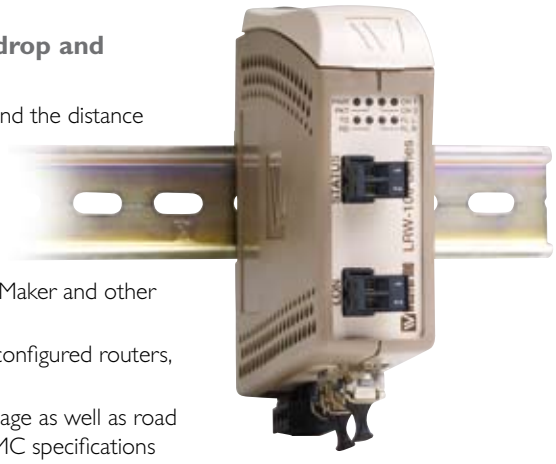
Fibre optic router for TP/FT-10
LRW-112



LonWorks® to fibre optic link, multidrop and redundant ring applications

The LRW-112 router offers an easy way to extend the distance between LONWORKS 78 kbit/s TP/FT network segment using a high speed 1250 kbit/s back-bone fibre optic network link.

LRW-112 is based on the Echelon RTR-10 standard router core module, thus allowing standard configuration and installation using LonMaker and other LNS-based tools.

LRW-112 devices can be installed as repeaters, configured routers, or learning routers.

The LRW-112 is designed for harsh industrial usage as well as road or railway installations meeting industrial level EMC specifications and having a wide operating temperature range.

The unit also has a re-timing function that eliminates the problem of jitter and hence ensures reliable communications in all situations.

Configuration

Easy to configure with DIP-switches.

Harsh industrial environment

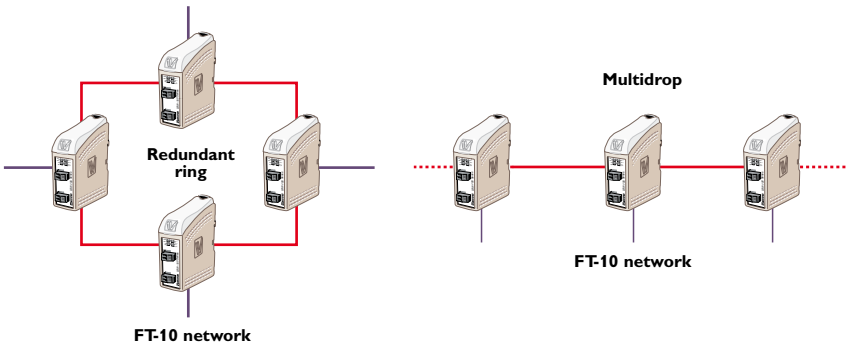
The units are well prepared for use in harsh industrial environments. Total galvanic isolation and transient protection are standard for all interfaces. The line interfaces are also equipped with extensive protection against over-currents and voltage suppression.

The DIN mounted case of the unit makes it easy to mount. The surrounding air temperature can be between –40 to 60°C. To allow for uninterrupted communication the units are designed with redundant power inputs that can be powered from two separate supplies and handle an operating voltage range of 10 – 60 VDC.

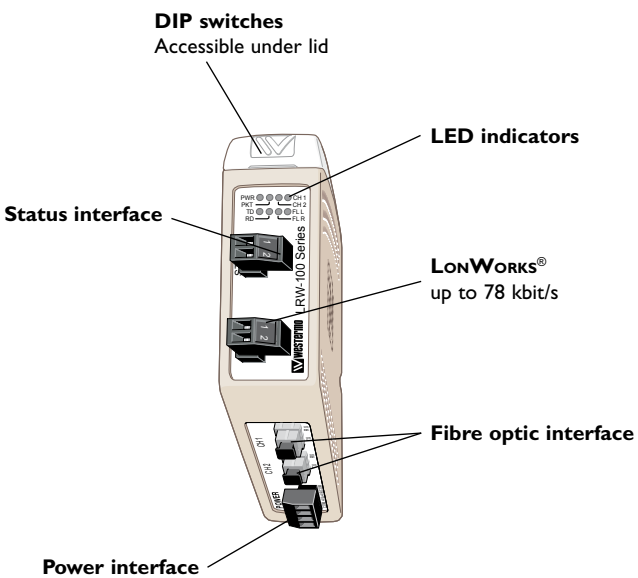
Approvals

The construction of the units has gone through extensive testing and approvals both by Westermo and accredited test houses. The LRW-112 has approvals for industrial as well as railway use.

Application



Interfaces



Technical Data

Power	
Rated voltage	12 to 48 VDC 24 VAC
Operating voltage	10 to 60 VDC 20 to 30 VAC
Rated current	400 mA @ 12 VDC 200 mA @ 24 VDC 100 mA @ 48 VDC
Rated frequency	DC
Inrush current I^2t	0.2 A^2s
Startup current*	1.0 Apeak
Polarity	Reverse polarity protected
Redundant power input	Yes
Isolation to	LON TP/FT-10 and Status port
Galvanic connection to	–
Connection	4- pos detachable screw terminal
Connector size	0.2 – 2.5 mm^2 (AWG 24 – 12)
Shielded cable	Not required

* External supply current capability for proper startup

Status	
Port type	Solid state relay
Rated voltage	Up to 48 VDC
Operating voltage	Up to 60 VDC
Contact rating	500 mA @ 48 VDC
Contact resistance	< 50 mA
Isolation to	LON TP/FT-10 and power port
Connection	2-position detachable screw terminal
Connector size	0.2 – 2.5 mm^2 (AWG 24 – 12)

LON Interface	
Electrical specification	FTT-10A, EIA 709.3
Data rate	78 kbit/s
Data format	Differential Manchester
Protocol	EIA 709.1
Transmission range	Bus Topology (2700 m [2.7 mi]), Free Topology (500 m [1640 ft])
Settings	None, external termination and failsafe biasing
Protection	Installation Fault Tolerant (up to ±60 V)
Isolation to	Power and Status port
Connection	2-position detachable screw terminal
Shielded cable	Not required
Conductive housing	Isolated to all other circuits and housings

FX (Fibre)	SM-LC15	MM-LC2
Fibre connector	LC duplex	LC duplex
Fibre type	Singlemode 9/125 µm	Multimode, 62.5/125 and 50/125 µm
Wavelength nm	1310	1310
Transmitter Output optical power min/max	–15/–8 dBm**	–20/–14 dBm*
Receiver Input sensitivity, max	–31 dBm	–31 dBm
Receiver Input optical power, max	–8 dBm	–8 dBm
Optical power budget, worst-case	16 dB	11 dB
Transceiver type	Small Form Factor Pluggable (SFP) Multi-Sourcing Agreement (MSA) compliant	
Laser class	Class 1, IEC 825-1 Accessible Emission Limit (AEL)	

FX (Fibre)	Bi-di LC-20	Bi-di MM LC-2
Fibre connector	LC Simplex	LC Simplex
Fibre type	Singlemode 9/125 µm	Multimode 62.5/125 and 50/125 µm
Wavelength nm, connector 1 Wavelength nm, connector 2	Tx1310, rx 1550 TX 1550, rx 1310	Tx 1310, rx 1550 Tx 1550, rx 1310
Transmitter Output optical power min/max	-10/0 dBm **	–10/–8 dBm *
Receiver Input sensitivity, max	–28 dBm	–28 dBm
Receiver Input optical power, max	0 dBm	–0 dBm
Optical power budget, worst-case	18 dB	18 dB
Transceiver type	Small Form Factor Pluggable (SFP) Multi-Sourcing Agreement (MSA) compliant	
Laser class	Class 1, IEC 825-1 Accessible Emission Limit (AEL)	

* Output power is power coupled into a 62.5/125 µm multimode fibre

** Output power is power coupled into a 9/125 µm singlemode fibre

*** The optical power should be reduced by at least 5 dB (SM-LC80 and Bi-di LC-60) or 3dB (SM-LC-40 and Bi-di LC-40) between the optical output and input.

Type tests and environmental conditions

Electromagnetic Compatibility			
Phenomena	**Test**	**Description**	**Test levels**
ESD	EN 61000-4-2	Enclosure contact	± 4 kV
		Enclosure air	± 8 kV
RF field AM modulated	IEC 61000-4-3	Enclosure	10 V/m 80% AM (1 kHz), 80 – 1 000 MHz
Fast transient	EN 61000-4-4	Signal ports	± 1 kV
		Power ports	± 2 kV
Surge	EN 61000-4-5	Signal ports balanced	± 1 kV line to earth, ± 1 kV line to line
		Power ports	± 0.5 kV line to earth, ± 0.5 kV line to line
RF conducted	EN 61000-4-6	Signal ports	10 V 80% AM (1 kHz), 0.15 – 80 MHz
		Power ports	10 V 80% AM (1 kHz), 0.15 – 80 MHz
Power frequency magnetic field	EN 61000-4-8	Enclosure	100 A/m, 50 Hz, 16.7 Hz & 0 Hz
Pulse magnetic field	EN 61000-4-9	Enclosure	300 A/m, 6.4 / 16 ms pulse
Voltage dips and interruption	EN 61000-4-11	AC power ports	10 & 5 000 ms, interruption10 & 500 ms, 30% reduction 100 & 1 000 ms, 60% reduction
Mains freq. 50 Hz	EN 61000-4-16	Signal ports	100 V 50 Hz line to earth
Mains freq. 50 Hz	SS 436 15 03	Signal ports	250 V 50 Hz line to line
Voltage dips and interruption	EN 61000-4-29	DC power ports	10 & 100 ms, interruption10 ms, 30% reduction10 ms, 60% reduction+20% above & –20% below rated voltage
Radiated emission	EN 55022	Enclosure	Class B
	FCC part 15		Class A
Conducted emission	EN 55022	AC power ports	Class B
	FCC part 15	AC power ports	Class A
	EN 55022	DC power ports	Class B
Dielectric strength	EN 60950	Signal port to other isolated ports	1.5 kVrms 50 Hz 1 min
		Power port to other isolated ports	2 kVrms 50 Hz 1 min
Environmental			
Temperature		Operating	–40 to +60°C
		Storage & Transport	–40 to +70°C
Humidity		Operating	5 to 95% relative humidity
		Storage & Transport	5 to 95% relative humidity
Altitude		Operating	2 000 m (1.2 mi) / 70 kPa
Service life		Operating	10 year
Vibration	IEC 60068-2-6	Operating	7.5 mm, 5 – 8 Hz 2 g, 8 – 500 Hz
Shock	IEC 60068-2-27	Operating	15 g, 11 ms
Packaging			
Enclosure	UL 94	PC / ABS	Flammability class V-1
Dimension W x H x D			35 x 121 x 119 mm
Weight			0.26 kg
Degree of protection	IEC 529	Enclosure	IP 21
Cooling			Convection
Mounting			Horizontal on 35 mm DIN-rail