

User Guide
6644-2240



SDW-500 S E R I E S

SDW-541-F1G-T4G
SDW-550-T5G



**Industrial Ethernet
5-port Switch**

www.westermo.com

Legal information

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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 air flow around the unit, follow the spacing recommendations (see Installation 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.



Class 1 Laser Product

Do not look directly into fibre optical fibre port or any connected fibre although this unit is designed to meet the Class 1 Laser regulations.

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.

Fibre connectors are supplied with plugs to avoid contamination inside the optical port.

As long as no optical fibre is mounted on the connector, e.g. for storage, service or transportation, should the plug be applied.

SPECIAL CONDITION FOR SAFE USE

Ambient temperature:

This unit is designed for use in extreme ambient temperature conditions according to the following: -40 °C to +74 °C (-40 °F to +165 °F)

Note. Fibre Optic Handling

Fibre optic equipment needs special treatment. It is very sensitive to dust and dirt. If the fibre will be disconnected from the modem the protective hood on the transmitter/receiver must be connected. The protective hood must be kept on during transportation. The fibre optic cable must also be handle the same way.

If this recommendation is not, it jeopardises the warranty.

Cleaning of the optical connectors

In the event of contamination, the optical connectors should be cleaned by the use of forced nitrogen and some kind of cleaning stick.

Recommended cleaning fluids:

- Methyl-, ethyl-, isopropyl- or isobutyl-alcohol
- Hexane
- Naphtha

Maintenance

No maintenance is required, as long as the unit is used as intended within the specified conditions.

Agency approvals and standards compliance

| Type | Approval / Compliance |
|------|---|
| EMC | EN 50121-4, Railway applications – Electromagnetic compatibility – Emission and immunity of the signalling and telecommunications apparatus |
| | EN 61000-6-1, Immunity residential environments |
| | EN 61000-6-2, Immunity industrial environments |
| | EN 61000-6-4, Emission industrial environments |

Declaration of Conformity



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 | Model | Art no |
|----------------------------|-----------------|-----------|
| Industrial Ethernet switch | SDW-550-T5G | 3644-2001 |
| | SDW-541-F1G-T4G | 3644-2020 |

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

| No | Short name |
|------------|--|
| 2014/30/EU | Electromagnetic Compatibility (EMC) |
| 2011/65/EU | Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) |

References of standards applied for this EC 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 61000-6-4 | Electromagnetic compatibility – Emission for industrial environments | 2007 |
| EN 50121-4 | Railway applications – Electromagnetic compatibility – Emission and immunity of the signalling and telecommunications apparatus | 2015 |
| 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: 15

Signature

Pierre Öberg
Technical Manager
02nd November 2015

| | | | | | | |
|---------------------------------|-----------------|-----------------|------------|-----------|----------------------------------|-------------------|
| Postadress/Postal address | Tel. | Telefax | Postgiro | Bankgiro | Org.nr/ Corp. identity number | Registered office |
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| | Int+46 16428000 | Int+46 16428001 | | | | |

