westermo

www.westermo.com

SandCat-3000 Series

Industrial Unmanaged Switches and Media Converters

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1. General Information

1.1. Legal Information

The contents of this document are provided “as is”. Except as required by applicable law, no warranties of any kind are made in relation to the accuracy and reliability or contents of this document, either expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Westermo reserves the right to revise this document or withdraw it at any time without prior notice.

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 www.westermo.com .

1.2. About This Guide

This guide is intended for installation engineers and users of the Westermo products.

It includes information on safety and regulations, a product description, installation instructions and technical specifications.

2.1. Warning Levels

Warning signs are provided to prevent personal injuries and/or damages to the product. The following levels are used:

Level of warning	Description	Consequence personal injury	Consequence material damage
 **WARNING**	Indicates a potentially hazardous situation	Possible death or major injury	Major damage to the product
 **CAUTION**	Indicates a potentially hazardous situation	Minor or moderate injury	Moderate damage to the product
 **NOTICE**	Provides information in order to avoid misuse of the product, confusion or misunderstanding	No personal injury	Minor damage to the product
 **NOTE**	Used for highlighting general, but important information	No personal injury	Minor damage to the product

Table 1. Warning levels

2.2. Safety Information
Before installation:

Read this manual completely and gather all information available on the product. Make sure it is fully understood. Check that your application does not exceed the safe operating specifications for the product.

SAFETY DURING INSTALLATION
The product must be installed and operated by qualified service personnel and installed into an apparatus cabinet or similar, where access is restricted to service personnel only.

Before energising and connecting communication cables to the product, ensure a protective earthing conductor is first connected to the protective earthing terminal (only valid for metallic housings). Westermo recommends a cross-sectional area of at least 4 mm^2.

If the product does not have a protective earthing terminal, then the DIN-rail must be connected to protective earth.

Upon removal of the product, disconnect the product from the power supply and all other communication ports before disconnecting the protective earthing conductor.

HAZARDOUS VOLTAGE
Do not open an energised product. Hazardous voltage may occur when connected to a power supply.

PROTECTIVE FUSE
The power supply wiring must be sufficiently fused.

It must be possible to disconnect manually from the power supply. Ensure compliance to national installation regulations.

Replacing the internal fuse must only be performed by Westermo qualified personnel.

REDUCE THE RISK OF FIRE
To reduce the risk of fire, use only telecommunication line cords with a cable diameter of AWG 26 or larger. Regarding power cable dimensions, see chapter Interface Specifications.

CLASS 1 LASER PRODUCT
Do not look directly into a fibre optical port or any connected fibre.

HANDLING OF SFP TRANSCEIVERS
SFP transceivers are supplied with plugs to avoid contamination inside the optical port. They are very sensitive to dust and dirt. If the fibre optic cable is disconnected from the product, a protective plug must be used on the transmitter/receiver. The protective plug must be kept on during transportation. The fibre optic cable must be handled the same way.

CORROSIVE GASES
If the product is placed in a corrosive environment, it is important that all unused connector sockets are protected with a suitable plug, in order to avoid corrosion attacks on the gold plated connector pins.

ELECTROSTATIC DISCHARGE (ESD)
Prevent electrostatic discharge damage to internal electronic parts by discharging your body to a grounding point (e.g. use a wrist strap).

2.3. Care Recommendations

Follow the care recommendations below to maintain full operation of the product and to fulfill the warranty obligations:

- Do not drop, knock or shake the product. Rough handling above the specification may cause damage to internal circuit boards.
- Use a dry or slightly water-damp cloth to clean the product. Do not use harsh chemicals, cleaning solvents or strong detergents.
- Do not paint the product. Paint can clog the product and prevent proper operation.

If the product is used in a manner not according to specification, the protection provided by the equipment may be impaired.

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

2.4. Product Disposal

This symbol means that the product shall not be treated as unsorted municipal waste when disposing of it. It needs to be handed over to an applicable collection point for recycling electrical and electronic equipment.

Proper disposal of the product helps minimize hazardous substances and prevents potential negative impacts on both the environment and human health.

