to 70 °C
- Storage temperature: -20 °C to 70 °C



Fig. 1 - PB-INSpektor®

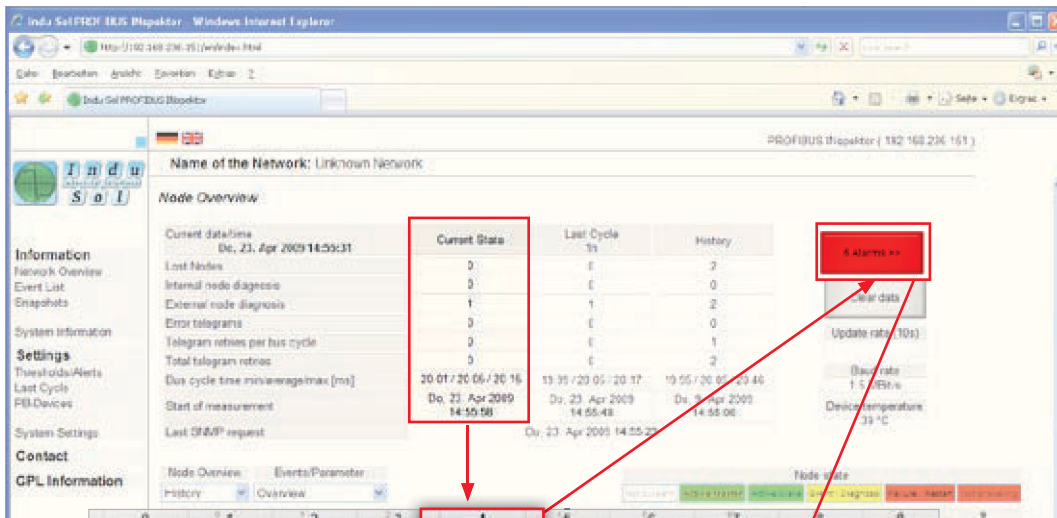
Functions	Product family PB-INSpektor®			
	Basic Line	Comfort Line	Premium Line	Comfort Line Plus
PROFIBUS analysis	X	X	X	X
Web interface	X	X	X	X
Message via potential-free contacts	X	X	X	X
Snapshot incl. viewer	X	X	X	X
Integrated telegram monitor PROFI-TM	-	X	-	X
SNMP query by PROmanage®	-	-	X	X

Ordering details	Art. No.
PB-INSpektor® Basic Line	061101
PB-INSpektor® Comfort Line	061102
PB-INSpektor® Premium Line	061103
PB-INSpektor® Comfort Line Plus	061104
Manual (included in delivery)	060902

Accessories

PROmanage®	020154
„APKA“ active programming cable	010530
Ethernet patch cable	021801
Ethernet patch cable „cross over“	021800
Power pack 2.5 A	010951

Actions to analyse event information in PB-INSpektor®



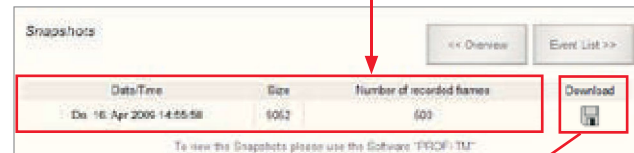
1. Events in fieldbus e.g. „external device diagnosis“

2. Generating an alarm

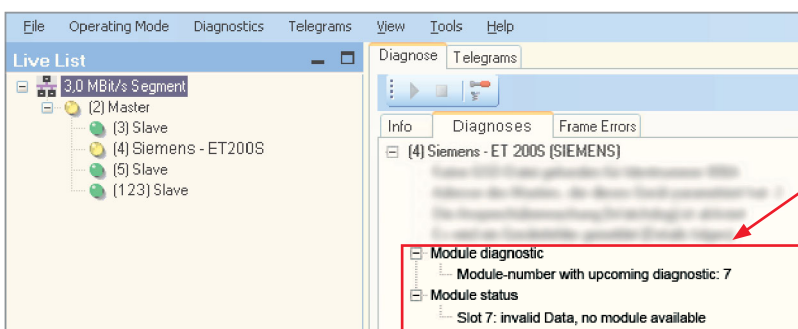
3. View of defective subscriber

4. Time stamp of alarm

5. Telegram recording of fault (snapshot)



6. Evaluating the telegram recording in diagnosis mode (plain text display)



7. Evaluating the telegram recording in telegram mode

Time	Date/Time	Size	Number of recorded frames	Download
14:55:50.057315	14:55:50.057315	2	4	DP
14:55:50.057324	14:55:50.057324	2	4	DP
14:55:50.057333	14:55:50.057333	2	4	DP
14:55:50.057349	14:55:50.057349	2	4	DP
14:55:50.057352	14:55:50.057352	2	4	DP
14:55:50.057361	14:55:50.057361	2	4	DP
14:55:50.057369	14:55:50.057369	2	4	DP
14:55:50.057400	14:55:50.057400	2	4	DP
14:55:50.057420	14:55:50.057420	2	4	DP
14:55:50.057445	14:55:50.057445	2	4	DP
14:55:50.057450	14:55:50.057450	2	4	DP
14:55:50.057456	14:55:50.057456	2	4	DP

8. Measures to eliminate sources of error *prior to Failure !!!*

StarterKIT PB-INspektor®

Scope of delivery

- 1 x INspektor®
- 1 x power pack
- 1 x active programming cable
- 1 x Crossover (5 m)
- 1 x patch cable
- 1 x line set 24V/230V
- 1 x carrying case



