

TURCK

TCP/IP

ETHERNET

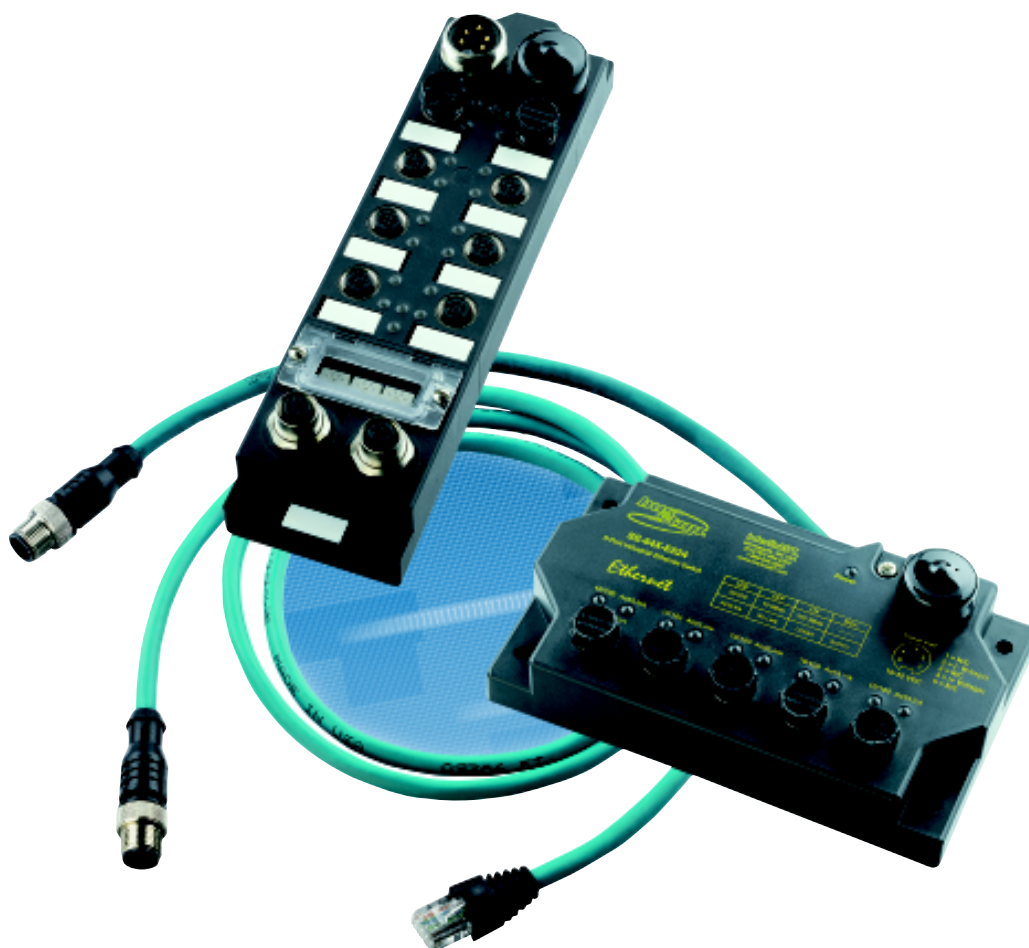
NETWORK
COMPONENTS



**bus
stop**[®]
Your fieldbus connection

F 428/01

Ethernet™ Stations and Connection Products



InterlinkBT – A BANNER-TURCK Company for Bus Products

InterlinkBT was founded by the companies **TURCK** und **BANNER** and combines the experience and know-how of these two pioneers in the field of industrial automation, resulting in one of the most complete and versatile lines of bus products. The range of products comprises stations, junctions and connection products for all customary industrial fieldbus systems.

InterlinkBT is the distributor for the American market.

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Ethernet™ Components

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A Worldwide Fieldbus Solution

Freedom to Make the Best Fieldbus Choice

When you work with TURCK, you are not linked to a single fieldbus technology. You have freedom of choice from a supplier who will allow you to choose from the leading bus products that best match your application and desired bus benefits.

The TURCK Catalogue

busstop® is the trade name that covers the industry's most complete and industrially hardened line of device-level stations, junctions and cabling products. Robust *busstop*® stations are high quality on-the-machine and at-the-process nodes which are designed to be installed in the worst environments while delivering maximum performance within the design parameters of the particular bus.

busstop® cables and cordsets for data and other bus-specific applications come in a variety of different connectors, cable grades and individual bus standards. These cabling products are the electrical designer's choice for secure and trouble-free communication. The gold plated pin-and-sleeve connector will transmit the lowest level data signal or carry enough power to actuate banks of solenoids.

Device-level Buses and Fieldbuses

A device-level bus connects directly to a device such as a sensor or actuator; there are no other buses between the device-level bus and the device. Only a few of the buses are strictly device-level buses. They are AS-Interface®, Seriplex, and *sensoplex*®2. These strictly device-level buses are fast and have limited data bits per node, but have minimal overhead in their messages.

A fieldbus is something more. It could be a device-level bus but it could also have a device-level bus attached to it through a gateway or bridge. Another definition of a fieldbus is that devices on the bus are complex or „smart“, while the products on the device-level buses are simple or “dumb”. Although this is a good black-and-white definition, it is full of holes when analogue or digital sensors are considered. Most digital sensors are actually analogue sensors with fixed set points; this makes the digital sensor more complex than the analogue sensor.

The buses that could qualify in some or all scenarios as fieldbuses are DeviceNet™, Smart Distributed System, PROFIBUS-DP, PA & FMS, Foundation Fieldbus H1 & H2, Interbus-S, Beckhoff I/O Light Bus, Sercos, Modbus+, ControlNet, GE Genius I/O and industrial versions of ARCnet and Ethernet. All are legitimate fieldbuses and vary in some form or another.

Ethernet™ – System Description

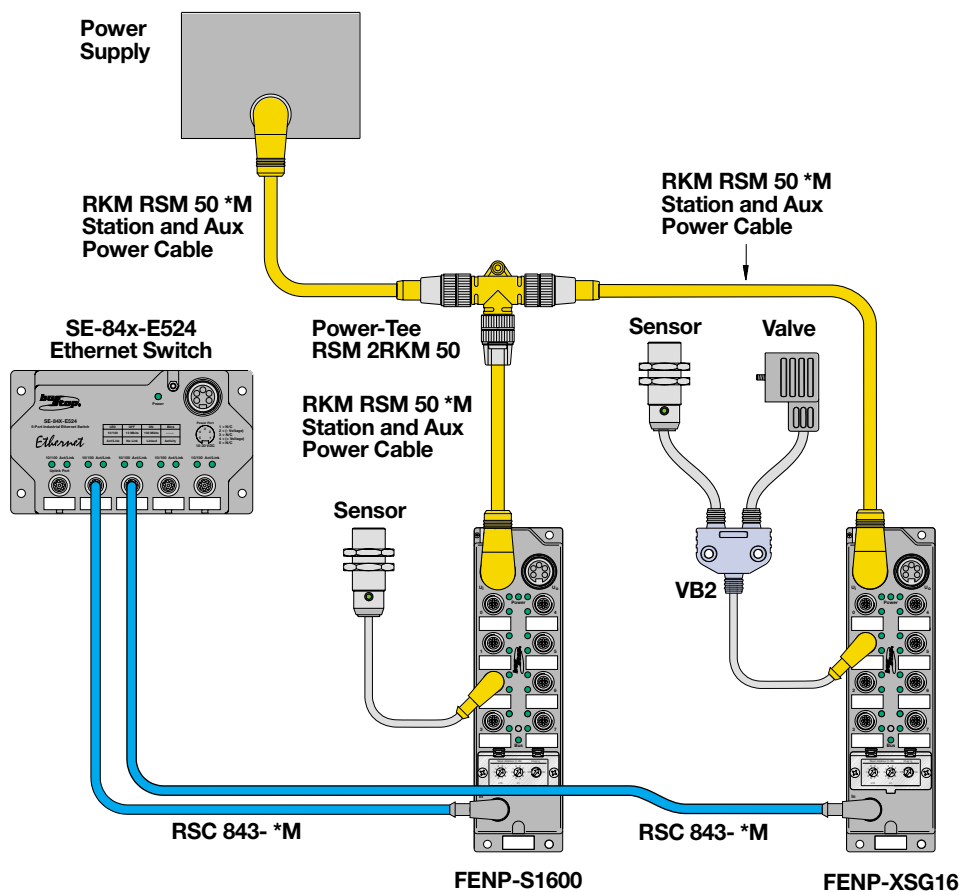
Today, Ethernet™ is the most popular way to connect office computers and peripherals. Because of its popularity, it is increasingly finding its way into other applications. It is rapidly becoming the network of choice for higher level industrial control applications. Ethernet™ is used primarily to connect PLC's, computers, flat panel displays, and other high level components. FENP... series Ethernet™ stations provide a convenient way to connect I/O directly to the Ethernet network.

Station Configuration using Microsoft Internet Explorer or Netscape

FEN stations can be configured or monitored using standard web browser software. Simply type the IP address of the station into the web browser's address box and an interactive website is displayed. This web page will allow you to:

- monitor inputs
- monitor diagnostic data
- set outputs
- upload/download device configurations

Fig. 1



Ethernet™ – System Description

Basic Parts List

For an Ethernet™ system like the one shown on the previous page the following parts are needed:

<u>Components</u>		<u>Cordsets</u>	
(1) ESX-84-E423	Ethernet™ switch	(3) RKM RSM 50-*M	bus and auxiliary power cable
(1) FENP-S1600	input module	(1) RSM 2RKM 50	power tee
(1) FENP-XSG16	universal input or output module	(2) RSC 843-*M	Ethernet™ cordset

Maximum Ratings

FEN series stations communicate at 10 or 100M baud, half or full duplex. Ethernet™ cables can be up to 100 m each.

Internet Protocol (IP) Addressing

Using DHCP:

If the leftmost rotary switch is set to DHCP, then the DHCP server on the network will set the IP address, netmask and default gateway automatically. The last two rotary switches will be ignored.

Addressing using rotary switches:

If the rotary switches are set from 2...254, then the switches are used to define the last byte of the IP address. The first 3 bytes of the IP address, the netmask and the default gateway are read from the non-volatile memory. These will either be the default values or the last values written with a DHCP server.

To reset the address to the factory defaults:

Set all 3 switches to zero, then power up the station. All of the address parameters will be reset to the following:

IP address:	192.168.0.0
Netmask:	255.255.255.0
Default gateway:	192.168.0.1

Ethernet™ – Housings

Version 1:



TURCK Ethernet™ devices are available in two different housing types. Both modules have IP67 rating. They are fully encapsulated

I/O modules FENP... (220 x 60.4 x 27 mm)

The I/O modules are made of high-grade plastics and are fully potted. They are equipped with eight 5-pin M12 x 1 connectors for the inputs and outputs.

The bus is connected via one 8-pin M12 x 1 connector. There are premoulded Ethernet™ cables available to exclude wiring errors. The modules are powered via a 5-pin 7/8" connector. Addresses are set either via three coded rotary switches or automatically via the DHCP server (leftmost rotary switch in DHCP position).

Version 2:



Ethernet™ switch, type SE... (160 x 96 x 88 mm)

The switch is made of die-cast aluminium and is fully potted. It is equipped with four 8-pin M12 x 1 downlink ports and an 8-pin M12 x 1 uplink port. Power for the module is connected via a 5-pin 7/8" connector.

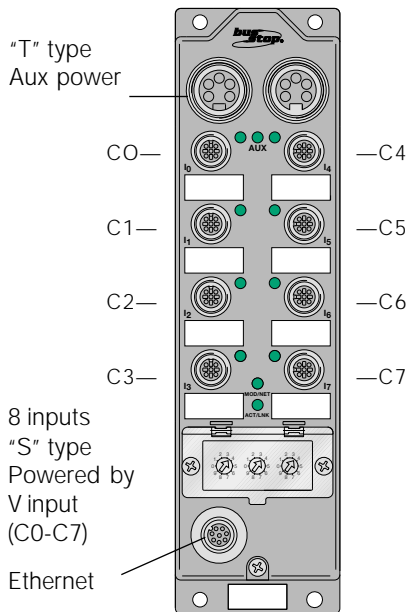
Ethernet™ I/O modules – quick selection guide

Part Number	Input Parameters					Output Parameters				
	Number of inputs	Input 5type	Inputs per connector	Compatible with npn/pnp	Short circuit ** protection	Number of outputs	Output type	Outputs per connector	Maximum output load	Short circuit ** protection
FENP-S0800	8	S	1	pnp	g	-	-	-	-	-
FENP-S1600	16	2S	2	pnp	g	-	-	-	-	-
FENPS0808G	8	2S	2	pnp	g	8	2G	2	0.5 A	i
FENPXSG16	16	2X	2	pnp	g	16	2X	2	0.5A	i
FENP-S0008G	-	-	-	-	-	8	G	1	0.5 A	i

** i = individual, g = group

Ethernet™ modules - Modbus TCP

FENP-S0800, 8 pnp inputs, group diagnostics



Input data, 16 bit word, offset 1

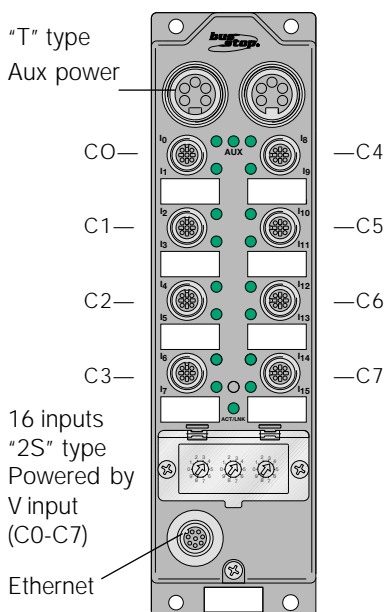
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	-	-	-	-	-	-	-	-	I-7	I-6	I-5	I-4	I-3	I-2	I-1	I-0

Input data, 16 bit word, offset 1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	SC

Please refer to pages 9..10 for dimensions and specifications.

FENP-S1600, 16 pnp inputs, group diagnostics



Input data, 16 bit word, offset 1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	I-15	I-14	I-13	I-12	I-11	I-10	I-9	I-8	I-7	I-6	I-5	I-4	I-3	I-2	I-1	I-0

Input data, 16 bit word, offset 1

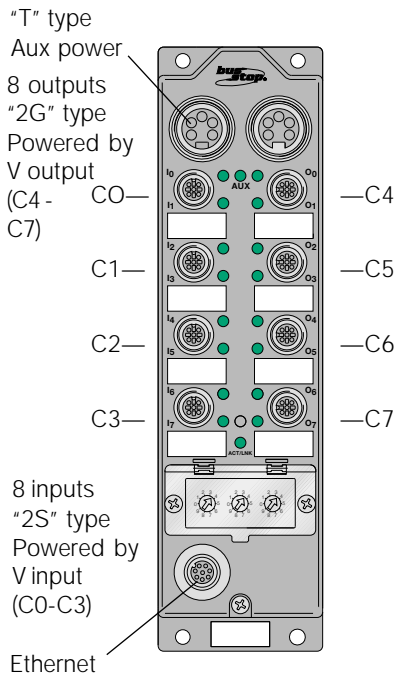
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	SC

Abbreviations

- I = input data (0 = OFF, 1 = ON)
- SC = common short-circuit indication
I > 500 mA
- V_i = V input
- V_o = V output
- O = output data (0 = OFF, 1 = ON)
- OS = output status

Ethernet™ modules - Modbus TCP

FENP-S0808G, 8 pnp inputs and 8 0.5 A outputs, group diagnostics



Input data, 16 bit word, offset 1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	-	-	-	-	-	-	-	-	I-7	I-6	I-5	I-4	I-3	I-2	I-1	I-0

Input data, 16 bit word, offset 1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V ₀	SC

Input data, 16 bit word, offset 1

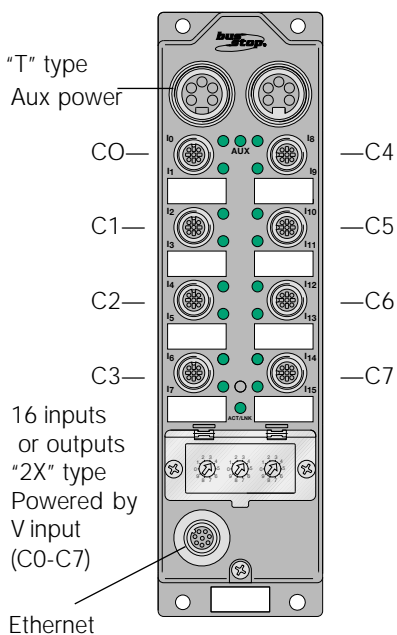
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	-	-	-	-	-	-	-	-	OS-7	OS-6	OS-5	OS-4	OS-3	OS-2	OS-1	OS-0

Output data, 16 bit word, offset 1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	-	-	-	-	-	-	-	-	0-7	0-6	0-5	0-4	0-3	0-2	0-1	0-0

Please refer to pages 9...10 for dimensions and specifications.

