

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Network and Communication Components

with type designation(s)
RedFox Industrial Rack Ethernet switches RFIR-series

Issued to
Westermo Teleindustri AB
STORA SUNDBY, Södermanlands län, Sweden

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Location classes:

Type	Temperature	Humidity	Vibration	EMC	Enclosure
RFIR-2xx-F4G-T7G-AC	C	B	A	A	A / IP40
RFIR-2xx-F4G-T7G-DC	D	B	A	B	A / IP40
RFIR-1xx-F4G-T7G-AC	C	B	A	A	A / IP40
RFIR-1xx-F4G-T7G-DC	D	B	A	B	A / IP40

Issued at **Høvik** on **2018-11-22**

for **DNV GL**

This Certificate is valid until **2023-12-31**.

DNV GL local station: **Stockholm**

Approval Engineer: **Ståle Sneen**

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Jan Tore Grimsrud
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.



Job Id: **262.1-018685-4**
 Certificate No: **TAA000006J**
 Revision No: **1**

Product description

Westermo RedFox Industrial Rack Ethernet switches (RFIR-series), comprising the following units:

Art. No.	Type Designation	Description
3641-4005	RFIR-219-F4G-T7G-DC	8 x 10/100 Mbit/s, Ethernet TX, RJ-45 7 x 10/100/1000 Mbit/s, Gigabit Ethernet TX, RJ-45 4 x 100/1000 Mbit/s, pluggable connections transceivers supported, Ethernet FX or TX SFP DC power supply
3641-4015	RFIR-219-F4G-T7G-AC	8 x 10/100 Mbit/s, Ethernet TX, RJ-45 7 x 10/100/1000 Mbit/s, Gigabit Ethernet TX, RJ-45 4 x 100/1000 Mbit/s, pluggable connections transceivers supported, Ethernet FX or TX SFP AC power supply
3641-4020	RFIR-127-F4G-T7G-DC	16 x 10/100 Mbit/s, Ethernet TX, RJ-45 7 x 10/100/1000 Mbit/s, Gigabit Ethernet TX, RJ-45 4 x 100/1000 Mbit/s, pluggable connections transceivers supported, Ethernet FX or TX SFP DC power supply
3641-4025	RFIR-227-F4G-T7G-DC	16 x 10/100 Mbit/s, Ethernet TX, RJ-45 7 x 10/100/1000 Mbit/s, Gigabit Ethernet TX, RJ-45 4 x 100/1000 Mbit/s, pluggable connections transceivers supported, Ethernet FX or TX SFP DC power supply
3641-4030	RFIR-127-F4G-T7G-AC	16 x 10/100 Mbit/s, Ethernet TX, RJ-45 7 x 10/100/1000 Mbit/s, Gigabit Ethernet TX, RJ-45 4 x 100/1000 Mbit/s, pluggable connections transceivers supported, Ethernet FX or TX SFP AC power supply
3641-4035	RFIR-227-F4G-T7G-AC	16 x 10/100 Mbit/s, Ethernet TX, RJ-45 7 x 10/100/1000 Mbit/s, Gigabit Ethernet TX, RJ-45 4 x 100/1000 Mbit/s, pluggable connections transceivers supported, Ethernet FX or TX SFP AC power supply

Westermo Small Form-factor Pluggable (SFP) transceivers, 100 Mbit/s:

Art. No.	Type Designation	Description
1100-0131	MLC2	Multimode, 100 Mbit/s, Range 2km, Power budget 11dB, TX/RX Wavelength 1310/1310 nm
1100-0132	SLC20	Singlemode, 100 Mbit/s, Range 20km, Power budget 19dB, TX/RX Wavelength 1310/1310 nm
1100-0133	SLC40	Singlemode, 100 Mbit/s, Range 40km, Power budget 30dB, TX/RX Wavelength 1310/1310 nm
1100-0134	SLC80	Singlemode, 100 Mbit/s, Range 80km, Power budget 30dB, TX/RX Wavelength 1550/1550 nm
1100-0140	SLC120	Singlemode, 100 Mbit/s, Range 120km, Power budget 35dB, TX/RX Wavelength 1550/1550 nm
1100-0152	MLC2-BiDi-A	Multimode, 100 Mbit/s, Range 2km, Power budget 18dB, TX/RX Wavelength 1310/1550 nm
1100-0153	MLC2-BiDi-B	Multimode, 100 Mbit/s, Range 2km, Power budget 18dB, TX/RX Wavelength 1550/1310 nm