Fig. 1 - StarterKIT

Ordering details	Art. No.
StarterKIT I (incl. Basic Line)	010168
StarterKIT II (incl. Comfort Line)	010169

First-time user set PB-INspektor®

Scope of delivery

- 4 x INspektor® Premium Line
- 1 x PROmanage® with 5 devices



Fig. 2 - First-time user set

Ordering details	Art. No.
First-time user set	010165

Permanent network monitoring (2 weeks)

Scope of delivery

- 4 x INspektor® Premium Line
- 1 x PROmanage®
- 1 x laptop
- incl. instructions and evaluation
- detailed record

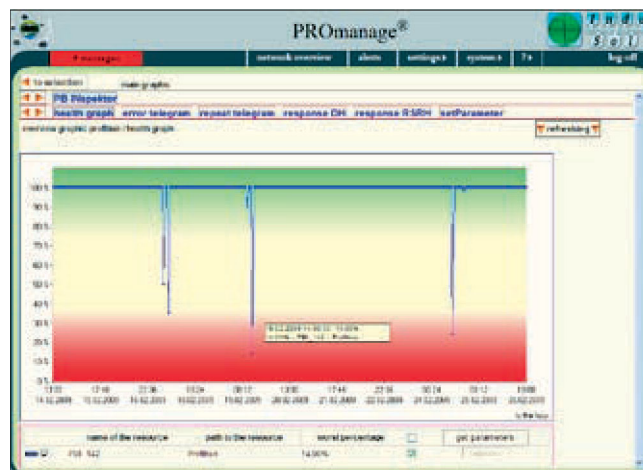


Fig. 3 - State graph (PROmanage®)

Ordering details	Art. No.
Permanent network monitoring (2 weeks)	060300

Decentralized data logger „CB-INSpektor®“

Function

The CB-INSpektor® is a passive data logger for the CAN fieldbus. The traffic light colours (green, yellow, red) highlight the status of the subscriber and provide detailed information on faults, such as

- error telegrams,
- device diagnoses,
- network utilization and
- device failures.

All network data logged are totalled per subscriber and stored and can be retrieved either via the web-based user interface of the CB-INSpektor® or the Ethernet using the standardized SNMP query protocol and the management software PROmanage®.

Because of the large variety of implemented CAN protocols three different CB-INSpektors® are available to the user.

Technical data

- Voltage supply: 24 V DC +/-20 %, typ. 0.3 A
- CAN:
 - Protocols: CAN, CANopen, DeviceNet, SafetyBUS p
 - Connection: 9-pole sub-D
 - Baud rate: 9.6 kbps - 1 Mbps
- Ethernet
 - Baud rate: 100BASE-TX / 10BASE-TX
 - Connection: RJ45

General data

- Installation: 35 mm DIN top-hat rail
- Dimensions (H x W x D): 131 x 110 x 111 mm
- Industrial protection: IP20
- Ambient temperature: 5 °C to 70 °C
- Storage temperature: -20 °C to 70 °C



Fig. 1 - CB-INSpektor®



Fig. 2 - Live List

Graphic display of logic quality parameters in network, early warning alarm when thresholds are exceeded.

Ordering details	Art. No.
CB-INSpektor® CAN / CANopen	061410
CB-INSpektor® DeviceNet	061420
CB-INSpektor® SafetyBUS p	061430

Accessories

PROmanage®	020154
Ethernet patch cable	021801
Ethernet patch cable „cross over“	021800
Power pack 2.5 A	010951

Decentralized data logger „ASi-INspektor®“

Function

The ASi-INspektor® is a passive data logger that analyses the telegram traffic of ASi networks for events, such as

- error telegrams,
- repeat telegrams,
- device diagnosis and
- device failures.

This information reflects the current status of the communication quality in ASi networks. All network data collected can be retrieved optionally via the web interface of the ASi-INspektor® or the Ethernet using the standardized SNMP protocol with the management software PROmanage®.

Technical data

- Voltage supply: 24 V DC
- ASi-Bus
 - Connection: terminal
- Ethernet
 - Baud rate: 100BASETX / 10BASE-TX
 - Connection: RJ45

General data

- Installation: 35 mm DIN top-hat rail
- Dimensions (H x W x D): 105 x 23 x 111 mm
- Industrial protection: IP20
- Ambient temperature: 0 °C to 55 °C
- Storage temperature: -25 °C to 85 °C



Fig. 1 - ASi-INspektor®

Ordering details

Art. No.

ASi-INspektor®

061301

Accessories

PROmanage®

020154

Ethernet patch cable

021801

Ethernet patch cable „cross over“

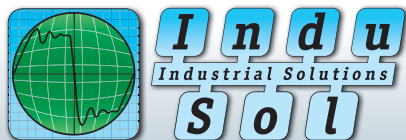
021800



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Notes:

This catalogue (2009) replaces all previous brochures and catalogues.

Figures, drawings, weights, sizes, performance parameters or other figures are only binding if expressly agreed upon.

Indu-Sol reserves the right to make changes.

The customer shall be responsible for the intended use of the ordered components. The information contained in the catalogue was prepared with utmost care. As regards correctness, completeness and up-to-datedness of the same liability shall be limited to coarse negligence.

Catalogue No. 02

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