Figure 1. WEEE symbol for treatment of product disposal

2.5. Compliance Information

2.5.1. Agency Approvals and Standards Compliance

Type	Approval/Compliance
EMC	• EN 50121-4/IEC 62236-4, Railway signalling and telecommunications apparatus • EN/IEC 61000-6-1, Immunity residential environments • EN/IEC 61000-6-2, Immunity industrial environments • EN/IEC 61000-6-4, Emission industrial environments
Safety	• EN/IEC/UL 62368-1, Audio/video, information and communication technology equipment

Table 2. Agency approvals and standards compliance

2.5.2. EN/IEC/UL 62368-1 Notice

This product has been tested and found compliant to EN/IEC/UL 62368-1, Safety for Communication Technology. In accordance with the definitions of the standard:

- This product shall be handled by ordinary personnel.
- This product is not suitable for use in locations where children are likely to be present.
- This product is intended to be supplied by an UL Listed DC power supply suitable for use at Tma 70 °C minimum, whose output meets ES1 (or SELV), PS2 (or LPS) and is rated within 12 to 48 VDC.

2.5.3. FCC Part 15.105 Class A Notice

This product 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 product is operated in a commercial environment.

This product generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user manual, may cause harmful interference to radio communications. Operation of this product in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the users own expense.

2.5.4. Corrosive Environment

This product has been successfully tested in a corrosion test according to IEC 60068-2-60, method 3. This means that the product meets the requirements to be placed in an environment classified as ISA-S71.04 class G3.

CORROSIVE GASES
If the product is placed in a corrosive environment, it is important that all unused connector sockets are protected with a suitable plug, in order to avoid corrosion attacks on the gold plated connector pins.

2.5.5. Simplified Declaration of Conformity

Hereby, Westermo declares that this product is in compliance with applicable EU directives and UK legislations. The full declaration of conformity and other detailed information is available at www.westermo.com/support/product-support.

Figure 2. The European Conformity and the UK Conformity Assessment markings

3. Product Description

3.1. Product Description

The SandCat-3000 series consists of industrial unmanaged gigabit switches and a media converter, developed to meet the needs of both current and future industrial data network applications. These devices are designed for robust performance in demanding environments, such as industrial, maritime and rail trackside applications. They ensure reliable connectivity with support for 802.1Q long packets and standard industrial Ethernet protocols.

The series is designed for use in industrial applications with dual 9.6 to 57.6 VDC power input. The unique "tri-galvanic" isolation provides isolation between all ports, power supply and between each chassis screens and avoids ground loop currents. The IP21 rating ensures that the products can be installed in locations where condensed water may occur.

Only industrial grade components are used which gives the SandCat-3000 series great MTBF hours and ensures a long service life. A wide operating temperature range of -40 to +70°C (-40 to +158°F) can be achieved with no moving parts. The series has 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.

The link fault forward function helps to transfer indication of media failure onto connected ports to ensure that the SandCat-MC-3502-F1G-T1G-LV can be used in resilient network structures.

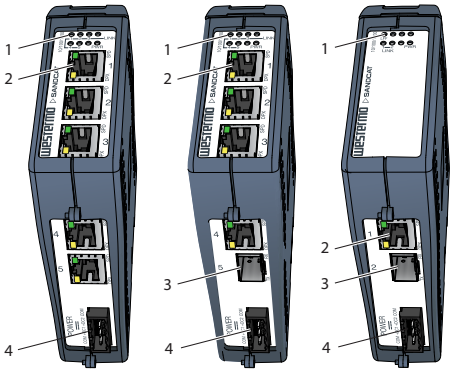
Network diagnostics are simplified with the inclusion of port mirroring on one port, allowing data flow through the switch to be monitored using a network analyzer. All five ports can have data rate and flow control locked by DIP switch which can eliminate problems with old legacy Ethernet equipment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

3.2. Available models

Art. no.	Model	Ethernet T/TX ports	SFP ports
3630-2010	SandCat-3505-T5G-LV	5	-
3630-2020	SandCat-3505-F1G-T4G-LV	4	1
3630-3001	SandCat-MC-3502-F1G-T1G-LV	1	1

Table 3. List of available models

3.3. Hardware Overview



SandCat-3505-T5G-LV, SandCat-3505-F1G-T4G-LV and SandCat-MC-3502-F1G-T1G-LV

No.	Description	No.	Description
1	LED indicators	2	Network RJ-45 connection (no. of ports depending on model)
3	Network fibre connection (not available on SandCat-3505-T5G-LV)	4	Power connection

Figure 3. Location of interface ports and LED indicators

3.4. Connector Information

3.4.1. Power Screw Terminal Plug

Illustration	Position	Product marking	Power
	1	COM	0 V
	2	+DC1	12-48 VDC
	3	+DC2	12-48 VDC
	4	COM	0 V

Table 4. Status screw terminal table

The product 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.

3.4.2. Ethernet Connection TX

Illustration	Pin no.	Description/Remark	Direction
	1	BI_DA+	In/Out
	2	BI_DA-	In/Out
	3	BI_DB+	In/Out
	4	BI_DC+	In/Out
	5	BI_DC-	In/Out
	6	BI_DB-	In/Out
	7	BI_DD+	In/Out
	8	BI_DD-	In/Out
	Shield	Floating with respect of internal logic	In/Out

Table 5. Ethernet connection TX

3.4.3. SFP Transceivers

The product supports Westermo labelled transceivers only. See Westermo's modular transceivers datasheets 100 Mbit and 1 Gbit for supported SFP transceivers, which can be downloaded from the product support pages at www.westermo.com/support/product-support.

Each SFP slot can hold one SFP transceiver. See *"Transceiver User Guide 6100-0000"* for transceiver handling instructions, which also can be downloaded from the product support pages at www.westermo.com/support/product-support.

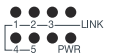
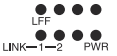
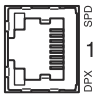
In the event of contamination, the optical connectors in the SFP transceivers should only be cleaned by the use of forced nitrogen and some kind of cleaning stick. Recommended cleaning fluids are methyl-, ethyl-, isopropyl- or isobutyl alcohol, hexane or naphtha.

HANDLING OF SFP TRANSCEIVERS

SFP transceivers are supplied with plugs to avoid contamination inside the optical port. They are very sensitive to dust and dirt. If the fibre optic cable is disconnected from the product, a protective plug must be used on the transmitter/receiver. The protective plug must be kept on during transportation. The fibre optic cable must be handled the same way.

3.5. LED Indicators

(LINK): link of every port, (SPD): speed of TX ports, (DPX): duplex of TX ports

LED	Status	Description	Illustration
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	
LFF[a.]	OFF	Link Fault Forward is not active	
	ON	Link Fault Forward is active and has shut down an interface	

[a.] Only valid for SandCat-MC-3502-F1G-T1G-LV

Table 6. LED indicators

3.6. Dimensions

Dimensions are stated in mm and are regardless of model.

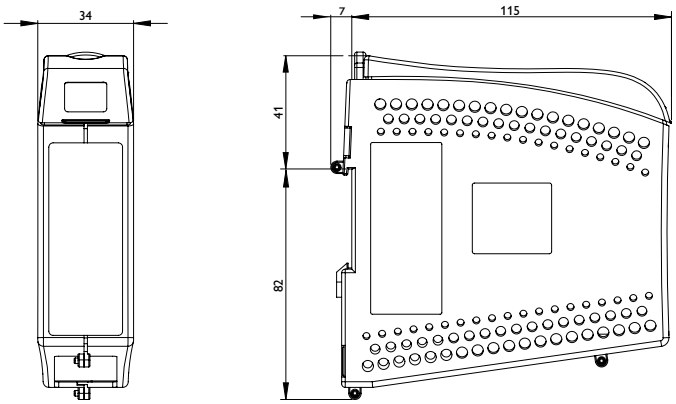


Figure 4. Dimensional drawing

4. Installation

4.1. Mounting

This product should be mounted on a 35 mm DIN-rail, which is horizontally mounted inside an apparatus cabinet or similar. It is recommended that the DIN-rail is connected to ground. Snap on the product to the DIN-rail according to the figure.

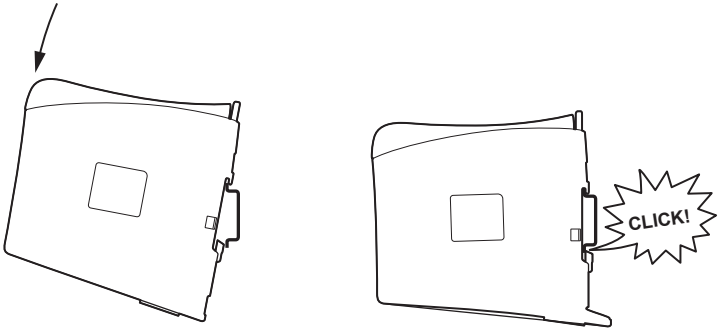


Figure 5. Mounting of product

4.2. Removal of Product

Press down the black support at the top of the unit.

