

Unmanaged Fast Ethernet Switch ValueLine

IE-SW-VL16 Series

Hardware Installation Guide

8th Edition, March 2018
1243330000/07/04.18

Important note:

This document and additional product information can be downloaded using following link:

<http://www.weidmueller.com>

► Select **Product Catalogue**

- ⇒ Select „Active Industrial Ethernet “
- ⇒ Select „ValueLine unmanaged Switches “
- ⇒ Select Product model
 - ⇒ Click and expand section „Downloads “
 - ⇒ Download needed software or documentation

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Weidmüller 

Overview

The IE-SW-VL16 series of 16-port smart Ethernet switches provides an economical solution for your Ethernet connections. As a bonus, the built-in smart alarm function helps system maintainers monitor the health of your Ethernet network.

IE-SW-VL16 series is available with an operating temperature range of 0 to 60°C or optional with extended operating temperature range from -40 to 75°C. The devices are designed to withstand a high degree of vibration and shock. The rugged hardware design makes IE-SW-VL16 series perfect for ensuring that your Ethernet equipment can withstand critical industrial applications, such as in hazardous locations (Class 1 Division 2/ Zone 2), and complies with FCC, UL and CE Standards.



ATTENTION

This device complies with part 15 of FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Package Checklist

Your Ethernet Switch is shipped with the following items. If any of these items is missing or damaged, please contact your Weidmüller customer service for assistance.

- Ethernet Switch
- Protective caps for unused ports
- Hardware Installation Guide (printed)

Features

High Performance Network Switching Technology

- 10/100BaseT(X) (RJ45), 100BaseFX (SC/ST type, Multimode)
- IEEE 802.3/802.3u/802.3x
- Store and Forward switching process type, with 4K address entries
- 10/100M, Full/Half-Duplex, MDI/MDIX auto-sensing

Industrial Grade Reliability

- Power failure, port break alarm by relay output
- Redundant dual DC power inputs
- Broadcast storm protection to prevent network devices from crashing

Rugged Design

- IP30, rugged high-strength case
- DIN-Rail or panel mounting ability

IE-SW-VL16(T)-16TX

The diagram shows the front panel of the Weidmüller ET 16 Ethernet switch. It features two rows of 8 RJ45 ports each, numbered 1 through 16. The top row (ports 1-8) is labeled '10/100' and the bottom row (ports 9-16) is labeled '10/100/1000'. To the right of the ports are three status LEDs labeled 'POWER', 'FAN', and 'FAULT'. Below the ports are two SFP ports, each labeled '15' and '100M'. The bottom right corner shows the serial number '1241000000' and a '10M' label.

1. Grounding screw
2. Terminal block for power input P1/P2
3. Heat dissipation orifices
4. DIP Switches
5. Power input PWR1 LED
6. Power input PWR2 LED
7. Fault LED
8. 10/100BaseT(X) Port
9. TP port's 100 Mbps LED
10. TP port's 10 Mbps LED
11. Article number
12. Screw hole for wall mounting kit
13. DIN-Rail Kit

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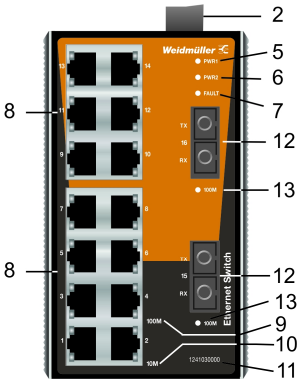
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- A schematic diagram of a three-layered structure. The top layer is dark gray and contains a large black square (labeled 2) and a small gray circle (labeled 1). The middle layer is light blue and contains two circles with a cross inside (labeled 13) and a small gray circle. The bottom layer is dark gray and contains two small black dots (labeled 12). The entire structure is bounded by a wavy line on the left and right sides.

