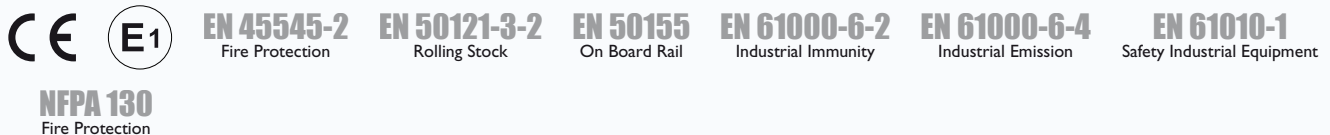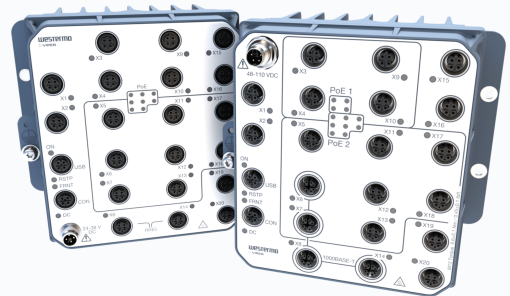# EN 50155 Managed Gbps PoE Routing Switch
Viper-20A-PoE Series

- **Compact 20 port routing switch, approved for rolling stock**
  - Various ports and models, all with 8 or 12 PoE ports
  - IEEE 802.3af/at (PoE/PoE+)
- **Designed and built for extreme operational environments**
  - Robustness-enhancing design features
  - Extensive range of approvals, by IEC/ISO 17025 certified laboratories
  - Quality-focused engineering and production located in Sweden
- **Powered by WeOS, Westermo's proven network operating system**
  - Strong set of protocols and functions, including layer 3 routing, DHCP (server and client) and VRRP
  - High level cybersecurity
  - Easy to use

CE   E1

EN 45545-2
Fire Protection

EN 50121-3-2
Rolling Stock

EN 50155
On Board Rail

EN 61000-6-2
Industrial Immunity

EN 61000-6-4
Industrial Emission

EN 61010-1
Safety Industrial Equipment

NFPA 130
Fire Protection

The Viper-20A-PoE series consists of managed 20 port routing switches optimised for the needs of the railway rolling stock market. PoE ports offer effective powering of end-devices. Gbps ports cope with high bandwidth devices such as access points and NVRs (Network Video Recorders).

The Viper-20A-PoE series is designed to withstand the tough environment on-board trains, exposing the switch to constant vibration, extreme temperatures, humidity and a demanding electrical environment.

A GORE-TEX® membrane prevents internal condensation. Threading integrated in chassis provides for additional vibration resistance. High-level isolation between all interfaces enables direct connectivity to vehicle auxiliary power and protects against overvoltage and flashover. IP67 protection prevents ingress of water and dust. An overall optimised design results in an extremely compact package in combination with very high MTBF for easy integration and low lifecycle cost.

Thorough type testing at independent ISO/IEC 17025 and ILAC MRA certified labs, accredited to a wide range of standards, show that the Viper series fulfills EN 50155 and other requirements. The state-of-the-art Westermo production facility ensures the quality of each individual unit, e.g. through temperature cycling burn-in testing.

The WeOS operating system offers an extensive suite of IP networking features for resilient and flexible networks, e.g. the FRNT ring protocol with very fast failover. The powerful layer 3 routing capability is very useful for separating networks in complex applications. The backup device accessory matches the Viper in robustness and offers easy configuration update and backup.

Meeting the requirements of the railcar market, the Viper-20A-PoE series is very well suited for deployment in any other application with severe operating conditions and tough environments, for instance in the mining industry.

Specifications - Viper-20A-PoE Series
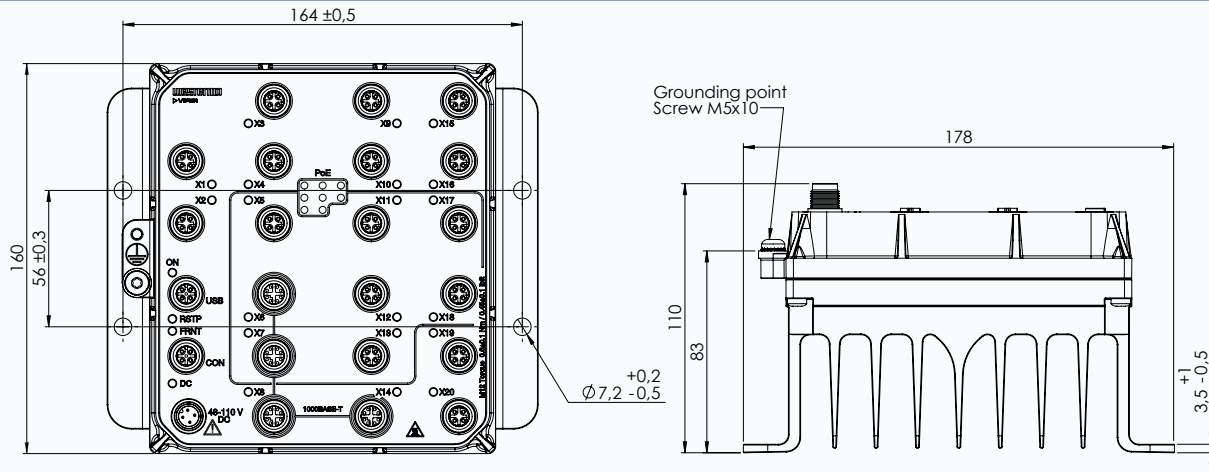
Drawing for P8 models, for P12 models see the user guide

Technical data

Dimensions (W x H x D)	P8 models: 178 x 160 x 110 mm (7.01 x 6.30 x 4.33 inches) P12 models: 178 x 160 x 115 mm (7.01 x 6.30 x 4.53 inches)
Weight	2.5 kg
HousingHousing	Full metal
Rated voltage	24 to 38 VDC for all LV models 48 to 110 VDC for all HV models
Operating voltage	16.8 to 49.4 VDC (14.4 to 53.2 VDC for 100 ms) for all LV models 33.6 to 143 VDC (28.8 to 154 VDC for 100 ms) for all HV models
Rated PoE power	P8 models: max 80 W total; max 30 W on a single port P12 models: max 160 W total; max 30 W on a single port
Power interruption	Class S2 (10 ms hold-up)
Operating temperature	-40 to +70°C (-40 to +158°F) (+85°C for a limited time)
Storage and transport temperatures	-55 to +85°C (-67 to +185°F)
Ingress protection	IP67
Humidity (operating)Humidity (operating)	5-95% relative humidity, operational, storage and transport
Altitude	2000 m/80 kPa

Rated current	Viper-x20A-(T4G-)P8-LV	Viper-x20A-(T4G-)P8-HV	Viper-x20A-T4G-P12-HV
No PoE power at 24 VDC	0.83 A		
Max at 24 VDC	5.0 A		
No PoE power at 38 VDC	0.56 A		
Max at 38 VDC	3.2 A		
No PoE power at 48 VDC		0.42 A	0.45 A
Max at 48 VDC		2.6 A	4.2 A
No PoE power at 110 VDC		0.21 A	0.25 A
Max at 110 VDC		1.1 A	1.8 A

Interface	Viper-x20A-P8-LV/HV	Viper-x20A-T4G-P8-LV/HV	Viper-x20A-T4G-P12-HV
Ethernet 1 Gbps (X-coded)	-	4	4
Ethernet 100 Mbps (D-coded)	20	16	16
Ports with PoE	8	8	12
Backup and restore port	1	1	1
Console port (RS-232, B-coded)	1	1	1

MTBF	Viper-x20A-T4G-P8-LV	Viper-x20A-T4G-P8-HV	Viper-x20A-P8-LV	Viper-x20A-P8-HV	Viper-x20A-T4G-P12-HV
MIL-HDBK-217F2	363,000 h	362,500 h	367,000 h	366,500 h	339,000 h
IEC 62380					389,000 h

Type	Approval/Compliance
Climate	• EN 50155 class OT4 / IEC 60571 class TX, Railway applications - Electronic equipment used on rolling stock • IEEE 1478 class 1, condition E4 (incl Salt Mist), Environmental conditions for transit rail car electronic equipment
EMC	• EN/IEC 61000-6-2, Immunity industrial environments • EN/IEC 61000-6-4, Emission industrial environments • EN 50121-3-2/IEC 62236-3-2 Railway applications – Rolling stock – apparatus • Tested and verified for Class S1, DB EMC Regulation 06, Commodity team Radio compatibility in VDB Rev 1.0 (Shunting Radio) • Tested and verified for FCC part 15b class A (CFR 47) • E-Mark, Road Vehicles, E1 10R-058942[a]
Mechanical (Shock and vibration)	• EN 61373 category 1, class A and B • EN 60068-2-27 20 g, 11 ms and 100 g, 6 ms[b]
Insulation (Coordination and test)	• EN 50124-1, Railway applications – Insulation coordination • EN 50155/IEC 60571, Railway applications - Electronic equipment used on rolling stock
Fire protection	• EN 45545-2, Fire protection on railway vehicles • NFPA 130, Fire protection for fixed guideway transit and passenger rail system
Software	• EN 50657:2017 Software Onboard Rolling Stock (Basic Integrity)
Safety[c]	• EN/IEC 61010-1, -2-201, Safety requirements for electrical equipment for measurement, control, and laboratory use

[a] Applicable only for Viper-x20A-T4G-P8-LV and Viper-x20A-P8-LV
[b] Applicable only for Viper-x20A-T4G-P8-LV and Viper-x20A-P8-LV
[c] Applicable only for Viper-HV models

Software	
WeOS	WeOS 4 and WeOS 5; https://www.westermo.com/solutions/weos
WeConfig	https://www.westermo.com/solutions/weconfig

Warranty	
Validity	5 years

Art.no.	Product	Functionality	Operating system
3635-1010	Viper-120A-P8-HV	Layer 2	WeOS 4
3635-1110	Viper-120A-P8-LV	Layer 2	WeOS 4
3635-1310	Viper-120A-T4G-P8-HV	Layer 2	WeOS 4
3635-1410	Viper-120A-T4G-P8-LV	Layer 2	WeOS 4
3635-1510	Viper-120A-T4G-P12-HV	Layer 2	WeOS 5
3635-1020	Viper-220A-P8-HV	Layer 3	WeOS 4
3635-1120	Viper-220A-P8-LV	Layer 3	WeOS 4
3635-1320	Viper-220A-T4G-P8-HV	Layer 3	WeOS 4
3635-1420	Viper-220A-T4G-P8-LV	Layer 3	WeOS 4
3635-1520	Viper-220A-T4G-P12-HV	Layer 3	WeOS 5

Accessories	
3641-0190	M12 USB configuration backup device
3641-7190	M12 USB configuration backup device with attachment strap
3146-11xx	Patch and power cables, see www.westermo.com
1211-4073	Console cable
WeConfig	https://www.westermo.com/products/software/weconfig

westermo

Specification WeOS 4[1]

The WeOS operating system has been developed by Westermo for its current as well as future range of Ethernet hardware products. This layer 2 and layer 3 switching solution enables Westermo to create complex multimedia ring networks and routing solutions. WeOS not only provides solutions to many challenging industrial networking issues, but also helps to protect investments by ensuring the future availability of fully compatible solutions. WeOS is the core of our latest ranges of Ethernet hardware allowing complex multimedia ring networks and routing solutions to be created.

Westermo has many years of experience developing products for industrial applications. At the heart of all Westermo networking solutions is the need for ease of use. By standardising on a single operating system for all Westermo Ethernet products this helps to simplify the installation, operation and maintenance of individual devices and complete networks. Once a user is familiar with a Westermo product, that knowledge can be readily applied to all our other devices. A web screen simplifies the configuration of many functions, whilst a command line interface allows for fine tuning.

WeOS incorporates unique functions that allow Westermo solutions to provide integration paths for legacy equipment. WeOS also enables Westermo to deliver a range of unique network security solutions, utilising elements such as stateful inspection firewalls and the IEEE 802.1X standard. Remote secure access can be provided using encrypted VPN tunnels. The WeOS Management Guide, 6101-3201, explains how many of these functions can be set up.

WeOS Standard - Layer 2 protocols and functionality
Resilience and High Availability
FRNTv0/v2 flexible ring topologies (multiring, subrings and ring coupling), Multilink dual homing, IEC 62439-2 Media Redundancy Protocol (MRP)[a], IEEE 802.1AX/802.3ad Link Aggregation (LACP and static), IEEE 802.1D Spanning Tree Protocol (STP) and IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
Layer 2 Switching
IEEE 802.1Q Static VLAN and VLAN Tagging, VLAN Q-in-Q tunnelling, VLAN transparency, IEEE 802.3x Flow Control, IGMPv2/v3 Snooping, AVT Dynamic VLAN (Adaptive VLAN Trunking), Management VLAN (Management Interface concept), Static Multicast MAC filters, IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
Layer 2 QoS
IEEE 802.1p Class of Service, Ingress/inbound rate limiting, Egress/outbound traffic shaping
Layer 2 Security
IEEE 802.1X Port Access Control, MAC Authentication, IP/MAC address conflict detection, Port Auto-Disable
Manageability
WeConfig, Web interface (HTTP and HTTPS), Command Line Interface (CLI) via console port, (SSHv2 and Telnet), Local and central user authentication (RADIUS and TACACS+), SNMPv1/v2c/v3. Secure Copy (SCP), USB configuration and backup[b], BOOTP client, flexible alarm/event handling system, Syslog (log files on RAM/USB and remote syslog server), Digital I/O, Persistent Port Monitoring, NTPv4 Client/Server, DHCP client (including options 60 and 61), DHCP server (including options 1, 3, 6, 7, 12, 15, 42, 61, 66, 67, 82, 121 and 249), DHCP relay agent (including options 54 and 82), DDNS
SNMP MIB Support
RFC1213 MIB-2, RFC 2819 RMON MIB, RFC 2863 Interface MIB, RFC 3411 SNMP Framework MIB, RFC 3433 Entity Sensor MIB, RFC 3621 Power Ethernet MIB, RFC 3635 Ethernet-like MIB, RFC 4133 Entity MIB, RFC4188 Bridge MIB, RFC4318 RSTP MIB, RFC4363 Q-BRIDGE MIB, RFC4836 MAU MIB, IEEE 802.1AB LLDP MIB, IEEE 802.1AX LAG MIB, IEC 62439-2 MRP[a], UCD SNMP MIB, WESTERMO-WEOS MIB, WESTERMO-FRNT MIB, WESTERMO-INTERFACE MIB

[a] Available as add-on-function. Please see your local Westermo sales contact to purchase a license for your product.
[b] Available in products with USB port

WeOS Extended - Layer 3 protocols and functionality[a]
IP Routing, Cyber Security and VPN
Static IP routing, Floating Static Routes, Dynamic IP routing (OSPFv2, RIPv1/v2), VRRPv2/v3, Static Multicast Routing, Stateful Inspection Firewall, Modbus Firewall (DPI), NAT, 1-1 NAT, Proxy ARP for 1-1 NAT, Port Forwarding, DSCP/TOS modification, IPsec VPN (IKEv1 certificates and PSK, ESP, VPN failover), SSL VPN (Client and Server, Local and central authentication with RADIUS, address pool and address per CN, TLS authentication, WeConnect), GRE, Multinetting
SNMP MIB Support
RFC 2787 VRRPv2 MIB, RFC 6527 VRRPv3 MIB

[a] Products with software level WeOS Extended include all functionality listed for WeOS Standard

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[1] Applicable for P8 models

WESTERMO

Specification WeOS 5[2]

The WeOS operating system has been developed by Westermo for its current as well as future range of Ethernet hardware products. This layer 2 and layer 3 switching solution enables Westermo to create complex multimedia ring networks and routing solutions. WeOS not only provides solutions to many challenging industrial networking issues, but also helps to protect investments by ensuring the future availability of fully compatible solutions. WeOS is the core of our latest ranges of Ethernet hardware allowing complex multimedia ring networks and routing solutions to be created.

Westermo has many years of experience developing products for industrial applications. At the heart of all Westermo networking solutions is the need for ease of use. By standardising on a single operating system for all Westermo Ethernet products this helps to simplify the installation, operation and maintenance of individual devices and complete networks. Once a user is familiar with a Westermo product, that knowledge can be readily applied to all our other devices. A web screen simplifies the configuration of many functions, whilst a command line interface allows for fine tuning.

WeOS Standard - Layer 2 protocols and functionality
Resilience and High Availability
FRNTv0/v2 flexible ring topologies (multiring, subrings and ring coupling), IEEE 802.1D/802.1w (RSTP), IEEE 802.1AX/802.3ad Link Aggregation (LACP and Static), IEC 62439-2 Media Redundancy Protocol (MRP; single instance or dual instances at MRP master)[a.]
Layer 2 Switching
IEEE 802.1D MAC Bridges, IEEE 802.1Q Static VLAN and VLAN Tagging, Q-in-Q Tunnelling, IEEE 802.1AB LLDP, IGMPv1/v2/v3 Snooping, Static Multicast MAC filters, MLDv1/v2 Snooping
Layer 2 QoS
IEEE 802.1p Class of Service with flexible classification (VLAN tag priority, IP DSCP/ToS, Port ID), MAC Authentication, IEEE 802.1X Port Access Control, Ingress and Egress Rate limiting
IP Host Services
Static IPv4/v6 Address, DHCP Client, DNS Client, DDNS, ZeroConf (mDNS and SSDP), NTP Client (NTPv4), IPv4/v6 Interfaces (Ethernet, VLAN, Loopback and Blackhole)
Network Servers
DHCP Server (including options 1, 3, 6, 7, 12, 15, 42, 61, 66, 68 and 82), DHCP Relay Agent (including options 54 and 82), DNS Proxy Server (DNS forwarder and Host records), NTP client/server (NTPv4)
Management Tools
Westermo configuration tool WeConfig, Web interface (HTTP and HTTPS), Command Line Interface (CLI) via console port, SSHv2 and Telnet, Local and Central Authentication (RADIUS/TACACS+), Role Based Access Control (RBAC), Password Compliance Policy, SNMPv1/v2c/v3, Secure Copy (SCP) for remote file upload and download, Local file management (via HTTP, FTP, TFTP and SCP), Tech support button, Flexible alarm and event handling system, RFC5424/RFC3164 Syslog (log files and remote syslog server), Port monitoring
SNMP MIB Support (read-only)
RFC 1213 MIB-2, RFC 2819 RMON MIB, RFC 2863 Interface MIB, RFC 3433 Entity Sensor MIB, RFC 3635 Ether-like Interface MIB, RFC 4133 Entity MIB, RFC 4188 Bridge MIB, RFC 4318 RSTP MIB, RFC4363 Q-BRIDGE MIB, RFC 4836 MAU MIB, IEEE 802.1AB LLDP MIB, IEEE 802.1AX LAG MIB, IEC 62439-2 MRP MIB, WESTERMO-DDM MIB (SFP), WESTERMO-EVENT MIB, WESTERMO-FRNT MIB, WESTERMO-INTERFACE MIB, WESTERMO-TCN MIB

[a.]Available as add-on-function. Please see your local Westermo sales contact to purchase a license for your product.

WeOS Extended - Layer 3 protocols and functionality[a.]
IP Host Services
IP Interfaces (SSL, VPN, GRE)
Train Protocols
IEC 61375-2-5 (TTDP), IEC 61375-2-3 TRDP/ECSP (including support for Annex E, and TCN Echo Server)
IP Routing and VPN
Static IP Routing, Floating Static Routes, Multinetting, Proxy ARP, Dynamic IP routing (OSPFv2, RIPv1/v2), VRRPv2/v3, Protocol Independent Multicast - Sparse-Mode (PIM-SM), Static Multicast Routing, Stateful Inspection Firewall, Firewall Hit Counters, IP Masquerading (NAT/NAPT), Port Forwarding, Stateless NAT (1-1 NAT), IPsec VPN (IKEv2 PSK), SSL VPN (Client and Server, Certificate Authentication, Pre-shared Key (PSK) Point-to-Point Mode, Layer-2 and Layer-3 VPN, Layer-2 VPN bridging, Address pool and address per CN, TLS Authentication), Generic Routing Encapsulation (GRE), Policy Based Routing, Equal-Cost Multi-Path (ECMP), OpenVPN Multipath TCP (MPTCP), Route monitor
SNMP MIB Support (read-only)
RFC 2787 VRRPv2 MIB, RFC 6527 VRRPv3 MIB

[a.]Products with software level WeOS Extended include all functionality listed for WeOS Standard

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[2]Applicable for P12 models