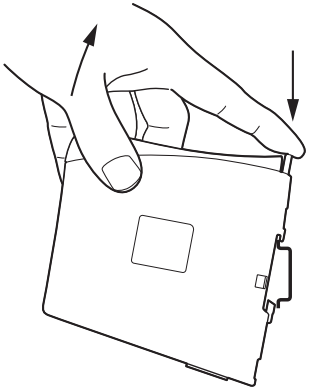


Figure 6. Removal of product

4.3. Cooling

This product uses convection cooling. Spacing is recommended for the use of the product in full operating temperature range and service life. To avoid obstructing the airflow around the product, use the following spacing rules.

A minimum spacing of 25 mm (1 inch) above and below, and 10 mm (0.4 inches) left and right of the product is recommended.

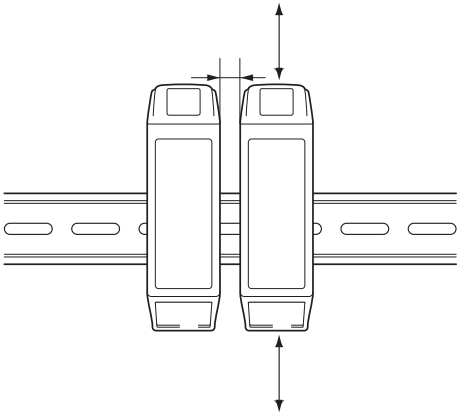


Figure 7. Minimum spacing of product

4.4. Configuration and Settings

HAZARDOUS VOLTAGE
Do not open an energised product. Hazardous voltage may occur when connected to a power supply.

ELECTROSTATIC DISCHARGE (ESD)
Prevent electrostatic discharge damage to internal electronic parts by discharging your body to a grounding point (e.g. use a wrist strap).

DIP switches are accessible under the lid of top of the product. They are used to configure the product.

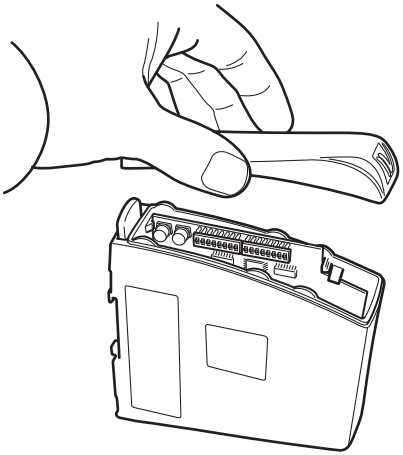


Figure 8. Removal of lid

The SandCat-3505-T5G-LV and SandCat-3505-F1G-T4G-LV can be autoconfigured (auto-negotiation) or manual set for speed and duplex of individual TX port, by the DIP-switches.

A port mirror function is possible to set with the 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.

4.4.1. DIP-Switch Settings for SandCat-3505-T5G-LV and SandCat-3505-F1G-T4G-LV

NOTE
Observe this when the DIP-switches are configured:
- Speed and duplex settings are only valid when auto-negotiation is disabled
- When mirroring is selected, all outgoing packets from the switch is also copied to port 1
- Speed and duplex settings are ignored for the FX-port
- If auto-negotiation and auto MDI/MDI-X is disabled, all TX ports support MDI-X configuration
- If Hub mode is selected, all incoming and outgoing packets are distributed on all other ports

NOTE
When configuring via DIP switches, the settings of the DIP switches configure the product only after a reboot (power off/on).