Type tests and environmental conditions

| Environmental phenomena | Basic standard | Description | Test levels |
|--------------------------------|-----------------------------|----------------------------------|---|
| ESD | EN 61000-4-2 | Enclosure | Contact: ± 6 kV Air: ± 8 kV |
| Fast transients | EN 61000-4-4 | Power port | ± 2 kV |
| | | Signal ports | ± 2 kV |
| Surge | EN 61000-4-5 | Power port | Line to earth: ± 2 kV Line to line: ± 1 kV |
| | | Signal ports | Line to earth: ± 2 kV Line to line: ± 1 kV |
| Power frequency magnetic field | EN 61000-4-8 | Enclosure | 300 A/m; 0, 16.7, 50 Hz |
| Pulsed magnetic field | EN 61000-4-9 | Enclosure | 300 A/m |
| Radiated RF immunity | EN 61000-4-3 | Enclosure | 20 V/m @ (800 – 2700) MHz 10 V/m @ (2700 – 6000) MHz 1 kHz sine, 80% AM |
| Conducted RF immunity | EN 61000-4-6 | Power port | 10 V, 80% AM, 1 kHz; (0.15 – 80) MHz |
| | | Signal ports | 10 V, 80% AM, 1 kHz; (0.15 – 80) MHz |
| Radiated RF emission | CISPR 16-2-3 | Enclosure | Class B |
| | ANSI C63.4 (FCC Part 15) | | Class B, (30 – 6500 MHz) |
| Conducted RF emission | CISPR 16-2-1 | Power port | Class B |
| | | Signal ports | Class B |
| Dielectric strength | EN 60950-1 | Power interface to all other | 1.5kV AC @ 60s duration |
| | | TX signal interface to all other | 1.5kV AC @ 60s duration |
| | | TX shield interface to all other | 1.5kV AC @ 60s duration |
| Environmental | | | |
| Temperatures | EN 60068-2-1 | Operating | -40 to +74 °C (-40 to +165 °F) |
| | EN 60068-2-2 | Storage and transport | -50 to +85 °C (-40 to +185 °F) |
| Relative humidity | EN 60068-2-30 | Operating | 5 to 95 % (non-condensing) |
| | | Storage and transport | 5 to 95 % (condensation allowed outside packaging) |
| Altitude | | Operating | 2 000 m/70 kPa |
| Service life | | Operating | 10 year |
| Reliability prediction (MTBF) | MIL-HDBK-217F | Operating | SDW-541-F1G-T4G: 1.182.000 hours SDW-550-T5G: 1.121.000 hours |
| Vibration | IEC 60068-2-6 (sine) | Operating | 5-8 Hz: 7.5 mm |
| | | | 30-50 Hz: 0.42 mm |
| | | | 8-500 Hz: 2 g |
| Shock | IEC 60068-2-27 | Operating | 15 g, 11 ms |
| Mechanical | | | |
| Enclosure | UL94 | Plastic | Flammability Class V-1 |
| Dimension W x H x D | | | 34 x 123 x 121 mm |
| Weight | | | 0.2 kg |
| Mounting | | DIN-rail | |
| Degree of protection | EN 60529 | Enclosure | IP 21 |
| Cooling | | | Convection |

Configuration

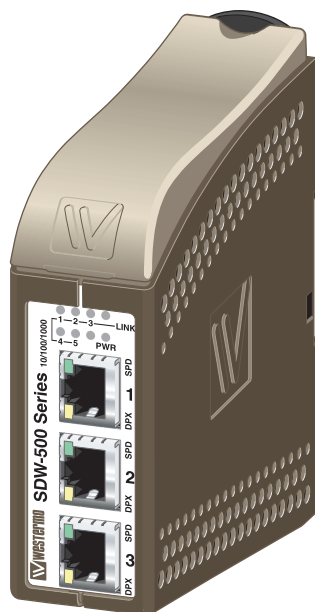
Auto configured (auto-negotiation) or manually setting of speed and duplex of individual TX port, by DIP-switches. Port mirror function is possible to set with DIP-switch. With the port mirror function active the switch will copy all outgoing traffic to port 1. This can be used to monitor all traffic going out from the switch. Packets may be discarded if the total throughput exceeds the port speed of port 1.

Description

The SDW-541-F1G-T4G is an unmanaged 5-port switch with one SFP fibre port and four copper ports, all supporting 100 Mbit/s or Gbit Ethernet. The Westermo range of 100Mbit or Gbit Small Form-factor Pluggable (SFP) transceivers are available as multimode, singlemode or Bi-Di transceivers with distance up to 120 km.

The SDW-550-T5G is an unmanaged 5-port switch with five copper ports, all supporting 10 Mbit/s, 100 Mbit/s or Gbit Ethernet. Both are designed for easy use in heavy duty industrial, maritime and rail trackside applications. The units support 802.1Q long packets which allow all standard industrial Ethernet protocols to be used.

The units are designed for use in industrial applications with dual 10 to 57 VDC power input. The unique “tri-galvanic” isolation provides isolation between all ports, power supply and between each chassis screen avoiding ground loop currents. The IP21 rating ensures that the unit can be installed in locations where condensed water may occur. Only industrial grade components are used which gives an MTBF of 1.182.000 hours for the SDW-541-F1T4G and 1.121.000 hours for the SDW-550-T5G and thus ensures a long service life. A wide operating temperature range of -40 to $+74$ °C (-50 to $+165$ °F) can be achieved with no moving parts.