Panel Layout

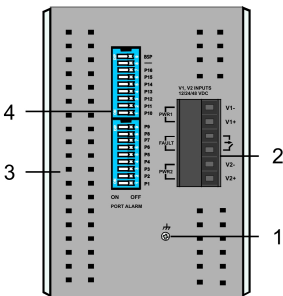
IE-SW-VL16(T)-14TX-2SC

IE-SW-VL16(T)-14TX-2SC
Front Panel View

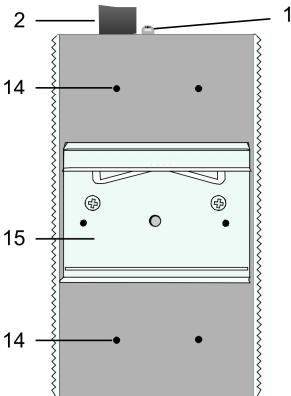


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13. FX port's 100 Mbps LED
14. Screw hole for wall mounting kit
15. DIN-Rail Kit

Top Panel View



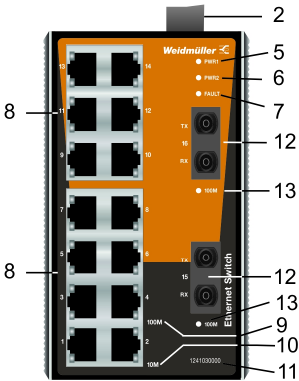
Rear Panel View



Panel Layout

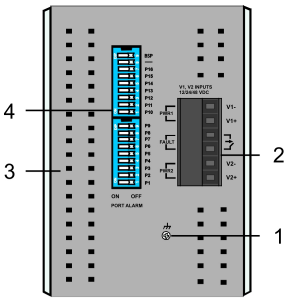
IE-SW-VL16(T)-14TX-2ST

IE-SW-VL16(T)-14TX-2ST
Front Panel View

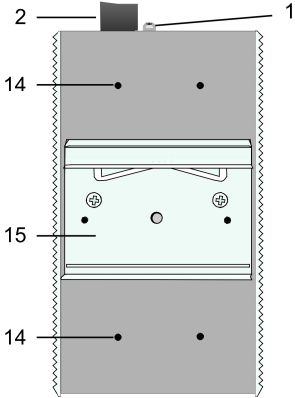


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Top Panel View

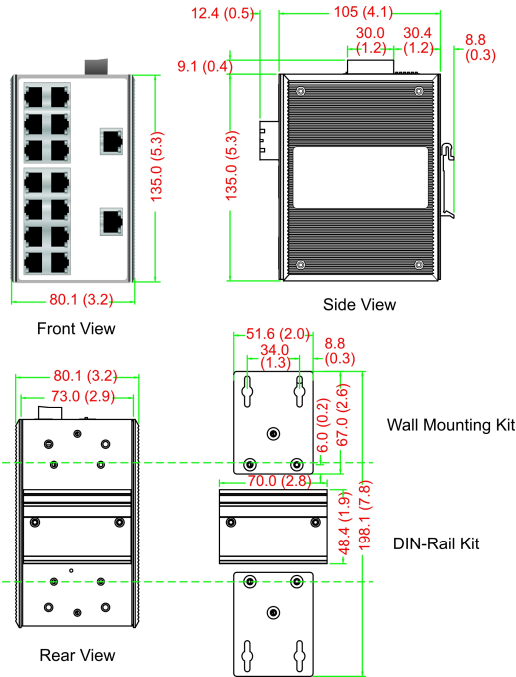


Rear Panel View



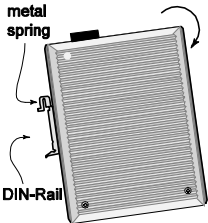
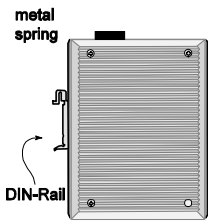
Mounting Dimensions

Units: mm (inch)



DIN-Rail Mounting

The aluminum DIN-rail attachment plate should already be fixed to the back panel of the Ethernet Switch when you take it out of the box. If you need to reattach the DIN-rail attachment plate, make sure the stiff metal spring is situated towards the top, as shown in the figures below.