FENP-XSG16, 16 pnp inputs or 0.5 A outputs, group diagnostics



Input data, 16 bit word, offset 1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	-	-	-	-	-	-	-	-	I-7	I-6	I-5	I-4	I-3	I-2	I-1	I-0

Input data, 16 bit word, offset 1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V ₀	SC

Input data, 16 bit word, offset 1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	OS-15	OS-14	OS-13	OS-12	OS-11	OS-10	OS-9	OS-8	OS-7	OS-6	OS-5	OS-4	OS-3	OS-2	OS-1	OS-0

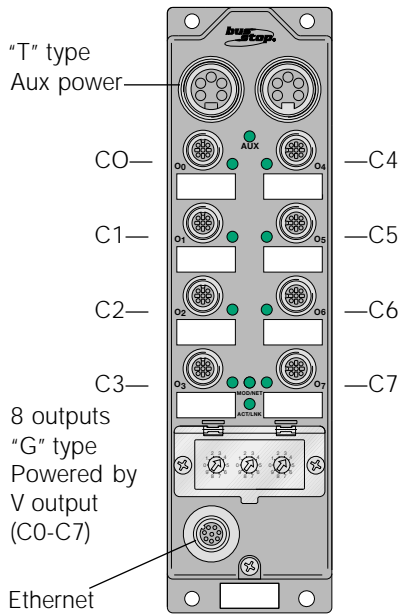
Output data, 16 bit word, offset 1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	0-15	0-14	0-13	0-12	0-11	0-11	0-9	0-8	0-7	0-6	0-5	0-4	0-3	0-2	0-1	0-0

On this station, V input and V output are tied together because the power circuits are common. This station is not recommended for E-stop controlled outputs.

Ethernet™ modules - Modbus TCP

FENP-S0008G, 8 0.5 A outputs, group diagnostics



Input data, 16 bit word, offset 1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V ₀	-

Input data, 16 bit word, offset 1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	-	-	-	-	-	-	-	-	OS-7	OS-6	OS-5	OS-4	OS-3	OS-2	OS-1	OS-0

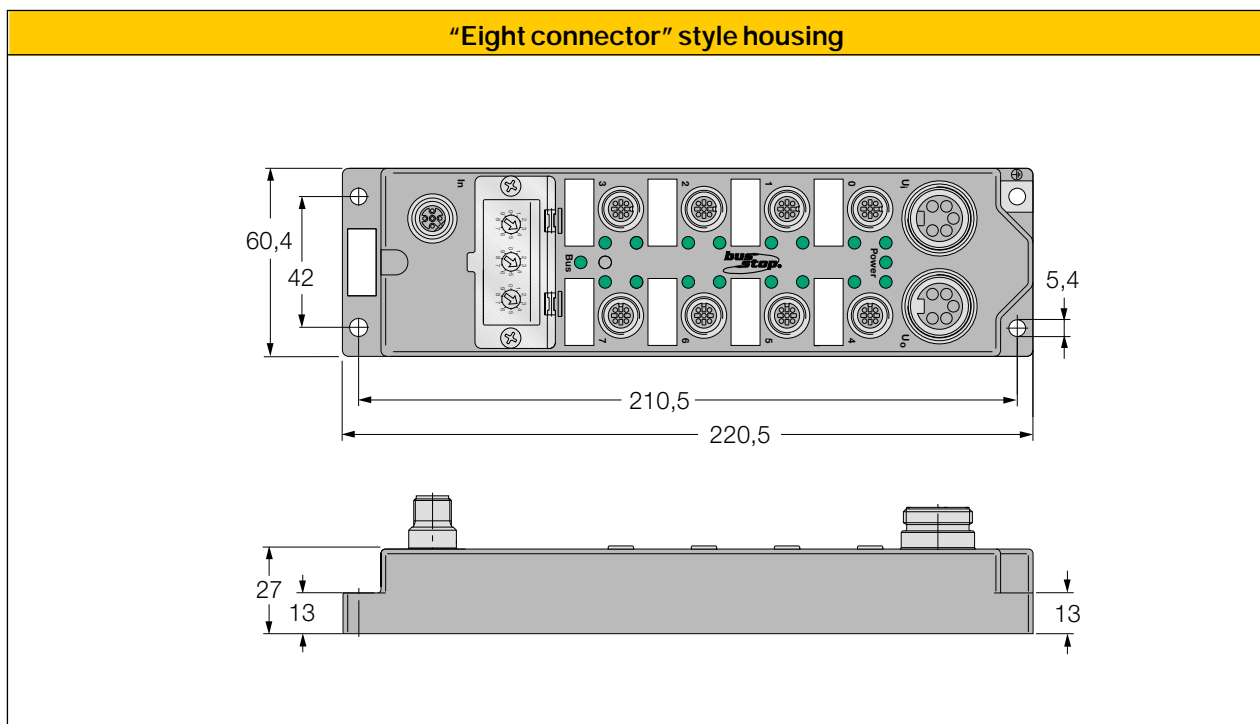
Output data, 16 bit word, offset 1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	-	-	-	-	-	-	-	-	0-7	0-6	0-5	0-4	0-3	0-2	0-1	0-0