The units have been tested both by Westermo and external test houses to meet EMC, isolation, vibration and shock standards, all to the highest levels suitable for heavy industrial, trackside and maritime environments.

Network diagnostics are simplified with the inclusion of port mirroring on one port allowing data flow through the switch to be monitored using a network analyzer. All five ports can have data rate and flow control locked by DIP switch which can eliminate problems with old legacy Ethernet equipment that is unable to support auto negotiation.

Interface specifications

| Power | |
|------------------------|---|
| Operating voltage | Rated: 12 to 48 VDC Operating: 9.6 to 57 VDC |
| Rated current | SDW-541-F1G-T4G: 100 mA@12 VDC SDW-550-T5G: 60 mA@12 VDC |
| Rated frequency | DC |
| Inrush current, I^2t | $22.7 \cdot 10^{-3} \text{ A}^2\text{s @ 48 VDC}$ |
| Startup current* | 2 x Rated current |
| Polarity | Reverse polarity protected |
| Redundant power input | Yes |
| Isolation to | All other |
| Connection | Detachable screw terminal |
| Connector size | 0.2 – 2.5 mm ² (AWG 24 – 12) |
| Shielded cable | Not required |

* External supply current capability for proper start-up

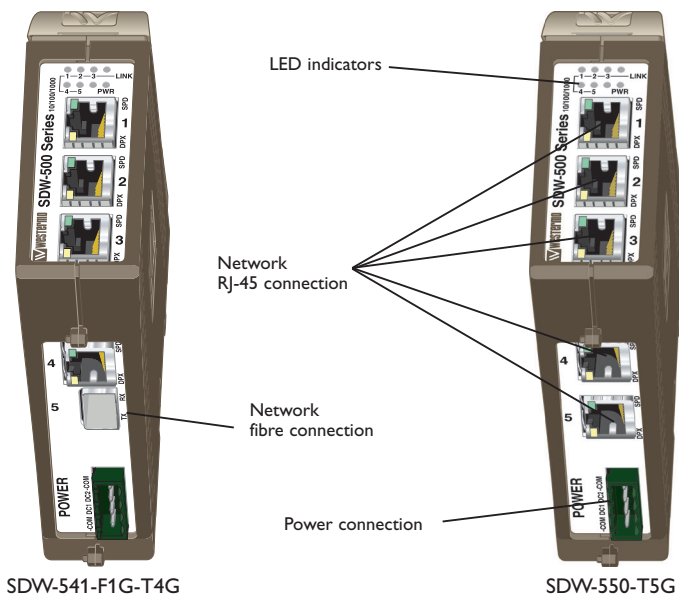
| Ethernet TX | |
|--------------------------|--|
| Electrical specification | IEEE std 802.3. 2005 Edition |
| Data rate | 10 Mbit/s, 100 Mbit/s, 1000 Mbit/s manual or auto |
| Duplex | Full or half, manual or auto |
| Circuit type | TNV-1 |
| Transmission range | Up to 150 m with CAT5e cable or better* |
| Isolation to | All other |
| Connection | RJ-45, auto MDI/MDI-X |
| Shielded cable | Not required, except when installed in Railway applications as signalling and telecommunications apparatus and located close to rails.** |
| Conductive housing | Yes |
| Number of ports | SDW-541-F1G-T4G: 4 SDW-550-T5G: 5 |

* Refer to Safety section.

** To minimise the risk of interference, a shielded cable is recommended when the cable is located inside 3 m boundary or the cable is longer than 30 m and inside 10 m boundary to the rails and connected to this port.

| Ethernet SFP pluggable connections (FX or TX) (SDW-541-F1G-T4G) | |
|--|--|
| Electrical specification | IEEE std 802.3. 2005 Edition |
| Data rate | 100 Mbit/s or 1000 Mbit/s transceivers supported |
| Duplex | Full or Auto, depending on transceiver |
| Transmission range | Depending on transceiver |
| Connection | SFP slot holding fibre transceiver or copper transceiver |
| Number of ports | SDW-541-F1G-T4G: 1 |

Connections



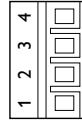
Available models:

- ⌘ SDW-541-F1G-T4G 10/100/1000Base-T/TX: 4 ports, 100/1000Base-FX: 1 port
- ⌘ SDW-550-T5G 10/100/1000Base-T/TX: 5 ports