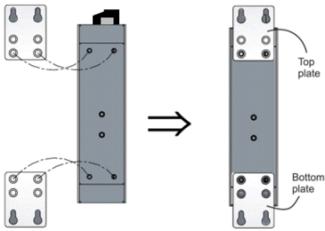
STEP 1:	STEP 2:
Insert the top of the DIN-Rail into the slot just below the stiff metal spring.	The DIN-Rail attachment unit will snap into place as shown below.
	

To remove the DIN-rail from the Ethernet Switch, simply reverse Steps 1 and 2.

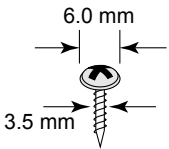
Wall Mounting (optional)

For some applications, you will find it convenient to mount the Ethernet switch on the wall, as shown in the following figures.

STEP 1: Remove the aluminum DIN-Rail attachment plate from the switch rear panel, and then attach the wall mount plates as shown in the diagram at the right.



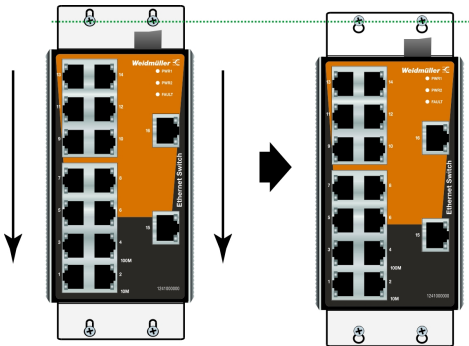
STEP 2: Mounting the switch on the wall requires 4 screws. Use the switch, with wall mount plates attached, as a guide to mark the correct locations of the 4 screws. The heads of the screws should be less than 6.0 mm in diameter, and the shafts should be less than 3.5 mm in diameter, as shown in the figure at the right.



NOTE Before tightening the screws into the wall, make sure the screw head and shank size are suitable by inserting the screw into one of the keyhole-shaped apertures of the wall mounting plates.

Do not screw the screws in completely—leave about 2 mm to allow room for sliding the wall mount panel between the wall and the screws

STEP 3: Once the screws are fixed on the wall, insert the four screw heads through the large parts of the keyhole-shaped apertures, and then slide the switch downwards, as indicated. Tighten the four screws for added stability.



ATEX Information



II 3G



- Certificate number DEMKO 11 ATEX 150194X
- Ambient range:
-40°C ≤ Tamb ≤ +75°C for models with suffix of "-T";
0°C ≤ Tamb ≤ +60°C for models without suffix of "-T"
- Certification string: Ex nA nC IIC T4 Gc
- Rated Cable Temperature: ≥ 100°C
- Standards covered:
EN 60079-0:2012+A11:2013, EN 60079-15:2010
- The conditions of safe usage:
- These devices are to be installed in an ATEX certified IP54 enclosure accessible only with use of a tool and used in an area of not more than pollution degree 2 as defined by EN 60664-1.
- Use a conductor wire of size 0.2 mm² or greater
- Conductors suitable for use in an ambient temperature of 93°C must be used for the Power Supply Terminal.
- PROVISIONS SHALL BE MADE, EITHER IN EXTERNAL TO THE APPARATUS, TO PREVENT THE RATED VOLTAGE BEING EXCEEDED BY THE TRANSIENTS DISTURBANCES OF MORE THAN 40 %

NOTE Suitable for use in Class I, Division 2, Groups A, B, C and D hazardous locations, or nonhazardous locations only.



WARNING

EXPLOSION HAZARD - Do not disconnect equipment while the circuit is live or unless the area is known to be free of ignitable concentrations.



WARNING

EXPLOSION HAZARD - Substitution of any component may impair suitability for Class 1, Division 2



WARNING

EXPLOSION HAZARD – Servicing, replacing, and installing the product can only take place in an area that is non-hazardous.

Wiring Requirements



WARNING

Do not disconnect modules or wires unless the power supply has been switched off or the area is known to be non-hazardous. The devices may only be connected to the supply voltage shown on the type plate.