NOTE
On S2, DIP switch settings no. 9 and 10 are not used

4.4.1.1. Port 1 Settings

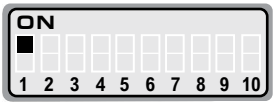
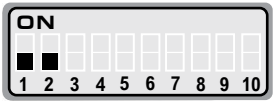
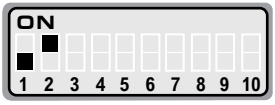
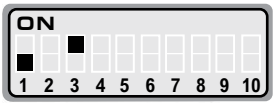
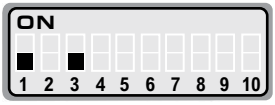
S1	Description
	Auto-negotiation enabled 10/100/1000 Mbit/s speed selected
	10 Mbit/s speed selected
	100 Mbit/s speed selected
	Full duplex selected
	Half duplex selected

Table 7. Port 1 settings SandCat-3505-T5G-LV and SandCat-3505-F1G-T4G-LV

4.4.1.2. Port 2 Settings

S1	Description
	Auto-negotiation enabled 10/100/1000 Mbit/s speed selected
	10 Mbit/s speed selected
	100 Mbit/s speed selected
	Full duplex selected
	Half duplex selected

Table 8. Port 2 settings SandCat-3505-T5G-LV and SandCat-3505-F1G-T4G-LV

4.4.1.3. Port 3 Settings

S1	Description
	Auto-negotiation enabled 10/100/1000 Mbit/s speed selected
	10 Mbit/s speed selected
	100 Mbit/s speed selected
	Full duplex selected
	Half duplex selected

Table 9. Port 3 settings SandCat-3505-T5G-LV and SandCat-3505-F1G-T4G-LV

4.4.1.4. Port 4 Settings

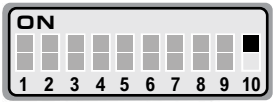
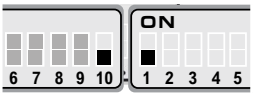
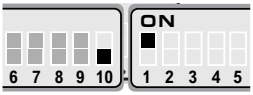
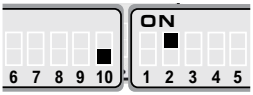
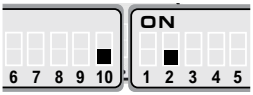
S1 and S2	Description
	(S1) Auto-negotiation enabled 10/100/1000 Mbit/s speed selected
	(S1 left, S2 right) 10 Mbit/s speed selected
	(S1 left, S2 right) 100 Mbit/s speed selected
	(S1 left, S2 right) full duplex selected
	(S1 left, S2 right) half duplex selected

Table 10. Port 4 settings SandCat-3505-T5G-LV and SandCat-3505-F1G-T4G-LV

4.4.1.5. Port 5 Settings

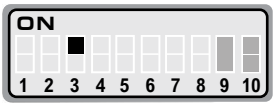
S2	Description
	Auto-negotiation enabled 10/100/1000 Mbit/s speed selected
	10 Mbit/s speed selected
	100 Mbit/s speed selected
	Full duplex selected
	Half duplex selected

Table 11. Port 5 settings SandCat-3505-T5G-LV

S2	Description
	100 Mbit/s speed selected
	1000 Mbit/s speed selected
	Full duplex selected Note: only valid for TX SFP
	Half duplex selected Note: only valid for TX SFP

Table 12. Port 5 settings SandCat-3505-F1G-T4G-LV

4.4.1.6. Port Mirroring Settings

S2	Description
	Mirroring selected
	No mirroring selected

Table 13. Port mirroring settings SandCat-3505-T5G-LV and SandCat-3505-F1G-T4G-LV

4.4.1.7. Flow Control Settings

S2	Description
	Flow control selected
	No flow control selected

Table 14. Flow control settings SandCat-3505-T5G-LV and SandCat-3505-F1G-T4G-LV

4.4.1.8. Hub Mode Settings

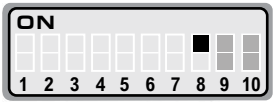
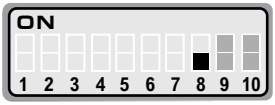
S2	Description
	Hub mode enable
	Hub mode disable

Table 15. Hub mode SandCat-3505-T5G-LV and SandCat-3505-F1G-T4G-LV

4.4.1.9. Factory Settings

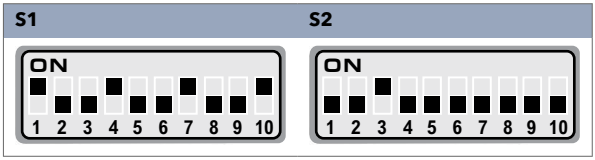


Table 16. Factory settings SandCat-3505-T5G-LV and SandCat-3505-F1G-T4G-LV

4.4.2. DIP-Switch Settings, SandCat-MC-3502-F1G-T1G-LV

NOTE
Observe this when the DIP-switches are configured:
- Speed and duplex settings are only valid when auto-negotiation is disabled
- Speed and duplex settings are ignored for the FX-port

NOTE
When configuring via DIP switches, the settings of the DIP switches configure the product only after a reboot (power off/on).

