

# Fibre Optic Modem

## ODW-611

### PROFIBUS DP to fibre optic link, point-to-point applications

The ODW-611 is a fibre optic modem designed for point-to-point fibre optic connections between PROFIBUS DP networks. The ODW-611 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 maximum distance of the fibre link depends on selected transceiver and fibre type. Fibre distances up to 80 km (50 miles) are possible using singlemode fibre.

The ODW-611 is able to automatically detect the data rate of the connected PROFIBUS DP network and hence needs minimal configuration prior to use. The unit also has a re-timing function that eliminates the problem of jitter and hence ensures reliable communications in all situations.

The ODW-611 can also be used in start/end points in a multidrop application together with ODW-612.

### Configuration and diagnostics

Easy to configured 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 to be between  $-40$  to  $70^{\circ}\text{C}$ . To allow for uninterrupted communication the units are supplied with redundant power inputs that can be powered from two separate supplies and handle an operating voltage range of  $10 - 60\text{VDC}$ .

### Approvals

The construction of the units has gone through extensive testing and approvals both by Westermo and accredited test houses. The ODW-611 has approvals for industrial as well as railway use.



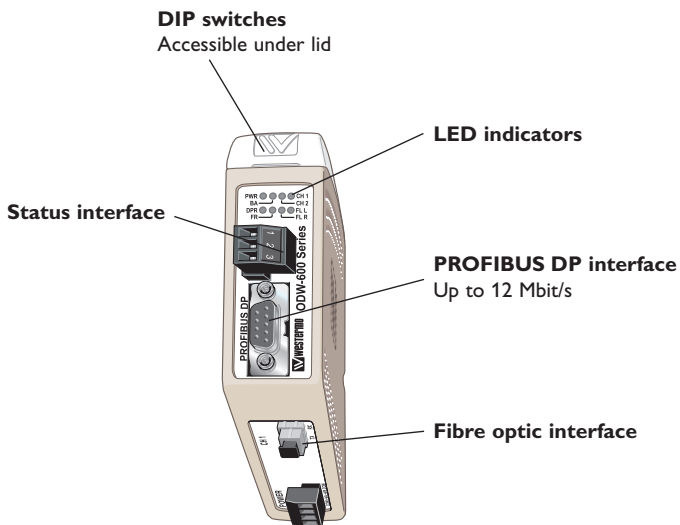
## Application



Point-to-point

Distances between units up to 80 km (50 miles)

## Interfaces



## Technical Data

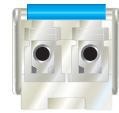
Power	
Rated voltage	12 to 48 VDC 24 VAC
Operating voltage	10 to 60 VDC 20 to 30 VAC
Rated current	300 mA @ 12 V 150 mA @ 24 V 75 mA @ 48 V
Rated frequency	DC
Inrush current I <sup>2</sup> t	0.2 A <sup>2</sup> s
Startup current*	1.0 A <sub>peak</sub>
Polarity	Reverse polarity protected
Redundant power input	Yes
Isolation to	PROFIBUS DP and Status port
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm <sup>2</sup> (AWG 24 – 12)
Shielded cable	Not required

\* External supply current capability for proper startup

Status	
Port type	Signal relay, changeover contacts
Rated voltage	Up to 48 VDC
Operating voltage	Up to 60 VDC
Contact rating	500 mA @ 48 VDC
Contact resistance	< 50 mΩ
Isolation to	PROFIBUS DP and Power port
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm <sup>2</sup> (AWG 24 – 12)
Shielded cable	Not required

PROFIBUS DP (RS-485)	
Electrical specification	EIA RS-485 / EN 50 170
Data rate	9 600 bit/s, 19.2, 93.75, 187.5, 500 kBit/s, 1.5, 3, 6 and 12 Mbit/s
Data format	8 data bits, even parity, 1 stop bit, 11 bits total
Protocol	PROFIBUS DP / EN 50170
Data Rate detection	Yes, compliant with EN 50 170
Retiming	Yes
Turn around time	In accordance with EN 50 170
Transmission range	< 1200 m, depending on data rate and cable type (EIA RS-485)
Settings	None, external termination and failsafe biasing
Protection	Installation Fault Tolerant (up to ±60 V)
Isolation to	Power and Status port
Connection	9-pin D-sub female
Connector size	0.2 – 2.5 mm <sup>2</sup> (AWG 24 – 12)
Shielded cable	Not required
Conductive housing	Isolated to all other circuits and housings