Abbreviations

- I = input data (0 = OFF, 1 = ON)
- SC = common short-circuit indication
I > 500 mA
- V_i = V input
- V_o = V output
- O = output data (0 = OFF, 1 = ON)
- OS = output status

Dimensions



Module specifications

Electronic / Load supply	18...30 VDC
Internal current consumption	< 250 mA ...TBD
<hr/>	
Internet Protocol (IP) Addressing	
Using DHCP:	If the leftmost rotary switch is set to DHCP, then the DHCP server on the network will set the IP address, netmask and default gateway automatically. The last two rotary switches will be ignored. Addressing using rotary switches: If the rotary switches are set from 2...254 then the switches are used to define the last byte of the IP address. The first three bytes of the IP address, the netmask and the default gateway are read from the non-volatile memory. These will either be the default values or the last values written with a DHCP server.
To reset the address to the factory defaults:	Set all three switches to zero, then power up the station. All of the address parameters will be reset to the following: IP address 192.168.0.0 netmask 255.255.255.0 default gateway 192.168.0.1
<hr/>	
Input Circuits	pnp 3-wire sensors/2-wire sensors
Input voltage	18...30 VDC
Input current	< 500 mA total, short-circuit protection
Switching threshold OFF/ON	2 mA / 4 mA
Input time delay	2.5 ms
Switching frequency	< 250 Hz
Isolation	to bus
<hr/>	
Output Circuits	
Output voltage	18...30 VDC
Output current	0.5 A per output, short-circuit protection (G type)
Switching frequency	< 250 Hz
Isolation	to bus
<hr/>	
LED Indications	
Voltage supply	green/ red: correct voltage/under-voltage
Input status/output status	green: I/O ON
Short-circuit indication	red: short-circuit
Module status	flashing green: ready to establish communication green: communication established flashing red: I/O short-circuit red: unable to communicate
<hr/>	
Connections	
Electronic and load supply	5-pole 7/8" connector
Bus line	M 12 x 1 connector, 8-pin
Inputs/outputs	M 12 x 1 connector, 5-pin
<hr/>	
Application Layer Protocols	
Modbus/TCP Server	class 1
HTTP Server (web server)	
EtherNet/IP	
(others available in future)	

5-Port Unmanaged Ethernet™ Switch



The high performance Industrial Ethernet™ Switch provides five M12 x 1 ports. The switch complies with IEEE 802.3 10Base-T Ethernet and 802.3u100Base-TX Fast Ethernet™ standards. Use the Ethernet™ Switch in your application to:

- segment network traffic
- extend Ethernet™ connection distance
- convert data packets between different transmission speeds

The switch auto-senses transmission speeds. It stores addresses in its routing table. The switch supports store-and-forward switching architecture.

SE-84X-E524

Communication

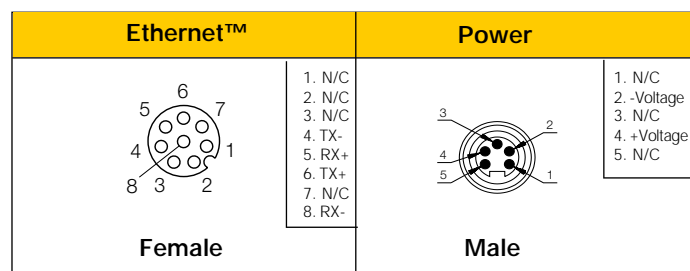
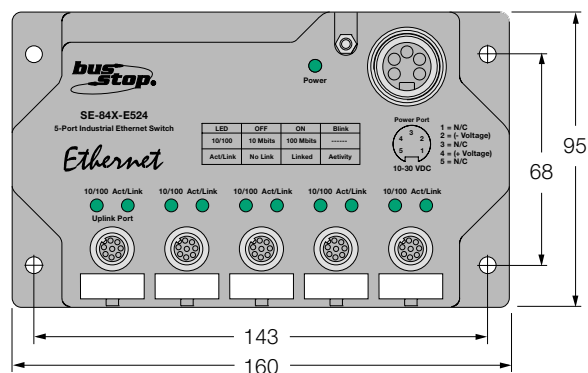
- 10/100 Mbps ports: 4 ports plus dedicated uplink port
- Standards: IEEE 802.3, 802.3u, 802.3x
- Switching architecture: store and forward
- Buffer: 128 bytes
- Nway Auto-Negotiation: all ports
- Full-Duplex/Half-Duplex: all ports
- Non-blocking Full Duplex Mode (no collision)
- Memory bandwidth: 1.4 Gbps

Diagnostics

- Power LED indications: green: power
- Port LED indications: Link/Activity yellow: 100 Mbps green: 10 Mbps

Mechanical Features

- Protection to IEC 60529/EN 60529 IP67 (NEMA 1, 3, 4, 12, 13)
- Operating voltage: 10...30 VDC
- Power: 1.9 watts (typical)
- Operating temperature: - 40 ° to 85°C

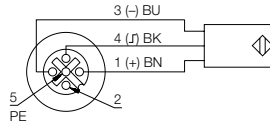
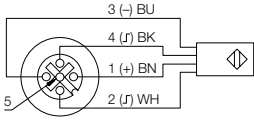
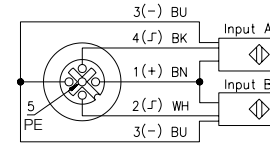


Auxiliary power connectors

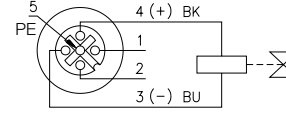
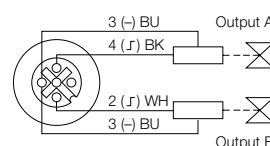
Please refer to the quick selection guide, page 6, columns "Input/output type", to find the connector types matching the various stations.

