

# Industrial Ethernet active and passive

## Product Information

# Industrial Ethernet active

## Unmanaged Switches Basic Line



## Unmanaged Switches Value Line



## Managed Switches Value Line



## Managed Switches Premium Line



## Power-over-Ethernet Switches



## Media Converter



## Serial / Ethernet converter



## Industrial wireless



## Accessories

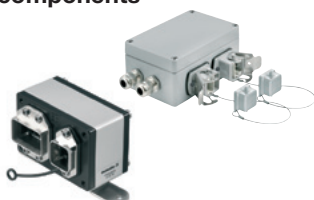


# Industrial Ethernet passive

IP67 plug-in connector



IP65 connection components



Mounting rail outlets



FrontCom® Micro



RJ45 Connectors IP20



Accessories



Bulk – cables  
AdvancedLine



System cables  
AdvancedLine



Patch cables  
CabinetLine





# Industrial Ethernet

|                                    |                                     |           |
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# Industrial Ethernet active

## Basic Line

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Weidmüller's Basic Line consists of unmanaged Plug & Play switches in a rugged IP30 rated aluminium housing. The devices are available with Fast Ethernet and Gigabit Ethernet and provide an economical solution for Industrial Ethernet ports networks. One model is equipped with Fast Ethernet and Power-over-Ethernet ports. All devices have been developed for applications in harsh industrial environments and have international approvals such as CE, cULus, Class I Div. 2 / Atex and DNV / GL and are thus international applicable for different applications.

- Plug & Play switches in a rugged aluminium housing (IP30)
- Compact design
- Cost efficient entry-level switches
- Fast Ethernet variants with 5 and 8 Ports
- Versions with copper or fibre optic interface (multimode and single-mode)
- 5 port Full-Gigabit Plug & Play Switch
- Power-over-Ethernet switch with 6 Fast Ethernet ports, thereof 4 PoE+ ports
- Approvals: CE, FCC, cULus, Class I Div. 2 / Atex, DNV / GL

## Value Line

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Weidmüller's Value Line consists of unmanaged and managed switches in a high quality IP30 rated metal housing. The devices are available with Fast Ethernet and Gigabit Ethernet ports. Managed switches of the Value Line support a variety of useful management functions, such as fast ring redundancy, port-based VLAN, QoS, RMON, bandwidth management, port mirroring and warning by email message or relay. The ring redundancy can be set up easily using the web-based management interface, or with the DIP switches located on the top panel of the switches.

- Unmanaged Plug & Play switches in a high quality metal housing (IP30)
- Price-sensitive mid-range class
- Managed switches for entry into configurable network infrastructure
- Unmanaged 8 port Full-Gigabit switches
- Approvals: CE, FCC, cULus, Class I Div. 2 / Atex, DNV / GL

## Premium Line

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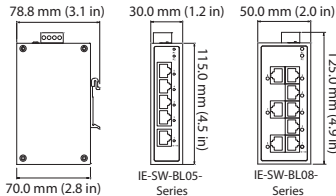


Weidmüller's Premium Line consists of high-end managed switches with advanced management and security features and is therefore suitable for most demanding network solutions. The devices are available with Fast Ethernet or Gigabit Ethernet ports. One model is equipped with Fast Ethernet and Power-over-Ethernet ports. With their advanced ring redundancy technology (recovery time  $\leq 20$  ms), these devices increase the reliability and availability of your industrial network. The optional to use SFP transceivers offer a high degree of flexibility and the Gigabit variants allows the use in networks with high traffic loads also.

- Managed Fast Ethernet variants in a high quality metal housing (IP30)
- Managed Power-over-Ethernet switch with 6 Fast Ethernet ports, thereof 4 PoE+ ports
- Variants with 10 or 18 ports and Gigabit uplink ports
- Full-Gigabit switch with 9 ports
- Supports all standard protocols in TCP/IP-based industrial networks (e.g. Ethernet/IP, Modbus/TCP)
- Built-in redundancy mechanisms (recovery time  $\leq 20$  ms) for increased reliability in network ring structures
- Approvals: CE, FCC, cULus, Class I Div. 2 / Atex, DNV / GL

## Unmanaged Fast Ethernet Switches

- 10/100BaseT(X) (RJ45 connector), 100BaseFX (multi/singlemode, SC or ST connector)
- Redundant dual 12/24/48 V DC, 18 to 30 V AC power inputs
- IP30 aluminum housing
- Rugged hardware design well suited for hazardous locations (Class I Div. 2 / ATEX) and maritime environments (DNV/GL)
- -40 to 75 °C operating temperature range (T models)



## Technical data

| Technology                  |                                                                                                                                                                            |                                   |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Standards                   | IEEE 802.3 for 10BaseT<br>IEEE 802.3u for 100BaseT(X) and 100BaseFX<br>IEEE 802.3x for Flow Control                                                                        |                                   |
| Processing Type             | Store and Forward                                                                                                                                                          |                                   |
| Flow Control                | IEEE 802.3x flow control, back pressure flow control                                                                                                                       |                                   |
| Switch Properties           |                                                                                                                                                                            |                                   |
| MAC Table Size              | 1 K                                                                                                                                                                        |                                   |
| Packet Buffer Size          | 512 Kbit                                                                                                                                                                   |                                   |
| Interface                   |                                                                                                                                                                            |                                   |
| Fiber Ports                 | 100BaseFX ports<br>(SC/ST connector, multimode, singlemode)                                                                                                                |                                   |
| RJ45 Ports                  | 10/100BaseT(X) auto negotiation speed, Full/Half duplex mode, and auto MDI/MDI-X connection                                                                                |                                   |
| DIP Switches                | Enable/Disable broadcast storm protection                                                                                                                                  |                                   |
| LED Indicators              | Power, 10/100M (TP port), 100M (fiber port)                                                                                                                                |                                   |
| Optical Fiber               |                                                                                                                                                                            |                                   |
|                             | 100BaseFX                                                                                                                                                                  |                                   |
|                             | multimode                                                                                                                                                                  | singlemode                        |
| Wavelength                  | 1300 nm                                                                                                                                                                    | 1310 nm                           |
| Max. TX                     | -10 dBm                                                                                                                                                                    | 0 dBm                             |
| Min. TX                     | -20 dBm                                                                                                                                                                    | -5 dBm                            |
| RX Sensitivity              | -32 dBm                                                                                                                                                                    | -34 dBm                           |
| Link Budget                 | 12 dB                                                                                                                                                                      | 29 dB                             |
| Typical Distance            | 5 km (50/125 µm multimode cable)<br>4 km (62.5/125 µm multimode cable)                                                                                                     | 40 km (9/125 µm singlemode cable) |
| Saturation                  | -6 dBm                                                                                                                                                                     | -3 dBm                            |
| Power Requirements          |                                                                                                                                                                            |                                   |
| Input Voltage               | 12/24/48 V DC (9.6 to 60 V DC),<br>18 to 30 V AC (47 to 63 Hz),<br>redundant dual inputs                                                                                   |                                   |
| Input Current               | IE SW BL05 5TX: 0.1 A @ 24 V<br>IE SW BL05 SC/ST/SCS: 0.11 A @ 24 V<br>IE SW BL08 8TX: 0.13 A @ 24 V<br>IE SW BL08 2SC/2ST: 0.22 A @ 24 V<br>IE SW BL08 SCS: 0.17 A @ 24 V |                                   |
| Overload Current Protection | 1.1 A                                                                                                                                                                      |                                   |
| Connection                  | 1 removable 4-contact terminal block                                                                                                                                       |                                   |
| Reverse Polarity Protection | Present                                                                                                                                                                    |                                   |
| Physical Characteristics    |                                                                                                                                                                            |                                   |
| Housing                     | Aluminum, IP30 protection                                                                                                                                                  |                                   |
| Dimensions W x H x D        | IIE-SW-BL05-Series:<br>30 x 115 x 70 mm (1.18 x 4.52 x 2.76 in)<br>IE-SW-BL08-Series:<br>50 x 115 x 70 mm (1.96 x 4.52 x 2.76 in)                                          |                                   |
| Weight                      | IE-SW-BL05-5TX: 175 g<br>IE-SW-BL08-8TX: 275 g                                                                                                                             |                                   |
| Installation                | DIN-Rail mounting                                                                                                                                                          |                                   |
| Environmental Limits        |                                                                                                                                                                            |                                   |
| Operating Temperature       | Standard Models: -10 to 60 °C (14 to 140 °F)<br>Wide Temp. Models: -40 to 75 °C (-40 to 167 °F)                                                                            |                                   |
| Storage Temperature         | -40 to 85 °C (-40 to 185 °F)                                                                                                                                               |                                   |

| Environmental Limits      |                                                                                                                                                                                      |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ambient Relative Humidity | 5 to 95 % (non-condensing)                                                                                                                                                           |
| Regulatory Approvals      |                                                                                                                                                                                      |
| Safety                    | UL508                                                                                                                                                                                |
| Hazardous Location        | UL/cUL Class I, Division 2, Groups A, B, C and D;<br>ATEX Zone 2, Ex nC IIC                                                                                                          |
| EMI                       | FCC Part 15, CISPR (EN55022) class A                                                                                                                                                 |
| EMS                       | EN61000-4-2 (ESD), level 3;<br>EN61000-4-3 (RS), level 3;<br>EN61000-4-4 (EFT), level 3;<br>EN61000-4-5 (Surge), level 3;<br>EN61000-4-6 (CS), level 3;<br>EN61000-4-8; EN61000-4-11 |
| Maritime                  | DNV, GL                                                                                                                                                                              |
| Shock                     | IEC 60068-2-27                                                                                                                                                                       |
| Freefall                  | IEC 60068-2-32                                                                                                                                                                       |
| Vibration                 | IEC 60068-2-6                                                                                                                                                                        |

| MTBF (mean time between failures) |                          |
|-----------------------------------|--------------------------|
| Time                              | 425,000 hrs              |
| Database                          | Telcordia (Bellcore), GB |

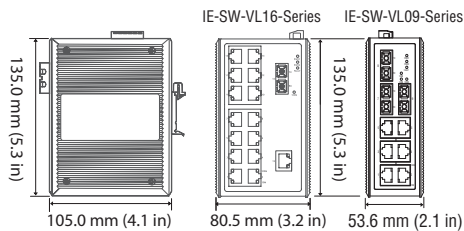
| Warranty        |         |
|-----------------|---------|
| Warranty Period | 5 years |

| Ordering Information        |                                             |                                |                          |
|-----------------------------|---------------------------------------------|--------------------------------|--------------------------|
| Port Variants               | Type                                        | Operating Temperature          | Order No.                |
| 5 * RJ45                    | IE-SW-BL05-5TX<br>IE-SW-BL05T-5TX           | -10 to +60 °C<br>-40 to +75 °C | 1240840000<br>1240850000 |
| 4 * RJ45, 1 * SC-Multimode  | IE-SW-BL05-4TX-1SC<br>IE-SW-BL05T-4TX-1SC   | -10 to +60 °C<br>-40 to +75 °C | 1240890000<br>1286550000 |
| 4 * RJ45, 1 * ST-Multimode  | IE-SW-BL05-4TX-1ST<br>IE-SW-BL05T-4TX-1ST   | -10 to +60 °C<br>-40 to +75 °C | 1240880000<br>1286540000 |
| 4 * RJ45, 1 * SC-Singlemode | IE-SW-BL05-4TX-1SCS<br>IE-SW-BL05T-4TX-1SCS | -10 to +60 °C<br>-40 to +75 °C | 1240870000<br>1286530000 |
| 8 * RJ45                    | IE-SW-BL08-8TX<br>IE-SW-BL08T-8TX           | -10 to +60 °C<br>-40 to +75 °C | 1240900000<br>1286560000 |
| 6 * RJ45, 2 * SC-Multimode  | IE-SW-BL08-6TX-2SC<br>IE-SW-BL08T-6TX-2SC   | -10 to +60 °C<br>-40 to +75 °C | 1240910000<br>1240920000 |
| 6 * RJ45, 2 * ST-Multimode  | IE-SW-BL08-6TX-2ST<br>IE-SW-BL08T-6TX-2ST   | -10 to +60 °C<br>-40 to +75 °C | 1240930000<br>1286570000 |
| 7 * RJ45, 1 * SC-Singlemode | IE-SW-BL08-7TX-1SCS<br>IE-SW-BL08T-7TX-1SCS | -10 to +60 °C<br>-40 to +75 °C | 1240950000<br>1286580000 |

| Accessories           |                      |
|-----------------------|----------------------|
| Type                  | Order No.            |
| 19" Rack Mounting Kit | RM-KIT<br>1241440000 |

## Unmanaged Fast Ethernet Switches

- Redundant dual 24 V DC power inputs
- Relay output warning for power failure and port break alarm
- Broadcast storm protection
- Transparent transmission of VLAN tagged packets
- -40 to 75 °C operating temperature range (T models)



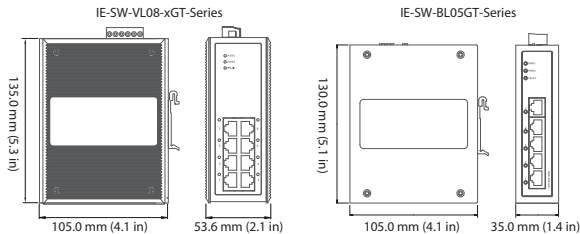
## Technical data

| Technology                  |                                                                                                                                                  |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Standards                   | IEEE 802.3 for 10BaseT<br>IEEE 802.3u for 100BaseT(X) and 100BaseFX<br>IEEE 802.3x for Flow Control                                              |
| Processing Type             | Store and Forward                                                                                                                                |
| Flow Control                | IEEE 802.3x flow control, back pressure flow control                                                                                             |
| Switch Properties           |                                                                                                                                                  |
| MAC Table Size              | 1 K (IE-SW-VL09...Series), 4 K (IE-SW-VL16...Series)                                                                                             |
| Packet Buffer Size          | 512 Kbit (IE-SW-VL09...Series),<br>1.5 Mbit (IE-SW-VL16...Series)                                                                                |
| Interface                   |                                                                                                                                                  |
| Fiber Ports                 | 100BaseFX ports (SC/ST connector)                                                                                                                |
| RJ45 Ports                  | 10/100BaseT(X) auto negotiation speed,<br>Full/Half duplex mode, and auto MDI/MDI-X connection                                                   |
| DIP Switches                | Port break alarm mask                                                                                                                            |
| LED Indicators              | PWR1, PWR2, FAULT, 10/100M (TP port),<br>100M (fiber port)                                                                                       |
| Alarm Contact               | 1 relay output with current carrying capacity<br>of 1 A @ 24 V DC                                                                                |
| Optical Fiber               |                                                                                                                                                  |
|                             | 100BaseFX<br>multimode                                                                                                                           |
| Wavelength                  | 1300 nm                                                                                                                                          |
| Max. TX                     | -10 dBm                                                                                                                                          |
| Min. TX                     | -20 dBm                                                                                                                                          |
| RX Sensitivity              | -32 dBm                                                                                                                                          |
| Link Budget                 | 12 dB                                                                                                                                            |
| Typical Distance            | 5 km (50/125 µm multimode cable)<br>4 km (62,5/125 µm multimode cable)                                                                           |
| Saturation                  | -6 dBm                                                                                                                                           |
| Power Requirements          |                                                                                                                                                  |
| Input Voltage               | IE-SW-VL09...16-Ports: 24 V DC<br>(12 to 45 V DC), redundant dual inputs                                                                         |
| Input Current               | IE-SW-VL09T-6TX-3SC: 0.31 A @ 24 V<br>IE-SW-VL16-16TX: 0.27 A @ 24 V<br>IE-SW-VL16 SC/ST: 0.44 A @ 24 V                                          |
| Overload Current Protection | IE-SW-VL09/16...Series: 1.6 A                                                                                                                    |
| Connection                  | 1 removable 6-pin terminal blocks                                                                                                                |
| Reverse Polarity Protection | Present                                                                                                                                          |
| Physical Characteristics    |                                                                                                                                                  |
| Housing                     | Metal, IP30 protection                                                                                                                           |
| Dimensions W x H x D        | IE-SW-VL09...Series:<br>53.6 x 135 x 105 mm<br>(2.11 x 5.31 x 4.13 in)<br>IE-SW-VL16...Series:<br>80.5 x 135 x 105 mm<br>(3.16 x 5.31 x 4.13 in) |
| Weight                      | IE-SW-VL09: 630 g<br>IE-SW-VL16: 1140 g                                                                                                          |

| Physical Characteristics          |                                                                                                                                                         |                      |                       |            |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------|------------|
| Installation                      | DIN-Rail mounting                                                                                                                                       |                      |                       |            |
| Environmental Limits              |                                                                                                                                                         |                      |                       |            |
| Operating Temperature             | Standard Models: 0 to 60 °C (32 to 140 °F)<br>Wide Temp. Models: -40 to 75 °C<br>(-40 to 167 °F)                                                        |                      |                       |            |
| Storage Temperature               | -40 to 85 °C (-40 to 185 °F)                                                                                                                            |                      |                       |            |
| Ambient Relative Humidity         | 5 to 95 % (non-condensing)                                                                                                                              |                      |                       |            |
| Regulatory Approvals              |                                                                                                                                                         |                      |                       |            |
| Safety                            | IE-SW-VL09...Series: UL508, UL60950-1,<br>CSA C22.2 No. 60950-1, EN60950-1<br>IE-SW-VL16...Series: UL508, UL60950-1,<br>EN60950-1                       |                      |                       |            |
| Hazardous Location                | UL/cUL Class I, Division 2, Groups A, B, C<br>and D; ATEX Zone 2, Ex nC IIC                                                                             |                      |                       |            |
| EMI                               | FCC Part 15, CISPR (EN55022) class A                                                                                                                    |                      |                       |            |
| EMS                               | EN61000-4-2 (ESD), level 3;<br>EN61000-4-3 (RS), level 3;<br>EN61000-4-4 (EFT), level 3;<br>EN61000-4-5 (Surge), level 3;<br>EN61000-4-6 (CS), level 3; |                      |                       |            |
| Maritime                          | DNV, GL                                                                                                                                                 |                      |                       |            |
| Shock                             | IEC 60068-2-27                                                                                                                                          |                      |                       |            |
| Freefall                          | IEC 60068-2-32                                                                                                                                          |                      |                       |            |
| Vibration                         | IEC 60068-2-6                                                                                                                                           |                      |                       |            |
| MTBF (mean time between failures) |                                                                                                                                                         |                      |                       |            |
| Time                              | IE-SW-VL09...Series: 396,000 hrs<br>IE-SW-VL16...Series: 257,000 hrs                                                                                    |                      |                       |            |
| Database                          | MIL-HDBK-217F, GB 25 °C                                                                                                                                 |                      |                       |            |
| Warranty                          |                                                                                                                                                         |                      |                       |            |
| Warranty Period                   | 5 years                                                                                                                                                 |                      |                       |            |
| Ordering Information              |                                                                                                                                                         |                      |                       |            |
| Port Variants                     |                                                                                                                                                         | Type                 | Operating Temperature | Order No.  |
| 16 * RJ45                         |                                                                                                                                                         | IE-SW-VL16-16TX      | 0 to +60 °C           | 1241000000 |
|                                   |                                                                                                                                                         | IE-SW-VL16T-16TX     | -40 to +75 °C         | 1286590000 |
| 6 * RJ45, 3 * SC-Multimode        |                                                                                                                                                         | IE-SW-VL09T-6TX-3SC  | -40 to +75 °C         | 1240980000 |
| 14 * RJ45, 2 * SC-Multimode       |                                                                                                                                                         | IE-SW-VL16-14TX-2SC  | 0 to +60 °C           | 1241030000 |
|                                   |                                                                                                                                                         | IE-SW-VL16T-14TX-2SC | -40 to +75 °C         | 1286610000 |
| 14 * RJ45, 2 * ST-Multimode       |                                                                                                                                                         | IE-SW-VL16-14TX-2ST  | 0 to +60 °C           | 1241050000 |
|                                   |                                                                                                                                                         | IE-SW-VL16T-14TX-2ST | -40 to +75 °C         | 1286620000 |
| Accessories                       |                                                                                                                                                         |                      |                       |            |
|                                   |                                                                                                                                                         |                      | Type                  | Order No.  |
| 19" Rack Mounting Kit             |                                                                                                                                                         |                      | RM-KIT                | 1241440000 |

## Unmanaged Gigabit Ethernet Switches

- Full Gigabit Ethernet on all ports
- Variants with slots for GB SFP transceivers
- Redundant dual 12/24/48 V DC power inputs
- Relay output warning for power failure and port break alarm
- Broadcast storm protection
- Supports jumbo frame transmission (up to 9.6 KB)