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Art. No.	Type Designation	Description
1100-0145	SLC20-BiDi-A	Singlemode, 100 Mbit/s, Range 20km, Power budget 18dB, TX/RX Wavelength 1310/1550 nm
1100-0146	SLC20-BiDi-B	Singlemode, 100 Mbit/s, Range 20km, Power budget 18dB, TX/RX Wavelength 1550/1310 nm
1100-0154	SLC40-BiDi-A	Singlemode, 100 Mbit/s, Range 40km, Power budget 26dB, TX/RX Wavelength 1310/1550 nm
1100-0155	SLC40-BiDi-B	Singlemode, 100 Mbit/s, Range 40km, Power budget 26dB, TX/RX Wavelength 1550/1310 nm
1100-0177	SLC80-BiDi-A	Singlemode, 100 Mbit/s, Range 80km, Power budget 29dB, TX/RX Wavelength 1310/1550 nm
1100-0178	SLC80-BiDi-B	Singlemode, 100 Mbit/s, Range 80km, Power budget 35dB, TX/RX Wavelength 1310/1550 nm
1100-0172	TX100	100/10 Mbit/s, Range 100m, Copper RJ45
1100-0531	MLC2-DDM	Multimode, 100 Mbit/s, Range 2km, Power budget 11dB, TX/RX Wavelength 1310/1310 nm
1100-0532	SLC20-DDM	Multimode, 100 Mbit/s, Range 20km, Power budget 17dB, TX/RX Wavelength 1310/1310 nm
1100-0533	SLC40-DDM	Multimode, 100 Mbit/s, Range 40km, Power budget 30dB, TX/RX Wavelength 1310/1310 nm
1100-0534	SLC80-DDM	Singlemode, 100 Mbit/s, Range 80km, Power budget 30dB, TX/RX Wavelength 1550/1550 nm
1100-0540	SCL120-DDM	Singlemode, 100 Mbit/s, Range 120km, Power budget 35dB, TX/RX Wavelength 1550/1550 nm
1100-0554	SLC40-BiDi-A-DDM	Singlemode, 100 Mbit/s, Range 40km, Power budget 26dB, TX/RX Wavelength 1310/1550 nm
1100-0555	SLC40-BiDi-B-DDM	Singlemode, 100 Mbit/s, Range 40km, Power budget 26dB, TX/RX Wavelength 1550/1310 nm
1100-0573	SLC120-BiDi-A-DDM	Singlemode, 100 Mbit/s, Range 120km, Power budget 32dB, TX/RX Wavelength 1550/1490 nm
1100-0574	SLC120-BiDi-A-DDM	Singlemode, 100 Mbit/s, Range 120km, Power budget 32dB, TX/RX Wavelength 1490/1550 nm

Westermo Small Form-factor Pluggable (SFP) transceivers, 1000 Mbit/s (Gigabit):

Art. No.	Type Designation	Description
1100-0144	GMLC550-SX	Multimode, 1000 Mbit/s, Range 0,55km, Power budget 8,5dB, TX/RX Wavelength 850/850 nm
1100-0147	GMLC2-SX+	Multimode, 1000 Mbit/s, Range 2km, Power budget 10dB, TX/RX Wavelength 1310/1310 nm
1100-0141	GSLC10-LX	Singlemode, 1000 Mbit/s, Range 10km, Power budget 10,5dB, TX/RX Wavelength 1310/1310 nm
1100-0142	GSLC50-XD	Singlemode, 1000 Mbit/s, Range 50km, Power budget 20dB, TX/RX Wavelength 1550/1550 nm
1100-0143	GSLCLC80-ZX	Singlemode, 1000 Mbit/s, Range 80km, Power budget 24dB, TX/RX Wavelength 1550/1550 nm
1100-0171	GSLC110-EZX	Singlemode, 1000 Mbit/s, Range 120km, Power budget 30dB, TX/RX Wavelength 1550/1550 nm
1100-0156	GSLC20-BiDi-A	Singlemode, 1000 Mbit/s, Range 20km, Power budget 15dB, TX/RX Wavelength 1310/1490 nm
1100-0157	GSLC20-BiDi-B	Singlemode, 1000 Mbit/s, Range 20km, Power budget 15dB, TX/RX Wavelength 1490/1310 nm
1100-0148	GTX100	1000Mbit/s, 0,1km, Copper RJ45
1100-0547	GMLC2-DDM	Multimode, 1000 Mbit/s, Range 2km, Power budget 10dB, TX/RX Wavelength 1310/1310 nm
1100-0525	GSLC30-DDM	Singlemode, 1000 Mbit/s, Range 2km, Power budget 20dB, TX/RX Wavelength 1310/1310 nm

