

TYPE APPROVAL CERTIFICATE**This is to certify:****That the Peripheral Equipment**

with type designation(s)

RedFox Industrial Routing Switches RFI- and RFI-EX-series including SFP's

Issued to

**Westermo Teleindustri AB
STORA SUNDBY, Sweden**

is found to comply with

DNV GL rules for classification – Ships and offshore units**Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.****Location classes:**

Temperature	D
Humidity	B
Vibration	A
EMC	B
Enclosure	A / IP40

This Certificate is valid until **2018-12-31**.Issued at **Høvik** on **2015-11-12**DNV GL local station: **Stockholm**Approval Engineer: **Ståle Sneen**for **DNV GL**

**Odd Magne Nesvåg
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.

Product description

Westermo RedFox Industrial Routing Switches (RFI- and RFI-EX-series), comprising the following units:

Art. No.	Type Designation	Description
3641-4100	RFI-219-T3G	3 x 10/100/1000 Mbit/s, Ethernet TX, RJ-45
3641-5100	RFI-219-T3G-EX	16 x 10/100 Mbit/s, Ethernet TX, RJ-45
3641-4110	RFI-211-T3G	3 x 10/100/1000 Mbit/s, Ethernet TX, RJ-45
3641-5110	RFI-211-T3G-EX	8 x 10/100 Mbit/s, Ethernet TX, RJ-45
3641-4200	RFI-215-F4G-T3G	3 x 10/100/1000 Mbit/s, Ethernet TX, RJ-45
3641-5200	RFI-215-F4G-T3G-EX	8 x 10/100 Mbit/s, Ethernet TX, RJ-45
3641-4210	RFI-207-F4G-T3G	3 x 10/100/1000 Mbit/s, Ethernet TX, RJ-45
3641-5210	RFI-207-F4G-T3G-EX	4 x 100/1000 Mbit/s, pluggable connections transceivers supported, Ethernet FX or TX SFP.
3641-4300	RFI-219-F4G-T7G	7 x 10/100/1000 Mbit/s, Gigabit Ethernet TX, RJ-45
3641-4305	RFI-119-F4G-T7G	8 x 10/100 Mbit/s, Ethernet TX, RJ-45
3641-5300	RFI-219-F4G-T7G-EX	4 x 100/1000 Mbit/s, pluggable connections transceivers supported, Ethernet FX or TX SFP.
3641-4310	RFI-211-F4G-T7G	7 x 10/100/1000 Mbit/s, Gigabit Ethernet TX, RJ-45
3641-4315	RFI-111-F4G-T7G	4 x 100/1000 Mbit/s, pluggable connections transceivers supported, Ethernet FX or TX SFP.
3641-5310	RFI-211-F4G-T7G-EX	4 x 100/1000 Mbit/s, pluggable connections transceivers supported, Ethernet FX or TX SFP.
3641-4320	RFI-219-F4G-T7G-F8	7 x 10/100/1000 Mbit/s, Gigabit Ethernet TX, RJ-45
3641-5320	RFI-219-F4G-T7G-F8-EX	4 x 100/1000 Mbit/s, pluggable connections transceivers supported, Ethernet FX or TX SFP. 8 x 100 Mbit/s, pluggable connections transceivers supported, Ethernet FX or TX SFP.

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
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

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Art. No.	Type Designation	Description
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	GSLC80-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
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

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Art. No.	Type Designation	Description
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. 02 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

Application/Limitation

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.

Ex-certification is not covered by this certificate. Application in hazardous area to be approved in each case according to the Rules and Ex-Certification/ Special Condition for Safe Use listed in valid Ex-certificate issued by a notified/recognized Certification Body.

Compass safe distance for all units: 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).

Type Approval documentation

User Guide: RedFox Industrial Series: 6641-22310 Rev. F, dated 2015-09,
RedFox Industrial Ex-Series: 6641-22400 Rev. A, dated 2015-08,
Westermo OS Management Guide 6101-3201 Version 4.17.1-0.

Data sheets: RFI-219-T3G Rev.A, RFI-219-T3G-EX Rev.B,
RFI-211-T3G Rev.A, RFI-211-T3G-EX Rev.B,
RFI-215-F4G-T3G Rev.A, RFI-215-F4G-T3G-EX Rev.B,
RFI-207-F4G-T3G Rev.A, RFI-207-F4G-T3G-EX Rev.B,
RFI-219-F4G-T7G Rev.A, RFI-219-F4G-T7G-EX Rev.B,
RFI-211-F4G-T7G Rev.A, RFI-211-F4G-T7G-EX Rev.B,
RFI-219-F4G-T7G-F8 Rev.A, RFI-219-F4G-T7G-F8-EX Rev.B,
100 Mbit Transceivers Rev.B, Gigabit Transceivers Rev.B,
WeOS Westermo Operating System.

Ex-approvals: Baseefa15ATEX0093X, dated 2015-09-11,
IECEX BAS 15.0066X Issue 0, dated 2015-09-11.

Test reports: DELTA REC-E703959 Rev. A, dated 2015-02-18

Tests carried out

Applicable tests according to Standard for Certification No. 2.4, April 2006.

Radiated emission 1 – 6 GHz according to IEC 61000-6-4:2007+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

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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 at least every second year and at renewal of this certificate.

END OF CERTIFICATE