## Technical data

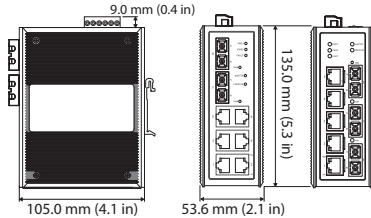
| Technology                  |                                                                                                                                                                   |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standards                   | IEEE 802.3 for 10BaseT<br>IEEE 802.3u for 100BaseT(X) and 100BaseFX<br>IEEE 802.3ab for 1000BaseT(X)<br>IEEE 802.3z for 1000BaseX<br>IEEE 802.3x for Flow Control |
| Processing Type             | Store and Forward                                                                                                                                                 |
| Flow Control                | IEEE 802.3x flow control, back pressure flow control                                                                                                              |
| Switch Properties           |                                                                                                                                                                   |
| MAC Table Size              | 8 K                                                                                                                                                               |
| Packet Buffer Size          | 1088 Kbit (IE-SW-BL05-5GT),<br>1408 Kbit (IE-SW-VL08-xGT)                                                                                                         |
| Interface                   |                                                                                                                                                                   |
| Fiber Ports                 | 100/1000BaseSFP slot (IE-SW-VL08-6GT-2GS)                                                                                                                         |
| RJ45 Ports                  | 10/100/1000BaseT(X) auto negotiation speed, Full/Half duplex mode, and auto MDI/MDI-X connection                                                                  |
| DIP Switches                | One for port break alarm, one for Enable/Disable broadcast storm protection                                                                                       |
| LED Indicators              | PWR1, PWR2, FAULT, 10/100/1000M                                                                                                                                   |
| Alarm Contact               | 1 relay output with current carrying capacity of 1 A @ 24 V DC                                                                                                    |
| Power Requirements          |                                                                                                                                                                   |
| Input Voltage               | 12/24/48 V DC (9.6 to 60 V DC), redundant dual inputs                                                                                                             |
| Input Current               | IE-SW-BL05-5GT: 0.20 A @ 24 V<br>IE-SW-VL08-8GT: 0.32 A @ 24 V<br>IE-SW-VL08-6GT-2GS: 0.34 A @ 24 V                                                               |
| Connection                  | 1 removable 6-contact terminal block                                                                                                                              |
| Reverse Polarity Protection | Present                                                                                                                                                           |
| Physical Characteristics    |                                                                                                                                                                   |
| Housing                     | Metal, IP30 protection                                                                                                                                            |
| Dimensions                  | IE-SW-BL05-5GT:<br>35 x 130 x 105 mm (1.37 x 5.12 x 4.13 in)<br>IE-SW-VL08-xGT:<br>53.6 x 135 x 105 mm (2.11 x 5.31 x 4.13 in)                                    |
| Weight                      | IE-SW-BL05-5GT: 290 g<br>IE-SW-VL08-xGT: 630 g                                                                                                                    |
| Installation                | DIN-Rail mounting                                                                                                                                                 |
| Environmental Limits        |                                                                                                                                                                   |
| Operating Temperature       | Standard Models: 0 to 60 °C (32 to 140 °F)<br>Wide Temp. Models: -40 to 75 °C (-40 to 167 °F)                                                                     |
| Storage Temperature         | -40 to 85 °C (-40 to 185 °F)                                                                                                                                      |
| Ambient Relative Humidity   | 5 to 95 % (non-condensing)                                                                                                                                        |
| Regulatory Approvals        |                                                                                                                                                                   |
| Safety                      | UL508                                                                                                                                                             |
| Hazardous Location          | UL/cUL Class I, Division 2, Groups A, B, C, and D; ATEX Zone 2, Ex nC IIC                                                                                         |
| EMI                         | FCC Part 15, CISPR (EN55022) class A                                                                                                                              |



| Regulatory Approvals                                                                        |                                                                                                                                                  |               |                       |            |
|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------|------------|
| EMS                                                                                         | EN61000-4-2 (ESD), level 3; EN61000-4-3 (RS), level 3;<br>EN61000-4-4 (EFT), level 3; EN61000-4-5 (Surge), level 3;<br>EN61000-4-6 (CS), level 3 |               |                       |            |
| Maritime                                                                                    | DNV, GL                                                                                                                                          |               |                       |            |
| Shock                                                                                       | IEC 60068-2-27                                                                                                                                   |               |                       |            |
| Freefall                                                                                    | IEC 60068-2-32                                                                                                                                   |               |                       |            |
| Vibration                                                                                   | IEC 60068-2-6                                                                                                                                    |               |                       |            |
| MTBF (mean time between failures)                                                           |                                                                                                                                                  |               |                       |            |
| Time                                                                                        | 478,000 hrs (IE-SW-BL05-5GT series)<br>325,000 hrs (IE-SW-VL08-XGT series)                                                                       |               |                       |            |
| Database                                                                                    | Telcordia (Bellcore), GB (IE-SW-VL08-xGT series)                                                                                                 |               |                       |            |
| Warranty                                                                                    |                                                                                                                                                  |               |                       |            |
| Warranty Period                                                                             | 5 years                                                                                                                                          |               |                       |            |
| Ordering Information                                                                        |                                                                                                                                                  |               |                       |            |
| Port Variants                                                                               |                                                                                                                                                  | Type          | Operating Temperature | Order No.  |
| 5 * RJ45 10/100/1000BaseT(X)                                                                | IE-SW-BL05-5GT                                                                                                                                   | 0 to +60 °C   |                       | 1241250000 |
|                                                                                             | IE-SW-BL05T-5GT                                                                                                                                  | -40 to +75 °C |                       | 1286850000 |
| 8 * RJ45 10/100/1000BaseT(X)                                                                | IE-SW-VL08-8GT                                                                                                                                   | 0 to +60 °C   |                       | 1241270000 |
|                                                                                             | IE-SW-VL08T-8GT                                                                                                                                  | -40 to +75 °C |                       | 1286860000 |
| 6 * RJ45 10/100/1000BaseT(X),<br>2 Combo-Ports (10/100/1000<br>BaseT(X) or 100/1000BaseSFP) | IE-SW-VL08-6GT-2GS                                                                                                                               | 0 to +60 °C   |                       | 1241280000 |
|                                                                                             | IE-SW-VL08T-6GT-2GS                                                                                                                              | -40 to +75 °C |                       | 1286870000 |
| Accessories                                                                                 |                                                                                                                                                  |               |                       |            |
|                                                                                             |                                                                                                                                                  | Type          | Order No.             |            |
| 19" Rack Mounting Kit                                                                       |                                                                                                                                                  | RM-KIT        | 1241440000            |            |

## Managed Entry-level Ethernet Switches

- Turbo Ring and Turbo Chain with fast recovery time (under 20 ms)
- IGMP snooping, QoS, port- and tag-based VLAN
- Configurable error messages via SNMP trap, e-mail or relay output
- User-friendly web-based configuration and management
- External Backup and Restoring Module for easy system reconfiguration (optional accessory)



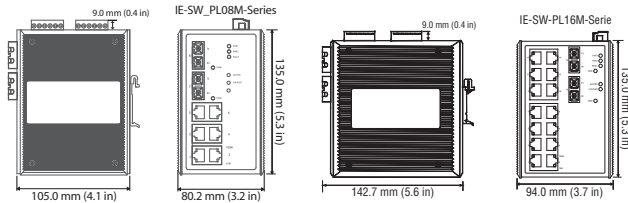
## Technical data

| Standards                                                                                                                                                                                                                                 |                                                                                                               |                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------|
| IEEE 802.3 for 10BaseT ▪ IEEE 802.3u for 100BaseT (X) and 100BaseFX ▪ IEEE 802.3x for Flow Control ▪ IEEE 802.1D for Spanning Tree Protocol ▪ IEEE 802.1w for Rapid STP ▪ IEEE 802.1p for Class of Service ▪ IEEE 802.1Q for VLAN Tagging |                                                                                                               |                    |
| Protocols                                                                                                                                                                                                                                 |                                                                                                               |                    |
| IGMPv1/v2 ▪ GMRP ▪ GVRP ▪ SNMPv1/v2c/v3 ▪ DHCP Server/Client ▪ TFTP ▪ SNTP ▪ SMTP ▪ RARP ▪ RMON ▪ HTTP ▪ Telnet ▪ Syslog ▪ DHCP Option 66/67/82 ▪ BootP ▪ LLDP ▪ Modbus/TCP ▪ IPv6                                                        |                                                                                                               |                    |
| MIB                                                                                                                                                                                                                                       |                                                                                                               |                    |
| MIB-II ▪ Ethernet-Like MIB ▪ P-BRIDGE MIB ▪ Bridge MIB ▪ RSTP MIB ▪ RMON MIB Group 1, 2, 3, 9                                                                                                                                             |                                                                                                               |                    |
| Flow Control                                                                                                                                                                                                                              |                                                                                                               |                    |
| IEEE 802.3x flow control ▪ back pressure flow control                                                                                                                                                                                     |                                                                                                               |                    |
| Switch Properties                                                                                                                                                                                                                         |                                                                                                               |                    |
| MAC Table Size                                                                                                                                                                                                                            | 8 K                                                                                                           |                    |
| Packet Buffer Size                                                                                                                                                                                                                        | 1 MBit                                                                                                        |                    |
| Interface                                                                                                                                                                                                                                 |                                                                                                               |                    |
| Fiber Ports                                                                                                                                                                                                                               | 100BaseFX ports (SC/ST connector)                                                                             |                    |
| RJ45 Ports                                                                                                                                                                                                                                | 10/100BaseT(X) auto negotiation speed, Full/Half duplex mode, and auto MDI/MDI-X connection                   |                    |
| Console Port                                                                                                                                                                                                                              | RS-232 (RJ45 connector)                                                                                       |                    |
| DIP Switches                                                                                                                                                                                                                              | Turbo Ring, Master, Coupler, Reserve                                                                          |                    |
| LED Indicators                                                                                                                                                                                                                            | PWR1, PWR2, FAULT, MSTR/HEAD, CPLR/ TAIL, 10/100M                                                             |                    |
| Alarm Contact                                                                                                                                                                                                                             | 1 relay output with current carrying capacity of 1 A @ 24 V DC                                                |                    |
| Optical Fiber                                                                                                                                                                                                                             |                                                                                                               |                    |
|                                                                                                                                                                                                                                           | 100BaseFX                                                                                                     |                    |
|                                                                                                                                                                                                                                           | multimode                                                                                                     | singlemode         |
| Wavelength                                                                                                                                                                                                                                | 1300 nm                                                                                                       | 1310 nm            |
| Max. TX                                                                                                                                                                                                                                   | -10 dBm                                                                                                       | 0 dBm              |
| Min. TX                                                                                                                                                                                                                                   | -20 dBm                                                                                                       | -5 dBm             |
| RX Sensitivity                                                                                                                                                                                                                            | -32 dBm                                                                                                       | -34 dBm            |
| Link Budget                                                                                                                                                                                                                               | 12 dB                                                                                                         | 29 dB              |
| Typical Distance                                                                                                                                                                                                                          | 5 km <sup>a</sup>                                                                                             | 40 km <sup>c</sup> |
|                                                                                                                                                                                                                                           | 4 km <sup>b</sup>                                                                                             |                    |
| Saturation                                                                                                                                                                                                                                | -6 dBm                                                                                                        | -3 dBm             |
| <sup>a</sup> 50/125 µm, 800 MHz*km fiber optic cable                                                                                                                                                                                      |                                                                                                               |                    |
| <sup>b</sup> 62.5/125 µm, 500 MHz*km fiber optic cable                                                                                                                                                                                    |                                                                                                               |                    |
| <sup>c</sup> 9/125 µm singlemode fiber optic cable                                                                                                                                                                                        |                                                                                                               |                    |
| Power Requirements                                                                                                                                                                                                                        |                                                                                                               |                    |
| Input Voltage                                                                                                                                                                                                                             | 24 V DC (12 to 45 V DC), redundant dual inputs                                                                |                    |
| Input Current                                                                                                                                                                                                                             | IE-SW-VL08M-8TX: 0.26 A @ 24 V<br>IE-SW-VL08M-6TX-2ST/SC: 0.35 A @ 24 V<br>IE-SW-VL08M-5TX-3SC: 0.32 A @ 24 V |                    |
| Overload Current Protection                                                                                                                                                                                                               | Present                                                                                                       |                    |
| Connection                                                                                                                                                                                                                                | 1 removable 6-contact terminal block                                                                          |                    |
| Reverse Polarity Protection                                                                                                                                                                                                               | Present                                                                                                       |                    |

| Physical Characteristics           |                                                                                                                                                                        |                       |                       |            |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|------------|
| Housing                            | Metal, IP30 protection                                                                                                                                                 |                       |                       |            |
| Dimensions                         | 53.6 x 135 x 105 mm (2.11 x 5.31 x 4.13 in)                                                                                                                            |                       |                       |            |
| Weight                             | IE-SW-VL08M-...8TX/6TX-2SC/6TX-2ST: 650 g<br>IE-SW-VL08M-5TX-3SC: 890 g                                                                                                |                       |                       |            |
| Installation                       | DIN-Rail mounting                                                                                                                                                      |                       |                       |            |
| Environmental Limits               |                                                                                                                                                                        |                       |                       |            |
| Operating Temperature              | -40 to 75 °C (-40 to 167 °F)                                                                                                                                           |                       |                       |            |
| Storage Temperature                | -40 to 85 °C (-40 to 185 °F)                                                                                                                                           |                       |                       |            |
| Ambient Relative Humidity          | 5 to 95 % (non-condensing)                                                                                                                                             |                       |                       |            |
| Regulatory Approvals               |                                                                                                                                                                        |                       |                       |            |
| Safety                             | UL508, UL60950-1, CSA C22.2 No. 60950-1, EN60950-1                                                                                                                     |                       |                       |            |
| Hazardous Location                 | UL/cUL Class I, Division 2, Groups A, B, C, and D; ATEX Zone 2, Ex nC IIC                                                                                              |                       |                       |            |
| EMI                                | FCC Part 15, CISPR (EN55022) class A                                                                                                                                   |                       |                       |            |
| EMS                                | EN61000-4-2 (ESD), level 3;<br>EN61000-4-3 (RS), level 3;<br>EN61000-4-4 (EFT), level 3;<br>EN61000-4-5 (Surge), level 3;<br>EN61000-4-6 (CS), level 3;<br>EN61000-4-8 |                       |                       |            |
| Maritime                           | DNV, GL                                                                                                                                                                |                       |                       |            |
| Shock                              | IEC 60068-2-27                                                                                                                                                         |                       |                       |            |
| Freefall                           | IEC 60068-2-32                                                                                                                                                         |                       |                       |            |
| Vibration                          | IEC 60068-2-6                                                                                                                                                          |                       |                       |            |
| MTBF (mean time between failures)  |                                                                                                                                                                        |                       |                       |            |
| Time                               | IE-SW-VL08M-...Series:<br>363,000 hrs                                                                                                                                  |                       |                       |            |
| Database                           | Telcordia (Bellcore), GB                                                                                                                                               |                       |                       |            |
| Warranty                           |                                                                                                                                                                        |                       |                       |            |
| Warranty Period                    | 5 years                                                                                                                                                                |                       |                       |            |
| Ordering Information               |                                                                                                                                                                        |                       |                       |            |
| Port Variants                      |                                                                                                                                                                        | Type                  | Operating Temperature | Order No.  |
| 8 * RJ45                           |                                                                                                                                                                        | IE-SW-VL08MT-8TX      | -40 to +75 °C         | 1240940000 |
| 5 * RJ45, 3 * SC-Multimode         |                                                                                                                                                                        | IE-SW-VL08MT-5TX-3SC  | -40 to +75 °C         | 1240970000 |
| 6 * RJ45, 2 * ST-Multimode         |                                                                                                                                                                        | IE-SW-VL08MT-6TX-2ST  | -40 to +75 °C         | 1240990000 |
| 6 * RJ45, 2 * SC-Singlemode        |                                                                                                                                                                        | IE-SW-VL08MT-6TX-2SCS | -40 to +75 °C         | 1241020000 |
| Accessories                        |                                                                                                                                                                        |                       |                       |            |
| Type                               |                                                                                                                                                                        |                       |                       | Order No.  |
| External Backup and Restore Module |                                                                                                                                                                        |                       |                       | 1241430000 |
| 19" Rack Mounting Kit              |                                                                                                                                                                        |                       |                       | 1241440000 |

## Managed Fast Ethernet Switches

- Plug-n-play Turbo Ring and Turbo Chain (recovery time < 20 ms), RSTP/STP (IEEE 802.1w/D) for Ethernet redundancy
- IEEE 1588 PTP, Modbus/TCP, LLDP, SNMP Inform, QoS, IGMP snooping, VLAN, IEEE 802.1X, HTTPS, SNMPv3, and SSH supported
- EBR-Module (External Backup and Restore Module) for system configuration backup (optional accessory)



## Technical data

| Standards                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                          |                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| IEEE 802.3 for 10BaseT ▪ IEEE 802.3u for 100BaseT (X) and 100BaseFX ▪ IEEE 802.3x for Flow Control ▪ IEEE 802.1D for Spanning Tree Protocol ▪ IEEE 802.1w for Rapid STP ▪ IEEE 802.1Q for VLAN Tagging ▪ IEEE 802.1p for Class of Service ▪ IEEE 802.1X for Authentication ▪ IEEE 802.3ad for Port Trunk with LACP |                                                                                                                                                                                                          |                                   |
| Protocols                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                          |                                   |
| IGMPv1/v2 ▪ GVRP ▪ SNMPv1/v2c/v3 ▪ DHCP Server/Client ▪ BootP ▪ TFTP ▪ SNTP ▪ SMTP ▪ RARP ▪ GMRP ▪ LACP ▪ RMON ▪ HTTP ▪ HTTPS ▪ Telnet ▪ Syslog ▪ DHCP Option 66/67/82 ▪ SSH ▪ SNMP Inform ▪ Modbus/TCP ▪ LLDP ▪ IEEE 1588 PTP ▪ IPv6                                                                              |                                                                                                                                                                                                          |                                   |
| MIB                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                          |                                   |
| MIB-II ▪ Ethernet-Like MIB ▪ P-BRIDGE MIB ▪ Q-BRIDGE MIB ▪ Bridge MIB ▪ RSTP MIB ▪ RMON MIB Group 1, 2, 3, 9                                                                                                                                                                                                       |                                                                                                                                                                                                          |                                   |
| Flow Control                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                          |                                   |
| IEEE 802.3x flow control ▪ back pressure flow control                                                                                                                                                                                                                                                              |                                                                                                                                                                                                          |                                   |
| Switch Properties                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                          |                                   |
| Priority Queues                                                                                                                                                                                                                                                                                                    | 4                                                                                                                                                                                                        |                                   |
| Max. Number of Available VLANs                                                                                                                                                                                                                                                                                     | 64                                                                                                                                                                                                       |                                   |
| VLAN ID Range                                                                                                                                                                                                                                                                                                      | VID 1 to 4094                                                                                                                                                                                            |                                   |
| IGMP Groups                                                                                                                                                                                                                                                                                                        | 256                                                                                                                                                                                                      |                                   |
| MAC Table Size                                                                                                                                                                                                                                                                                                     | 8 K                                                                                                                                                                                                      |                                   |
| Packet Buffer Size                                                                                                                                                                                                                                                                                                 | 1 Mbit (IE-SW-PL08M), 2 Mbit (IE-SW-PL16M)                                                                                                                                                               |                                   |
| Interface                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                          |                                   |
| Fiber Ports                                                                                                                                                                                                                                                                                                        | 100BaseFX ports (SC/ST connector)                                                                                                                                                                        |                                   |
| RJ45 Ports                                                                                                                                                                                                                                                                                                         | 10/100BaseT(X) auto negotiation speed, Full/Half duplex mode, and auto MDI/MDI-X connection                                                                                                              |                                   |
| Console Port                                                                                                                                                                                                                                                                                                       | RS-232 (RJ45 connector)                                                                                                                                                                                  |                                   |
| DIP Switches                                                                                                                                                                                                                                                                                                       | Turbo Ring, Master, Coupler, Reserve                                                                                                                                                                     |                                   |
| LED Indicators                                                                                                                                                                                                                                                                                                     | PWR1, PWR2, FAULT, MSTR/HEAD, CPLR/TAIL, 10/100M                                                                                                                                                         |                                   |
| Alarm Contact                                                                                                                                                                                                                                                                                                      | 2 relay outputs with current carrying capacity of 1 A @ 24 V DC                                                                                                                                          |                                   |
| Digital Inputs                                                                                                                                                                                                                                                                                                     | 2 inputs with the same ground, electrically isolated <ul style="list-style-type: none"><li>• +13 to +30 V for state "1"</li><li>• -30 to +3 V for state "0"</li><li>• Max. input current: 8 mA</li></ul> |                                   |
| Optical Fiber                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                          |                                   |
|                                                                                                                                                                                                                                                                                                                    | 100BaseFX                                                                                                                                                                                                |                                   |
|                                                                                                                                                                                                                                                                                                                    | multimode                                                                                                                                                                                                | singlemode                        |
| Wavelength                                                                                                                                                                                                                                                                                                         | 1300 nm                                                                                                                                                                                                  | 1310 nm                           |
| Max. TX                                                                                                                                                                                                                                                                                                            | -10 dBm                                                                                                                                                                                                  | 0 dBm                             |
| Min. TX                                                                                                                                                                                                                                                                                                            | -20 dBm                                                                                                                                                                                                  | -5 dBm                            |
| RX Sensitivity                                                                                                                                                                                                                                                                                                     | -32 dBm                                                                                                                                                                                                  | -34 dBm                           |
| Link Budget                                                                                                                                                                                                                                                                                                        | 12 dB                                                                                                                                                                                                    | 29 dB                             |
| Typical Distance                                                                                                                                                                                                                                                                                                   | 5 km (50/125 μm multimode cable)<br>4 km (62.5/125 μm multimode cable)                                                                                                                                   | 40 km (9/125 μm singlemode cable) |
| Saturation                                                                                                                                                                                                                                                                                                         | -6 dBm                                                                                                                                                                                                   | -3 dBm                            |
| Power Requirements                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                          |                                   |
| Input Voltage                                                                                                                                                                                                                                                                                                      | 24 V DC (12 to 45 V DC), redundant dual inputs                                                                                                                                                           |                                   |
| Input Current                                                                                                                                                                                                                                                                                                      | IE-SW-PL08M-8TX: 0.26 A @ 24 V<br>IE-SW-PL08M-6TX-2SC/ST/2SCS: 0.36 A @ 24 V<br>IE-SW-PL16M-16TX: 0.41 A @ 24 V<br>IE-SW-PL16M-14TX-2SC/ST: 0.51 A @ 24 V                                                |                                   |

