



The Industrial Broadband Router

In a world where remote access to field assets is becoming ever more critical due to both economic and environmental factors, the Falcon provides the next generation solution.

Westermo has lead the way in industrial remote access since our introduction of the first truly industrial modem back in the mid 1990's.

Falcon – the world's first VDSL2 industrial router

As the Internet grows so does the need for even higher speed connections. VDSL2-technology, capable of delivering data-rates of around 100 Mbit/s both downstream as well as upstream, has been adopted in many parts of the world to meet that demand.

The industrial remote access market often requires a higher upstream speed due to the nature of the applications and VDSL2 technology can currently offer upstream speeds of up to 40 times higher than ADSL technology.

Falcon is the first purpose built INDUSTRIAL VDSL2 router and delivers secure, high-speed access to vital remote assets.



ADSL backwards compatibility

Today many broadband circuits are still using ADSL and these circuits will remain in use for many years alongside the newer VDSL2 services. The Falcon has therefore been designed to operate on ADSL / ADSL2 / ADSL2+ lines as well, making it a perfect fit for installations that have not yet been upgraded to VDSL2.

Reliable global connectivity

When using broadband circuits from internet service providers you will always be connected through to a device called a DSLAM in the phone exchange or roadside cabinet. Globally there are a number of different manufacturers of these devices which unfortunately can lead to compatibility issues. To counter this risk manufacturers have created an interoperability lab to which Westermo are the only industrial member:

Truly designed for industrial applications

The Falcon, incredibly compact and built into a purpose designed case with an integrated DIN rail clip, has an operational temperature between -20 to $+60^{\circ}\text{C}$ and is designed to operate in industrial EMC levels. High MTBF figures lead to an expected service life of more than 10 years. The often critical nature of the installations calls for reliability so the Falcon can be powered from separate DC voltages sources with inputs ranging from 19 – 60VDC

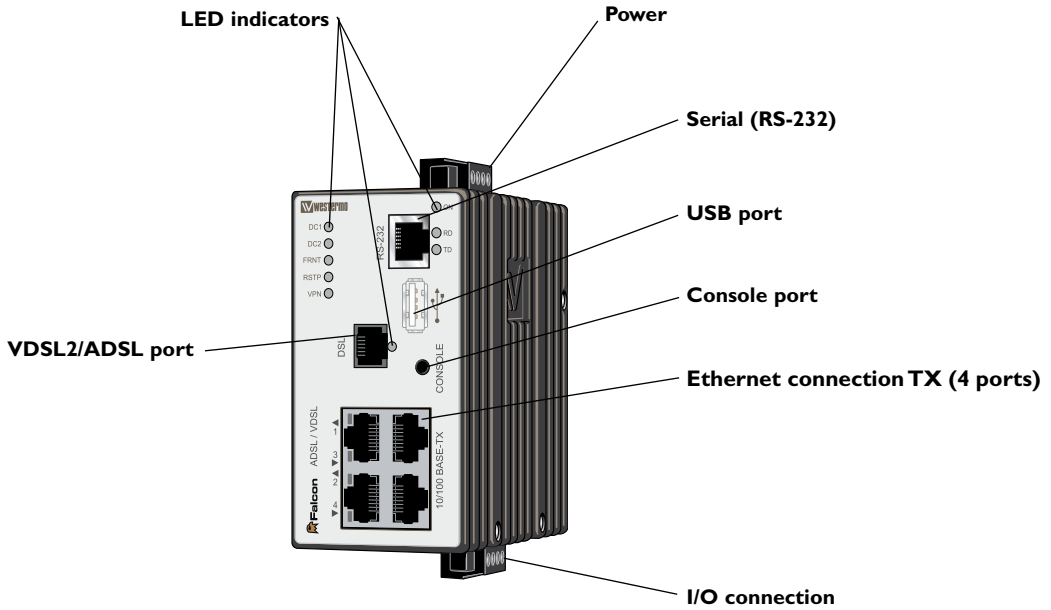
Connections to match industrial requirements

Most industrial devices today have Ethernet communications ports so the Falcon comes equipped with a built in 4 port layer 3 routing switch. The Falcon can cope with older legacy devices running RS-232 with its built in device server interface, making it perfect for analogue modem replacement projects.