Type "T"	<p>1 = Aux + 2 = E+ 3 = E- 4 = Aux-</p>	
<p>Style: 5-pin 7/8"</p> <p>Cordset: Aux power use RSM RKM 46- *M</p> <p>Tee : Aux power use RSM 2RKM 40</p>	<p>Male</p>	<p>Female</p>

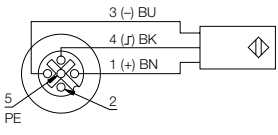
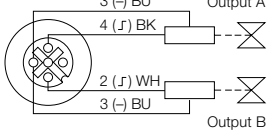
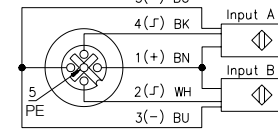
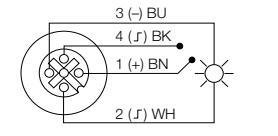
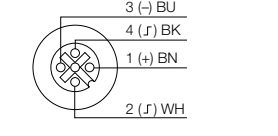
Input connectors

Type "S"	<p>1 = V+ 2 = N/C 3 = V- 4 = Input 5 = PE</p>	
<p>Style: 5-pin M12 x 1</p> <p>Cordset: Single sensor use RK 4.4T-* -RS 4.4T</p> <p>Field wireable: Single sensor use BS 8141-0</p>	<p>Single sensor</p>	
Type "2S"	<p>1 = V + 2 = Input B 3 = V - 4 = Input A 5 = PE</p>	
<p>Style: 5-pin M12 x 1</p> <p>Cordset: Single sensor use RK 4.4T-* -RS 4.4T</p> <p>Splitter: Splitter and 2 sensors use VBRS 4.4-2RK 4T-*/*</p>	<p>Sensor with 2 signals</p>	
		<p>Splitter and 2 sensors</p>

Output connectors

Type "G"	<p>1 = N/C 2 = N/C 3 = GND 4 = Output 5 = PE</p>	
<p>Style: 5-pin M12 x 1</p> <p>Cordset: Single output use RK 4.4T-* -RS 4.4T</p> <p>Field wireable: Single output use BS 8141-0</p>		<p>Single output</p>
Type "2G"	<p>1 = N/C 2 = Output B (odd numbers) 3 = GND 4 = Output A (even numbers) 5 = PE</p>	
<p>Style: 5-pin M12 x 1</p> <p>Cordset: Dual output use RK 4.4T-* -RS 4.4T</p> <p>Splitter: Dual output or dual valve use VB2-RS 4.5T-*/*2VAS 22-A528-*/*("A"Style valve plug, others available)</p> <p>Field wireable: Dual Output use BS 8141-0</p>		<p>Dual output</p>

Universal input or output connector

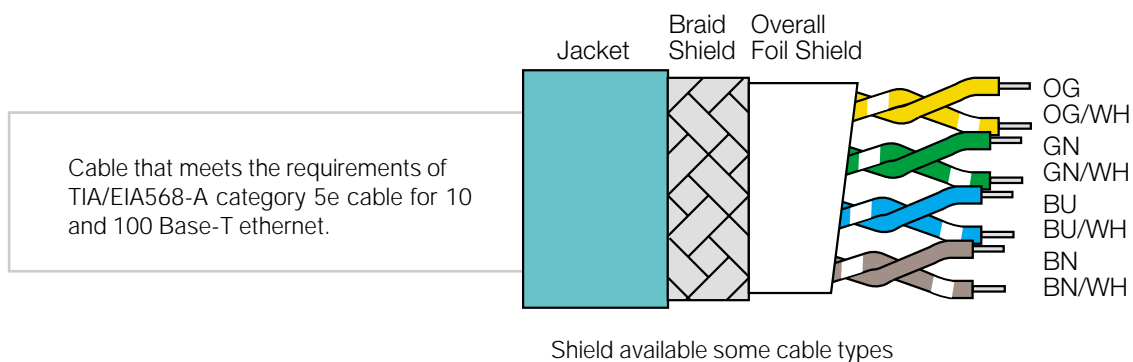
Type "2X"	1 = V + 2 = Input/Output B 3 = GND 4 = Input/Output A 5 = PE	 <p>Single sensor</p>	 <p>Outputs</p>
Cordsets: Single sensor, output or push button use RK 4.4T-* -RS 4.4T Splitter: 2 sensors or 2 outputs use VBRS 4.4-2RK 4T-*/*		 <p>Splitter and 2 sensors</p>	 <p>Push button</p>
Parallel Splitter: Part verification array use VB2-RS 4.4T */2RK 4.4T-*/*/S651			 <p>Part verification array</p>

Ethernet™

Ethernet	1 = N/C 2 = N/C 3 = N/C 4 = Tx - 5 = Rx + 6 = Tx + 7 = N/C 8 = Rx -	 <p>Male Female</p>
Style: 8-pin M12 x 1 Cordset: Bus line use RSC RSC 842-*M		

* Indicates length in meters

Ethernet™ – Cable specifications



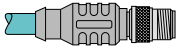
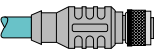

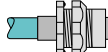
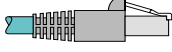

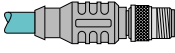
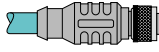
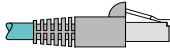
Cable	840	841	842	843
Max. cable length	10 m	10 m	90 m	90 m

Type	Approval	Data Pair		Outer Jacket	Shields	Bulk Cable Part Number
		AWG	DCR (/1000ft) Insulation	Material Colour Nominal O.D.	Type	
840	CMR/CL2R	8/24 Stranded	28.6 PE	PVC 5.9 mm (.231)	None	Cable, 840-*M
841	CMR/CL2R	8/24 Stranded	28.6 PE	PVC 6.4 mm (.250)	Foil/Braid	Cable, 841-*M
842	CMR/CL2R	8/24 Solid	28.6 PE	PVC 6.5 mm (.256)	None	Cable, 842-*M
843	CMR/CL2R	8/24 Solid	28.6 PE	PVC 7.3 mm (.286)	Foil/Braid	Cable, 843-*M

Cable is UL rated for sunlight and oil resistance

* Indicates length in metres.