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Art. No.	Type Designation	Description
1100-0541	GSLC10-DDM	Singlemode, 1000 Mbit/s, Range 50km, Power budget 12dB, TX/RX Wavelength 1310/1310 nm
1100-0542	GSLC50-DDM	Singlemode, 1000 Mbit/s, Range 50km, Power budget 20dB, TX/RX Wavelength 1310/1310 nm
1100-0543	GSLC80-DDM	Singlemode, 1000 Mbit/s, Range 80km, Power budget 24dB, TX/RX Wavelength 1550/1550 nm
1100-0558	GSLC20-BiDi-A-DDM	Singlemode, 1000 Mbit/s, Range 20km, Power budget 15dB, TX/RX Wavelength 1310/1550 nm
1100-0559	GSLC20-BiDi-B-DDM	Singlemode, 1000 Mbit/s, Range 20km, Power budget 15dB, TX/RX Wavelength 1550/1310 nm
1100-0566	GSLC60-BiDi-A-DDM	Singlemode, 1000 Mbit/s, Range 60km, Power budget 25dB, TX/RX Wavelength 1310/1550 nm
1100-0567	GSLC40-BiDi-A-DDM	Singlemode, 1000 Mbit/s, Range 40km, Power budget 20dB, TX/RX Wavelength 1310/1490 nm
1100-0568	GSLC40-BiDi-B-DDM	Singlemode, 1000 Mbit/s, Range 40km, Power budget 20dB, TX/RX Wavelength 1490/1310 nm
1100-0569	GSLC60-BiDi-B-DDM	Singlemode, 1000 Mbit/s, Range 60km, Power budget 25dB, TX/RX Wavelength 1550/1310 nm

Version information at date of issue of this certificate: HW Rev. 01 and WeOS SW/FW Rev. 4.17.1.

Dielectric strength – signal to other isolated ports: 1.5 kVAC
Dielectric strength – power to other isolated ports: 1.5 kVAC

Approval conditions

The Type Approval covers hardware listed under Product description. When the hardware is used in applications to be classed by DNV GL, documentation for the actual application is to be submitted for approval by the manufacturer of the application system in each case. Reference is made to DNV GL rules for classification of ships Pt.4 Ch.9 Control and monitoring systems.

Application/Limitation

DC powered units (Type Designation ending with "-DC")

Compass safe distance: Standard: 20 cm, Steering: 10 cm.

Tested and approved for direct connection to 24 to 48 VDC distribution boards (test voltage 18.0 - 62.4 VDC).

AC powered units (Type Designation ending with "-AC")

Compass safe distance for AC powered units: Standard: 55 cm, Steering: 30 cm.

Tested and approved for direct connection to 115/230 VAC 50/60 Hz distribution boards.

Type Approval documentation

User Guide: RedFox Industrial Rack Series: 6641-22810 Rev.F, dated 2015-09,
Westermo OS Management Guide: 6101-3201 Version 4.17.1-0.

Data sheets: RFIR-219-F4G-T7G-DC Rev.C, RFIR-219-F4G-T7G-AC Rev.D,
RFIR-127-F4G-T7G-DC Rev.A, RFIR-227-F4G-T7G-DC Rev.C,
RFIR-127-F4G-T7G-AC Rev.A, RFIR-227-F4G-T7G-AC Rev.D,
100 Mbit Transceivers Rev.B, Gigabit Transceivers Rev.B,
WeOS Westermo Operating System.

Test reports: DELTA REC-E703968 Rev. -, dated 2014-10-23

Type approval renewal assessment report for TAA000006J, DNV GL Stockholm 2018-11-21.

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Tests carried out

Applicable tests according to class guideline DNVGL-CG-0339, November 2016.
Radiated emission 1 – 6 GHz according to IEC 61000-6-3:2007+A1.
15 g, 11 ms shock test according to IEC 60068-2-27:2008.
For the bridge mounted components the 'Compass safe distance' was measured according to section 11.2 of IEC 60945 4th edition (2002).

Marking of product

Westermo
Art. No. and Type as listed under Product description
Unique serial number
Power supply voltage and current rating

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE