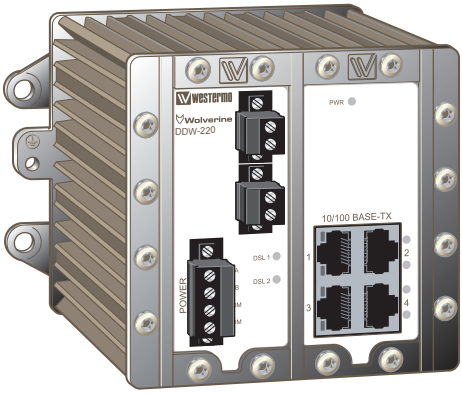
User Guide
6642-22005

DDW-220

WOLVERINE SERIES



Wolverine

Industrial Ethernet
SHDSL extender

www.westermo.com

westermo

Software tools

Related software tools are available in the folder software tools under technical support on the Westermo website.

Legal information

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Under no circumstances shall Westermo be responsible for any loss of data or income or any special, incidental, and consequential or indirect damages howsoever caused.

More information about Westermo can be found at the following Internet address:

http://www.westermo.com

Safety

Before installation:

Read this manual completely and gather all information on the unit. Make sure that you understand it fully. Check that your application does not exceed the safe operating specifications for this unit.

This unit should only be installed by qualified personnel.

This unit should be built-in to an apparatus cabinet, or similar, where access is restricted to service personnel only.

The power supply wiring must be sufficiently fused, and if necessary it must be possible to disconnect manually from the power supply. Ensure compliance to national installation regulations.

This unit uses convection cooling. To avoid obstructing the airflow around the unit, follow the spacing recommendations (see Cooling section).

Before mounting, using or removing this unit:

Prevent access to hazardous voltage by disconnecting the unit from power supply. Warning! Do not open connected unit. Hazardous voltage may occur within this unit when connected to power supply.

Care recommendations

Follow the care recommendations below to maintain full operation of unit and to fulfil the warranty obligations.

This unit must not be operating with removed covers or lids.

Do not attempt to disassemble the unit. There are no user serviceable parts inside.

Do not drop, knock or shake the unit, rough handling above the specification may cause damage to internal circuit boards.

Do not use harsh chemicals, cleaning solvents or strong detergents to clean the unit.

Do not paint the unit. Paint can clog the unit and prevent proper operation.

Do not expose the unit to any kind of liquids (rain, beverages, etc). The unit is not waterproof. Keep the unit within the specified humidity levels.

Do not use or store the unit in dusty, dirty areas, connectors as well as other mechanical part may be damaged.

If the unit is not working properly, contact the place of purchase, nearest Westermo distributor office or Westermo Tech support.

A readily accessible disconnect device shall be incorporated external to the equipment.

This unit may have hot surfaces when used in high ambient temperature.

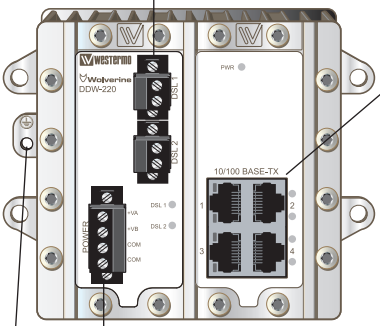
Ratings

Power	(20 – 48) VDC; 300 mA
Ambient temperature	–40°C ≤ Ta ≤ +70°C
Ingress protection (IP)	IP40
Maximum surface temperature	135°C (temperatur class T4)

Safety Control Drawing

Degree of protection	IP40
Ambient temperature	–40°C to +70°C
Installation spacing	Minimum 25 mm above / below Minimum 10 mm left / right

Direction relative this unit!



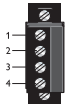
Position	Direction*/ descripton	Input/Output values
1	In/Out / SHDSL	U = ± 5 Vpk I = ± 25 mA Data rate up to 15.3 Mbit/s
2	In/Out / SHDSL	

* Galvanically isolated via signal transformer and capacitively isolated to signal ground through a 1,5 kV 220 pF capacitor.
See user manual for proven transient protection.

Position	Direction*/ descripton	Input/Output values
1	In/Out / TD+	U = ± 1 V (4V/µs) I = ± 20 mA Data rate: 10/100 Mbit/s
2	In/Out / TD–	
3	In/Out / RD+	
4	Not connected	
5	Not connected	
6	In/Out / RD–	
7	Not connected	
8	Not connected	

* Galvanically isolated via signal transformers and capacitively isolated to signal ground through a 2 kV 1000 pF capacitor.
See user manual for proven transient protection.

M5 threaded hole for PE connection.

Position	Direction*/ descripton	Input values	
1	In / +Voltage A	U_{in} = (10 – 60) VDC I_{in} = 420mA @ 16VDC; P_{In} = Max 7 W	
2	In / +Voltage B		
3	In / Common		
4	In / Common		

* See section *Type tests and environmental conditions* in this user manual for proven transient protection.

Agency approvals and standards compliance

Type	Approved Agency/ W-mo	Approval / Compliance
EMC	W-mo	EN 50121-4, Railway signalling and telecommunications apparatus
	W-mo	EN 61000-6-1, Immunity residential, commercial and light-industrial environments
	W-mo	EN 61000-6-2, Immunity industrial environments
	W-mo	EN 61000-6-3, Emission residental environments
	W-mo	EN 61000-6-4, Emission industrial environments
Safety	W-mo	EN 60950-1, IT equipment
SHDSL	NEMKO	ITU-T G.991.2
Ex	FM Approvals	Class I, Division 2

FCC Part 15.105 Notice:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Warning

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Westermo Teleindustri AB

Declaration of Conformity

The manufacturer Westermo Teleindustri AB
SE-640 40 Stora Sundby, Sweden

Herewith declares that the product(s)

Type of product	Models	Art no
Industrial Ethernet SHDSL extender	Wolverine DDW-220	3642-0200
	Wolverine DDW-222	3642-0220

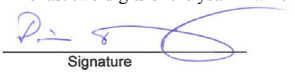
is in conformity with the following EU directive(s).

No	Short name
2014/30/EU	Electromagnetic Compatibility (EMC)
2014/35/EU	Low Voltage Directive (LVD)
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

References of standards applied for this EU declaration of conformity.

No	Title	Issue
EN 61000-6-1	Electromagnetic compatibility – Immunity for residential environments	2007
EN 61000-6-2	Electromagnetic compatibility – Immunity for industrial environments	2005
EN 61000-6-3	Electromagnetic compatibility – Emission residential environments	2007
EN 61000-6-4	Electromagnetic compatibility – Emission for industrial environments	2007
EN 50121-4	Railway applications – Electromagnetic compatibility – Emission and immunity of the signalling and telecommunications apparatus	2006
EN 60950-1	Information technology equipment -- Safety -- General requirements	2006 +A11: 2009
EN 50581	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances	2012

The last two digits of the year in which the CE marking was affixed: 16



Signature

Pierre Öberg
Technical Manager
21st March 2016

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Type tests and environmental conditions

Phenomena	Test	Description	Test levels
ESD	EN 61000-4-2	Enclosure contact	± 6 kV
		Enclosure air	± 8 kV
RF field AM modulated	IEC 61000-4-3	Enclosure	20 V/m 80% AM (1 kHz), 80 – 1000 MHz 10 V/m 80% AM (1 kHz), 1400 – 2100 MHz 5 V/m 80% AM (1 kHz), 2100 – 2500 MHz 1 V/m 80% AM (1 kHz), 2500 – 2700 MHz
Fast transient	EN 61000-4-4	Signal ports	± 2 kV
		Power ports	± 2 kV
Surge	EN 61000-4-5	Signal ports balanced	± 2 kV line to earth, ± 1 kV line to line
		Power ports	± 2 kV line to earth, ± 2 kV line to line
RF conducted	EN 61000-4-6	Signal ports	10 V 80% AM (1 kHz), 0.15 – 80 MHz
		Power ports	10 V 80% AM (1 kHz), 0.15 – 80 MHz
Power frequency magnetic field	EN 61000-4-8	Enclosure	300 A/m
Pulse magnetic field	EN 61000-4-9	Enclosure	300 A/m
Mains freq. 50 Hz	EN 61000-4-16	Signal ports	100 V 50 Hz line to earth
Mains freq. 50 Hz	SS 436 15 03	Signal ports	250 V 50 Hz line to line
Voltage dips and interruption	EN 61000-4-29	DC power ports	10 ms, interruption 10 ms, 30% reduction 10 ms, 60% reduction +20% above & –20% below rated voltage
Radiated emission	CISPR 16-2-3 ANSI C63.4 (FCC part 15)	Enclosure	Class A
			Class A
Conducted emission	CISPR 16-2-1	DC power ports	Class B
Dielectric strength	EN 60950	Signal port to other isolated ports	1500 Vrms 50 Hz 1 min
		Power port to other isolated ports	1500 Vrms 50 Hz 1 min
Temperature	EN 60068-2-1 EN 60068-2-2	Operating	-40 to +70°C
		Storage & Transport	-40 to +70°C
		Maximum surface temperatur	135°C (temperature class T4)
Humidity	EN 60068-2-30	Operating	5 to 95% relative humidity
		Storage & Transport	5 to 95% relative humidity
Altitude		Operating	2 000 m / 70 kPa
Vibration	IEC 60068-2-6	Operating	7.5 mm, 5 – 8 Hz 2 g, 8 – 500 Hz
Shock	IEC 60068-2-27	Operating	15 g, 11 ms
Enclosure	UL 94	Aluminium/Zink	Flammability class V-0
Dimension W x H x D			134 x 105 x 122 mm
Weight			1.5 kg
Degree of protection	IEC 529	Enclosure	IP40
Cooling			Convection
Mounting			Horizontal on 35 mm DIN-rail