Ethernet™ – Cables, extensions, M12 x 1 cable, types 840, 842 only

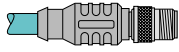
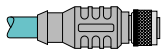
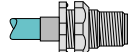
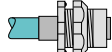


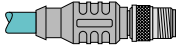
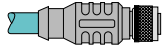

		M12 x 1					
		Pin (male)	Socket (female)	Pin (male)	Socket (female)	Receptacle	
		 RSC	 RKC	 FSFD	 FKFD	 RJ45	
 84x		RSC 84x-*M	RKC 84x-*M	FSFD 84x-*M	FKFD 84x-*M	RJ45 84x-*M	
M12 x 1	Pin (male)	 RSC	RSC RSC 84x-*M	RSC RKC 84x-*M	RSC FSFD 84x-*M	RSC FKFD 84x-*M	RSC RJ45 84x-*M
	Socket (female)	 RKC		RKC RKC 84x-*M	RKC FSFD 84x-*M	RKC FKFD 84x-*M	RKC RJ45 84x-*M
	Receptacle	 RJ45			RJ45 FSFD 84x-*M	RJ45 FKFD 84x-*M	RJ45 RJ45 84x-*M

x indicates cable type

* indicates length in metres

For stainless steel coupling nut, change part number from RSC to RSCV.

Ethernet™ – Cables, extensions, shielded M12 x 1 cable, types 841, 843 only

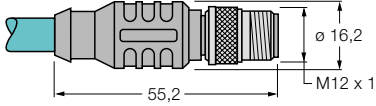
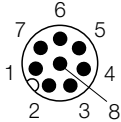
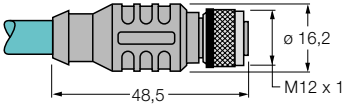
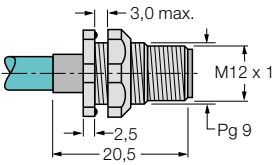
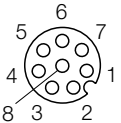
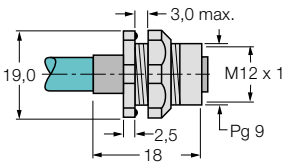
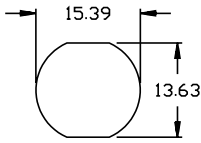
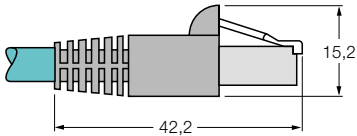

		M12 x 1				
		Pin (male)	Socket (female)	Pin (male)	Socket (female)	Receptacle
						
		RSS	RKS	FSSD	FKSD	RJ45S
84x						
		RSS 84x-*M	RKS 84x-*M	FSSD 84x-*M	FKSD 84x-*M	RJ45S 84x-*M
M12 x 1	Pin (male)					
		RSS				
		RSS RSS 84x-*M	RSS RKS 84x-*M	RSS FSSD 84x-*M	RSS FKSD 84x-*M	RSS RJ45S 84x-*M
	Socket (female)					
		RKS				
			RKS RKS 84x-*M	RKS FSSD 84x-*M	RKS FKSD 84x-*M	RKS RJ45S 84x-*M
	Receptacle					
		RJ45S				
				RJ45S FSSD 84x-*M	RJ45S FKSD 84x-*M	RJ45S RJ45S 84x-*M