NOTE
On S1, DIP switch settings no. 1 to 9 are not used
On S2, DIP switch settings no. 6, 8 and 9 are not used

4.4.2.1. Port 1 Settings

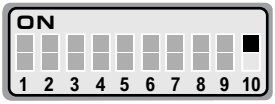
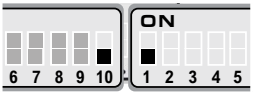
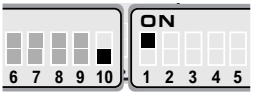
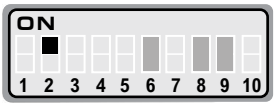
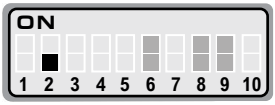
S1	S2	Description
		Auto-negotiation enabled 10/100/1000 Mbit/s speed selected
		(S1 left, S2 right) 10 Mbit/s speed selected
		(S1 left, S2 right) 100 Mbit/s speed selected
		Full duplex selected
		Half duplex selected

Table 17. Port 1 settings SandCat-MC-3502-F1G-T1G-LV

4.4.2.2. Port 2 Settings

S2	Description
	100 Mbit/s speed selected
	1000 Mbit/s speed selected
	Full duplex selected. Note: only valid for TX SFP
	Half duplex selected Note: Only valid for TX SFP

Table 18. Port 2 settings SandCat-MC-3502-F1G-T1G-LV

4.4.2.3. Flow Control Settings

S2	Description
	Flow control selected
	No flow control selected

Table 19. Flow control selected SandCat-MC-3502-F1G-T1G-LV

4.4.2.4. Link Fault Forward Mode Settings

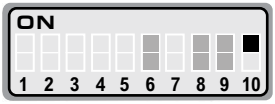
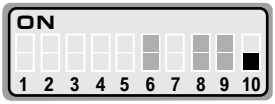
S2	Description
	LFF mode enable
	LFF mode disable

Table 20. Flow control selected SandCat-MC-3502-F1G-T1G-LV

4.4.2.5. Factory Settings

S1	S2
	

Table 21. Factory settings SandCat-MC-3502-F1G-T1G-LV

5.1. Interface Specifications

Power	
Rated voltage	12 to 48 VDC
Operating voltage	9.6 to 57.6 VDC
Rated current	SandCat-3505-T5G-LV: 12 to 48 VDC; 320 to 80 mA SandCat-3505-F1G-T4G-LV: 12 to 48 VDC; 320 to 80 mA SandCat-MC-3502-F1G-T1G-LV: 12 to 48 VDC; 180 to 50 mA
Rated frequency	DC
Inrush current I^2t[a.]	10 mA^2s at 12 VDC 33 mA^2s at 24 VDC 88 mA^2s at 48 VDC
Startup current[b.]	2 x rated current
Polarity	Reverse polarity protected
Redundant power input	Yes
Isolation	All other
Connector	Detachable screw terminal
Connector size	0.5 – 2.5 mm2 (AWG 20 – 12)
Shielded cable	Not required

[a.] Measured for 1 second at startup

[b.] External supply current capability for proper startup

Ethernet TX	
Electrical specification	IEEE std 802.3
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	All other ports
Connection	RJ-45, auto MDI/MDI-X
Cabling	Required
Conductive chassis	Yes
Number of ports	SandCat-3505-T5G-LV: 5 ports SandCat-3505-F1G-T4G-LV: 4 ports SandCat-MC-3502-F1G-T1G-LV: 1 port

SFP ports[a.]	
Optical/Electrical specification	IEEE std 802.3
Data rate	10 Mbit/s, 100 Mbit/s, 1000 Mbit/s manual or auto
Duplex	Full or half, manual or auto
Transmission range	Depending on transceiver
Connector	SFP slot holding fibre or copper transceiver
Number of ports	1 port