Power

The SDW-500 series supports redundant power connection. The positive inputs are DC1 and DC2, the negative inputs for both supplies are –COM. The power is drawn from the input with the highest voltage.

| 4-pos screw terminal | Description | Power |
|----------------------|-------------|--------------|
| 1 | –COM | 0V |
| 2 | DC1 | 9.6–57.6 VDC |
| 3 | DC2 | 9.6–57.6 VDC |
| 4 | –COM | 0V |



TX

Ethernet TX connection (RJ-45 connector), automatic MDI/MDI-X crossover.

| Contact | Direction | Description/Remark |
|---------|-----------|--------------------|
| 1 | In/Out | BI_DA+ |
| 2 | In/Out | BI_DA- |
| 3 | In/Out | BI_DB+ |
| 4 | In/Out | BI_DC+ |
| 5 | In/Out | BI_DC- |
| 6 | In/Out | BI_DB- |
| 7 | In/Out | BI_DD+ |
| 8 | In/Out | BI_DD- |
| Shield | In/Out | Connected to PE |



CAT 5 cable is recommended.

Unshielded (UTP) or shielded (STP) connector might be used.

F1G, 1 SFP slots

The F1G interface has one SFP slot supporting Ethernet 10/100/1000 BaseFX/X. Each slot can hold one SFP transceiver for copper or fibre cable. For supported transceivers see SFP transceivers user guide (art no. 6100-0000) available at www.westermo.com.

DIP switch settings SDW-541-F1G-T4G and SDW 550-T5G

DIP-switches are accessible under the lid on top of the unit. DIP-switches are used to configure the unit.



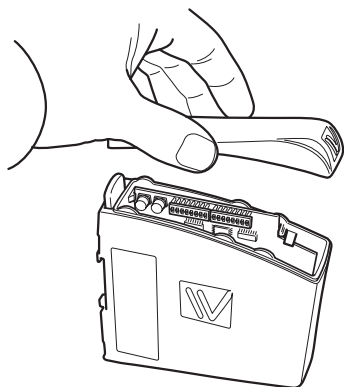
Warning!

Prevent damage to internal electronics from electrostatic discharges (ESD) by discharging your body to a grounding point (e.g. use of wrist strap), before the lid on top/front of the unit is removed.



Warning! Do not open connected equipment.

Prevent access to hazardous voltages by disconnecting the unit from AC/DC mains supply and all other electrical connections.



NOTE

When configuration via DIP-switches, the settings of DIP-switches configure the unit only after a reboot (power off/on).

Observe this when the DIP-switches are configured

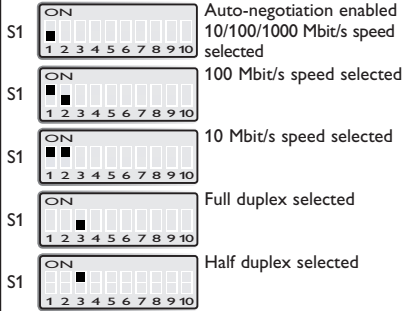
- ⌘ Speed and duplex setting only valid when auto-negotiation is disabled.
- ⌘ When monitoring selected all outgoing packets from the switch is also copied to the port 1.
- ⌘ Speed and duplex switch settings are ignored for FX ports.
- ⌘ If auto-negotiation and auto MDI/MDI-X disabled all TX ports support MDI-X configuration.
- ⌘ If Hub mode is selected, all incoming and outgoing packets are distributed on all other ports.

ONLY VALID FOR SDW-541-F1G-T4G

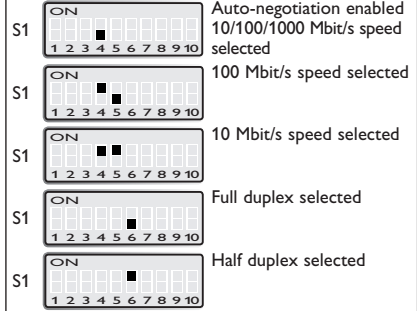
- ⌘ Speed and duplex switch settings are ignored for FX ports.
- ⌘ If auto-negotiation and auto MDI/MDI-X disabled all TX ports support MDI-X configuration.