The devices are designed for operation with a Safety Extra-Low Voltage. Thus, they may only be connected to the supply voltage connections and to the signal contact with the Safety Extra-Low Voltages (SELV) in compliance with IEC950/ EN60950/ VDE0805.



WARNING

This unit is a built-in type. When the unit is installed in another piece of equipment, the equipment enclosing the unit must comply with fire enclosure regulation IEC 60950/EN60950 (or similar regulation).



WARNING

Safety First!

Be sure to disconnect the power cord before installing and/or wiring the Ethernet Switch.

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.

If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

You should also pay attention to the following items:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.
NOTE: Do not run signal or communications wiring and power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.
- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring with similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separated.
- It is strongly advised that you label wiring for all devices in the system when necessary.
- Only use copper conductors with 60/75°C capability

Grounding Ethernet Switch

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screw to the grounding surface prior to connecting devices. A 4 mm² conductor must be used when a connection to the external grounding screw is utilized.



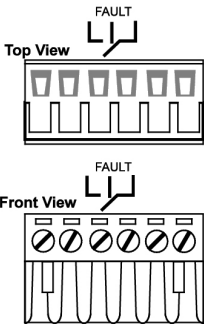
ATTENTION

This product is intended to be mounted to a well-grounded mounting surface, such as a metal panel.

Wiring the Alarm Contact

The Alarm Contact consists of the two middle contacts of the terminal block on the Ethernet Switch’s top panel. A typical scenario would be to connect the Fault circuit to a warning light located in the control room. The light can be set up to switch on when a fault is detected.

In this section, we explain the meaning of the two contacts used to connect the Alarm Contact.



FAULT: The two middle contacts of the 6-contact terminal block connector are used to detect both power faults and port faults. The two wires attached to the Fault contacts form an open circuit when:

1. Ethernet Switch has lost power from one of the DC power inputs.
- OR
2. The PORT ALARM DIP Switch for one of the ports is set to ON, but the port is not connected properly.

If neither of these two conditions is satisfied, the Fault circuit will be closed.



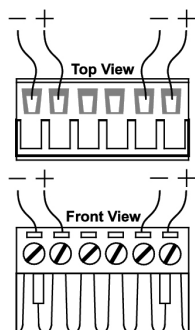
ATTENTION

Exposure to some chemicals may degrade the sealing properties of materials used in the Sealed Relay Device

Wiring the Redundant Power Inputs

Both power inputs can be connected simultaneously to live DC power sources. If one power source fails, the other live source acts as a backup, and automatically supplies the Ethernet Switch's power needs.

The top two contacts and the bottom two contacts of the 6-contact terminal block connector on the Ethernet Switch's top panel are used for the Ethernet Switch's two DC inputs. Top and front views of the terminal block connector are shown here.



STEP 1: Insert the negative/positive DC wires into the V-/V+ terminals.

STEP 2: To keep the DC wires from pulling loose, use a small flat-blade screwdriver to tighten the wire-clamp screws on the front of the terminal block connector.

STEP 3: Insert the plastic terminal block connector prongs into the terminal block receptor, which is located on Ethernet Switch's top panel.



ATTENTION

Before connecting the Ethernet Switch to the DC power inputs, make sure the DC power source voltage is stable.



ATTENTION

Conductors suitable for use in an ambient temperature of 93°C must be used for the power supply terminal. One individual conductor in a clamping point with 28-12 AWG wire size, and a torque value of 4.5 lb-in should be used.



ATTENTION

Transient provisions shall be made to prevent the rated voltage being exceeded by transient disturbances of more than 40%.

Communication Connections

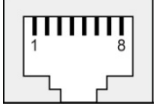
The models of IE-SW-VL16 series have 14 or 16 10/100BaseT(X) Ethernet ports, and 2 or 0 (zero) 100 BaseFX multimode (SC/ST-type connector) fiber ports.