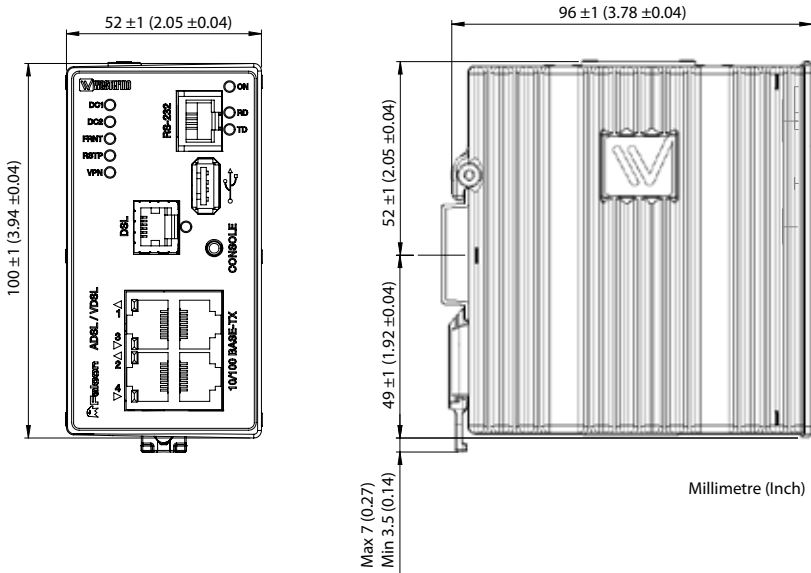
WeOS with Cyber Security

The Westermo Operating System (WeOS) is a feature rich operating system designed for the industrial markets. It provides the Falcon with cyber security functionality, such as DMZ, IPsec VPNs and a stateful inspection firewall configured to be secure by default. Management is done via an easy-to-use web interface, through an advanced CLI, or via SNMP. Setting up a broadband connection has never been easier using the basic setup page.

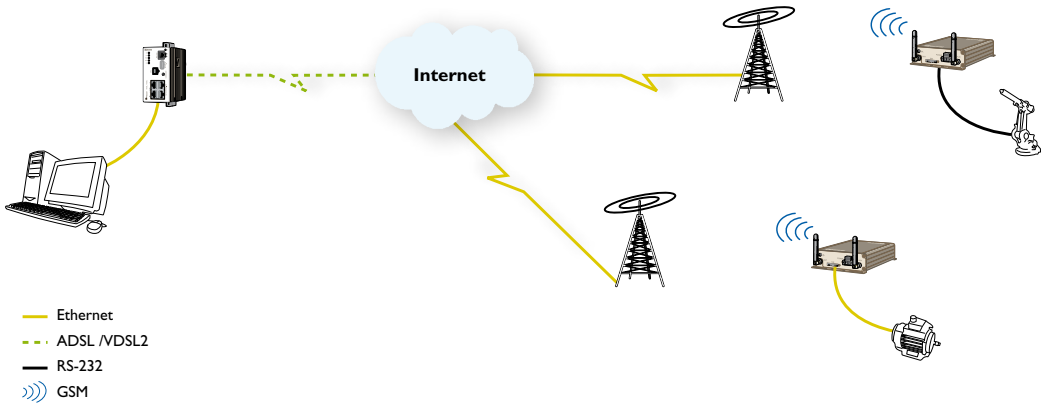
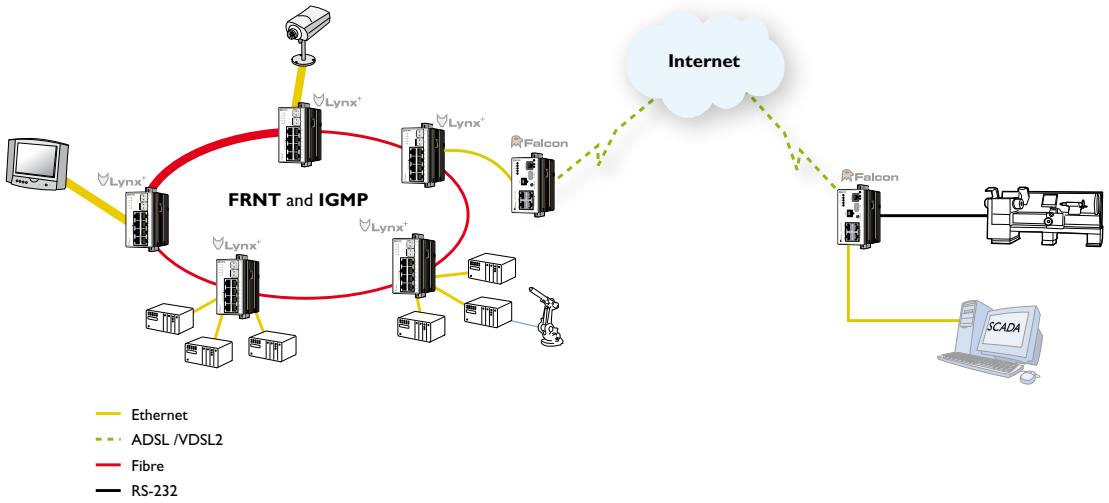
Interfaces



Dimensional Drawing



Applications



Technical Data

Power	
Rated voltage	24 to 48 VDC
Operating voltage	19 to 60 VDC
Rated current	460 mA @ 24 VDC 220 mA @ 48 VDC
Rated frequency	DC
Inrush current, I _t	1 mA ² s @ 24 VDC 3 mA ² s @ 48 VDC
Startup current*	760 mA _{peak} @ 24 VDC 500 mA _{peak} @ 48 VDC
Polarity	Reverse polarity protected
Redundant power input	Yes
Isolation to	All other
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm ² (AWG 24 – 12)
Shielded cable	Not required

* With fully loaded USB port. External supply current capability for proper startup

RS-232	
Electrical specification	EIA RS-232
Data rate	300 bit/s – 115.2 kbit/s
Data format	7 or 8 data bits, Odd, even or none parity, 1 or 2 stop bits
Protocol	Transparent, optimised by packing algorithm
Circuit type	SELV
Transmission range	15 m / 49 ft
Isolation to	Power, DSL, Ethernet
Galvanic connection to	USB, Console
Connection	RJ-45*
Shielded cable	Not required
Conductive housing	Yes
Number of ports	1

* RJ-45 to RS-232 converter cable included.

Ethernet TX	
Electrical specification	IEEE std 802.3. 2005 Edition
Data rate	10 Mbit/s, 100 Mbit/s, manual or auto
Duplex	Full or half, manual or auto
Transmission range	150 m, according to long cable specification
Isolation to	All other
Connection	RJ-45 auto MDI/MDIX
Shielded cable	Not required, except when installed in Railway applications as signalling and telecommunications apparatus and located close to rails.*
Conductive housing	Yes
Number of ports	4

* To minimise the risk of interference, a shielded cable is recommended when the cable is located inside 3 m boundary to the rails and connected to this port.

Console	
Electrical specification	TTL-level
Data rate	115.2 kbit/s
Data format	8 data bits, none parity, 1 stop bit, no flow control
Circuit type	SELV
Transmission range	15 m
Isolation to	Power, DSL, Ethernet
Galvanic connection to	Serial, USB
Connection	2.5 mm jack, use Westermo cable 1211-2027

USB	
Electrical specification	USB 2.0 host interface
Data rate	Up to 12 Mbit/s (full-speed mode)
Circuit type	SELV
Maximum supply current	500 mA
Isolation to	Power, DSL, Ethernet
Galvanic connection to	Serial, Console
Connection	USB receptacle connector type A

I/O / Relay output	
Connect resistance	30 Ω
Isolation to	All other
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm ² (AWG 24 -12)
Maximum voltage/current	60 VDC / 80 mA

I/O / Digital input	
Voltage levels	Logic one >12V, Logic zero <1V
Isolation to	All other
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm ² (AWG 24 -12)

DSL	
Electrical specification	See standard table below
Data rate	250 Mbit U/D, limited to 100 Mbit
Protocol	EFM (VDSL2), LLC/VC-MUX encap Ethernet (ADSL), PPPoE (ADSL / VDSL2)
Isolation to	All other
Connection	RJ-11*
Shielded cable	Not required, except when installed in Railway applications as signalling and telecommunications apparatus and located close to rails.**
Number of ports	1

* RJ-11 to RJ-45 converter cable included.

** To minimise the risk of interference, a shielded cable is recommended when the cable is located inside 3 m boundary or the cable is longer than 30 m and inside 10 m boundary to the rails and connected to this port.

Standard	Annex
ETSI TS 101 270	N/A
ITU-T 993.2 (VDSL2)	A, B, J
T1.424	N/A
ITU-T G.992.1 (ADSL)	A, B (non overlap)
ITU-T G.992.2 (ADSL lite)	A (non overlap)
ITU-T G.992.3 (ADSL2)	A, B, I, J, L, M (non overlap)
ITU-T G.992.5 (ADSL2+)	A, B, I, J, M (non overlap)
ANSI T1.413	N/A

Ordering Information		
3660-0100	FDV-206-1D1S	The Industrial Broadband Router

Protocols and Functionality

Ethernet Technologies	IEEE 802.3 for 10BaseT IEEE 802.3u for 100BaseTX and 100Base FX IEEE 802.3ab for 1000BaseT IEEE 802.3z for 1000BaseX
VDSL/ADSL technologies	ITU-T G.993.2 VDSL2 (Annex A, B, J) ITU-T G.992.1 ADSL (Annex A, B (non overlap)) ITU-T G.992.2 ADSL Lite (Annex A (non overlap)) ITU-T G.992.3 ADSL2 (Annex A, B, I, J, L, M (non overlap)) ITU-T G.992.5 ADSL2+ (Annex A, B, I, J, M (non overlap)) RFC2684 Bridged LLC and Bridged VC-MUX ATM encapsulation (ADSL)
Serial Port Technologies	RS-232 Serial Over IP (Serial Extender and Virtual Serial Port)
Resiliency and High Availability	Fast Reconfiguration of Network Topology (FRNT) FRNT Link Health Protocol (FLHP) IEEE 802.1D Spanning Tree Protocol (STP) IEEE 802.1w Rapid STP (RSTP)
Layer-2 Switching	IEEE 802.1Q Static VLAN and VLAN Tagging IEEE 802.3x Flow Control IGMPv2/v3 snooping AVT Dynamic VLAN (Westermo Adaptive VLAN Trunking) Management VLAN (Westermo Management Interface concept) Static Multicast MAC filters
Layer-2 QoS	IEEE 802.1p Class of Service Flexible classification VLAN tag, VLAN ID, IP DSCP/ToS, Port ID)
IP Routing, Firewall and VPN	Static IP routing Dynamic IP routing <ul style="list-style-type: none"> • OSPFv2 • RIPv1/v2 VRRP Firewall, NAT, Port Forwarding IPSec VPN
Manageability	Management tools <ul style="list-style-type: none"> • Web interface (HTTP and HTTPS) • Command Line Interface (CLI) via console port and SSHv2 • Westermo IPConfig tool • SNMPv1/v2c/v3 • Flexible management of configuration and log files <ul style="list-style-type: none"> • Secure Copy (SCP) for remote file upload and download • Local file management via HTTP, FTP, TFTP and SCP • Load/save files from/to USB memory stick Flexible alarm/event handling system Syslog (log files and remote syslog server) Digital I/O Port Monitoring SNTP (NTP client) PPPoE client DHCP client DHCP server DDNS
SNMP MIB support	RFC1213 MIB-2 RFC2863 Interface MIB (ifXTable) RFC2819 RMON MIB (etherStatsTable) RFC4188 Bridge MIB RFC4318 RSTP MIB RFC4363 Q-BRIDGE MIB (dot1qVlan and dot1qVlanStaticTable) RFC4836 MAU MIB (dot3IfMauBasicGroup and dot3IfMauAutoNegGroup) RFC4133 Entity MIB (entityPhysical) RFC3433 Entity Sensor MIB WESTERMO PRIVATE MIB

Type tests and environmental conditions

Phenomena	Test	Description	Test levels
ESD	EN 61000-4-2	Enclosure contact	± 6 kV
		Enclosure air	± 8 kV
RF field AM modulated	EN 61000-4-3	Enclosure	20 V/m 80% AM (1 kHz), 80 – 2 700 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
Pulse magnetic field	EN 61000-4-9	Enclosure	300 A/m, 6.4 / 16 µs pulse
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 A
	FCC part 15		Class A
Conducted emission	EN 55022	AC power ports	Class B
	FCC part 15	AC power ports	Class B
	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	3 kVrms 50 Hz 1 min 2 kVrms 50 Hz 1 min (@ rated power <60 V)
Temperature		Operating	-20 to +60°C
		Storage & Transport	-40 to +85°C
Humidity		Operating	5 to 95% relative humidity
		Storage & Transport	5 to 95% relative humidity
Altitude		Operating	2000 m / 70 kPa
Reliability prediction (MTBF)	MIL-HDBK- 217F	Operating	580 000 hours @ 25°C
Service life		Operating	10 year
Vibration	IEC 60068-2-6	Operating	5 – 20 Hz: 2 m ² /s ³ 20 – 200 Hz: – 3 dB/oct 3 axis = 3 * 30 min
Shock	IEC 60068-2-27	Operating	6 ms 1000 m/s ² 6 directions, 3 shocks / direction
Enclosure	UL 94	PC / ABS	Flammability class V-1
Dimension W x H x D			52.5 x 100 x 101 mm
Weight			0.6 kg
Degree of protection	IEC 529	Enclosure	IP 40
Cooling			Convection
Mounting			Horizontal on 35 mm DIN-rail

Approvals



Member of



University of New Hampshire
InterOperability Laboratory