Port settings

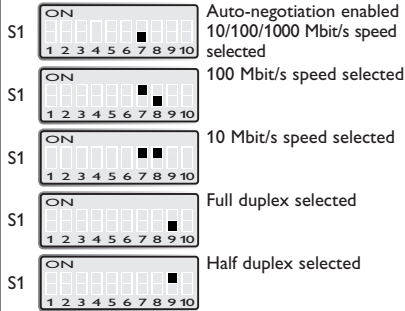
Port 1 settings



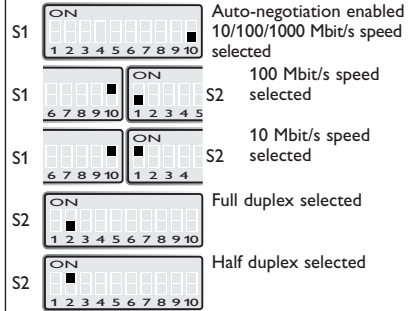
Port 2 settings



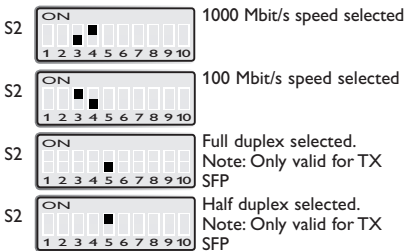
Port 3 settings



Port 4 settings



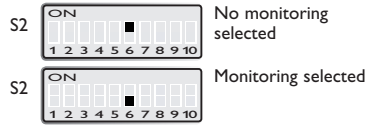
Port 5 settings



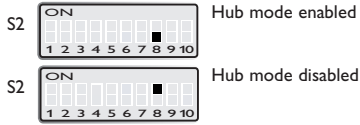
Factory settings



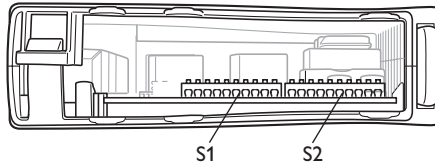
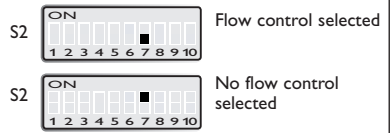
Port mirroring settings



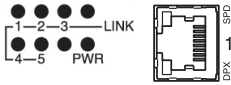
Hub mode



Flow control selected



LED indicators



Indicators (LED)

Power (PWR)

Link (LINK) of every port

Speed (SPD) and duplex (DPX) of TX ports

| LED | Status | Description |
|-----------|-------------|--|
| PWR | ON | Internal power, initialising OK |
| | Slow flash | Initialisation progressing |
| | Fast flash | Initialisation error |
| LINK/SPD | OFF | No Ethernet link |
| | ON | Good Ethernet link |
| | Flash | Ethernet data is transmitted or received, traffic indication |
| | Flash 3 Hz | 10 Mbit/s |
| | Flash 6 Hz | 100 Mbit/s |
| | Flash 12 Hz | 1000 Mbit/s |
| DPX | OFF | Half duplex |
| (TX only) | ON | Full duplex |

SFP Transceivers

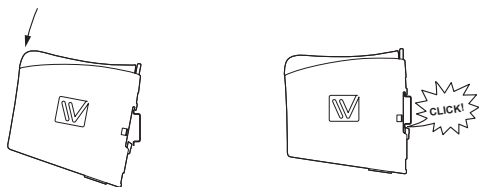
The unit supports Westermo labelled transceivers only.

See Westermo's modular transceivers datasheets 100 Mbit and 1 Gbit for supported SFP transceivers. See Transceiver User Guide "6100-0000" for transceiver handling instructions.



Mounting

This unit should be mounted on 35 mm DIN-rail, which is horizontally mounted on a wall or cabinet backplate. Snap on mounting, see figure.



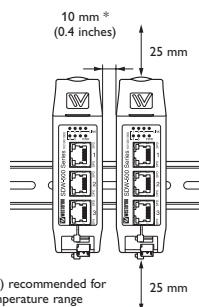
Removal

Press down the black support at the back of the unit, 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 and 10 mm (0.4 inches) left / right the unit. Spacing is recommended for the use of unit in full operating temperature range and service life.



* Spacing (left/right) recommended for full operating temperature range



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