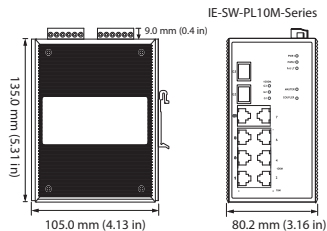


| Power Requirements               |                                                                                                                                                                                                                     |                       |                       |            |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|------------|
| Overload Current Protection      | Present                                                                                                                                                                                                             |                       |                       |            |
| Connection                       | 2 removable 6-contact terminal blocks                                                                                                                                                                               |                       |                       |            |
| Reverse Polarity Protection      | Present                                                                                                                                                                                                             |                       |                       |            |
| Physical Characteristics         |                                                                                                                                                                                                                     |                       |                       |            |
| Housing                          | Metal, IP30 protection                                                                                                                                                                                              |                       |                       |            |
| Dimensions                       | IE-SW-PL08M: 80.2 x 135 x 105 mm (3.16 x 5.31 x 4.13 in) IE-SW-PL16M: 94 x 135 x 142.7 mm (3.7 x 5.31 x 5.62 in)                                                                                                    |                       |                       |            |
| Weight                           | IE-SW-PL08M: 1040 g, IE-SW-PL16M: 1586 g                                                                                                                                                                            |                       |                       |            |
| Installation                     | DIN-Rail mounting                                                                                                                                                                                                   |                       |                       |            |
| Environmental Limits             |                                                                                                                                                                                                                     |                       |                       |            |
| Operating Temperature            | Standard Models: 0 to 60 °C (32 to 140 °F)<br>Wide Temp. Models: -40 to 75 °C (-40 to 167 °F)                                                                                                                       |                       |                       |            |
| Storage Temperature              | -40 to 85 °C (-40 to 185 °F)                                                                                                                                                                                        |                       |                       |            |
| Ambient Relative Humidity        | 5 to 95 % (non-condensing)                                                                                                                                                                                          |                       |                       |            |
| Regulatory Approvals             |                                                                                                                                                                                                                     |                       |                       |            |
| Safety                           | UL508, UL60950-1, CSA C22.2 No. 60950-1, EN60950-1                                                                                                                                                                  |                       |                       |            |
| Hazardous Location               | UL/cUL Class I, Division 2, Groups A, B, C, and D; ATEX Zone 2, Ex nC IIC                                                                                                                                           |                       |                       |            |
| EMI                              | FCC Part 15, CISPR (EN55022) class A                                                                                                                                                                                |                       |                       |            |
| EMS                              | EN61000-4-2 (ESD): IE-SW-PL08M...Series: level 3<br>IE-SW-PL16M...Series: level 2;<br>EN61000-4-3 (RS) level 3; EN61000-4-4 (EFT) level 2;<br>EN61000-4-5 (Surge) level 3;<br>EN61000-4-6 (CS) level 3; EN61000-4-8 |                       |                       |            |
| Maritime                         | DNV, GL                                                                                                                                                                                                             |                       |                       |            |
| Shock                            | IEC 60068-2-27                                                                                                                                                                                                      |                       |                       |            |
| Freefall                         | IEC 60068-2-32                                                                                                                                                                                                      |                       |                       |            |
| Vibration                        | IEC 60068-2-6                                                                                                                                                                                                       |                       |                       |            |
| MTBF (meantime between failures) |                                                                                                                                                                                                                     |                       |                       |            |
| Time                             | IE-SW-PL08M...Series: 339,000 hrs<br>IE-SW-PL16M...Series: 247,000 hrs                                                                                                                                              |                       |                       |            |
| Database                         | Telcordia (Bellcore), GB                                                                                                                                                                                            |                       |                       |            |
| Warranty                         |                                                                                                                                                                                                                     |                       |                       |            |
| Warranty Period                  | 5 years                                                                                                                                                                                                             |                       |                       |            |
| Ordering Information             |                                                                                                                                                                                                                     |                       |                       |            |
| Port Variants                    |                                                                                                                                                                                                                     | Type                  | Operating Temperature | Order No.  |
| 8 * RJ45                         |                                                                                                                                                                                                                     | IE-SW-PL08M-8TX       | 0 to 60 °C            | 1241040000 |
|                                  |                                                                                                                                                                                                                     | IE-SW-PL08MT-8TX      | -40 to +75 °C         | 1286780000 |
| 6 * RJ45, 2 * SC-Multimode       |                                                                                                                                                                                                                     | IE-SW-PL08M-6TX-2SC   | 0 to 60 °C            | 1241070000 |
|                                  |                                                                                                                                                                                                                     | IE-SW-PL08MT-6TX-2SC  | -40 to +75 °C         | 1286790000 |
| 6 * RJ45, 2 * ST-Multimode       |                                                                                                                                                                                                                     | IE-SW-PL08M-6TX-2ST   | 0 to 60 °C            | 1241080000 |
|                                  |                                                                                                                                                                                                                     | IE-SW-PL08MT-6TX-2ST  | -40 to +75 °C         | 1286800000 |
| 6 * RJ45, 2 * SC-Singlemode      |                                                                                                                                                                                                                     | IE-SW-PL08M-6TX-2SCS  | 0 to 60 °C            | 1241090000 |
|                                  |                                                                                                                                                                                                                     | IE-SW-PL08MT-6TX-2SCS | -40 to +75 °C         | 1286810000 |
| 16 * RJ45                        |                                                                                                                                                                                                                     | IE-SW-PL16M-16TX      | 0 to 60 °C            | 1241100000 |
|                                  |                                                                                                                                                                                                                     | IE-SW-PL16MT-16TX     | -40 to +75 °C         | 1286820000 |
| 14 * RJ45, 2 * SC-Multimode      |                                                                                                                                                                                                                     | IE-SW-PL16M-14TX-2SC  | 0 to 60 °C            | 1241120000 |
|                                  |                                                                                                                                                                                                                     | IE-SW-PL16MT-14TX-2SC | -40 to +75 °C         | 1286830000 |
| 14 * RJ45, 2 * ST-Multimode      |                                                                                                                                                                                                                     | IE-SW-PL16M-14TX-2ST  | 0 to 60 °C            | 1241130000 |
|                                  |                                                                                                                                                                                                                     | IE-SW-PL16MT-14TX-2ST | -40 to +75 °C         | 1286840000 |
|                                  |                                                                                                                                                                                                                     |                       |                       |            |



## Managed Gigabit Ethernet Switches

- 2 Gigabit Ethernet ports for redundant ring and 1 Gigabit Ethernet port for uplink solution
- Turbo Ring, Turbo Chain, and RSTP/STP for network redundancy
- IEEE 1588 PTP, Modbus/TCP, LLDP, SNMP Inform, QoS, IGMP snooping, VLAN, IEEE 802.1X, HTTPS, SNMPv3, and SSH supported
- EBR-Module - External Backup and Restoring Module for easy system reconfiguration (optional accessory)



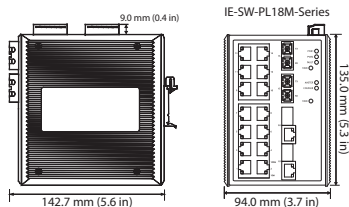
## Technical data

| Standards                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IEEE 802.3 for 10BaseT ■ IEEE 802.3u for 100BaseT(X) and 100BaseFX ■ IEEE 802.3ab for 1000BaseT(X) ■ IEEE 802.3z for 1000BaseX ■ IEEE 802.3x for Flow Control ■ IEEE 802.1D for Spanning Tree Protocol ■ IEEE 802.1w for Rapid STP ■ IEEE 802.1Q for VLAN Tagging ■ IEEE 802.1p for Class of Service ■ IEEE 802.1X for Authentication ■ IEEE 802.3ad for Port Trunk with LACP |                                                                                                                                                                                                                                        |
| Protocols                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                        |
| IGMPv1/v2 ■ GMRP ■ GVRP ■ SNMPv1/v2c/v3 ■ DHCP Server/Client ■ BootP ■ TFTP ■ SNTP ■ SMTP ■ RARP ■ RMON ■ HTTP ■ HTTPS ■ Telnet ■ Syslog ■ DHCP Option 66/67/82 ■ SSH ■ SNMP Inform ■ Modbus/TCP ■ LLDP ■ IEEE 1588 PTP ■ IPv6                                                                                                                                                |                                                                                                                                                                                                                                        |
| MIB                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                        |
| MIB-II ■ Ethernet-Like MIB ■ P-BRIDGE MIB ■ Q-BRIDGE MIB ■ Bridge MIB ■ RSTP MIB ■ RMON MIB Group 1, 2, 3, 9                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                        |
| Flow Control                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                        |
| IEEE 802.3x flow control ■ back pressure flow control                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                        |
| Switch Properties                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                        |
| Priority Queues                                                                                                                                                                                                                                                                                                                                                               | 4                                                                                                                                                                                                                                      |
| Max. Number of Available VLANs                                                                                                                                                                                                                                                                                                                                                | 64                                                                                                                                                                                                                                     |
| VLAN ID Range                                                                                                                                                                                                                                                                                                                                                                 | VID 1 to 4094                                                                                                                                                                                                                          |
| IGMP Groups                                                                                                                                                                                                                                                                                                                                                                   | 256                                                                                                                                                                                                                                    |
| MAC Table Size                                                                                                                                                                                                                                                                                                                                                                | 8 K                                                                                                                                                                                                                                    |
| Packet Buffer Size                                                                                                                                                                                                                                                                                                                                                            | 1 Mbit                                                                                                                                                                                                                                 |
| Interface                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                        |
| Fiber Ports                                                                                                                                                                                                                                                                                                                                                                   | 1000BaseSFP slot                                                                                                                                                                                                                       |
| RJ45 Ports                                                                                                                                                                                                                                                                                                                                                                    | 10/100BaseT(X) or 10/100/1000BaseT(X) auto negotiation speed                                                                                                                                                                           |
| Console Port                                                                                                                                                                                                                                                                                                                                                                  | RS-232 (RJ45 connector)                                                                                                                                                                                                                |
| DIP Switches                                                                                                                                                                                                                                                                                                                                                                  | Turbo Ring, Master, Coupler, Reserve                                                                                                                                                                                                   |
| LED Indicators                                                                                                                                                                                                                                                                                                                                                                | PWR1, PWR2, FAULT, 10/100M (TP port), 1000M (Gigabit port), MSTR/HEAD, CPLR/TAIL                                                                                                                                                       |
| Alarm Contact                                                                                                                                                                                                                                                                                                                                                                 | 2 relay outputs with current carrying capacity of 1 A @ 24 V DC                                                                                                                                                                        |
| Digital Inputs                                                                                                                                                                                                                                                                                                                                                                | 2 inputs with the same ground, but electrically isolated from the electronics. <ul style="list-style-type: none"> <li>• +13 to +30 V for state "1"</li> <li>• -30 to +3 V for state "0"</li> <li>• Max. input current: 8 mA</li> </ul> |
| Power Requirements                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                        |
| Input Voltage                                                                                                                                                                                                                                                                                                                                                                 | 24 V DC (12 to 45 V DC), redundant dual inputs                                                                                                                                                                                         |
| Input Current                                                                                                                                                                                                                                                                                                                                                                 | IE-SW-PL10M-3GT-7TX: 0.65 A @ 24 V<br>IE-SW-PL10M-1GT-2GS-7TX: 0.44 A @ 24 V                                                                                                                                                           |
| Overload Current Protection                                                                                                                                                                                                                                                                                                                                                   | Present                                                                                                                                                                                                                                |
| Connection                                                                                                                                                                                                                                                                                                                                                                    | 2 removable 6-contact terminal blocks                                                                                                                                                                                                  |
| Reverse Polarity Protection                                                                                                                                                                                                                                                                                                                                                   | Present                                                                                                                                                                                                                                |
| Physical Characteristics                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                        |
| Housing                                                                                                                                                                                                                                                                                                                                                                       | Metal, IP30 protection                                                                                                                                                                                                                 |
| Dimensions                                                                                                                                                                                                                                                                                                                                                                    | 80.2 x 135 x 105 mm (3.16 x 5.31 x 4.13 in)                                                                                                                                                                                            |
| Weight                                                                                                                                                                                                                                                                                                                                                                        | 1170 g                                                                                                                                                                                                                                 |
| Installation                                                                                                                                                                                                                                                                                                                                                                  | DIN-Rail mounting                                                                                                                                                                                                                      |

| Environmental Limits               |  |                                                                                                                                                               |                       |            |
|------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------|
| Operating Temperature              |  | Standard Models: 0 to 60 °C (32 to 140 °F)<br>Wide Temp. Models: -40 to 75 °C<br>(-40 to 167 °F)                                                              |                       |            |
| Storage Temperature                |  | -40 to 85 °C (-40 to 185 °F)                                                                                                                                  |                       |            |
| Ambient Relative Humidity          |  | 5 to 95 % (non-condensing)                                                                                                                                    |                       |            |
| Regulatory Approvals               |  |                                                                                                                                                               |                       |            |
| Safety                             |  | UL508, UL60950-1, CSA C22.2 No. 60950-1<br>EN60950-1                                                                                                          |                       |            |
| Hazardous Location                 |  | UL/cUL Class I, Division 2, Groups A, B, C, and D; ATEX Zone 2, Ex nC IIC                                                                                     |                       |            |
| EMI                                |  | FCC Part 15, CISPR (EN55022) class A                                                                                                                          |                       |            |
| EMS                                |  | EN61000-4-2 (ESD), level 3; EN61000-4-3 (RS), level 3;<br>EN61000-4-4 (EFT), level 3; EN61000-4-5 (Surge), level 3;<br>EN61000-4-6 (CS), level 3; EN61000-4-8 |                       |            |
| Maritime                           |  | DNV, GL                                                                                                                                                       |                       |            |
| Shock                              |  | IEC 60068-2-27                                                                                                                                                |                       |            |
| Freefall                           |  | IEC 60068-2-32                                                                                                                                                |                       |            |
| Vibration                          |  | IEC 60068-2-6                                                                                                                                                 |                       |            |
| MTBF (mean time between failures)  |  |                                                                                                                                                               |                       |            |
| Time                               |  | 204,000 hrs                                                                                                                                                   |                       |            |
| Database                           |  | MIL-HDBK-217J, GB 25 °C                                                                                                                                       |                       |            |
| Warranty                           |  |                                                                                                                                                               |                       |            |
| Warranty Period                    |  | 5 years                                                                                                                                                       |                       |            |
| Ordering Information               |  |                                                                                                                                                               |                       |            |
| Port Variants                      |  | Type                                                                                                                                                          | Operating Temperature | Order No.  |
| 3 * RJ45 10/100/1000BaseT(X),      |  | IE-SW-PL10M-3GT-7TX                                                                                                                                           | 0 to 60 °C            | 1241290000 |
| 7 * RJ45 10/100BaseT(X)            |  | IE-SW-PL10MT-3GT-7TX                                                                                                                                          | -40 to +75 °C         | 1286930000 |
| 1 * RJ45 10/100/1000BaseT(X),      |  | IE-SW-PL10M-1GT-2GS-7TX                                                                                                                                       | 0 to 60 °C            | 1241300000 |
| 2 * Slots 1000BaseSFP,             |  | IE-SW-PL10MT-1GT-2GS-7TX                                                                                                                                      | -40 to +75 °C         | 1286940000 |
| 7 * RJ45 10/100BaseT(X)            |  |                                                                                                                                                               |                       |            |
| Accessories                        |  |                                                                                                                                                               |                       |            |
| Type                               |  |                                                                                                                                                               |                       | Order No.  |
| External Backup and Restore Module |  |                                                                                                                                                               |                       | 1241430000 |
| 19" Rack Mounting Kit              |  |                                                                                                                                                               |                       | 1241440000 |

## Managed Gigabit Ethernet Switches

- 2 Gigabit Ethernet ports plus 16 Fast Ethernet ports for copper and fibre
- Turbo Ring, Turbo Chain, and RSTP/STP for network redundancy
- IEEE 1588 PTP, Modbus/TCP, LLDP, SNMP Inform, QoS, IGMP snooping, VLAN, IEEE 802.1X, HTTPS, SNMPv3, and SSH supported
- EBR-Module - External Backup and Restoring Module for easy system reconfiguration (optional accessory)



## Technical data

| Standards                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IEEE 802.3 for 10BaseT ■ IEEE 802.3u for 100BaseT(X) and 100BaseFX ■ IEEE 802.3ab for 1000BaseT(X) ■ IEEE 802.3z for 1000BaseX ■ IEEE 802.3x for Flow Control ■ IEEE 802.1D for Spanning Tree Protocol ■ IEEE 802.1w for Rapid STP ■ IEEE 802.1Q for VLAN Tagging ■ IEEE 802.1p for Class of Service ■ IEEE 802.1X for Authentication ■ IEEE 802.3ad for Port Trunk with LACP |                                                                                                                                                                                                                                        |
| Protocols                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                        |
| IGMPv1/v2 ■ GMRP, GVRP ■ SNMPv1/v2c/v3 ■ DHCP Server/Client ■ BootP ■ TFTP ■ SNMP ■ SMTP ■ RARP ■ RMON ■ HTTP ■ HTTPS ■ Telnet ■ Syslog ■ DHCP Option 66/67/82 ■ SSH ■ SNMP Inform ■ Modbus/TCP ■ LLDP ■ IEEE 1588 PTP ■ IPv6                                                                                                                                                 |                                                                                                                                                                                                                                        |
| MIB                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                        |
| MIB-II ■ Ethernet-Like MIB ■ P-BRIDGE MIB ■ Q-BRIDGE MIB ■ Bridge MIB ■ RSTP MIB ■ RMON MIB Group 1, 2, 3, 9                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                        |
| Flow Control                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                        |
| IEEE 802.3x flow control, back pressure flow control                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                        |
| Switch Properties                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                        |
| Priority Queues                                                                                                                                                                                                                                                                                                                                                               | 4                                                                                                                                                                                                                                      |
| Max. Number of Available VLANs                                                                                                                                                                                                                                                                                                                                                | 64                                                                                                                                                                                                                                     |
| VLAN ID Range                                                                                                                                                                                                                                                                                                                                                                 | VID 1 to 4094                                                                                                                                                                                                                          |
| IGMP Groups                                                                                                                                                                                                                                                                                                                                                                   | 256                                                                                                                                                                                                                                    |
| MAC Table Size                                                                                                                                                                                                                                                                                                                                                                | 8 K                                                                                                                                                                                                                                    |
| Packet Buffer Size                                                                                                                                                                                                                                                                                                                                                            | 2 Mbit                                                                                                                                                                                                                                 |
| Interface                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                        |
| Fiber Ports                                                                                                                                                                                                                                                                                                                                                                   | 100BaseFX (SC/ST connector) and 1000BaseSFP slot                                                                                                                                                                                       |
| RJ45 Ports                                                                                                                                                                                                                                                                                                                                                                    | 10/100BaseT(X) or 10/100/1000BaseT(X) auto negotiation speed                                                                                                                                                                           |
| Console Port                                                                                                                                                                                                                                                                                                                                                                  | RS-232 (RJ45 connector)                                                                                                                                                                                                                |
| LED Indicators                                                                                                                                                                                                                                                                                                                                                                | PWR1, PWR2, FAULT, 10/100M (TP port), 100M (fiber port), MSTR/HEAD, CPLR/TAIL                                                                                                                                                          |
| Alarm Contact                                                                                                                                                                                                                                                                                                                                                                 | 2 relay outputs with current carrying capacity of 1 A @ 24 V DC                                                                                                                                                                        |
| Digital Inputs                                                                                                                                                                                                                                                                                                                                                                | 2 inputs with the same ground, but electrically isolated from the electronics. <ul style="list-style-type: none"> <li>• +13 to +30 V for state "1"</li> <li>• -30 to +3 V for state "0"</li> <li>• Max. input current: 8 mA</li> </ul> |

| Optical Fiber    |                                                                        |                                   |
|------------------|------------------------------------------------------------------------|-----------------------------------|
|                  | 100BaseFX                                                              |                                   |
|                  | multimode                                                              | singlemode                        |
| Wavelength       | 1300 nm                                                                | 1310 nm                           |
| Max. TX          | -10 dBm                                                                | 0 dBm                             |
| Min. TX          | -20 dBm                                                                | -5 dBm                            |
| RX Sensitivity   | -32 dBm                                                                | -34 dBm                           |
| Link Budget      | 12 dB                                                                  | 29 dB                             |
| Typical Distance | 5 km (50/125 µm multimode cable)<br>4 km (62.5/125 µm multimode cable) | 40 km (9/125 µm singlemode cable) |
| Saturation       | -6 dBm                                                                 | -3 dBm                            |

| Power Requirements               |                                                                                                                                                                       |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Voltage                    | 24 V DC (12 to 45 V DC), redundant dual inputs                                                                                                                        |
| Input Current                    | IE-SW-PL18M-2GC-16TX: 0.51 A @ 24 V<br>IE-SW-PL18M-SC/ST/SCS: 0.61 A @ 24 V                                                                                           |
| Overload Current Protection      | Present                                                                                                                                                               |
| Connection                       | 2 removable 6-contact terminal blocks                                                                                                                                 |
| Reverse Polarity Protection      | Present                                                                                                                                                               |
| Physical Characteristics         |                                                                                                                                                                       |
| Housing                          | Metal, IP30 protection                                                                                                                                                |
| Dimensions                       | 94 x 135 x 142.7 mm (3.7 x 5.31 x 5.62 in)                                                                                                                            |
| Weight                           | 1630 g                                                                                                                                                                |
| Installation                     | DIN-Rail mounting                                                                                                                                                     |
| Environmental Limits             |                                                                                                                                                                       |
| Operating Temperature            | Standard Models: 0 to 60 °C (32 to 140 °F)<br>Wide Temp. Models: -40 to 75 °C (-40 to 167 °F)                                                                         |
| Storage Temperature              | -40 to 85 °C (-40 to 185 °F)                                                                                                                                          |
| Ambient Relative Humidity        | 5 to 95 % (non-condensing)                                                                                                                                            |
| Regulatory Approvals             |                                                                                                                                                                       |
| Safety                           | UL508, UL60950-1, CSA C22.2 No. 60950-1, EN60950-1                                                                                                                    |
| Hazardous Location               | UL/cUL Class I, Division 2, Groups A, B, C, and D; ATEX Zone 2, Ex nC IIC                                                                                             |
| EMI                              | FCC Part 15, CISPR (EN55022) class A                                                                                                                                  |
| EMS                              | EN61000-4-2 (ESD), level 2; EN61000-4-3 (RS), level 3; EN61000-4-4 (EFT), level 2; EN61000-4-5 (Surge), level 3; EN61000-4-6 (CS), level 3; EN61000-4-8; EN61000-4-12 |
| Maritime                         | DNV, GL                                                                                                                                                               |
| Shock                            | IEC 60068-2-27                                                                                                                                                        |
| Freefall                         | IEC 60068-2-32                                                                                                                                                        |
| Vibration                        | IEC 60068-2-6                                                                                                                                                         |
| MTBF (meantime between failures) |                                                                                                                                                                       |
| Time                             | 240,000 hrs                                                                                                                                                           |
| Database                         | Telcordia (Bellcore), GB                                                                                                                                              |
| Warranty                         |                                                                                                                                                                       |
| Warranty Period                  | 5 years                                                                                                                                                               |