10/100BaseT(X) Ethernet Port Connection

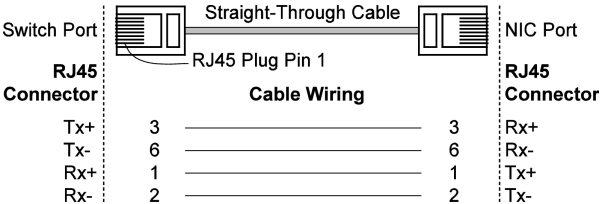
The 10/100BaseT(X) ports located on Ethernet Switch's front panel are used to connect to Ethernet-enabled devices. Below we show pinouts for both MDI (NIC-type) ports and MDI-X (HUB/Switch-type) ports, and also show cable wiring diagrams for straight-through and cross-over Ethernet cables.

10/100Base T(x) RJ45 Pinouts

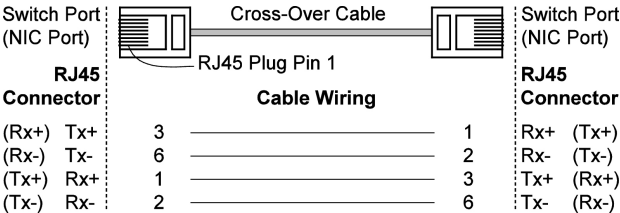
MDI Port Pinouts		MDI-X Port Pinouts		8-pin RJ45
Pin	Signal	Pin	Signal	
1	Tx+	1	Rx+	
2	Tx-	2	Rx-	
3	Rx+	3	Tx+	
6	Rx-	6	Tx-	



RJ45 (8-pin) to RJ45 (8-pin) Straight-Through Cable Wiring



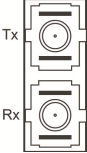
RJ45 (8-pin) to RJ45 (8-pin) Cross-Over Cable Wiring



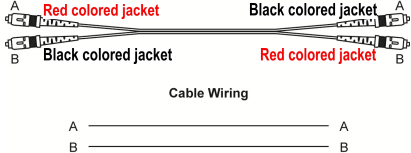
100BaseFX Ethernet Port Connection (Fiber)

Remember to connect the Tx (transmit) port of device 1 to the Rx (receive) port of device 2, and the Rx (receive) port of device 1 to the Tx (transmit) port of device 2. Fiber optic connections generally are using the full-duplex transmission mode.

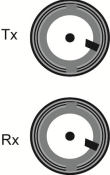
SC-Port Pinouts



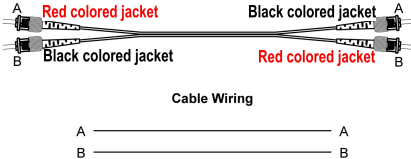
SC-Port to SC-Port Cable Wiring



ST-Port Pinouts



ST-Port to ST-Port Cable Wiring

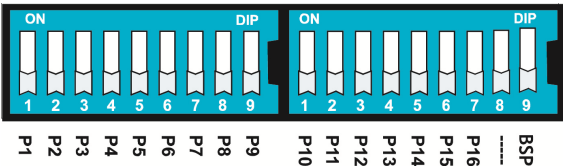


ATTENTION

This is a Class 1 Laser/LED product. To avoid causing serious damage to your eyes, do not stare directly into the Laser Beam.

DIP Switch Settings

IE-SW-VL16 Series DIP Switches



The default setting for each DIP Switch is OFF. The following table explains the effect of setting the DIP Switches to the ON positions.

DIP Switch	Setting	Description
----	—	Serves no function (reserved for future use).
Port Alarm Function (P1 to P16)	ON	Enables the corresponding PORT Alarm. If the port's link fails, the relay will form an open circuit and the fault LED will light up.
	OFF	Disables the corresponding PORT Alarm. The relay will form a closed circuit and the Fault LED will never light up.
BSP	ON	Enables broadcast storm protection (limitation to 2000 broadcast packets per second and port)
	OFF	Disables broadcast storm protection

LED Indicators

The front panel of the Ethernet Switch contains several LED indicators. The function of each LED is described in the table below.