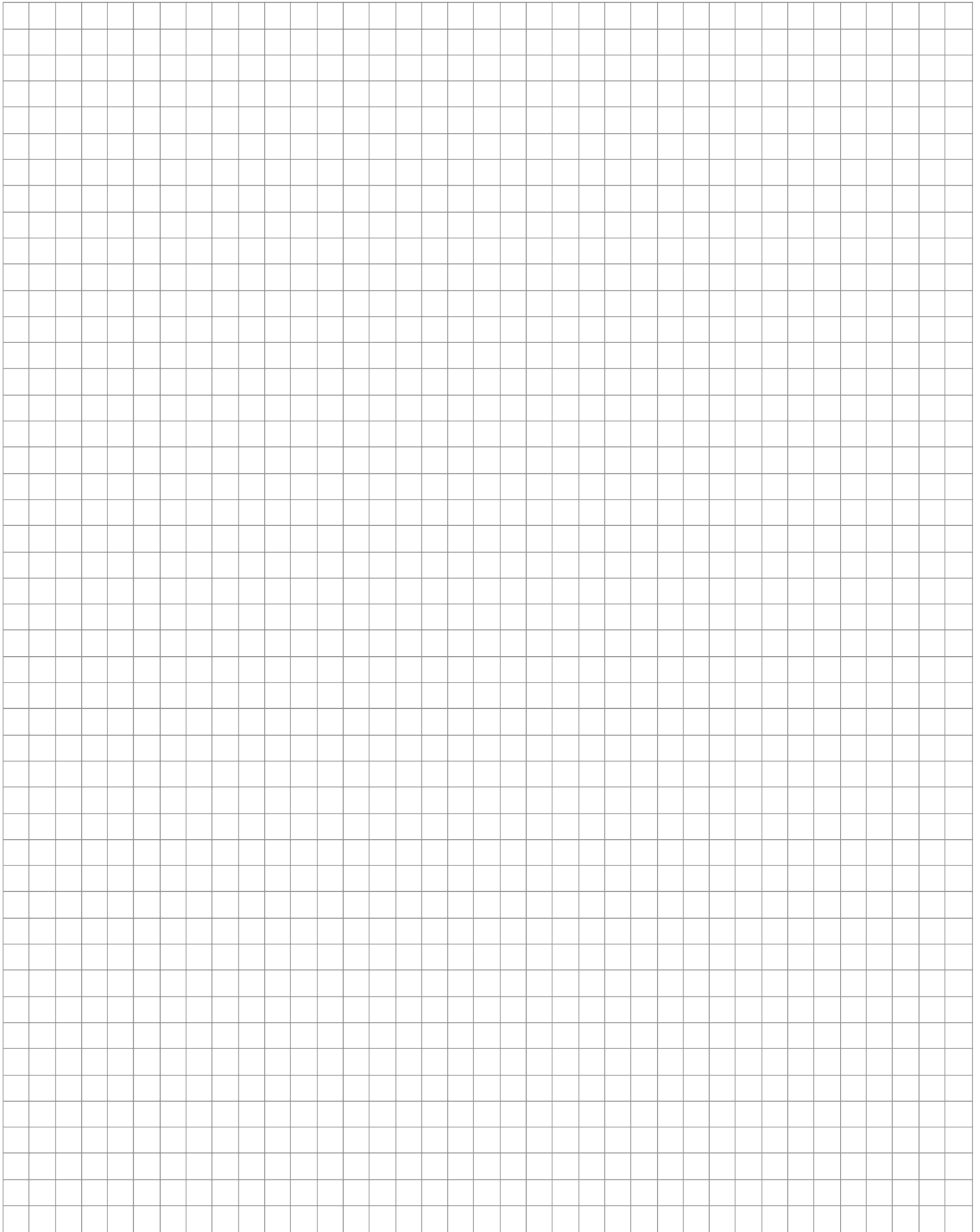
x indicates cable type

* indicates length in metres

For stainless steel coupling nut, change part number from RSS to RSSV.

Ethernet™ – Dimensions and pin configuration

<p style="text-align: center;">RSC/RSS</p> 	<p style="text-align: center;">Male</p> 	<p style="text-align: center;">RKC/RKS</p> 
<p style="text-align: center;">FSFD</p> 	<p style="text-align: center;">Female</p> 	<p style="text-align: center;">FKFD</p> 
	<p style="text-align: center;">Pinout male/female</p> <ol style="list-style-type: none"> 1. white/blue 2. white/brown 3. brown 4. orange (TX-) 5. white/green (RX+) 6. white/orange (TX+) 7. white/brown 8. green (RX-) 	<p style="text-align: center;">Mounting Installation</p> 
<p style="text-align: center;">RJ45/RJ45S</p> 	<p style="text-align: center;">Pinout per EIA 568B</p> <ol style="list-style-type: none"> 1. white/orange (TX+) 2. orange (TX-) 3. white/green (RX+) 4. blue 5. white/blue 6. green (RX-) 7. white/brown 8. brown 	



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Sensortechnik

- Induktive Sensoren
- Induktive Sensoren für Schwenkantriebe
- uprox*[®] induktive Sensoren
- Kapazitive Sensoren
- Magnetfeldsensoren
- Opto-Sensoren
- Geräte für den Personenschutz
- Ultraschall-Sensoren
- Strömungswächter
- Druckwächter
- Temperaturwächter
- Steckverbinder
- CD-ROM Sensortechnik

Interfacetechnik

- Interfacetechnik im Aufbau-gehäuse
 - Bauform *multimodul*
 - Bauform *multisafe*[®]
- Allgemeine Informationen
- Interfacetechnik auf 19"-Karte
 - Bauform *multicart*[®]
- Miniaturrelais, Industrirelais, Zeitwürfel, Sockel
- Zeit- und Überwachungsrelais
- Ex-Schutz - Grundlagen für die Praxis (Übersichtsposter)
- CD-ROM Interfacetechnik

Feldbustechnik

- busstop*[®]-Feldbuskomponenten
- Bussystem *sensoplex*[®] 2
- Bussystem *sensoplex*[®] 2Ex
- Bussystem *sensoplex*[®] MC
- Bussystem AS-Interface[®]
- Bussystem DeviceNet[™]
- Bussystem FOUNDATION[™] fieldbus
- Bussystem PROFIBUS-DP
- Bussystem PROFIBUS-PA
- Bussystem *piconet*[®]
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- uprox*[®] inductive sensors
- capacitive sensors
- magnetic-field sensors
- photoelectric sensors
- machine safety equipment
- ultrasonic sensors
- flow controls
- pressure controls
- temperature controls
- connectors
- CD-ROM Sensors

Interface technology

- devices in modular housings
 - *multimodul* style
 - *multisafe*[®] style
- general information
- devices on 19" card
 - *multicart*[®] style
- miniature relays, industrial relays, time cubes, sockets
- programmable relays and timers
- explosion protection - basics for practical application (overview poster)
- CD-ROM Interface technology

Fieldbus technology

- busstop*[®] fieldbus components
- bus system *sensoplex*[®] 2
- bus system *sensoplex*[®] 2Ex
- bus system *sensoplex*[®] MC
- bus system AS-Interface[®]
- bus system DeviceNet[™]
- bus system FOUNDATION[™] fieldbus
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- bus system PROFIBUS-PA
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