Description

The DDW-220 is an Industrial Ethernet SHDSL extender with a built-in Ethernet switch. It is designed as a transparent Ethernet Extender for 10/100BaseTX networks.

SHDSL represents the best of several symmetric DSL technologies. This unit provides the ability to reuse existing twisted copper pair with data rates from 192 kbit/s to 5.7 Mbit/s in both directions. The DDW-220 makes it possible to communicate over 10 km (6.2 miles) on twisted pair cable.

The DDW-220 is a bridge not router and so is simple to install. All configuration is done using a web interface.

The DIN rail mounted DDW-220 is designed for harsh environments and can be used in industrial and railway applications. It can be powered from two separate supplies and handle an operating voltage range of 16 – 60 VDC.

- 192 kbit/s to 5.7 Mbit/s
- Over 10 km (6.2 miles) on twisted pair
- Daisy chain SHDSL applications
- Wide temperature range (–40 to +70°C) (–40 to 158°F)
- Total galvanic isolation & transient protection
- Industrial and Rail EMC approvals
- Redundant power and wide DC input range
- Configuration using web interface
- Integrated 4-port Ethernet switch with 10/100Base-T/TX
- Auto MDI/MDI-X
- Auto speed on SHDSL with reliable, normal or high speed mode
- Comprehensive statistics
  - SHDSL
  - Ethernet
- SNMP support
- Extensive line protection with over-current / voltage suppression

Diagram showing speed versus distance

	DDW-220 @ 0.5 mm	DDW-220 @ 0.4 mm
Speed bit/s	**Distance metre / miles**	**Distance metre / miles**
192000	10000 / 6.21	6450 / 4.00
1024000	7650 / 4.75	4850 / 3.01
1280000	7050 / 4.38	4700 / 2.92
2304000	5950 / 3.69	4150 / 2.58
3328000	4900 / 3.04	3700 / 2.30
4544000	4250 / 2.64	3150 / 1.95
5696000	3650 / 2.26	2800 / 1.73

Distance is tested without noise.

Interface specifications

Power

Rated voltage	20 to 48 VDC
Operating voltage	16 to 60 VDC
Rated current	300 mA @ 20 VDC 150 mA @ 48 VDC
Rated frequency	DC
Inrush current, I^2t	3.1 A^2s
Startup current*	400 mA
Polarity	Reverse polarity protected
Redundant power input	Yes
Isolation to	Ethernet, SHDSL
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm^2 (AWG 24 – 12)
Shielded cable	Not required

* If external power supply is used it must meet specified inrush current.

SHDSL

Electrical specification	ITU-T G.991.2 Annex B
Data rate	192 kbit/s to 5696 kbit/s
Protocol	EFM according to IEEE 802.3-2004
Transmission range	According to ITU-T G.991.2 depending on the line quality
Protection	Overcurrent / overvoltage protection circuit and varistor
Isolation to	Power, Ethernet
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm^2 (AWG 24 – 12)
Shielded cable	Not required
Number of ports	2