[a.] Only valid for SandCat-3505-F1G-T4G-LV and SandCat-MC-3502-F1G-T1G-LV

5.2. 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, 5 kHz, 100 kHz , direct coupling
		Ethernet ports	± 2 kV, 5 kHz, 100 kHz , capacitive clamp
Surge	EN 61000-4-5	Power port	L-E: ± 1 kV, 12 Ω, 9 µF, 1.2/50 µs L-E: ± 2 kV, 42 Ω, 0.5 µF, 1.2/50 µs L-L: ± 0,5 kV, 2 Ω, 18 µF, 1.2/50 µs L-L: ± 1 kV, 42 Ω, 0,5 µF, 1.2/50 µs
		Ethernet ports	L-E: ± 2 kV, 2 Ω, Direct on shield, 1.2/50 µs
Power frequency magnetic field	EN 61000-4-8	Enclosure	100 A/m; 16.7, 50 and 60 Hz 300 A/m DC
Pulse magnetic field	EN 61000-4-9	Enclosure	300 A/m
Radiated RF immunity	EN 61000-4-3	Enclosure	20 V/m at (80 MHz to 2.7 GHz) 10 V/m at (2.7 to 6 GHz)
Conducted RF immunity	EN 61000-4-6	Power port	10 V, 80% AM, 1 kHz; (0.15-80) MHz Spot frequencies: 2, 3, 4, 6.2, 8.2, 12.6, 16.5, 18.8, 22, 25 MHz
		Ethernet ports	
Radiated RF emission	CISPR 16-2-3	Enclosure	Class A (30-6000 MHz)
			DNV - Bridge and Deck Zone (0.15 to 6000 MHz)
	ANSI C63.4		Class A (FCC part 15 B, 30 to 6000 MHz)
Conducted RF emission	CISPR 16-2-1	Power port	Class A (0.15 to 30 MHz)
			DNV - Bridge and Deck Zone (0.01 to 30 MHz)
	ANSI C63.4		Class A (FCC part 15 B, 0.15 to 30 MHz)
	CISPR 22	Ethernet ports	Class A (0.15 to 30 MHz)
Compass safe distance	IEC 60945	Enclosure	Minimum safe distance to: Standard compass: 10 cm Steering compass: 10 cm
Power supply failure	DNV-CG-0339	Power port	U_N - 100%, 30 s
Immunity to conducted low frequency interference	DNV-CG-0339	Power port	3 V_{rms}, 0.05 to 10 kHz
Insulation resistance	DNV-CG-0339	Power port to all other ports	500 VDC, 60 s

Environmental phenomena	Basic standard	Description	Test levels
		Ethernet port to all other ports	
Dielectric strength	DNV-CG-0339	Power port to all other ports	1.5 kV AC rms, 60 s
	UL 62368-1	Ethernet port to all other ports	

Table 22. EMC and electrical conditions

Environmental phenomena	Basic standard	Description	Test levels
Temperatures	EN 60068-2-1 EN 60068-2-2	Operational	-40 to +70 °C (-40 to +158 °F)
		Storage and transport	-40 to +85 °C (-40 to +185 °F)
Humidity	EN 60068-2-30	Damp heat, cyclic	+25 to 55°C, 95% RH 2 cycles (12+12 hours) = 48 hours
Corrosive gases	IEC 60068-2-60	Operational	Method 3, 21 days
Altitude		Operational	2000 m/80 kPa
Service life		Operational	10 years
MTBF	Telcordia	Operational	SandCat-3505-T5G-LV: 1,956,000 SandCat-3505-F1G-T4G-LV: 2,012,000 SandCat-MC-3502-F1G-T1G-LV: 2,427,000
Vibration	IEC 60068-2-6 (sine)	Operational	5 to 8 Hz at ± 7.5 mm 8 to 500 Hz at 2 g 5 sweep cycles in each axis (3 x 5), 1 octave/min
	IEC 60068-2-64 (random)	Operational	2.3 m/s^2 random, 5 to 2000 Hz, 3 x 1.5 h
Shock	IEC 60068-2-27	Operational	15 g, 11 ms, 3 x 6 shocks
Enclosure	UL 94	Plastic	Flammability class V-0
Weight			0.2 kg
Degree of protection	EN 60529		IP21
Cooling			Convection

Table 23. Environmental and mechanical conditions

6. Revision Notes

Revision	Date	Change description
Rev. A	2025-06	First revision of the user guide

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