FX (Fibre)	SM-LC80	SM-LC40	SM-LC15	MM-LC2
Fibre connector	LC duplex	LC duplex	LC duplex	LC duplex
Fibre type	Singlemode 9/125 µm	Singlemode 9/125 µm	Singlemode 9/125 µm	Multimode, 62.5/125 and 50/125 µm
Wavelength nm	1550	1310	1310	1310
Transmitter Output optical power min/max	-5/0 dBm**	-5/0 dBm**	-15/-8 dBm**	-20/-14 dBm*
Receiver Input sensitivity, max	-34 dBm	-34 dBm	-31 dBm	-31 dBm
Receiver Input optical power, max	-5 dBm***	-3 dBm***	-8 dBm	-8 dBm
Optical power budget, worst-case	29 dB	29 dB	16 dB	11 dB
Bit error rate (BER)	$< 1 \times 10^{-10}$	$< 1 \times 10^{-10}$	$< 1 \times 10^{-10}$	$< 2.5 \times 10^{-10}$
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-60	Bi-di LC-40	Bi-di LC-20	Bi-di MM LC-2
Fibre connector	LC Simplex	LC Simplex	LC Simplex	LC Simplex
Fibre type	Singlemode 9/125 µm	Singlemode 9/125 µm	Singlemode 9/125 µm	Multimode 62.5/125 and 50/125 µm
Wavelength nm, connector 1 Wavelength nm, connector 2	Tx 1310, rx 1550 Tx 1550, rx 1310	Tx 1310, rx 1550 Tx 1550, rx 1310	Tx1310, rx 1550 TX 1550, rx 1310	Tx 1310, rx 1550 Tx 1550, rx 1310
Transmitter Output optical power min/max	-5/0 dBm **	-8/0 dBm **	-10/0 dBm **	-10/-8 dBm *
Receiver Input sensitivity, max	-34 dBm	-34 dBm	-28 dBm	-28 dBm
Receiver Input optical power, max	0 dBm***	0 dBm***	0 dBm	-0 dBm
Optical power budget, worst-case	29 dB	26 dB	18 dB	18 dB
Bit error rate (BER)	$< 1 \times 10^{-10}$	$< 1 \times 10^{-10}$	$< 1 \times 10^{-10}$	$< 1 \times 10^{-10}$
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	Level
ESD	EN 61000-4-2	Enclosure contact	± 6 kV
		Enclosure air	± 8 kV
RF field AM modulated	IEC 61000-4-3	Enclosure	20 V/m 80% AM (1 kHz), 80 – 2000 MHz
RF field 900 MHz	ENV 50204	Enclosure	20 V/m pulse modulated 200 Hz, 900 ± 5 MHz
Fast transient	EN 61000-4-4	Signal ports	± 2 kV
		Power ports	± 2 kV
Surge	EN 61000-4-5	Signal ports unbalanced	± 2 kV line to earth, ± 2 kV line to line
		Signal ports balanced	± 2 kV line to earth, ± 1 kV line to line
		Power ports	± 2 kV line to earth, ± 2 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 µs pulse
Voltage dips and interruption	EN 61000-4-11	AC power ports	10 & 5 000 ms, interruption 10 & 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, interruption
			10 ms, 30% reduction 10 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 all other isolated ports	2 kVrms 50 Hz 1min
		Power port to other isolated ports	3 kVrms 50 Hz 1min 2 kVrms 50 Hz 1min (@ rated power < 60V)
Environmental			
Temperature		Operating	-40 to +70°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 / 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			IP 21
Cooling	IEC 529	Enclosure	Convection
Mounting			Horizontal on 35 mm DIN-rail