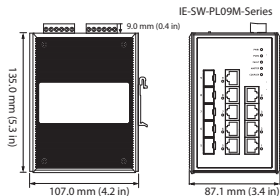
| Ordering Information                                                                  |                                                     |                              |                                        |
|---------------------------------------------------------------------------------------|-----------------------------------------------------|------------------------------|----------------------------------------|
| Port Variants                                                                         | Type                                                | Operating Temperature        | Order No.                              |
| 16 * RJ45 10/100BaseT(X),<br>2 * Combo-Ports <sup>1</sup>                             | IE-SW-PL18M-2GC-16TX<br>IE-SW-PL18MT-2GC-16TX       | 0 to +60 °C<br>-40 to +75 °C | <b>1241320000</b><br><b>1286970000</b> |
| 14 * RJ45 10/100BaseT(X),<br>2 * SC-Multimode 100FX,<br>2 * Combo-Ports <sup>1</sup>  | IE-SW-PL18M-2GC14TX2SC<br>IE-SW-PL18MT-2GC14TX2SC   | 0 to +60 °C<br>-40 to +75 °C | <b>1241330000</b><br><b>1286990000</b> |
| 14 * RJ45 10/100BaseT(X),<br>2 * ST-Multimode 100FX,<br>2 * Combo-Ports <sup>1</sup>  | IE-SW-PL18M-2GC14TX2ST<br>IE-SW-PL18MT-2GC14TX2ST   | 0 to +60 °C<br>-40 to +75 °C | <b>1241340000</b><br><b>1287000000</b> |
| 14 * RJ45 10/100BaseT(X),<br>2 * SC-Singlemode 100FX,<br>2 * Combo-Ports <sup>1</sup> | IE-SW-PL18M-2GC14TX2SCS<br>IE-SW-PL18MT-2GC14TX2SCS | 0 to +60 °C<br>-40 to +75 °C | <b>1241350000</b><br><b>1287010000</b> |

<sup>1</sup> (10/100/1000BaseT(X) or 100/1000BaseSFP)



## Managed Full Gigabit Ethernet Switch

- 4 10/100/1000BaseT(X) ports plus 5 combo (10/100/1000BaseT(X) or 100/1000BaseSFP slot) Gigabit ports
- Turbo Ring, Turbo Chain, and RSTP/STP for network redundancy
- IEEE 1588 PTP, Modbus/TCP, LLDP, SNMP Inform, QoS, IGMP snooping, VLAN, IEEE 802.1X, HTTPS, SNMPv3, and SSH supported
- EBR-Module - External Backup and Restoring Module for easy system reconfiguration (optional accessory)



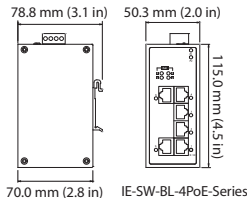
## Technical data

| Standards                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IEEE 802.3 for 10BaseT ■ IEEE 802.3u for 100BaseT (X) and 100BaseFX ■ IEEE 802.3ab for 1000BaseT(X) ■ IEEE 802.3z for 1000BaseX ■ IEEE 802.3x for Flow Control ■ IEEE 802.1D for Spanning Tree Protocol ■ IEEE 802.1w for Rapid STP ■ IEEE 802.1Q for VLAN Tagging ■ IEEE 802.1p for Class of Service ■ IEEE 802.1X for Authentication ■ IEEE 802.3ad for Port Trunk with LACP |                                                                                                                                                                                                                                        |
| Protocols                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                        |
| IGMPv1/v2 ■ GMRP ■ GVRP ■ SNMPv1/v2c/v3 ■ DHCP Server/Client ■ DHCP Option 66/67/82 ■ BootP ■ TFTP ■ SNTP ■ SMTP ■ RARP ■ RMON ■ HTTP ■ HTTPS ■ Telnet ■ SSH ■ Syslog ■ Modbus/TCP ■ SNMP Inform ■ LLDP ■ IEEE 1588 PTP ■ IPv6                                                                                                                                                 |                                                                                                                                                                                                                                        |
| MIB                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                        |
| MIB-II ■ Ethernet-Like MIB ■ P-BRIDGE MIB ■ Q-BRIDGE MIB ■ Bridge MIB ■ RSTP MIB ■ RMON MIB Group 1, 2, 3, 9                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                        |
| Flow Control                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                        |
| IEEE 802.3x flow control ■ back pressure flow control                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                        |
| Switch Properties                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                        |
| Priority Queues                                                                                                                                                                                                                                                                                                                                                                | 4                                                                                                                                                                                                                                      |
| Max. Number of Available VLANs                                                                                                                                                                                                                                                                                                                                                 | 64                                                                                                                                                                                                                                     |
| VLAN ID Range                                                                                                                                                                                                                                                                                                                                                                  | ID 1 to 4094                                                                                                                                                                                                                           |
| IGMP Groups                                                                                                                                                                                                                                                                                                                                                                    | 256                                                                                                                                                                                                                                    |
| MAC Table Size                                                                                                                                                                                                                                                                                                                                                                 | 8 K                                                                                                                                                                                                                                    |
| Packet Buffer Size                                                                                                                                                                                                                                                                                                                                                             | 1 Mbit                                                                                                                                                                                                                                 |
| Interface                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                        |
| Fiber Ports                                                                                                                                                                                                                                                                                                                                                                    | 100/1000Base SFP slot                                                                                                                                                                                                                  |
| RJ45 Ports                                                                                                                                                                                                                                                                                                                                                                     | 10/100/1000BaseT(X) auto negotiation speed                                                                                                                                                                                             |
| Console Port                                                                                                                                                                                                                                                                                                                                                                   | RS-232 (RJ45 connector)                                                                                                                                                                                                                |
| DIP Switches                                                                                                                                                                                                                                                                                                                                                                   | Turbo Ring, Master, Coupler, Reserve                                                                                                                                                                                                   |
| LED Indicators                                                                                                                                                                                                                                                                                                                                                                 | PWR1, PWR2, FAULT, 10/100/1000M, MSTR/HEAD, CPLR/TAIL                                                                                                                                                                                  |
| Alarm Contact                                                                                                                                                                                                                                                                                                                                                                  | 2 relay outputs with current carrying capacity of 1 A @ 24 V DC                                                                                                                                                                        |
| Digital Inputs                                                                                                                                                                                                                                                                                                                                                                 | 2 inputs with the same ground, but electrically isolated from the electronics. <ul style="list-style-type: none"> <li>• +13 to +30 V for state "1"</li> <li>• -30 to +3 V for state "0"</li> <li>• Max. input current: 8 mA</li> </ul> |
| Power Requirements                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                        |
| Input Voltage                                                                                                                                                                                                                                                                                                                                                                  | 12/24/48 V DC, redundant dual inputs                                                                                                                                                                                                   |
| Input Current                                                                                                                                                                                                                                                                                                                                                                  | 0.81 A @ 24 V                                                                                                                                                                                                                          |
| Overload Current Protection                                                                                                                                                                                                                                                                                                                                                    | Present                                                                                                                                                                                                                                |
| Connection                                                                                                                                                                                                                                                                                                                                                                     | 2 removable 6-contact terminal blocks                                                                                                                                                                                                  |
| Reverse Polarity Protection                                                                                                                                                                                                                                                                                                                                                    | Present                                                                                                                                                                                                                                |
| Physical Characteristics                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                        |
| Housing                                                                                                                                                                                                                                                                                                                                                                        | Metal, IP30 protection                                                                                                                                                                                                                 |
| Dimensions                                                                                                                                                                                                                                                                                                                                                                     | 87.1 × 135 × 107 mm (3.43 × 5.31 × 4.21 in)                                                                                                                                                                                            |
| Weight                                                                                                                                                                                                                                                                                                                                                                         | 1510 g                                                                                                                                                                                                                                 |
| Installation                                                                                                                                                                                                                                                                                                                                                                   | DIN-Rail mounting                                                                                                                                                                                                                      |

| Environmental Limits                                                                          |                                                                                                                                                                        |                      |                       |                          |
|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------|--------------------------|
| Operating Temperature                                                                         | Standard Models: 0 to 60 °C (32 to 140 °F)<br>Wide Temp. Models: -40 to 75 °C (-40 to 167 °F)                                                                          |                      |                       |                          |
| Storage Temperature                                                                           | -40 to 85 °C (-40 to 185 °F)                                                                                                                                           |                      |                       |                          |
| Ambient Relative Humidity                                                                     | 5 to 95 % (non-condensing)                                                                                                                                             |                      |                       |                          |
| Regulatory Approvals                                                                          |                                                                                                                                                                        |                      |                       |                          |
| Safety                                                                                        | UL508, EN60950-1                                                                                                                                                       |                      |                       |                          |
| Hazardous Location                                                                            | UL/cUL Class I, Division 2, Groups A, B, C, and D (Pending); ATEX Zone 2, Ex nC IIC (Pending)                                                                          |                      |                       |                          |
| EMI                                                                                           | FCC Part 15, CISPR (EN55022) class A                                                                                                                                   |                      |                       |                          |
| EMS                                                                                           | EN61000-4-2 (ESD), level 3;<br>EN61000-4-3 (RS), level 3;<br>EN61000-4-4 (EFT), level 3;<br>EN61000-4-5 (Surge), level 3;<br>EN61000-4-6 (CS), level 3;<br>EN61000-4-8 |                      |                       |                          |
| Maritime                                                                                      | DNV                                                                                                                                                                    |                      |                       |                          |
| Shock                                                                                         | IEC 60068-2-27                                                                                                                                                         |                      |                       |                          |
| Freefall                                                                                      | IEC 60068-2-32                                                                                                                                                         |                      |                       |                          |
| Vibration                                                                                     | IEC 60068-2-6                                                                                                                                                          |                      |                       |                          |
| MTBF (mean time between failures)                                                             |                                                                                                                                                                        |                      |                       |                          |
| Time                                                                                          | 330,000 hrs                                                                                                                                                            |                      |                       |                          |
| Database                                                                                      | Telcordia (Bellcore), GB                                                                                                                                               |                      |                       |                          |
| Warranty                                                                                      |                                                                                                                                                                        |                      |                       |                          |
| Warranty Period                                                                               | 5 years                                                                                                                                                                |                      |                       |                          |
| Ordering Information                                                                          |                                                                                                                                                                        |                      |                       |                          |
| Port Variants                                                                                 |                                                                                                                                                                        | Type                 | Operating Temperature | Order No.                |
| 4 * RJ45 10/100/1000BaseT(X),<br>5 * Combo Ports<br>10/100/1000BaseT(X) or<br>100/1000BaseSFP |                                                                                                                                                                        | IE-SW-PL09M-5GC-4GT  | 0 to 60 °C            | 1241370000<br>1287020000 |
|                                                                                               |                                                                                                                                                                        | IE-SW-PL09MT-5GC-4GT | -40 to +75 °C         |                          |
| Accessories                                                                                   |                                                                                                                                                                        |                      |                       |                          |
|                                                                                               |                                                                                                                                                                        |                      | Type                  | Order No.                |
| External Backup and Restore Module                                                            |                                                                                                                                                                        |                      | EBR-Modul RS232       | 1241430000               |
| 19" Rack Mounting Kit                                                                         |                                                                                                                                                                        |                      | RM-KIT                | 1241440000               |

## 6-port IEEE 802.3af/at PoE+ unmanaged Ethernet Switch

- 4 IEEE 802.3af/at compliant PoE and Ethernet combo ports
- Up to 30 watts per PoE port
- 24/48 V DC redundant wide-range power supply
- Integrated DC/DC converter can supply 48V-PoE devices across the entire input voltage range of 24 to 48 V DC
- Intelligent power consumption detection and classification
- Redundant dual V DC power inputs
- Broadcast Storm Protection



## Technical data

| Technology                  |                                                                                                                                                                        |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standards                   | IEEE 802.3at for Power-over-Ethernet<br>IEEE 802.3 for 10BaseT<br>IEEE 802.3u for 100BaseT(X)<br>IEEE 802.3x for Flow Control                                          |
| Processing Type             | Store and Forward                                                                                                                                                      |
| Flow Control                | IEEE 802.3x flow control,<br>back pressure flow control                                                                                                                |
| Interface                   |                                                                                                                                                                        |
| RJ45 Ports                  | 10/100BaseT(X) auto negotiation speed,<br>Full/Half duplex mode and<br>auto MDI/MDI-X connection                                                                       |
| LED Indicators              | PWR1, PWR2, 10/100M, PoE                                                                                                                                               |
| Power Requirements          |                                                                                                                                                                        |
| Input Voltage               | 24/48 (20 to 60 V) V DC                                                                                                                                                |
| Input Current               | Max 7.5 A @ 24 V DC (supports up to 4 ports<br>at 30 watts per PoE port)                                                                                               |
| Overload Current Protection | Present                                                                                                                                                                |
| Connection                  | 1 removable 4-contact terminal block                                                                                                                                   |
| Reverse Polarity Protection | Present                                                                                                                                                                |
| Physical Characteristics    |                                                                                                                                                                        |
| Housing                     | Metal, IP30 protection                                                                                                                                                 |
| Dimensions                  | 50 x 115 x 70 mm (1.96 x 4.52 x 2.76 in)                                                                                                                               |
| Weight                      | 375 g                                                                                                                                                                  |
| Installation                | DIN-Rail mounting, wall mounting (with optional kit)                                                                                                                   |
| Environmental Limits        |                                                                                                                                                                        |
| Operating Temperature       | Standard Models: 0 to 60 °C (32 to 140 °F)<br>Wide Temp. Models: -40 to 75 °C<br>(-40 to 167 °F)                                                                       |
| Storage Temperature         | -40 to 85 °C (-40 to 185 °F)                                                                                                                                           |
| Ambient Relative Humidity   | 5 to 95 % (non-condensing)                                                                                                                                             |
| Regulatory Approvals        |                                                                                                                                                                        |
| Safety                      | UL508                                                                                                                                                                  |
| EMI                         | FCC Part 15, CISPR (EN55022) class A                                                                                                                                   |
| EMS                         | EN61000-4-2 (ESD), level 3;<br>EN61000-4-3 (RS), level 3;<br>EN61000-4-4 (EFT), level 4;<br>EN61000-4-5 (Surge), level 4;<br>EN61000-4-6 (CS), level 3;<br>EN61000-4-8 |
| Shock                       | IEC 60068-2-27                                                                                                                                                         |
| Freefall                    | IEC 60068-2-32                                                                                                                                                         |
| Vibration                   | IEC 60068-2-6                                                                                                                                                          |
| Warranty                    |                                                                                                                                                                        |
| Warranty Period             | 5 years                                                                                                                                                                |

## Ordering Information

| Port Variants                            | Type                 | Operating Temperature | Order No.  |
|------------------------------------------|----------------------|-----------------------|------------|
| 2 * RJ45 10/100 BaseT(X), 4 *            | IE-SW-BL06-2TX-4POE  | 0 to 60 °C            | 1241380000 |
| RJ45 10/100 BaseT(X) PoE+                | IE-SW-BL06T-2TX-4POE | -40 to +75 °C         | 1286920000 |
| Models with Fiber optic ports on request |                      |                       |            |

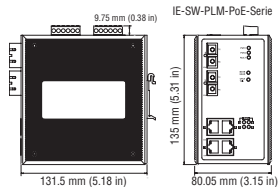
## Accessories

| Type                  | Order No.  |
|-----------------------|------------|
| 19" Rack Mounting Kit | 1241440000 |



## 6-port IEEE 802.3af/at PoE+ managed Ethernet Switch

- 4 IEEE 802.3af/at compliant PoE and Ethernet combo ports
- Up to 30 watts per PoE port
- 24/48 V DC redundant wide-range power supply
- Integrated DC/DC converter can supply 48 V-PoE devices across the entire input voltage range of 24 to 48 V DC
- Extended PoE management functions, including PoE error checking or configuring the operational times of connected PoE devices



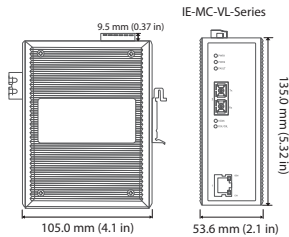
## Technical data

| Standards                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IEEE 802.3at/af for Power-over-Ethernet ▪ IEEE 802.3 for 10BaseT ▪ IEEE 802.3u for 100BaseT (X) and 100BaseFX ▪ IEEE 802.3x for Flow Control ▪ IEEE 802.1D for Spanning Tree Protocol ▪ IEEE 802.1w for Rapid STP ▪ IEEE 802.1Q for VLAN Tagging ▪ IEEE 802.1p for Class of Service ▪ IEEE 802.1X for Authentication ▪ IEEE 802.3ad for Port Trunk with LACP |                                                                                                                                                                                                              |
| Protocols                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                              |
| IGMPv1/v2 ▪ GMRP ▪ GVRP ▪ SNMPv1/v2c/v3 ▪ DHCP Server/Client ▪ DHCP Option 66/67/82 ▪ BootP ▪ TFTP ▪ SNTP ▪ SMTP ▪ RARP ▪ RMON ▪ HTTP ▪ HTTPS ▪ SSH ▪ Syslog ▪ Modbus/TCP ▪ SNMP Inform ▪ LLDP ▪ IEEE 1588 PTP ▪ IPv6                                                                                                                                        |                                                                                                                                                                                                              |
| MIB                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |
| MIB-II ▪ Ethernet-Like MIB ▪ P-BRIDGE MIB ▪ Q-BRIDGE MIB ▪ Bridge MIB ▪ RSTP MIB ▪ RMON MIB Group 1, 2, 3, 9                                                                                                                                                                                                                                                 |                                                                                                                                                                                                              |
| Flow Control                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                              |
| IEEE 802.3x flow control ▪ back pressure flow control                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                              |
| Switch Properties                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                              |
| Priority Queues                                                                                                                                                                                                                                                                                                                                              | 4                                                                                                                                                                                                            |
| Max. Number of Available VLANs                                                                                                                                                                                                                                                                                                                               | 64                                                                                                                                                                                                           |
| VLAN ID Range                                                                                                                                                                                                                                                                                                                                                | VID 1 to 4094                                                                                                                                                                                                |
| IGMP Groups                                                                                                                                                                                                                                                                                                                                                  | 256                                                                                                                                                                                                          |
| MAC Table Size                                                                                                                                                                                                                                                                                                                                               | 8 K                                                                                                                                                                                                          |
| Packet Buffer Size                                                                                                                                                                                                                                                                                                                                           | 1 Mbit                                                                                                                                                                                                       |
| Interface                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                              |
| RJ45 Ports                                                                                                                                                                                                                                                                                                                                                   | 10/100BaseT(X) auto negotiation speed, Full/Half duplex mode, and auto MDI/MDI-X connection                                                                                                                  |
| Console Port                                                                                                                                                                                                                                                                                                                                                 | RS-232 (RJ45 connector)                                                                                                                                                                                      |
| DIP Switches                                                                                                                                                                                                                                                                                                                                                 | Turbo Ring, Master, Coupler, Reserve                                                                                                                                                                         |
| LED Indicators                                                                                                                                                                                                                                                                                                                                               | PWR1, PWR2, FAULT, 10/100M, MSTR/HEAD, CPLR/TAIL, PoE                                                                                                                                                        |
| Alarm Contact                                                                                                                                                                                                                                                                                                                                                | 2 relay outputs with current carrying capacity of 1 A @ 24 V DC                                                                                                                                              |
| Digital Inputs                                                                                                                                                                                                                                                                                                                                               | 2 inputs with the same ground, electrically isolated <ul style="list-style-type: none"> <li>• +13 to +30 V for state "1"</li> <li>• -30 to +3 V for state "0"</li> <li>• Max. input current: 8 mA</li> </ul> |
| Power Requirements                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                              |
| Input Voltage                                                                                                                                                                                                                                                                                                                                                | 24/48 (20 to 60 V) V DC                                                                                                                                                                                      |
| Input Current                                                                                                                                                                                                                                                                                                                                                | Max. 7.8 A @ 24 V DC (supports up to 4 ports at 30 watts per PoE port)                                                                                                                                       |
| Overload Current Protection                                                                                                                                                                                                                                                                                                                                  | Present                                                                                                                                                                                                      |
| Connection                                                                                                                                                                                                                                                                                                                                                   | 2 removable 6-contact terminal blocks                                                                                                                                                                        |
| Reverse Polarity Protection                                                                                                                                                                                                                                                                                                                                  | Present                                                                                                                                                                                                      |
| Physical Characteristics                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                              |
| Housing                                                                                                                                                                                                                                                                                                                                                      | Metal, IP30 protection                                                                                                                                                                                       |
| Dimensions                                                                                                                                                                                                                                                                                                                                                   | 80 x 135 x 131.5 mm (3.15 x 5.31 x 5.18 in)                                                                                                                                                                  |
| Weight                                                                                                                                                                                                                                                                                                                                                       | 1270 g                                                                                                                                                                                                       |
| Installation                                                                                                                                                                                                                                                                                                                                                 | DIN-Rail mounting                                                                                                                                                                                            |

| Environmental Limits                     |                       |                                                                                                                                                                        |            |
|------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Operating Temperature                    |                       | Standard Models: 0 to 60 °C (32 to 140 °F)<br>Wide Operating Temp. Models: -40 to 75 °C (-40 to 167 °F)                                                                |            |
| Storage Temperature                      |                       | -40 to 85 °C (-40 to 185 °F)                                                                                                                                           |            |
| Ambient Relative Humidity                |                       | 5 to 95 % (non-condensing)                                                                                                                                             |            |
| Regulatory Approvals                     |                       |                                                                                                                                                                        |            |
| Safety                                   |                       | UL508 (Pending)                                                                                                                                                        |            |
| EMI                                      |                       | FCC Part 15, CiSPR (EN55022) class A                                                                                                                                   |            |
| EMS                                      |                       | EN61000-4-2 (ESD), level 3;<br>EN61000-4-3 (RS), level 3;<br>EN61000-4-4 (EFT), level 3;<br>EN61000-4-5 (Surge), level 3;<br>EN61000-4-6 (CS), level 3;<br>EN61000-4-8 |            |
| Shock                                    |                       | IEC 60068-2-27                                                                                                                                                         |            |
| Freefall                                 |                       | IEC 60068-2-32                                                                                                                                                         |            |
| Vibration                                |                       | IEC 60068-2-6                                                                                                                                                          |            |
| Warranty                                 |                       |                                                                                                                                                                        |            |
| Warranty Period                          |                       | 5 years                                                                                                                                                                |            |
| Ordering Information                     |                       |                                                                                                                                                                        |            |
| Port Variants                            | Type                  | Operating Temperature                                                                                                                                                  | Order No.  |
| 2 * RJ45 10/100 BaseT(X), 4 *            | IE-SW-PL06M-2TX-4PoE  | 0 to 60 °C                                                                                                                                                             | 1241390000 |
| RJ45 10/100 BaseT(X) PoE+                | IE-SW-PL06MT-2TX-4PoE | -40 to +75 °C                                                                                                                                                          | 1286910000 |
| Models with Fiber optic ports on request |                       |                                                                                                                                                                        |            |
| Accessories                              |                       |                                                                                                                                                                        |            |
|                                          | Type                  |                                                                                                                                                                        | Order No.  |
| External Backup and Restore Module       | EBR-Modul RS232       |                                                                                                                                                                        | 1241430000 |
| 19" Rack Mounting Kit                    | RM-KIT                |                                                                                                                                                                        | 1241440000 |

## Industrial Fast Ethernet Media Converter

- 10/100BaseT(X) auto-negotiation and auto-MDI/MDI-X
- Link Fault Pass-Through (LFP)
- Power failure, port break alarm by relay output
- Redundant power inputs
- Designed for hazardous locations (Class 1 Div. 2/Zone 2)



## Technical data

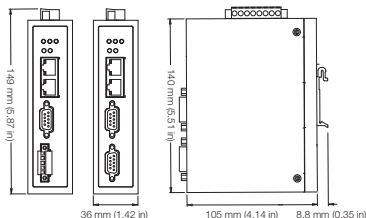
| Technology                                              |                                                                                                  |                    |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------|
| Standards                                               | IEEE 802.3 for 10BaseT<br>IEEE 802.3u for 100BaseT(X) and 100BaseFX                              |                    |
| Interface                                               |                                                                                                  |                    |
| Fiber Ports                                             | 100BaseFX (SC/ST connectors)                                                                     |                    |
| RJ45 Ports                                              | 10/100BaseT(X)                                                                                   |                    |
| DIP Switches                                            | 100BaseFX Full/Half duplex selection, port break alarm mask                                      |                    |
| LED Indicators                                          | PWR1, PWR2, FAULT, 10/100M (TP port), 100M (Fiber port), FDX/COL (Fiber port)                    |                    |
| Alarm Contact                                           | One relay output with current carrying capacity of 1 A @ 24 V DC                                 |                    |
| Optical Fiber                                           |                                                                                                  |                    |
|                                                         | 100BaseFX                                                                                        |                    |
|                                                         | multimode                                                                                        | singlemode         |
| Wavelength                                              | 1300 nm                                                                                          | 1310 nm            |
| Max. TX                                                 | -10 dBm                                                                                          | 0 dBm              |
| Min. TX                                                 | -20 dBm                                                                                          | -5 dBm             |
| RX Sensitivity                                          | -32 dBm                                                                                          | -34 dBm            |
| Link Budget                                             | 12 dB                                                                                            | 29 dB              |
| Typical Distance                                        | 5 km <sup>a</sup><br>4 km <sup>b</sup>                                                           | 40 km <sup>c</sup> |
| Saturation                                              | -6 dBm                                                                                           | -3 dBm             |
| <sup>a</sup> 50/125 µm, 800 MHz*km fiber optic cable    |                                                                                                  |                    |
| <sup>b</sup> 62.5/125 µm, 500 MHz*km fiber optic cable  |                                                                                                  |                    |
| <sup>c</sup> 9/125 µm, 3.5 PS/(nm*km) fiber optic cable |                                                                                                  |                    |
| Power Requirements                                      |                                                                                                  |                    |
| Input Voltage                                           | 24 V DC (12 to 48 V DC),<br>redundant inputs                                                     |                    |
| Input Current                                           | 0.16 A (@ 24 V)                                                                                  |                    |
| Connection                                              | Removable terminal block                                                                         |                    |
| Overload Current Protection                             | 1.1 A                                                                                            |                    |
| Reverse Polarity Protection                             | Present                                                                                          |                    |
| Physical Characteristics                                |                                                                                                  |                    |
| Housing                                                 | Metal, IP30 protection                                                                           |                    |
| Dimensions                                              | 53.6 x 135 x 105 mm (2.11 x 5.31 x 4.13 in)                                                      |                    |
| Weight                                                  | 630 g                                                                                            |                    |
| Installation                                            | DIN-Rail mounting, wall mounting (with optional kit)                                             |                    |
| Environmental Limits                                    |                                                                                                  |                    |
| Operating Temperature                                   | Standard Models: 0 to 60 °C (32 to 140 °F)<br>Wide Temp. Models: -40 to 75 °C<br>(-40 to 167 °F) |                    |
| Operating Humidity                                      | 5 to 95 % RH                                                                                     |                    |
| Storage Temperature                                     | -40 to 85 °C (-40 to 185 °F)                                                                     |                    |

| Regulatory Approvals        |                                                                                                                                                                                   |                       |            |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------|
| Safety                      | UL508, UL60950-1, CSA C22.2 No. 60950-1, EN60950-1                                                                                                                                |                       |            |
| EMI                         | FCC Part 15, CISPR (EN55022) class A                                                                                                                                              |                       |            |
| EMS                         | EN61000-4-2 (ESD), level 3<br>EN61000-4-3 (RS), level 3<br>EN61000-4-4 (EFT), level 3<br>EN61000-4-5 (Surge), level 2<br>EN61000-4-6 (CS), level 3<br>EN61000-4-8<br>EN61000-4-11 |                       |            |
| Hazardous Location          | UL/cUL Class1, Division 2, Groups A, B, C, and D, ATEX Class1, Zone 2, Ex nC IIC                                                                                                  |                       |            |
| Freefall                    | IEC60068-2-32                                                                                                                                                                     |                       |            |
| Shock                       | IEC60068-2-27                                                                                                                                                                     |                       |            |
| Vibration                   | IEC60068-2-6                                                                                                                                                                      |                       |            |
| Maritime                    | DNV, GL                                                                                                                                                                           |                       |            |
| MTBF                        | 401,000 hrs; Database: MIL-HDBK-217F: GB 25 °C                                                                                                                                    |                       |            |
| Warranty                    |                                                                                                                                                                                   |                       |            |
| Warranty Period             | 5 years                                                                                                                                                                           |                       |            |
| Ordering Information        |                                                                                                                                                                                   |                       |            |
| Port Variants               | Type                                                                                                                                                                              | Operating Temperature | Order No.  |
| 1 * RJ45, 1 * SC-Multimode  | IE-MC-VL-1TX-1SC                                                                                                                                                                  | 0 to +60 °C           | 1241400000 |
|                             | IE-MC-VLT-1TX-1SC                                                                                                                                                                 | -40 to +75 °C         | 1286880000 |
| 1 * RJ45, 1 * ST-Multimode  | IE-MC-VL-1TX-1ST                                                                                                                                                                  | 0 to +60 °C           | 1241410000 |
|                             | IE-MC-VLT-1TX-1ST                                                                                                                                                                 | -40 to +75 °C         | 1286890000 |
| 1 * RJ45, 1 * SC-Singlemode | IE-MC-VL-1TX-1SCS                                                                                                                                                                 | 0 to +60 °C           | 1241420000 |
|                             | IE-MC-VLT-1TX-1SCS                                                                                                                                                                | -40 to +75 °C         | 1286900000 |
| Accessories                 |                                                                                                                                                                                   |                       |            |
|                             | Type                                                                                                                                                                              | Order No.             |            |
| 19" Rack Mounting Kit       | RM-KIT                                                                                                                                                                            | 1241440000            |            |



## 1 and 2- port Serial/Ethernet Converter for industrial automation

- High surge protection for the serial ports, LAN ports and power supply connection
- Rugged screw-type terminal blocks for power and serial connectors
- Cascading Ethernet ports for easy wiring
- Redundant DC power inputs
- Warning by relay output and email
- Low power consumption



### Technical data

| Ethernet Interface              |                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Number of Ports                 | 2                                                                                                                                                  |
| Speed                           | 10/100 Mbps, auto MDI/MDIX                                                                                                                         |
| Connector                       | 8-pin RJ45                                                                                                                                         |
| Magnetic Isolation Protection   | 1.5 KV built-in                                                                                                                                    |
| Ethernet Line Protection        | 1 KV (level 2) surge protection                                                                                                                    |
| Serial Interface                |                                                                                                                                                    |
| Number of Ports                 | IE-CS-2TX-1RS232/485: 1, IE-CS-2TX-2RS232/485: 2                                                                                                   |
| Serial Standards                | RS-232/422/485                                                                                                                                     |
| Connector                       | IE-CS-2TX-1RS232/485: DB9 for RS-232, terminal block for RS-422/485<br>IE-CS-2TX-2RS232/485: DB9 for RS-232/422/485                                |
| Serial Line Protection          | <ul style="list-style-type: none"> <li>• 15 KV ESD protection for all signals</li> <li>• 1 KV (level 2) surge protection</li> </ul>                |
| RS-485 Data Direction Control   | ADDC® (automatic data direction control)                                                                                                           |
| Serial Communication Parameters |                                                                                                                                                    |
| Data Bits                       | 5, 6, 7, 8                                                                                                                                         |
| Stop Bits                       | 1, 1.5, 2                                                                                                                                          |
| Parity                          | None, Even, Odd, Space, Mark                                                                                                                       |
| Flow Control                    | RTS/CTS and DTR/DSR (RS-232 only), XON/XOFF                                                                                                        |
| Baud rate                       | 50 to 921.6 Kbps                                                                                                                                   |
| Serial Signals                  |                                                                                                                                                    |
| RS-232                          | TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND                                                                                                             |
| RS-422                          | Tx+, Tx-, Rx+, Rx-, GND                                                                                                                            |
| RS-485-4w                       | Tx+, Tx-, Rx+, Rx-, GND                                                                                                                            |
| RS-485-2w                       | Data+, Data-, GND                                                                                                                                  |
| Software                        |                                                                                                                                                    |
| Network Protocols               | ICMP, IP, TCP, UDP, DHCP, BOOTP, Telnet, Rtelnet, DNS, SNMP, HTTP, SMTP, SNTP, IGMP                                                                |
| Configuration Options           | Web Console, Serial Console, Telnet Console, Windows Utility                                                                                       |
| Windows Real COM Drivers        | Windows 95/98/ME/NT/2000, Windows XP/2003/Vista/2008/7 x86/x64                                                                                     |
| Physical Characteristics        |                                                                                                                                                    |
| Housing                         | Metal, IP30 protection                                                                                                                             |
| Weight                          | IE-CS-2TX-1RS232/485: 475 g<br>IE-CS-2TX-2RS232/485: 485 g                                                                                         |
| Dimensions                      | 36 x 105 x 140 mm (1.42 x 4.13 x 5.51 in)                                                                                                          |
| Environmental Limits            |                                                                                                                                                    |
| Operating Temperature           | Standard Models: 0 to 60 °C (32 to 140 °F)<br>Wide Temp. Models: -40 to 75 °C (-40 to 167 °F)                                                      |
| Operating Humidity              | 5 to 95% RH                                                                                                                                        |
| Storage Temperature             | -40 to 85 °C (-40 to 185 °F)                                                                                                                       |
| Power Requirements              |                                                                                                                                                    |
| Input Voltage                   | 12 to 48 V DC                                                                                                                                      |
| Power Consumption               | IE-CS-2TX-1RS232/485: 12 to 48 V DC; 220 mA @ 12 V DC, 110 mA @ 24 V DC<br>IE-CS-2TX-2RS232/485: 12 to 48 V DC; 250 mA @ 12 V DC, 125 mA @ 24 V DC |



| Regulatory Approvals     |                                                                                                                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EMC                      | CE (EN55022 Class A, EN55024), FCC Part 15 Subpart B Class A                                                                                                                      |
| Safety                   | UL508                                                                                                                                                                             |
| Hazardous Location       | UL/cUL Class 1 Division 2 Groups A, B, C and D                                                                                                                                    |
| ATEX                     | Class I, Zone 2 (Pending)                                                                                                                                                         |
| EMS                      | EN61000-4-2 (ESD), Level 3<br>EN61000-4-3 (RS), Level 3<br>EN61000-4-4 (EFT), Level 4<br>EN61000-4-5 (Surge), Level 3<br>EN61000-4-6 (CS), Level 3<br>EN61000-4-8<br>EN61000-4-11 |
| Shock                    | IEC60068-2-27                                                                                                                                                                     |
| Freefall                 | IEC60068-2-32                                                                                                                                                                     |
| Vibration                | IEC60068-2-6                                                                                                                                                                      |
| Reliability              |                                                                                                                                                                                   |
| Alert Tools              | Built-in buzzer and RTC (real-time clock)                                                                                                                                         |
| Automatic Reboot Trigger | Built-in WDT (watchdog timer)                                                                                                                                                     |
| Warranty                 |                                                                                                                                                                                   |
| Warranty Period          | 5 years                                                                                                                                                                           |
| Pin Assignment           |                                                                                                                                                                                   |

| RS-232/422/485 DB9 male port | PIN | RS-232  | RS-422/RS-485-4w | RS-485-2W |
|------------------------------|-----|---------|------------------|-----------|
| 1                            | DCD | TxD-(A) | -                | -         |
| 2                            | RxD | TxD+(B) | -                | -         |
| 3                            | TXD | RxD+(B) | Data+(B)         | -         |
| 4                            | DTR | RxD-(A) | Data-(A)         | -         |
| 5                            | GND | GND     | GND              | -         |
| 6                            | DSR | -       | -                | -         |
| 7                            | RTS | -       | -                | -         |
| 8                            | CTS | -       | -                | -         |

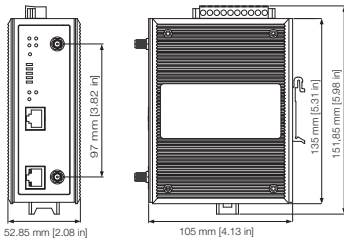
| Pin Assignment                   |         |
|----------------------------------|---------|
| RS-422/485 Terminal Block Wiring |         |
| 1                                | TxD+(B) |
| 2                                | TxD-(A) |
| 3                                | RxD+(B) |
| 4                                | RxD-(A) |
| 5                                | GND     |

| Ordering Information                                             |                       |                       |            |
|------------------------------------------------------------------|-----------------------|-----------------------|------------|
| Models                                                           | Type                  | Operating Temperature | Order No.  |
| Two RJ45; One serial (RS232: Sub-DB9, RS422/485: terminal block) | IE-CS-2TX-1RS232/485  | 0 to +60 °C           | 1242080000 |
|                                                                  | IE-CST-2TX-1RS232/485 | -40 to +75 °C         | 1285830000 |
| Two RJ45; Two serial (RS232/422/485: Two SubDB9)                 | IE-CS-2TX-2RS232/485  | 0 to +60 °C           | 1242090000 |
|                                                                  | IE-CST-2TX-2RS232/485 | -40 to +75 °C         | 1285840000 |

| Accessories           |        |            |
|-----------------------|--------|------------|
|                       | Type   | Order No.  |
| 19" Rack Mounting Kit | RM-KIT | 1241440000 |

## Industrial Wireless - Access point/bridge/client

- IEEE 802.11a/b/g compatible single radio module (2.4 GHz or 5 GHz band)
- Power input by redundant 24 V DC power inputs or Power-over-Ethernet
- Multi-SSID and VLAN support
- Turbo Roaming for seamless wireless connections
- Integrated DI/DO for on-site monitoring and warning
- QoS (WMM) support