Ethernet TX

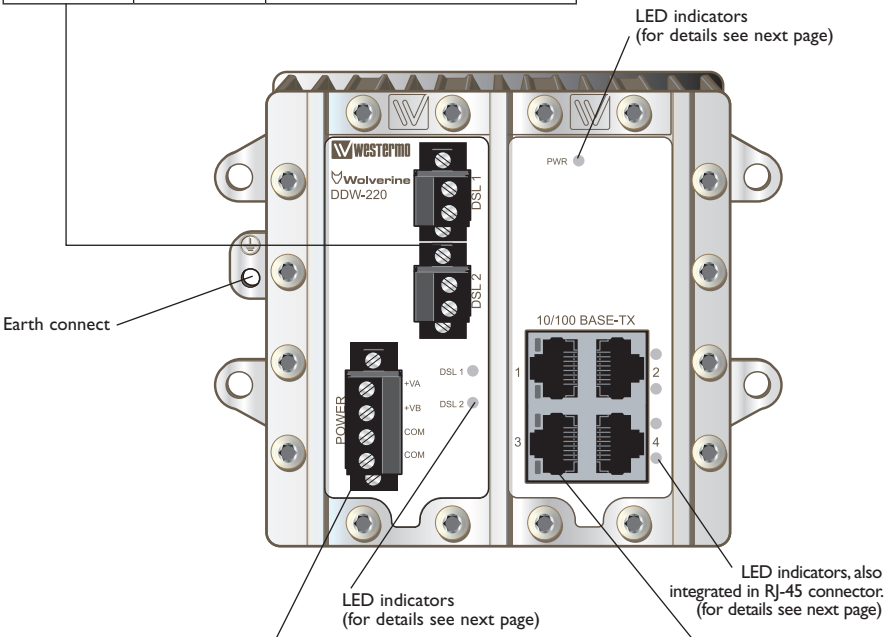
Electrical specification	IEEE std 802.3 2000 Edition
Data rate	10 Mbit/s, 100 Mbit/s, manual or auto
Duplex	Full or half
Transmission range	100 m / 328 ft
Isolation to	Power, SHDSL
Connection	RJ-45
Shielded cable	Not required, except when installed in Railway applications as signalling and telecommunications apparatus and located close to rails**
Number of ports	4 ports marked as 1, 2, 3, 4

** To minimise the risk of interference, a shielded cable is recommended when the cable is located inside 3 m boundary to the rails and connected to this port.

Connections

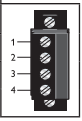
DSL screw connector 1 & 2

Position	Direction	Description
1	In/Out	2-wire Receive/ Transmit SHDSL
2	In/Out	2-wire Receive/ Transmit SHDSL



Power connection

Position	Direction*	Description
1	In	+ Voltage A
2	In	+ Voltage B
3	In	Common
4	In	Common



Ethernet TX connection (RJ-45 connector) 1 – 4**

Position	Direction*	Description
1	In/Out	TD+
2	In/Out	TD–
3	In/Out	RD+
4	–	Not Connected
5	–	Not Connected
6	In/Out	RD–
7	–	Not Connected
8	–	Not Connected

CAT 5 cable is recommended.
Unshielded (UTP) or shielded (STP) connectors can be used.

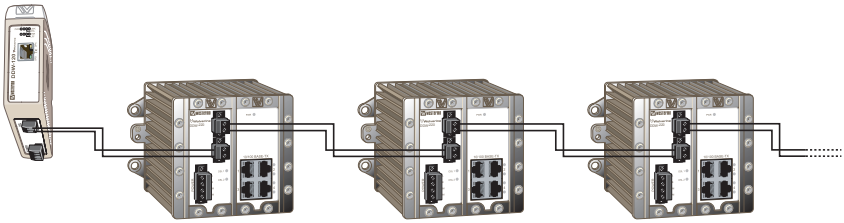
* Direction relative this unit

** To minimise the risk of interference, a shielded cable is recommended when the cable is located inside 3 m boundary to the rails and connected to this port. The cable shield should be properly connected (360°) to an earthing point within 1 m from this port. This earthing point should have a low impedance connection to the conductive enclosure of the apparatus cabinet, or similar, where the unit is built-in. This conductive enclosure should be connected to the earthing system of an installation and may be directly connected to the protective earth.

LED indicators

LED	Status	Description
PWR	OFF	No power
	ON (green)	Booting ready, unit ready
	ON (red)	Unit is booting
10/100BASE-TX Port 1 – 4 Green LED	OFF	No link
	ON	Link active
	Flashing	Traffic on link
10/100BASE-TX Port 1 – 4 Yellow LED	OFF	No port alarm
	ON	Port alarm
DSL Port 1 – 2	OFF	No link
	ON (green)	Link established
	ON (red)	Unit is booting
	Flashing (green)	Link negotiation
	Flashing (red))	Downloading firmware to DSL chip

Daisy chain SHDSL connection



The default configuration of the units allow for an Ethernet extension to be made. Connect DSL 1 to DSL 2 on the following units to obtain a chain of linked units.

Configuration

The unit can easily be configured via the onboard Web based configuration tool. Local IP addresses can also be configured by using the Westermo IP Config tool. From the IP Config tool it is then possible to browse into the unit for further configuration.

IP Address

When delivered, the default IP address of the DDW-200 is 192.168.2.200.
The default gateway is 192.168.2.200
If the default address of the unit is valid in the connected network it is possible to access the unit directly from a web browser.

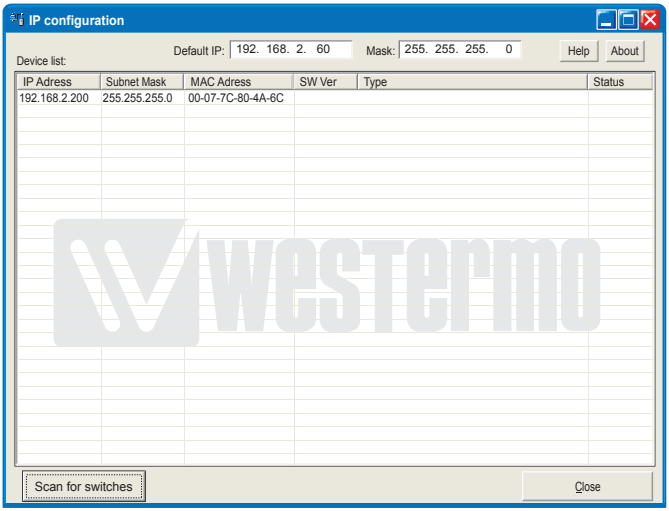
Change local IP address

The local address of DDW-2XX can be configured using the IP Configuration tool. The IP Configuration program is available on the CD or for download from the WESTERMO web page: http://www.westermo.com, (choose Downloads/Software/ Ethernet/Ethernet sitches/)

Name: setup.exe

Install the software and start the application from a PC on the network connected to where the DDW-2XX is installed. Make sure that the Default IP of the configuration software (see figure below) is in the same subnet as your PC.

Note! If you are not sure about the subnet – consult your network administrator.
Note! IP Config version must be 10.0.0 or higher.



Note! If you are not sure about the settings - consult your network administrator.

Figure 1

By clicking the Scan for switches button the IP Configuration Software will detect the Westermo switches on the network. The software will list all Westermo managed switches or routers connected to the network. Information as in figure 1 will appear for each detected unit connected to the same network as your PC.
If you only want to change the IP address and the subnet mask, this can be done within the IP config tool.

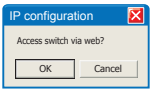


Figure 2

1. Click the listed DDW-2XX that you wish to re-configure.
2. A pop-up screen will show with the message "Access switch via web". Click Cancel, figure 2.
3. Enter the preferred IP address, Subnet mask and IP gateway address, figure 3.

Click Set-button to confirm the settings in the unit, figure 3.

Click the Scan for switches button again and the settings you configured will appear in the list. Now you can access the DDW-2XX via the browser for further configuration by clicking the unit with an IP address that fits your subnet. Figure 2 will appear and now you click the OK button and a web browser will be opened and redirected to the DDW-2XX unit login page, figure 5.

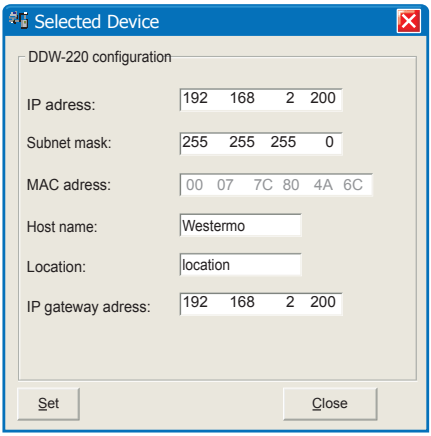


Figure 3

Click the Close button to get back to main view. You will then be asked if you would like to quit. Click the OK button, figure 4, and you will be back to the main view of the IP Configuration program (see figure 1).