LED	Color	State	Description
PWR1	AMBER	On	Power is being supplied to power input PWR1.
		Off	Power is not being supplied to power input PWR1.
PWR2	AMBER	On	Power is being supplied to power input PWR2.
		Off	Power is not being supplied to power input PWR2.
FAULT	RED	On	When the corresponding PORT alarm is enabled, and the port's link is inactive.
		Off	When the corresponding PORT alarm is enabled and the port's link is active, or when the corresponding PORT alarm is disabled.
10M	YELLOW	On	Port's 10 Mbps link is active.
		Blinking	Data is being transmitted at 10 Mbps.
		Off	Port's 10 Mbps link is inactive
100M (TP)	GREEN	On	Port's 100 Mbps link is active.
		Blinking	Data is being transmitted at 100 Mbps.
		Off	Port's 100Mbps link is inactive.
100M (FX)	GREEN	On	Port's 100 Mbps link is active.
		Blinking	Data is being transmitted at 100 Mbps.
		Off	Port's 100Mbps link is inactive.

Auto MDI/MDI-X Connection

The Auto MDI/MDI-X function allows connecting devices to an Ethernet Switch's 10/100BaseT(X) port without paying attention to the type of Ethernet cable being used for the connection. This means that you can use either a straight-through cable or cross-over cable to connect devices to the Ethernet Switch.

Auto-Negotiation and Speed Sensing

Each RJ45 Ethernet port independently supports auto-negotiation for recognizing the transmission speed 10 Mbps or 100 Mbps according to the IEEE802.3 standard. This means that some of connected Ethernet devices could operate at 10 Mbps, while at the same time other nodes are operating at 100 Mbps. Auto-negotiation takes place each time when a RJ45 cable connection is made and a link will be established. The Ethernet Switch advertises its capability for using 10 or 100 Mbps transmission speed to the connected device and expects this also from the connected device. This procedure results in an agreement to operate at a speed of either 10 or 100 Mbps.

The fiber optic ports operate at a fixed 100 Mbps speed and full-duplex mode to provide the best performance.

Auto-Negotiation and Transmission Mode

Besides the transmission speed, each RJ45 port auto-negotiates the transmission mode (half duplex or full duplex). Typically, if both devices are set to “auto-negotiation”, the full duplex transmission will be set.

Note about possible loss of data packages in case of “Duplex mismatching”

If the switch’s auto-negotiation port is connected to a non-negotiating device, then the Switch will set its port transmission speed same as the connected device but is unable to correctly detect the duplex mode. As result the port is set to the correct speed but is using always the half duplex mode as required by the IEEE 802.3u standard in such cases. For correct transmission, the non-negotiating port must be set to half-duplex mode (speed either 10 Mbps or 100 Mbps).

Switching, Filtering, Forwarding, Address Learning

Each time a packet arrives at one of the switched ports, a decision is made to either filter or forward the packet. Packets with source and destination addresses belonging to the same port segment will be filtered, constraining those packets to one port, and relieving the rest of the network from the need to process them. A packet with destination address on another port segment will be forwarded to the appropriate port, and will not be sent to the other ports where it is not needed. Packets that are used in maintaining the operation of the network (such as the occasional multi-cast packet) are forwarded to all ports.

The Ethernet switch operates in the store-and-forward switching mode, which eliminates bad packets and enables peak performance to be achieved when there is heavy traffic on the network.

Switches of IE-SW-VL16 series have an address table that can hold up to 4K node addresses, which makes it suitable for use with large networks. The address tables are self-learning, so that as nodes are added or removed, or moved from one segment to another, the Ethernet Switch automatically keeps up with new node locations. An address-aging algorithm causes the least-used addresses to be deleted in favor of newer, more frequently used addresses. To reset the address buffer, power down the unit and then power it back up



WARNING

This equipment is intended to be used in a restricted access location.

HOT SURFACE!! Before touching it, special attention or protection is required.

Specifications

Technology			
Standards	IEEE 802.3 for 10BaseT, IEEE 802.3u for 100BaseT(X) and 100Base FX, IEEE 802.3x for Flow Control		
Forward and Filtering Rate	148,810 pps (100Mbit), 14,881 pps (10Mbit)		
Packet Buffer Memory	1.25 Mbit		
Processing Type	Store and Forward, with IEEE802.3x full duplex, back pressure flow control		
MAC-address Table Size	4K uni-cast addresses		
Interface			
RJ45 Ports	10/100BaseT(X) auto negotiation speed, F/H duplex mode and auto MDI/MDI-X connection		
Fiber Ports	100BaseFX ports (SC/ST connector)		
LED Indicators	PWR1, PWR2 (Power), 10/100M (TP-Port) and 100M (Fiber port)		
DIP Switches	Enable/disable broadcast storm protection		
Alarm Contact	One relay output with current carrying capacity of 1A @ 24 VDC		
Optical Fiber			
		100Base FX	
		Multi-mode	
Fiber Cable Type		OM1	50/125 μm 800 MHz*Km
Typical Distance		4 km	5 km
Wavelength	Typical (nm)	1300	
	TX Range (nm)	1260 to 1360	
	RX Range (nm)	1100 to 1600	
Optical Power	TX Range (dBm)	-10 to -20	
	RX Range (dBm)	-3 to -32	
	Link Budget (dB)	12	
	Dispersion Penalty (dB)	3	
Typical Distance: To reach the typical distance of a specified fiber transceiver, please refer to the following formula: Link budget(dB) > dispersion penalty(dB) + total link loss(dB).			
Power			
Input Voltage	12/24/48 VDC (9.6 to 60 VDC), 2 redundant inputs		
Input Current @ 24 VDC	0.34 A (IE-SW-VL16-16TX) 0.39 A (IE-SW-VL16-14TX-2SC/2ST)		
Connection	One removable 6-pin terminal block		
Inrush current	Max. 6.3A @ 24VDC (0.1 - 1ms)		
Overload Current Protection	Present		
Reverse Polarity Protection	Present		
Physical Characteristics			
Housing	IP30 protection, metal case		
Dimension (W x H x D)	80.5 x 135 x 105 mm		
Weight	1,140 g		
Installation	DIN-rail, Wall Mounting (with optional kit)		

Environmental	
Operating Temperature	0 to 60°C (32 to 140°F) -40 to 75°C (-40 to 167°F) for -T models
Storage Temperature	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5 to 95% (non-condensing)
Regulatory Approvals	
Safety	UL 508, UL 60950-1, EN 60950-1
Hazardous Location	UL/cUL Class I, Division 2, Groups A, B, C, and D; ATEX Zone 2, Ex nA nC IIC T4 Gc
Maritime	DNV/GL
EMI	FCC Part 15, CISPR (EN 55032) class A
EMS	IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV IEC 61000-4-3 RS: 80 MHz to 1 GHz: 20 V/m IEC 61000-4-4 EFT: Power: 2 kV; Signal: 1 kV IEC 61000-4-5 Surge: Power: 2 kV; Signal: 2 kV IEC 61000-4-6 CS: 10 V IEC 61000-4-8
Shock	IEC 60068-2-27
Free Fall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	
Time	2,290,506 hrs
Database	Telcordia (Bellcore), GB
Warranty	
Time Period	5 years

Weidmüller gives a 5-year warranty on this product in accordance with the warranty terms as described in the general conditions of sale of the Weidmüller company which has sold the products to you. Weidmüller warrants to you that such products the defects of which have already existed at the time when the risk passed will be repaired by Weidmüller free of charge or that Weidmüller will provide a new, functionally equivalent product to replace the defective one. Safe where expressly described otherwise in writing in this catalogue/product description, Weidmüller gives no warranty or guarantee as to the interoperability in specific systems or as to the fitness for any particular purpose. To the extent permitted by law, any claims for damages and reimbursement of expenses, based on whatever legal reason, including contract or tort, shall be excluded. Where not expressly stated otherwise in this warranty, the general conditions of purchase and the expressive liability commitments therein of the respective Weidmüller company which has sold the products to you shall be applicable.

Contact Information

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32760 Detmold
Klingenbergstraße 16
32758 Detmold / Germany

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