## Technical data

| WLAN Interface                           |                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standards                                | IEEE 802.11a/b/g for Wireless LAN<br>IEEE 802.11i for Wireless Security<br>IEEE 802.3u for 10/100BaseT(X)<br>IEEE 802.3af for Power-over-Ethernet<br>IEEE 802.1D for Spanning Tree Protocol<br>IEEE 802.1w for Rapid STP<br>IEEE 802.1Q VLAN                                                                                                                                                                         |
| Spread Spectrum and Modulation (typical) | <ul style="list-style-type: none"> <li>• DSSS with DBPSK, DQPSK, CCK</li> <li>• OFDM with BPSK, QPSK, 16QAM, 64QAM</li> <li>• 802.11b: CCK @ 11/5.5 Mbps, DQPSK @ 2 Mbps, DBPSK @ 11 Mbps</li> <li>• 802.11a/g: 64QAM @ 54/48 Mbps, 16QAM @ 36/24 Mbps, QPSK @ 18/12 Mbps, BPSK @ 9/6 Mbps</li> </ul>                                                                                                                |
| Operating Channels (central frequency)   | US: 2.412 to 2.462 GHz (11 channels)<br>5.18 to 5.24 GHz (4 channels)<br>EU: 2.412 to 2.472 GHz (13 channels)<br>5.18 to 5.24 GHz (4 channels)                                                                                                                                                                                                                                                                       |
| Security                                 | <ul style="list-style-type: none"> <li>• SSID broadcast enable/disable</li> <li>• Firewall for MAC/IP/Protocol/Port-based filtering</li> <li>• 64-bit and 128-bit WEP encryption, WPA /WPA2-Personal and Enterprise (IEEE 802.1X/RADIUS, TKIP and AES)</li> </ul>                                                                                                                                                    |
| Transmission Rates                       | 802.11b: 1, 2, 5.5, 11 Mbps<br>802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps                                                                                                                                                                                                                                                                                                                                          |
| TX Transmit Power                        | 802.11b: Typ. 23±1.5 dBm @ 1 to 11 Mbps<br>802.11g: Typ. 20±1.5 dBm @ 6 to 24 Mbps, Typ. 19±1.5 dBm @ 36 Mbps, Typ. 18±1.5 dBm @ 48 Mbps, Typ. 17±1.5 dBm @ 54 Mbps<br>802.11a: Typ. 18±1.5 dBm @ 6 to 24 Mbps, Typ. 16±1.5 dBm @ 36 to 48 Mbps, Typ. 15±1.5 dBm @ 54 Mbps                                                                                                                                           |
| RX Sensitivity                           | 802.11b: -97 dBm @ 1 Mbps, -94 dBm @ 2 Mbps, -92 dBm @ 5.5 Mbps, -90 dBm @ 11 Mbps<br>802.11g: -93 dBm @ 6 Mbps, -91 dBm @ 9 Mbps, -90 dBm @ 12 Mbps, -88 dBm @ 18 Mbps, -84 dBm @ 24 Mbps, -80 dBm @ 36 Mbps, -76 dBm @ 48 Mbps, -74 dBm @ 54 Mbps<br>802.11a: -90 dBm @ 6 Mbps, -89 dBm @ 9 Mbps, -89 dBm @ 12 Mbps, -85 dBm @ 18 Mbps, -83 dBm @ 24 Mbps, -79 dBm @ 36 Mbps, -75 dBm @ 48 Mbps, -74 dBm @ 54 Mbps |
| Protocol Support                         |                                                                                                                                                                                                                                                                                                                                                                                                                      |
| General Protocols:                       | Proxy ARP, DNS, HTTP, HTTPS, IP, ICMP, SNMP, TCP, UDP, RADIUS, SNMP, PPPoE, DHCP                                                                                                                                                                                                                                                                                                                                     |
| AP-only Protocols:                       | ARP, BOOTP, DHCP, dynamic VLAN-Tags for 802.1X-Clients, STP/RSTP (IEEE 802.1D/w)                                                                                                                                                                                                                                                                                                                                     |



| Interface                                                      |                                                                                                                                                                                    |                       |            |
|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------|
| Default Antenna                                                | 2 dBi dual-band omni-directional antenna, RP-SMA (male)                                                                                                                            |                       |            |
| Connector for External Antennas                                | RP-SMA (female)                                                                                                                                                                    |                       |            |
| LAN Port                                                       | 10/100BaseT(X), auto negotiation speed (RJ45-type)                                                                                                                                 |                       |            |
| Console Port                                                   | RS-232 (RJ45-type)                                                                                                                                                                 |                       |            |
| LED Indicators                                                 | PWR1, PWR2, PoE, FAULT, STATE, signal strength, CLIENT MODE, BRIDGE MODE, WLAN, 10M, 100M                                                                                          |                       |            |
| Alarm Contact                                                  | 1 relay output with current carrying capacity of 1 A @ 24 V DC                                                                                                                     |                       |            |
| Digital Inputs                                                 | 2 electrically isolated inputs <ul style="list-style-type: none"><li>• +13 to +30 V for state "1"</li><li>• +3 to -30 V for state "0"</li><li>• Max. input current: 8 mA</li></ul> |                       |            |
| Physical Characteristics                                       |                                                                                                                                                                                    |                       |            |
| Housing                                                        | Metal, IP30 protection                                                                                                                                                             |                       |            |
| Weight                                                         | 850 g                                                                                                                                                                              |                       |            |
| Dimensions                                                     | 53.6 x 135 x 105 mm (2.11 x 5.31 x 4.13 in)                                                                                                                                        |                       |            |
| Installation                                                   | DIN-Rail mounting                                                                                                                                                                  |                       |            |
| Environmental Limits                                           |                                                                                                                                                                                    |                       |            |
| Operating Temperature                                          | Standard Models: 0 to 60 °C (32 to 140 °F)<br>Wide Temp. Models: -40 to 75 °C (-40 to 167 °F)                                                                                      |                       |            |
| Storage Temperature                                            | -40 to 85 °C (-40 to 185 °F)                                                                                                                                                       |                       |            |
| Ambient Relative Humidity                                      | 5% to 95% (non-condensing)                                                                                                                                                         |                       |            |
| Power Requirements                                             |                                                                                                                                                                                    |                       |            |
| Input Voltage                                                  | 12 to 48 V DC, redundant dual DC power inputs or 48 V DC Power-over-Ethernet (IEEE 802.3af compliant)                                                                              |                       |            |
| Connector                                                      | 10-pin removable terminal block                                                                                                                                                    |                       |            |
| Power Consumption                                              | <ul style="list-style-type: none"><li>• 0.121 to 0.494 A @ 12 to 48 V DC</li><li>• 0.3 A @ 24 V DC</li></ul>                                                                       |                       |            |
| Reverse Polarity Protection                                    | Present                                                                                                                                                                            |                       |            |
| Regulatory Approvals                                           |                                                                                                                                                                                    |                       |            |
| Safety                                                         | EN60950-1, UL60950-1                                                                                                                                                               |                       |            |
| Radio                                                          | EN300 328, EN301 893,                                                                                                                                                              |                       |            |
| EMC                                                            | EN301 489-1/-17, FCC Part 15 Subpart B Class B, EN55022/55024                                                                                                                      |                       |            |
| Hazardous Location                                             | UL/cUL Class I, Div. 2; ATEX Class I, Zone 2                                                                                                                                       |                       |            |
| MTBF                                                           | 392.209 hrs                                                                                                                                                                        |                       |            |
| Warranty                                                       |                                                                                                                                                                                    |                       |            |
| Warranty Period                                                | 5 years                                                                                                                                                                            |                       |            |
| Ordering Information                                           |                                                                                                                                                                                    |                       |            |
| Models                                                         | Type                                                                                                                                                                               | Operating Temperature | Order No.  |
| IEEE 802.11a/b/g Wireless AP/ Bridge/Client (European version) | IE-WL-AP-BR-CL-ABG-EU                                                                                                                                                              | 0 to +60 °C           | 1242100000 |
|                                                                | IE-WLT-AP-BR-CL-ABG-EU                                                                                                                                                             | -40 to +75 °C         | 1286480000 |
| IEEE 802.11a/b/g Wireless AP/ Bridge/Client (US version)       | IE-WL-AP-BR-CL-ABG-US                                                                                                                                                              | 0 to +60 °C           | 1242110000 |
|                                                                | IE-WLT-AP-BR-CL-ABG-US                                                                                                                                                             | -40 to +75 °C         | 1286490000 |
| Accessories                                                    |                                                                                                                                                                                    |                       |            |
|                                                                | Type                                                                                                                                                                               |                       | Order No.  |
| External Backup and Restore Module                             | EBR-Modul RS232                                                                                                                                                                    |                       | 1241430000 |
| 19" Rack Mounting Kit                                          | RM-KIT                                                                                                                                                                             |                       | 1241440000 |

## 1-port Gigabit Ethernet SFP modules

- Compliant with IEEE 802.3z
- Differential LVPECL inputs and outputs
- TTL signal detect indicator
- Hot pluggable LC duplex connector
- Class 1 laser product; complies with EN60825-1



n

### Technical data

| Interface        |                                   |                    |                     |                     |                                 |                                 |                                  |                                 |
|------------------|-----------------------------------|--------------------|---------------------|---------------------|---------------------------------|---------------------------------|----------------------------------|---------------------------------|
| Ethernet Ports   | 1                                 |                    |                     |                     |                                 |                                 |                                  |                                 |
| Connectors       | Duplex LC Connector or Simplex LC |                    |                     |                     |                                 |                                 |                                  |                                 |
| Optical Fiber    |                                   |                    |                     |                     |                                 |                                 |                                  |                                 |
|                  | Gigabit Ethernet                  |                    |                     |                     |                                 |                                 |                                  |                                 |
|                  | SFP-SX                            | SFP-LSX            | SFP-LX              | SFP-LHX             | SFP-10A                         | SFP-10B                         | SFP-20A                          | SFP-20B                         |
| Wavelength       | 850 nm                            | 1310 nm            | 1310 nm             | 1310 nm             | TX<br>1310 nm,<br>RX<br>1550 nm | TX<br>1550 nm,<br>RX<br>1310 nm | TX 1<br>310 nm,<br>RX<br>1550 nm | TX<br>1550 nm,<br>RX<br>1310 nm |
| Max. TX          | -4 dBm                            | -1 dBm             | -3 dBm              | 1 dBm               | -3 dBm                          |                                 | -2 dBm                           |                                 |
| Min. TX          | -9.5 dBm                          | -9 dBm             | -9.5 dBm            | -4 dBm              | -9 dBm                          |                                 | -8 dBm                           |                                 |
| RX Sensitivity   | -18 dBm                           | -19 dBm            | -20 dBm             | -24 dBm             | -21 dBm                         |                                 | -23 dBm                          |                                 |
| Link Budget      | 8.5 dB                            | 10 dB              | 10.5 dB             | 20 dB               | 12 dB                           |                                 | 15 dB                            |                                 |
| Typical Distance | 550 m <sup>a)</sup>               | 2 km <sup>b)</sup> | 10 km <sup>c)</sup> | 40 km <sup>c)</sup> | 10 km <sup>c)</sup>             |                                 | 20 km <sup>c)</sup>              |                                 |
| Saturation       | 0 dBm                             | -3 dBm             | -3 dBm              | -3 dBm              | -1 dBm                          |                                 | -1 dBm                           |                                 |

<sup>a)</sup> 50/125 µm, 400 MHz \* km or 62.5/125 µm, 500 MHz \* km @ 850 nm multimode fiber optic cable

<sup>b)</sup> 62.5/125 µm, 750 MHz \* km @ 1310 nm multimode fiber optic cable

<sup>c)</sup> 9/125 µm singlemode fiber optic cable

Note: The actual communication distance depends on many factors, including connector loss, cable deployment, and the age of the cabling system. We recommend doing a link budget analysis and reserving a 3 dB margin for such factors.

| Environmental Limits      |                                                                                               |
|---------------------------|-----------------------------------------------------------------------------------------------|
| Operating Temperature     | Standard Models: 0 to 60 °C (32 to 140 °F)<br>Wide Temp. Models: -40 to 75 °C (-40 to 167 °F) |
| Storage Temperature       | -40 to 85 °C (-40 to 185 °F)                                                                  |
| Ambient Relative Humidity | 5 to 95 % (non-condensing)                                                                    |
| Regulatory Approvals      |                                                                                               |
| Safety                    | UL, TÜV                                                                                       |
| Warranty                  |                                                                                               |
| Warranty Period           | 3 years                                                                                       |

| Ordering Information                                                                                        |                  |                       |                   |
|-------------------------------------------------------------------------------------------------------------|------------------|-----------------------|-------------------|
| SFP Variants                                                                                                | Type             | Operating Temperature | Order No.         |
| Gigabit-Ethernet, Multimode, LC Connector, 500 m                                                            | IE-SFP-1GSXLC    | 0 to +60 °C           | <b>1241490000</b> |
|                                                                                                             | IE-SFP-1GSXLC-T  | -20 to 75 °C          | <b>1286700000</b> |
| Gigabit-Ethernet, Multimode, LC Connector, 2 km                                                             | IE-SFP-1GLSXL    | 0 to +60 °C           | <b>1241500000</b> |
|                                                                                                             | IE-SFP-1GLSXL-T  | -40 to 85 °C          | <b>1286710000</b> |
| Gigabit-Ethernet, Singlemode, LC Connector, 10 km                                                           | IE-SFP-1GLXLC    | 0 to +60 °C           | <b>1241510000</b> |
|                                                                                                             | IE-SFP-1GLXLC-T  | -40 to 85 °C          | <b>1286720000</b> |
| Gigabit-Ethernet, Singlemode, LC Connector, 40 km                                                           | IE-SFP-1GLHXL    | 0 to +60 °C           | <b>1241520000</b> |
|                                                                                                             | IE-SFP-1GLHXL-T  | -40 to 85 °C          | <b>1286730000</b> |
| WDM-Type, Gigabit Ethernet, LC Connector, 10 km, Tx 1310 nm, Rx 1550 nm, must be paired with IE-SFP-1G10BLC | IE-SFP-1G10ALC   | 0 to +60 °C           | <b>1241530000</b> |
|                                                                                                             | IE-SFP-1G10ALC-T | -40 to 85 °C          | <b>1286740000</b> |
| WDM-Type, Gigabit Ethernet, LC Connector, 10 km, Tx 1550 nm, Rx 1310 nm, must be paired with IE-SFP-1G10ALC | IE-SFP-1G10BLC   | 0 to +60 °C           | <b>1241540000</b> |
|                                                                                                             | IE-SFP-1G10BLC-T | -40 to 85 °C          | <b>1286750000</b> |
| WDM-Type, Gigabit Ethernet, LC Connector, 20 km, Tx 1310 nm, Rx 1550 nm, must be paired with IE-SFP-1G20BLC | IE-SFP-1G20ALC   | 0 to +60 °C           | <b>1241550000</b> |
|                                                                                                             | IE-SFP-1G20ALC-T | -40 to 85 °C          | <b>1286760000</b> |
| WDM-Type, Gigabit Ethernet, LC Connector, 20 km, Tx 1550 nm, Rx 1310 nm, must be paired with IE-SFP-1G20ALC | IE-SFP-1G20BLC   | 0 to +60 °C           | <b>1241570000</b> |
|                                                                                                             | IE-SFP-1G20BLC-T | -40 to 85 °C          | <b>1286770000</b> |
| <b>Note:</b> WDM-type SFP modules must be used in pairs (e.g. SFP-1GXXALC and SFP-1GXXBLC)                  |                  |                       |                   |

## 1-port Fast Ethernet SFP modules

- Compliant with IEEE 802.3u
- Differential PECL inputs and outputs
- TTL signal detect indicator
- Hot pluggable LC duplex connector
- Class 1 laser product; complies with EN60825-1



n

### Technical data

| Interface        |                     |                     |                     |
|------------------|---------------------|---------------------|---------------------|
| Ethernet Ports   | 1                   |                     |                     |
| Connectors       | Duplex LC Connector |                     |                     |
| Optical Fiber    |                     |                     |                     |
|                  | Fast Ethernet       |                     |                     |
|                  | SFP-M               | SFP-S               | SFP-L               |
| Wavelength       | 1300 nm             | 1310 nm             | 1550 nm             |
| Max. TX          | -18 dBm             | 0 dBm               | 0 dBm               |
| Min. TX          | -8 dBm              | -5 dBm              | -5 dBm              |
| RX Sensitivity   | -34 dBm             | -34 dBm             | -34 dBm             |
| Link Budget      | 26 dB               | 29 dB               | 29 dB               |
| Typical Distance | 4 km <sup>a)</sup>  | 40 km <sup>b)</sup> | 80 km <sup>b)</sup> |
| Saturation       | 0 dBm               | -3 dBm              | -3 dBm              |

<sup>a)</sup> 50/125 µm or 62.5/125 µm, 800 MHz \* km @ 1300 nm multimode fiber optic cable

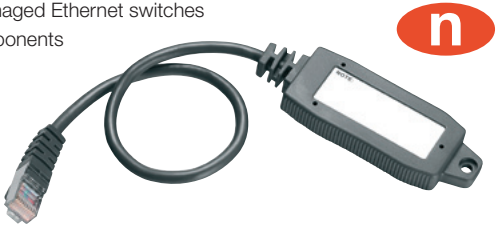
<sup>b)</sup> 9/125 µm singlemode fiber optic cable

| Environmental Limits      |                              |
|---------------------------|------------------------------|
| Operating Temperature     | -40 to 85 °C (-40 to 185 °F) |
| Storage Temperature       | -40 to 85 °C (-40 to 185 °F) |
| Ambient Relative Humidity | 5 to 95 % (non-condensing)   |
| Regulatory Approvals      |                              |
| Safety                    | UL, TÜV                      |
| Warranty                  |                              |
| Warranty Period           | 3 years                      |

| Ordering Information                           |                 |                       |                   |
|------------------------------------------------|-----------------|-----------------------|-------------------|
| Port Variants                                  | Type            | Operating Temperature | Order No.         |
| Fast Ethernet, Multimode, LC Connector, 4 km   | IE-SFP-1FEMLC-T | -40 to +85 °C         | <b>1241450000</b> |
| Fast Ethernet, Singlemode, LC Connector, 40 km | IE-SFP-1FESLC-T | -40 to +85 °C         | <b>1241470000</b> |
| Fast Ethernet, Singlemode, LC Connector, 80 km | IE-SFP-1FELLC-T | -40 to +85 °C         | <b>1241480000</b> |

External Backup and Restore Module for System Configuration

- Reduce system downtime by simple reconfiguration in case of replacing devices
- Plug-n-Play system backup and restoration
- Compact, rugged, reliable design
- Supports all managed Ethernet switches and WLAN components



Technical data

| Basic Operation                    |                                                                                                                                                  |            |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Connector                          | RS232-Interface with RJ45-Connector                                                                                                              |            |
| Configuration                      | Use the WEB-Console of managed Switches                                                                                                          |            |
| Power Requirements                 |                                                                                                                                                  |            |
| Input Voltage                      | 3 to 5 V DC (through the RS-232 port's RTS signal)                                                                                               |            |
| Physical Characteristics           |                                                                                                                                                  |            |
| Housing                            | PVC molding, IP40 protection                                                                                                                     |            |
| Dimensions                         | 32.5 x 97 x 12 mm (8.07 x 3.82 x 0.47 in)                                                                                                        |            |
| Weight                             | 50 g                                                                                                                                             |            |
| Mounting possibility               | M4 screw (< 4 mm)                                                                                                                                |            |
| Cable Length                       | 35 cm (including connector)                                                                                                                      |            |
| Environmental Limits               |                                                                                                                                                  |            |
| Operating Temperature              | 0 to 60 °C (32 to 140 °F)                                                                                                                        |            |
| Storage Temperature                | -20 to 70 °C (-4 to 158 °F)                                                                                                                      |            |
| Ambient Relative Humidity          | 5 to 95 % (non-condensing)                                                                                                                       |            |
| Regulatory Approvals               |                                                                                                                                                  |            |
| EMI                                | FCC Part 15, CISPR (EN55022) Class A                                                                                                             |            |
| EMS                                | EN61000-4-2 (ESD), level 2; EN61000-4-3 (RS), level 3;<br>EN61000-4-4 (EFT), level 3; EN61000-4-5 (Surge), level 3;<br>EN61000-4-6 (CS), level 3 |            |
| Warranty                           |                                                                                                                                                  |            |
| Warranty Period                    | 5 years                                                                                                                                          |            |
| Ordering Information               |                                                                                                                                                  |            |
| Models                             | Type                                                                                                                                             | Order No.  |
| External Backup and Restore Module | EBR-Modul RS232                                                                                                                                  | 1241430000 |

Kit for 19"-rack mounting

- For mounting DIN-rail based devices in 19" racks



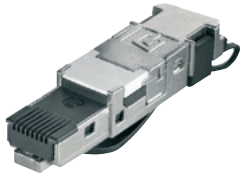
Technical data

| Physical Characteristics |                        |            |
|--------------------------|------------------------|------------|
| Dimensions               | 481 x 177.8 x 202.4 mm |            |
| Ordering Information     |                        |            |
| Models                   | Type                   | Order No.  |
| 19" Rack Mounting Kit    | RM-KIT                 | 1241440000 |



# Industrial Ethernet passive

## Connectors for copper cable



**RJ45 (IP20)** acc. to IEC 60603-7

For use in office environments, in floor and building distributors, or in the electrical cabinet

The benefits:

- For high-speed transmissions, up to 10-gigabit Ethernet
- Standardized internationally
- Can be used overall
- Sturdy version suitable for industrial applications



**RJ45 (IP67)** acc. to IEC 61076-3-106

For connections between electrical cabinets and for use in the field for gigabit applications

The benefits:

- For high-speed transmissions, up to 10-gigabit Ethernet
- IP67 protection
- Can be assembled in the field



**M12, D-coded** acc. to IEC 61076-2-101

For use near machinery or where a high degree of vibration resistance is required

The benefits:

- Compact design
- IP67 protection
- Can be used with extrusion mould or assembled in the field
- particularly resistant to vibrations

## Connector for fibre-optic cable



**SC duplex** acc. to IEC 61754-4

For use in building distributors, electrical cabinets, together with protective housing it can also be used in the field or for connecting our active components

The benefits:

- For multi-mode, single-mode or POF

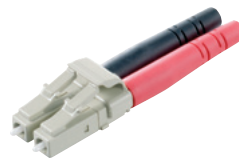


**SC-RJ** acc. to IEC 61754-24

For use in building distributors, electrical cabinets, or together with protective housing it can also be used in the field in compliance with PROFINET directive

The benefits:

- For multi-mode, single-mode and POF



**LC-Duplex** acc. to IEC 61754-20

For use in building distributors, electrical cabinets, or together with protective housing it can also be used in the field in compliance with EtherNet/IP directive

The benefits:

- For multi-mode and single-mode
- In protective housing, also in IP67



**ST** acc. to IEC 61754-2

For use in building distributors, electrical cabinets, or for connecting our active components

The benefits:

- For multi-mode, single-mode and POF

## AdvancedLine



The AdvancedLine from Weidmüller offers all combinations of cables that are possible with the extensive range of plug connections.

This means flexibility and robustness through the high quality of the used components. The range comprises standard cables and customer-specific versions. Standard cables can be found in the catalogue; customer-specific versions can be freely configured online using the “Galaxy” configuration software. All AdvancedLine cables are particularly suitable for industrial use.

- High-quality cables with very good technical characteristics
- Suitable for demanding IP20 to IP67 applications
- Suitable for temperatures from -40 to +70 °C
- High-quality shielding

## CabinetLine



The new Cabinet Line range of patch cables from Weidmüller is available in a variety of colours for visually differentiating between various networks.

Additional advantage:

all Cabinet Line cables are fitted with Weidmüller TM marking sleeves for clearly labelling cables and ports. Cabinet Line is available in the colours grey, blue, red and violet in combination with LSZH sheathing material and transmission power Cat.6<sub>A</sub>. Furthermore, Cabinet Line is also available in the colour green and Cat.5 with PUR or PVC sheathing material. All variants are fitted with protected clips which facilitate, e.g., pulling through a cable duct.

- For applications in switching cabinets and simple environmental conditions
- Suitable for temperatures from 0 to +60 °C
- Simple shielding

## Metal plug

| Housings                                                                          |                       |                                           |                                                      | Variant 1 Bayonet                                                                 |            | Variant 14 PushPull RJ                                                             |            | Variant 14 PushPull fibre-optic                                                     |            | Variant 5 HDC                                                                       |
|-----------------------------------------------------------------------------------|-----------------------|-------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------|------------|------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------|
|                                                                                   |                       |                                           |                                                      |  |            |  |            |  |            |  |
|                                                                                   |                       |                                           |                                                      | With KS                                                                           | Without KS | With KS                                                                            | Without KS | With KS                                                                             | Without KS | Without KS                                                                          |
| <b>Inserts</b>                                                                    |                       |                                           |                                                      | 1962560000                                                                        | 1962550000 | 1011570000                                                                         | 1011560000 | 1058110000                                                                          | 1058100000 | 1962540000                                                                          |
|  | RJ45 AWG 24 crimp     |                                           | 1962720000                                           | 1963150000                                                                        | 1963140000 | 1012070000                                                                         | 1012160000 |                                                                                     |            | 1963110000                                                                          |
|  | RJ45 AWG 22 tool-free | TIA-A/-B/-P<br>TIA-A<br>TIA-B<br>PROFINET | 1962730000<br>1132010000<br>1132020000<br>1132030000 | 1963130000                                                                        | 1963120000 | 1012090000                                                                         | 1012170000 |                                                                                     |            | 1963200000<br>1271250000                                                            |
|  | LWL SC                | multimode                                 | 1067380000                                           | 1963270000                                                                        | 1963260000 |                                                                                    |            | Please order separately                                                             |            |                                                                                     |
|                                                                                   |                       | singlemode                                | 1067390000                                           | 1963310000                                                                        | 1963300000 |                                                                                    |            | Please order separately                                                             |            |                                                                                     |
|                                                                                   |                       | POF                                       | 1067410000                                           | 1963290000                                                                        | 1963280000 |                                                                                    |            |                                                                                     | 1191550000 |                                                                                     |
|  | LWL LC                | multimode                                 | 1962780000                                           | 1963230000                                                                        | 1963220000 |                                                                                    |            | Please order separately                                                             |            |                                                                                     |
|                                                                                   |                       | singlemode                                | 1962790000                                           | 1963250000                                                                        | 1963240000 |                                                                                    |            | Please order separately                                                             |            |                                                                                     |
|                                                                                   | Protective cap        |                                           |                                                      | 1965690000                                                                        |            | 1058280000                                                                         |            | 1058280000                                                                          |            | 1968930002                                                                          |

KS = anti-kink protection

## Plastic plug

| Housings                                                                            |                       |                                           |                                                      | Variant 1 Bayonet                                                                 |            | Variant 4 PushPull                                                                 |                          |
|-------------------------------------------------------------------------------------|-----------------------|-------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------|------------|------------------------------------------------------------------------------------|--------------------------|
|                                                                                     |                       |                                           |                                                      |  |            |  |                          |
|                                                                                     |                       |                                           |                                                      | With KS                                                                           | Without KS | With KS                                                                            | Without KS               |
| <b>Inserts</b>                                                                      |                       |                                           |                                                      | 1012460000                                                                        | 1012440000 | 1962530000                                                                         | 1962520000               |
|  | RJ45 AWG 24 crimp     |                                           | 1962720000                                           | 1012560000                                                                        | 1012470000 | 1963190000                                                                         | 1963180000               |
|  | RJ45 AWG 22 tool-free | TIA-A/-B/-P<br>TIA-A<br>TIA-B<br>PROFINET | 1962730000<br>1132010000<br>1132020000<br>1132030000 | 1012570000                                                                        | 1012490000 | 1963170000                                                                         | 1963160000<br>1271240000 |
|  | LWL SC                | multimode                                 | 1067380000                                           | Please order separately                                                           |            | 1963370000                                                                         | 1963360000               |
|                                                                                     |                       | singlemode                                | 1067390000                                           | Please order separately                                                           |            | 1963410000                                                                         | 1963400000               |
|                                                                                     |                       | POF                                       | 1067410000                                           | Please order separately                                                           |            | 1963390000                                                                         | 1963380000               |
|  | LWL LC                | multimode                                 | 1962780000                                           | Please order separately                                                           |            | 1963330000                                                                         | 1963320000               |
|                                                                                     |                       | singlemode                                | 1962790000                                           | Please order separately                                                           |            | 1963350000                                                                         | 1963340000               |
|                                                                                     | Protective cap        |                                           |                                                      | 1965690000                                                                        |            | 1963890000                                                                         |                          |

KS = anti-kink protection

## Outlet boxes IP67



## Ordering data

| Type                            | Order No.  |
|---------------------------------|------------|
| Bayonet V 01, 1 port, straight  | 1966300000 |
| Bayonet V 01, 2 ports, left     | 1966320000 |
| Bayonet V 01, 2 ports, right    | 1966310000 |
| Bayonet V 01, 2 ports, straight | 1966330000 |
|                                 |            |
|                                 |            |
|                                 |            |

## Ordering data

| Type                              | Order No.  |
|-----------------------------------|------------|
| Push Pull V 04, 1 port, straight  | 1966220000 |
| Push Pull V 04, 2 ports, left     | 1966240000 |
| Push Pull V 04, 2 ports, right    | 1966230000 |
| Push Pull V 04, 2 ports, straight | 1966250000 |
|                                   |            |
|                                   |            |
|                                   |            |

## Ordering data

| Type                              | Order No.  |
|-----------------------------------|------------|
| RockStar® V 05, 1 port, straight  | 1966260000 |
| RockStar® V 05, 2 ports, left     | 1966280000 |
| RockStar® V 05, 2 ports, right    | 1966270000 |
| RockStar® V 05, 2 ports, straight | 1966290000 |
|                                   |            |
|                                   |            |
|                                   |            |

## Metal flange

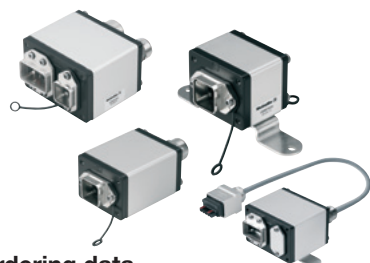
| Housings                                                                          |                    |            |            | Variant 1 Bayonet                                                                 | Variant 14 PushPull RJ                                                                                |                                                                                                   | Variant 14 PushPull fibre-optic                                                                         |                                                                                                    | Var. 5 HDC                                                                          |
|-----------------------------------------------------------------------------------|--------------------|------------|------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Inserts                                                                           |                    |            |            |  |  Standardised flange |  Central flange |  Standardised flange |  Central flange |  |
|  | RJ45 coupling      |            | 1962840000 | 1963540000                                                                        | 1011540000                                                                                            | 1047950000                                                                                        |                                                                                                         |                                                                                                    | 1963530000                                                                          |
|                                                                                   |                    |            |            | 1963470000                                                                        | 1012310000                                                                                            | 1058250000                                                                                        |                                                                                                         |                                                                                                    | 1963510000                                                                          |
|  | RJ45 module        | TIA-A      | 1962850000 | 1963480000                                                                        | 1012320000                                                                                            | 1058270000                                                                                        |                                                                                                         |                                                                                                    | 1963460000                                                                          |
|                                                                                   |                    | TIA-B      | 1963840000 | Please order separately                                                           | Please order separately                                                                               | Please order separately                                                                           |                                                                                                         |                                                                                                    | Please order separately                                                             |
|                                                                                   |                    | PROFINET   | 1963830000 | Please order separately                                                           | 1085260000                                                                                            | Please order separately                                                                           |                                                                                                         |                                                                                                    | 1963700000                                                                          |
|  | SC/SCRJ coupling   | multimode  | 1964430000 | 1964450000                                                                        |                                                                                                       |                                                                                                   | 1058120000                                                                                              | 1062590000                                                                                         |                                                                                     |
|                                                                                   |                    | singlemode | 1962870000 | 1963440000                                                                        |                                                                                                       |                                                                                                   | 1058140000                                                                                              | 1062600000                                                                                         |                                                                                     |
|  | LC Duplex coupling | multimode  | 1964420000 | 1964440000                                                                        |                                                                                                       |                                                                                                   | 1058130000                                                                                              | 1062610000                                                                                         |                                                                                     |
|                                                                                   |                    | singlemode | 1962880000 | 1963430000                                                                        |                                                                                                       |                                                                                                   | 1058150000                                                                                              | 1062620000                                                                                         |                                                                                     |
|  | USB coupling       |            | 1019570000 | Please order separately                                                           | Please order separately                                                                               | Please order separately                                                                           |                                                                                                         |                                                                                                    | Please order separately                                                             |
|                                                                                   | Protective cap     |            |            | 1965700000                                                                        | 1058310000                                                                                            | 1058310000                                                                                        | 1058310000                                                                                              | 1058310000                                                                                         | 1968930000                                                                          |

## Plastic flange

| Housings                                                                            |                    |            |            | Variant 1 Bayonet                                                                 | Variant 4 PushPull                                                                |
|-------------------------------------------------------------------------------------|--------------------|------------|------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Inserts                                                                             |                    |            |            |  |  |
|  | RJ45 coupling      |            | 1962840000 | 1016960000                                                                        | 1963520000                                                                        |
|                                                                                     |                    |            |            | 1012370000                                                                        | 1963490000                                                                        |
|  | RJ45 module        | TIA-A      | 1962850000 | 1012380000                                                                        | 1963500000                                                                        |
|                                                                                     |                    | TIA-B      | 1963840000 | Please order separately                                                           | 1963730000                                                                        |
|                                                                                     |                    | PROFINET   | 1963830000 | Please order separately                                                           | Please order separately                                                           |
|  | SC/SCRJ coupling   | multimode  | 1964430000 | Please order separately                                                           | 1964470000                                                                        |
|                                                                                     |                    | singlemode | 1962870000 | Please order separately                                                           | 1963420000                                                                        |
|  | LC Duplex coupling | multimode  | 1964420000 | Please order separately                                                           | 1964460000                                                                        |
|                                                                                     |                    | singlemode | 1962880000 | Please order separately                                                           | 1963450000                                                                        |
|  | USB coupling       |            | 1019570000 | Please order separately                                                           | Please order separately                                                           |
|                                                                                     | Protective cap     |            |            | 1965700000                                                                        | 1963900000                                                                        |

 Individual components  
 Sets

## FreeCon junction boxes V14



### Ordering data

| Description                                   | Order No.  |
|-----------------------------------------------|------------|
| Double junction box V14 RJ45 / PushPull Power | 1068830000 |
| Single junction box V14 RJ45                  | 1068880000 |
| Double junction box V14 RJ45 / PushPull       | 1068820000 |
| Single junction box V14 RJ45                  | 1068870000 |
| Single junction box V14 Hybrid                | 1068850000 |
| Single junction box V14 Hybrid                | 1068840000 |
| Y-Verteiler PushPull Power                    | 1297010000 |

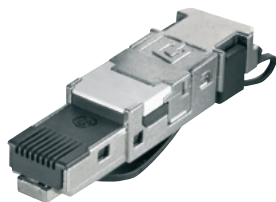
## FrontCom® Micro service interface



### Ordering data

| Description                     | Type             | Order No.  |
|---------------------------------|------------------|------------|
| RJ45 Coupling                   | IE-FCM-RJ45-C    | 1018790000 |
| RJ45 TIA-A Module               | IE-FCM-RJ45-FJ-A | 1018810000 |
| RJ45 TIA-B Module               | IE-FCM-RJ45-FJ-B | 1018820000 |
| RJ45 Ind. Ethernet Module       | IE-FCM-RJ45-FJ-P | 1018830000 |
| USB Coupling                    | IE-FCM-USB-A     | 1018840000 |
| USB Coupling                    | IE-FCM-USB-AB    | 1222550000 |
| Accessories: SwitchMark SM27/18 |                  |            |

## RJ45 plug field installation



## Ordering data

| Description            | Type             | Order No.  |
|------------------------|------------------|------------|
| Plug A/B/Ind. Ethernet | IE-PS-RJ45-FH-BK | 1963600000 |
| Plug TIA - A           | IE-PS-RJ45-BK-A  | 1132040000 |
| Plug TIA - B           | IE-PS-RKJ45-BK-B | 1132050000 |
| Plug TIA - P           | IE-PS-RKJ45-BK-P | 1132060000 |

## RJ45 crimp plug



## Ordering data

| Description                      | Type             | Order No.  |
|----------------------------------|------------------|------------|
| Plug with cable bushing in black | IE-PS-RJ45-TH-BK | 1963590000 |
| Plug without cable bushing       | IE-PM-RJ45-TH    | 1963580000 |

## SC duplex connectors



## Ordering data

| Description                | Type         | Order No.  |
|----------------------------|--------------|------------|
| Plug SC duplex, singlemode | IE-PS-SCD-SM | 1964410000 |
| Plug SC duplex, multimode  | IE-PS-SCD-MM | 1964480000 |
| Plug SC duplex, POF        | IE-PS-SCD-MM | 1962930000 |

## SCRJ connectors



## Ordering data

| Description           | Type            | Order No.  |
|-----------------------|-----------------|------------|
| Plug SCRJ, singlemode | IE-PS-SCRJ1-SM  | 1206740000 |
| Plug SCRJ, multimode  | IE-PS-SCRJ1-MM  | 1206730000 |
| Plug SCRJ, POF        | IE-PS-SCRJ1-POF | 1206720000 |

## LC duplex connectors



## Ordering data

| Description                | Type         | Order No.  |
|----------------------------|--------------|------------|
| Plug LC duplex, singlemode | IE-PS-LCD-SM | 1962980000 |
| Plug LC duplex, multimode  | IE-PS-LCD-MM | 1962970000 |

## Terminal rail outlets



## Ordering data

| Description               | Type             | Order No.  |
|---------------------------|------------------|------------|
| RJ45 module EIA/TIA 568 A | IE-XM-RJ45/IDC   | 8808360000 |
| RJ45 module EIA/TIA 568 B | IE-XM-RJ45/IDC-B | 8891980000 |
| RJ45-RJ45 coupler         | IE-XM-RJ45/RJ45  | 8879050000 |
| ST-ST coupler             | IE-XM-ST/ST      | 8808340000 |

## Ordering data

| Description               | Type            | Order No.  |
|---------------------------|-----------------|------------|
| RJ45-RJ45 coupler         | IE-TO-RJ45-C    | 8946920000 |
| RJ45 module EIA/TIA 568 A | IE-TO-RJ45-FJ-A | 8946930000 |
| RJ45 module EIA/TIA 568 B | IE-TO-RJ45-FJ-B | 8946940000 |
| RJ45 module Ind. Ethernet | IE-TO-RJ45-FJ-P | 8946950000 |
| USB-A coupler             | IE-TO-USB       | 8946960000 |

## Ordering data

| Description          | Type          | Order No.  |
|----------------------|---------------|------------|
| Adaptor LC Duplex MM | IE-TO-LCD-MM  | 8947010000 |
| Adaptor LC Duplex SM | IE-TO-LCD-SM  | 8947020000 |
| Adaptor SC Duplex MM | IE-TO-SCD-MM  | 8946970000 |
| Adaptor SC Duplex SM | IE-TO-SCD-SM  | 8946980000 |
| Adaptor SC-RJ MM     | IE-TO-SCRJ-MM | 8946990000 |
| Adaptor SC-RJ SM     | IE-TO-SCRJ-SM | 8947000000 |

## Cable tester



### Ordering data

| Description | Type           | Order No.  |
|-------------|----------------|------------|
| Tester      | LAN USB TESTER | 9205400000 |
|             |                |            |
|             |                |            |
|             |                |            |
|             |                |            |

## Cable markers



### Ordering data

| Description           | Type                  | Order No.  |
|-----------------------|-----------------------|------------|
| SlimFix, 4.7 – 5.8 mm | SF 5/21 NEUTRAL WS V0 | 1696130001 |
| SlimFix, 5.8 – 7.0 mm | SF 6/21 NEUTRAL WS V0 | 1740870001 |
| TM-I for M12, 18 mm   | TM-I 18 NEUTRAL WS    | 1718431044 |
|                       |                       |            |
|                       |                       |            |

## Dismantling tool



### Ordering data

| Description               | Type   | Order No.  |
|---------------------------|--------|------------|
| for Ethernet cables       | IE-CST | 9204350000 |
| for UTP / STP data cables | AM12   | 9030060000 |
|                           |        |            |
|                           |        |            |
|                           |        |            |

## Hole punch



### Ordering data

| Description          | Type      | Order No.  |
|----------------------|-----------|------------|
| Hand Tool            | IE-KO-HAT | 1966810000 |
| Insert for Variant 1 | IE-KOK-V1 | 1966780000 |
| Insert for Variant 4 | IE-KOK-V4 | 1966790000 |
| Insert for Variant 5 | IE-KOK-V5 | 9204790000 |
|                      |           |            |
|                      |           |            |

## Crimping pliers RJ45



### Ordering data

| Description  | Type | Order No.  |
|--------------|------|------------|
| TT 8 RS MP 8 |      | 9202800000 |
|              |      |            |
|              |      |            |
|              |      |            |
|              |      |            |

## Crimping pliers FO



### Ordering data

| Description     | Type           | Order No.  |
|-----------------|----------------|------------|
| SC GOF          | IE-CT-SC-GOF   | 9205320000 |
| SC GOF Profinet | IE-CT-SC-GOF-P | 9205350000 |
| SC POF          | E-CT-SC-POF    | 9205340000 |
| LC GOF          | IE-CT-LC-GOF   | 9205330000 |
|                 |                |            |
|                 |                |            |

## Copper cables

## Connecting cable



## Ordering data

| Type                                         | 100 m      | per meter  |
|----------------------------------------------|------------|------------|
| Cat.5; 4x2xAWG26/7; PUR                      | 8813200000 | 8938880000 |
| Cat.5; 4x2xAWG26/7; PVC                      | 8813190000 | 8955490000 |
| Cat.7; 4x2xAWG26/7; PUR                      | 8813180000 | 8954300000 |
| Cat.7; 4x2xAWG26/7; PVC                      | 8813170000 | 8955480000 |
| Cat.5; 4xAWG22/7+6x0.5mm <sup>2</sup> ; PVC* |            | 1172250000 |
| Cat.5; 4xAWG22/7; PVC*                       | 8898990000 | 8955560000 |
| * PROFINET                                   |            |            |

## Installation cable



## Ordering data

| Type                    | 100 m      | per meter  |
|-------------------------|------------|------------|
| Cat.5; 4x2xAWG24/1; PUR | 8813160000 | 8944310000 |
| Cat.5; 4x2xAWG24/1; PVC | 8813150000 | 8953160000 |
| Cat.7; 4x2xAWG23/1; PUR | 8813140000 | 8955350000 |
| Cat.7; 4x2xAWG23/1; PVC | 8813130000 | 8955360000 |
| Cat.5; 4xAWG22/1; PVC*  | 8899000000 | 8955950000 |
| * PROFINET              |            |            |

## Dragline cable



## Ordering data

| Type                             | 100 m      | per meter  |
|----------------------------------|------------|------------|
| Cat.5; 4x2xAWG26/7; PUR          | 8813210000 | 8936390000 |
| Cat.5; 4xAWG22/7; PUR*           | 8899010000 | 8947670000 |
| Cat.5; 4xAWG22/19; PUR; Torsion* |            | 1103010000 |
| Cat.5; 4x2xAWG26/7; PUR; blue    | 8960670000 | 8949760000 |
| * PROFINET                       |            |            |

## Fibre optic cables

## FO connecting cable, zipcord, POF



## Ordering data

| Type                                             | Order No.  |
|--------------------------------------------------|------------|
| 2 x POF 980/1000 µm, Bulk stock starting at 50 m | 1242820000 |

## LWL-Dragline cable, Breakout, POF



## Ordering data

| Type                                             | Order No.  |
|--------------------------------------------------|------------|
| 2 x POF 980/1000 µm, Bulk stock starting at 50 m | 1172280000 |

## LWL-Dragline cable, Breakout, MM, Fibre-optic



## Ordering data

| Type                                         | Order No.  |
|----------------------------------------------|------------|
| 2x Core 50 µm, Bulk stock starting at 50 m   | 8946000000 |
| 2x Core 62.5 µm, Bulk stock starting at 50 m | 8956060000 |

## Copper cables

## Dragline cable Cat.6 RJ45 IP20



## Ordering data

| Description | Type                   | Order No.  |
|-------------|------------------------|------------|
| 0.5 m       | IE-C5DD4UG0005A20A20-E | 1173030005 |
| 1 m         | IE-C5DD4UG0010A20A20-E | 1173030010 |
| 2 m         | IE-C5DD4UG0020A20A20-E | 1173030020 |
| 3 m         | IE-C5DD4UG0030A20A20-E | 1173030030 |
| 5 m         | IE-C5DD4UG0050A20A20-E | 1173030050 |
| 10 m        | IE-C5DD4UG0100A20A20-E | 1173030100 |
| 15 m        | IE-C5DD4UG0150A20A20-E | 1173030150 |
| 20 m        | IE-C5DD4UG0200A20A20-E | 1173030200 |

## Dragline cable Cat.5 M12 IP67

plug / plug



plug / socket



## Ordering data

| Description         | Type                   | Order No.  |
|---------------------|------------------------|------------|
| plug / plug 0.5 m   | IE-C5DD4UG0005MCSMCS-E | 1025950005 |
| plug / plug 1.5 m   | IE-C5DD4UG0015MCSMCS-E | 1025950015 |
| plug / plug 3 m     | IE-C5DD4UG0030MCSMCS-E | 1025950030 |
| plug / plug 5 m     | IE-C5DD4UG0050MCSMCS-E | 1025950050 |
| plug / plug 10 m    | IE-C5DD4UG0100MCSMCS-E | 1025950100 |
| plug / socket 1.5 m | IE-C5DD4UG0015MSSMCS-E | 1059330015 |
| plug / socket 3 m   | IE-C5DD4UG0030MSSMCS-E | 1059330030 |
| plug / socket 5 m   | IE-C5DD4UG0050MSSMCS-E | 1059330050 |
| plug / socket 10 m  | IE-C5DD4UG0100MSSMCS-E | 1059330100 |

## Dragline cable Cat.5 RJ45 IP67 V14



## Ordering data

| Description | Type                   | Order No.  |
|-------------|------------------------|------------|
| 1 m         | IE-C5DD4UG0010A2EA2E-X | 1119730010 |
| 2 m         | IE-C5DD4UG0020A2EA2E-X | 1119730020 |
| 3 m         | IE-C5DD4UG0030A2EA2E-X | 1119730030 |
| 5 m         | IE-C5DD4UG0050A2EA2E-X | 1119730050 |
| 10 m        | IE-C5DD4UG0100A2EA2E-X | 1119730100 |
| 15 m        | IE-C5DD4UG0150A2EA2E-X | 1119730150 |
| 20 m        | IE-C5DD4UG0200A2EA2E-X | 1119730200 |

## Dragline cable Cat.5 M12/open



## Ordering data

| Description | Type                   | Order No.  |
|-------------|------------------------|------------|
| 1.5 m       | IE-C5DD4UG0015MCSXXX-X | 1025940015 |
| 3 m         | IE-C5DD4UG0030MCSXXX-X | 1025940030 |
| 5 m         | IE-C5DD4UG0050MCSXXX-X | 1025940050 |
| 10 m        | IE-C5DD4UG0100MCSXXX-X | 1025940100 |

## System cable Cat.5 RJ45 IP67 V1



## Ordering data

| Description | Type                   | Order No.  |
|-------------|------------------------|------------|
| 1 m         | IE-C5ES8UG0010B41B41-E | 1066850000 |
| 2 m         | IE-C5ES8UG0020B41B41-E | 1066860000 |
| 5 m         | IE-C5ES8UG0050B41B41-E | 1066870000 |
| 10 m        | IE-C5ES8UG0100B41B41-E | 1066880000 |

## Dragline cable RJ45 - M12



## Ordering data

| Description | Type                   | Order No.  |
|-------------|------------------------|------------|
| 1 m         | IE-C5DD4UG0010MCSA20-E | 1044470010 |
| 1.5 m       | IE-C5DD4UG0015MCSA20-E | 1044470015 |
| 3 m         | IE-C5DD4UG0030MCSA20-E | 1044470030 |
| 5 m         | IE-C5DD4UG0050MCSA20-E | 1044470050 |
| 10 m        | IE-C5DD4UG0100MCSA20-E | 1044470100 |

## LWL-Patch cable IP20, Zipcord

## SC duplex



## Ordering data

| Description        | Type                   | Order No.         |
|--------------------|------------------------|-------------------|
| Core 62.5 µm, 1 m  | IE-FM6Z2VO0001MSD0SD0X | <b>8813330000</b> |
| Core 62.5 µm, 2 m  | IE-FM6Z2VO0002MSD0SD0X | <b>8813340000</b> |
| Core 62.5 µm, 3 m  | IE-FM6Z2VO0003MSD0SD0X | <b>8813350000</b> |
| Core 62.5 µm, 5 m  | IE-FM6Z2VO0005MSD0SD0X | <b>8876360050</b> |
| Core 62.5 µm, 10 m | IE-FM6Z2VO0010MSD0SD0X | <b>8876360100</b> |
| Core 50 µm, 1 m    | IE-FM5Z2VO0001MSD0SD0X | <b>8813300000</b> |
| Core 50 µm, 2 m    | IE-FM5Z2VO0002MSD0SD0X | <b>8813310000</b> |
| Core 50 µm, 3 m    | IE-FM5Z2VO0003MSD0SD0X | <b>8813320000</b> |
| Core 50 µm, 5 m    | IE-FM5Z2VO0005MSD0SD0X | <b>8876350050</b> |
| Core 50 µm, 10 m   | IE-FM5Z2VO0010MSD0SD0X | <b>8876350100</b> |

## ST / ST



## Ordering data

| Description        | Type                   | Order No.         |
|--------------------|------------------------|-------------------|
| Core 62.5 µm, 1 m  | IE-FM6Z2VO0001MST0ST0X | <b>8813270000</b> |
| Core 62.5 µm, 2 m  | IE-FM6Z2VO0002MST0ST0X | <b>8813280000</b> |
| Core 62.5 µm, 3 m  | IE-FM6Z2VO0003MST0ST0X | <b>8813290000</b> |
| Core 62.5 µm, 5 m  | IE-FM6Z2VO0005MST0ST0X | <b>8876380050</b> |
| Core 62.5 µm, 10 m | IE-FM6Z2VO0010MST0ST0X | <b>8876380100</b> |
| Core 50 µm, 1 m    | IE-FM5Z2VO0001MST0ST0X | <b>8813240000</b> |
| Core 50 µm, 2 m    | IE-FM5Z2VO0002MST0ST0X | <b>8813250000</b> |
| Core 50 µm, 3 m    | IE-FM5Z2VO0003MST0ST0X | <b>8813260000</b> |
| Core 50 µm, 5 m    | IE-FM5Z2VO0005MST0ST0X | <b>8876370050</b> |
| Core 50 µm, 10 m   | IE-FM5Z2VO0010MST0ST0X | <b>8876370100</b> |

## LC duplex / LC duplex



## Ordering data

| Description         | Type                   | Order No.         |
|---------------------|------------------------|-------------------|
| Core 62.5 µm, 2 m   | IE-FM6Z2VO0002MLD0LD0X | <b>1062450000</b> |
| Core 62.5 µm, 100 m | IE-FM6Z2VO0100MLD0LD0X | <b>8992990000</b> |
| Core 50 µm, 1 m     | IE-FM5Z2VO0001MLD0LD0X | <b>1276880000</b> |
| Core 50 µm, 2 m     | IE-FM5Z2VO0002MLD0LD0X | <b>1062570000</b> |
| Core 50 µm, 5 m     | IE-FM5Z2VO0005MLD0LD0X | <b>1062550000</b> |
| Core 50 µm, 10 m    | IE-FM5Z2VO0010MLD0LD0X | <b>1062580000</b> |

## ST / SC duplex



## Ordering data

| Description      | Type                   | Order No.         |
|------------------|------------------------|-------------------|
| Core 62.5 µm 2 m | IE-FM6Z2VO0002MST0SD0X | <b>8813400000</b> |
| Core 50 µm, 2 m  | IE-FM5Z2VO0002MST0SD0X | <b>8813390000</b> |

## SCRJ / SCRJ



## Ordering data

| Description           | Type                    | Order No.         |
|-----------------------|-------------------------|-------------------|
| POF 980/1000 µm, 1 m  | IE-FPOZ2EE0001MSJ0SJ0-X | <b>1273430010</b> |
| POF 980/1000 µm, 3 m  | IE-FPOZ2EE0003MSJ0SJ0-X | <b>1273430030</b> |
| POF 980/1000 µm, 5 m  | IE-FPOZ2EE0005MSJ0SJ0-X | <b>1273430050</b> |
| POF 980/1000 µm, 10 m | IE-FPOZ2EE0010MSJ0SJ0-X | <b>1273430100</b> |

LWL-System cable, Breakout

Dragline cable SC duplex



Ordering data

| Description        | Type                   | Order No.  |
|--------------------|------------------------|------------|
| Core 62.5 µm, 1 m  | IE-FM6D2UE0001MSD0SD0X | 8876440010 |
| Core 62.5 µm, 3 m  | IE-FM6D2UE0003MSD0SD0X | 8876440030 |
| Core 62.5 µm, 5 m  | IE-FM6D2UE0005MSD0SD0X | 8876440050 |
| Core 62.5 µm, 10 m | IE-FM6D2UE0010MSD0SD0X | 8876440100 |
| Core 50 µm, 1 m    | IE-FM5D2UE0001MSD0SD0X | 8876430010 |
| Core 50 µm, 3 m    | IE-FM5D2UE0003MSD0SD0X | 8876430030 |
| Core 50 µm, 5 m    | IE-FM5D2UE0005MSD0SD0X | 8876430050 |
| Core 50 µm, 10 m   | IE-FM5D2UE0010MSD0SD0X | 8876430100 |

Dragline cable LC duplex



Ordering data

| Description        | Type                   | Order No.  |
|--------------------|------------------------|------------|
| Core 62.5 µm, 5 m  | IE-FM6B2UE0005MLD0LD0X | 1220930000 |
| Core 62.5 µm, 10 m | IE-FM6B2UE0010MLD0LD0X | 1276680000 |
| Core 50 µm, 10 m   | IE-FM5B2UE0010MLD0LD0X | 8979020000 |
| Core 50 µm, 100 m  | IE-FM5B2UE0100MLD0LD0X | 8979030000 |

Dragline cable ST / ST



Ordering data

| Description        | Type                   | Order No.  |
|--------------------|------------------------|------------|
| Core 62.5 µm, 1 m  | IE-FM6D2UE0001MST0ST0X | 8876460010 |
| Core 62.5 µm, 3 m  | IE-FM6D2UE0003MST0ST0X | 8876460030 |
| Core 62.5 µm, 5 m  | IE-FM6D2UE0005MST0ST0X | 8876460050 |
| Core 62.5 µm, 10 m | IE-FM6D2UE0010MST0ST0X | 8876460100 |
| Core 50 µm, 1 m    | IE-FM5D2UE0001MST0ST0X | 8876450010 |
| Core 50 µm, 3 m    | IE-FM5D2UE0003MST0ST0X | 8876450030 |
| Core 50 µm, 5 m    | IE-FM5D2UE0005MST0ST0X | 8876450050 |
| Core 50 µm, 10 m   | IE-FM5D2UE0010MST0ST0X | 8876450100 |

CabinetLine Cat.6<sub>A</sub>/LSZH

Patch cable grey



Ordering data

| Cable length | Type                   | Order No.  |
|--------------|------------------------|------------|
| 0.5 m        | IE-C6FP8LD0005M40M40-D | 1165940005 |
| 1 m          | IE-C6FP8LD0010M40M40-D | 1165940010 |
| 1.5 m        | IE-C6FP8LD0015M40M40-D | 1165940015 |
| 2 m          | IE-C6FP8LD0020M40M40-D | 1165940020 |
| 3 m          | IE-C6FP8LD0030M40M40-D | 1165940030 |
| 5 m          | IE-C6FP8LD0050M40M40-D | 1165940050 |
| 7.5 m        | IE-C6FP8LD0075M40M40-D | 1165940075 |
| 10 m         | IE-C6FP8LD0100M40M40-D | 1165940100 |
| 15 m         | IE-C6FP8LD0150M40M40-D | 1165940150 |
| 20 m         | IE-C6FP8LD0200M40M40-D | 1165940200 |
| 25 m         | IE-C6FP8LD0250M40M40-D | 1165940250 |

Note

CabinetLine Cat.6<sub>A</sub>/LSZH

Patch cable blue



Ordering data

| Cable length | Type                   | Order No.  |
|--------------|------------------------|------------|
| 0.5 m        | IE-C6FP8LB0005M40M40-B | 1165900005 |
| 1 m          | IE-C6FP8LB0010M40M40-B | 1165900010 |
| 1.5 m        | IE-C6FP8LB0015M40M40-B | 1165900015 |
| 2 m          | IE-C6FP8LB0020M40M40-B | 1165900020 |
| 3 m          | IE-C6FP8LB0030M40M40-B | 1165900030 |
| 5 m          | IE-C6FP8LB0050M40M40-B | 1165900050 |
| 10 m         | IE-C6FP8LB0100M40M40-B | 1165900100 |
| 15 m         | IE-C6FP8LB0150M40M40-B | 1165900150 |
| 20 m         | IE-C6FP8LB0200M40M40-B | 1165900200 |
| 25 m         | IE-C6FP8LB0250M40M40-B | 1165900250 |

Note

CabinetLine Cat.6<sub>A</sub>/LSZH

Patch cable red



Ordering data

| Cable length | Type                   | Order No.  |
|--------------|------------------------|------------|
| 0.5 m        | IE-C6FP8LR0005M40M40-R | 1166030005 |
| 1 m          | IE-C6FP8LR0010M40M40-R | 1166030010 |
| 1.5 m        | IE-C6FP8LR0015M40M40-R | 1166030015 |
| 2 m          | IE-C6FP8LR0020M40M40-R | 1166030020 |
| 3 m          | IE-C6FP8LR0030M40M40-R | 1166030030 |
| 5 m          | IE-C6FP8LR0050M40M40-R | 1166030050 |
| 10 m         | IE-C6FP8LR0100M40M40-R | 1166030100 |
| 15 m         | IE-C6FP8LR0150M40M40-R | 1166030150 |
| 20 m         | IE-C6FP8LR0200M40M40-R | 1166030200 |
| 25 m         | IE-C6FP8LR0250M40M40-R | 1166030250 |

Note

CabinetLine Cat.6<sub>A</sub>/LSZH

Patch cable black



Ordering data

| Cable length | Type                   | Order No.  |
|--------------|------------------------|------------|
| 0.5 m        | IE-C6FP8LE0005M40M40-E | 1251610005 |
| 1 m          | IE-C6FP8LE0010M40M40-E | 1251610010 |
| 1.5 m        | IE-C6FP8LE0015M40M40-E | 1251610015 |
| 2 m          | IE-C6FP8LE0020M40M40-E | 1251610020 |
| 3 m          | IE-C6FP8LE0030M40M40-E | 1251610030 |
| 5 m          | IE-C6FP8LE0050M40M40-E | 1251610050 |
| 10 m         | IE-C6FP8LE0100M40M40-E | 1251610100 |
| 15 m         | IE-C6FP8LE0150M40M40-E | 1251610150 |
| 20 m         | IE-C6FP8LE0200M40M40-E | 1251610200 |
| 25 m         | IE-C6FP8LE0250M40M40-E | 1251610250 |

Note

**CabinetLine Cat.6 /LSZH**

Patch cable yellow

**Ordering data**

| Cable length | Type                   | Order No.  |
|--------------|------------------------|------------|
| 0.5 m        | IE-C6FP8LY0005M40M40-Y | 1251580005 |
| 1 m          | IE-C6FP8LY0010M40M40-Y | 1251580010 |
| 1.5 m        | IE-C6FP8LY0015M40M40-Y | 1251580015 |
| 2 m          | IE-C6FP8LY0020M40M40-Y | 1251580020 |
| 3 m          | IE-C6FP8LY0030M40M40-Y | 1251580030 |
| 5 m          | IE-C6FP8LY0050M40M40-Y | 1251580050 |
| 10 m         | IE-C6FP8LY0100M40M40-Y | 1251580100 |
| 15 m         | IE-C6FP8LY0150M40M40-Y | 1251580150 |
| 20 m         | IE-C6FP8LY0200M40M40-Y | 1251580200 |
| 25 m         | IE-C6FP8LY0250M40M40-Y | 1251580250 |

Note

**CabinetLine Cat.6 /LSZH**

Patch cable magenta

**Ordering data**

| Cable length | Type                   | Order No.  |
|--------------|------------------------|------------|
| 0.2 m        | IE-C6FP8LM0002M40M40-M | 1201270002 |
| 0.35 m       | IE-C6FP8LM0035M40M40-M | 1201380000 |
| 0.5 m        | IE-C6FP8LM0005M40M40-M | 1201270005 |
| 1 m          | IE-C6FP8LM0010M40M40-M | 1201270010 |
| 1.5 m        | IE-C6FP8LM0015M40M40-M | 1201270015 |
| 2 m          | IE-C6FP8LM0020M40M40-M | 1201270020 |
| 3 m          | IE-C6FP8LM0030M40M40-M | 1201270030 |
| 5 m          | IE-C6FP8LM0050M40M40-M | 1201270050 |
| 10 m         | IE-C6FP8LM0100M40M40-M | 1201270100 |
| 15 m         | IE-C6FP8LM0150M40M40-M | 1201270150 |
| 20 m         | IE-C6FP8LM0200M40M40-M | 1201270200 |

Note

**CabinetLine Cat.6 /LSZH**

Patch cable grey 270° angled

**Ordering data**

| Cable length | Type                   | Order No.  |
|--------------|------------------------|------------|
| 0.5 m        | IE-C6FP8LD0005M40W40-D | 1233160005 |
| 1 m          | IE-C6FP8LD0010M40W40-D | 1233160010 |
| 1.2 m        | IE-C6FP8LD0012M40W40-D | 1233160012 |
| 1.5 m        | IE-C6FP8LD0015M40W40-D | 1233160015 |
| 2 m          | IE-C6FP8LD0020M40W40-D | 1233160020 |
| 3 m          | IE-C6FP8LD0030M40W40-D | 1233160030 |
| 5 m          | IE-C6FP8LD0050M40W40-D | 1233160050 |
| 10 m         | IE-C6FP8LD0100M40W40-D | 1233160100 |

Note

**CabinetLine Cat.6 /LSZH**

Patch cable grey 90° angled

**Ordering data**

| Cable length | Type                   | Order No.  |
|--------------|------------------------|------------|
| 0.5 m        | IE-C6FP8LD0005M40V40-D | 1248280005 |
| 1 m          | IE-C6FP8LD0010M40V40-D | 1248280010 |
| 1.2 m        | IE-C6FP8LD0012M40V40-D | 1248280012 |
| 1.5 m        | IE-C6FP8LD0015M40V40-D | 1248280015 |
| 2 m          | IE-C6FP8LD0020M40V40-D | 1248280020 |
| 3 m          | IE-C6FP8LD0030M40V40-D | 1248280030 |
| 5 m          | IE-C6FP8LD0050M40V40-D | 1248280050 |
| 10 m         | IE-C6FP8LD0100M40V40-D | 1248280100 |

Note

CabinetLine Cat.5/PVC

Patch cable green



Ordering data

| Cable length | Type                   | Order No.  |
|--------------|------------------------|------------|
| 0.5 m        | IE-C5ES8VG0005M40M40-G | 1166020005 |
| 1 m          | IE-C5ES8VG0010M40M40-G | 1166020010 |
| 1.5 m        | IE-C5ES8VG0015M40M40-G | 1166020015 |
| 2 m          | IE-C5ES8VG0020M40M40-G | 1166020020 |
| 3 m          | IE-C5ES8VG0030M40M40-G | 1166020030 |
| 5 m          | IE-C5ES8VG0050M40M40-G | 1166020050 |
| 10 m         | IE-C5ES8VG0100M40M40-G | 1166020100 |
| 15 m         | IE-C5ES8VG0150M40M40-G | 1166020150 |
| 20 m         | IE-C5ES8VG0200M40M40-G | 1166020200 |

Note

CabinetLine Cat.5/PUR

Patch cable green



Ordering data

| Cable length | Type                   | Order No.  |
|--------------|------------------------|------------|
| 0.5 m        | IE-C5ES8UG0005M40M40-G | 1166000005 |
| 1 m          | IE-C5ES8UG0010M40M40-G | 1166000010 |
| 1.5 m        | IE-C5ES8UG0015M40M40-G | 1166000015 |
| 2 m          | IE-C5ES8UG0020M40M40-G | 1166000020 |
| 3 m          | IE-C5ES8UG0030M40M40-G | 1166000030 |
| 5 m          | IE-C5ES8UG0050M40M40-G | 1166000050 |
| 10 m         | IE-C5ES8UG0100M40M40-G | 1166000100 |
| 15 m         | IE-C5ES8UG0150M40M40-G | 1166000150 |
| 20 m         | IE-C5ES8UG0200M40M40-G | 1166000200 |

Note

Accessories, can be used with all cables:  
Inlay tag, white: TM-I 18 neutral WS: order no. 1718431044  
(also available in the colours yellow, blue, red and green)



# Addresses worldwide

|           |                                                                                                                                                                                                                                  |           |                                                                                                                                                                                                                                                              |           |                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                |                                                                                                                                                                                                                                       |
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