

TYPE APPROVAL CERTIFICATE**This is to certify:****That the Network and Communication Components**

with type designation(s)

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

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:**

| | |
|--------------------|-----------------|
| Temperature | D |
| Humidity | B |
| Vibration | A |
| EMC | B |
| Enclosure | 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**

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: **262.1-018457-3**
 Certificate No: **TAA000006B**
 Revision No: **1**

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

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

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

Type approval renewal assessment report for TAA000006B, DNV GL Stockholm 2018-11-21.

Tests carried out

Applicable tests according to class guideline DNVGL-CG-0339, November 2016.

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).

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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