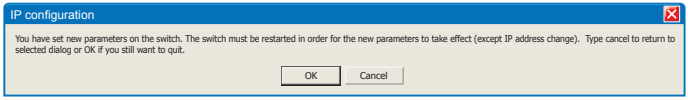
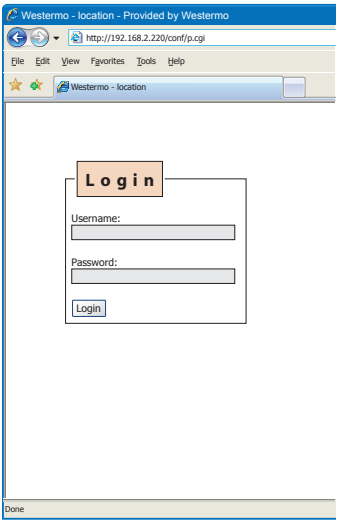


Figure 4



Log in via Web

You will be prompted with a Login screen where the default settings for Username and Password are:
Username: admin
Password: westermo

Figure 5

The unit can be easily configured via the on-board Web based configuration tool. The network interface and switch properties can be configured and stored. The Web tool also has an extended integrated help function describing all configuration options.

Note! Max 10 characters can be used in the login.

Note! For login the following characters are not valid.

ASCII 34 = "
ASCII 35 = #
ASCII 39 = ”
ASCII 40 = (
ASCII 92 = \

Simple Network Management Protocol (SNMP)

The DDW-2XX supports Simple Network Management Protocol version 1 and 2c (SNMPv1 and SNMPv2c). SNMP is an Internet standard protocol (IP) developed to manage IP nodes (servers, workstations, routers, switches and hubs etc.) on an Ethernet network.

SNMP enables network administrators and control engineers to manage network performance, find and solve network problems, and plan for network growth.

The DDW-2XX MIB’s are divided into groups allowing the SNMP manager to poll the SNMP agents for information.

Factory default

It is possible to set the unit to factory default settings by using two Ethernet cables and connect to the unit.

To set the unit to factory default do the following:

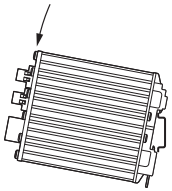
1. Connect Ethernet cable from port 1 to port 4.
2. Connect Ethernet cable from port 2 to port 3.
3. Power up the unit.
4. Wait for the unit to start up. Control that the PWR led is flashing green. The PWR flashing indicates that the unit will be set to factory default.
5. Remove the Ethernet cables, the unit will automatically start with factory default settings.

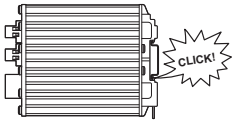
Note The Ethernet cables must be removed within 30 seconds from power up or the unit will do a normal start up.

Mounting

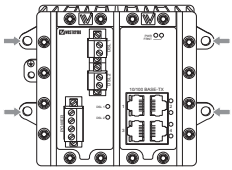
This unit should be mounted on 35 mm DIN-rail, which is horizontally mounted inside an apparatus cabinet or similar. Snap on mounting, see figure.

35 mm DIN-rail shall be mounted with a maximum distance of 70 mm between the mounting points.



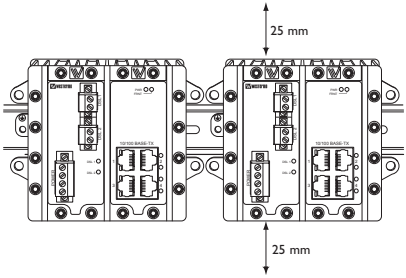


This unit can also be wall-mounted, see figure.



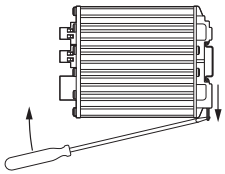
Cooling

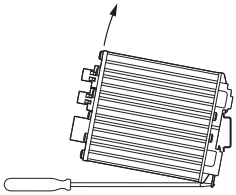
This unit uses convection cooling. To avoid obstructing the airflow around the unit, use the following spacing rules. Minimum spacing 25 mm (1.0 inch) above /below the unit. Spacing is recommended for the use of unit in full operating temperature range and service life.



Removal

Press down the support at the back of the unit using a screwdriver. See figure.





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Other Offices

For complete contact information, please visit our website at www.westermo.com/contact or scan the QR code

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