

Train Switch

KONUENDO NETWORKING



VDS Rail
The onboard networking company



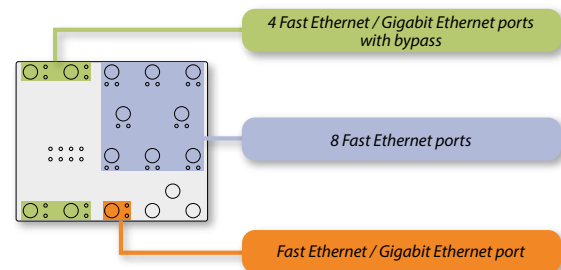
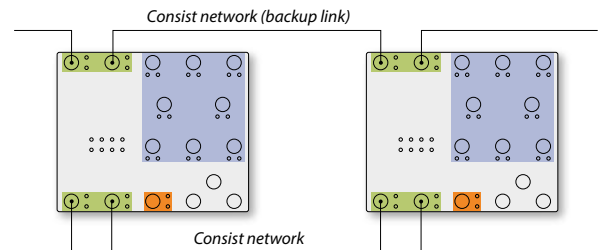
The *Train Switch* is a Fast Ethernet/Gigabit Ethernet Layer 2 managed switch specifically designed for network applications in rolling-stock environment. Its purpose is to enable the implementation of network topologies in a train.

The *Train Switch* provides advanced traffic switching capabilities, including support for VLANs, (Rapid) Spanning Tree Protocol (STP/RSTP) protocols and the possibility to apply Quality of Service (QoS) policies. The bypass feature makes the device completely transparent to the network in case of power loss or failure, thus avoiding or reducing the impact of possible local drop outs or malfunction on network performance. Available in different models, the *Train Switch* supports up to 13 Fast Ethernet ports or up to 5 Gigabit Ethernet ports and 8 Fast Ethernet ports (2 pairs with bypass function).

Designed to operate in harsh environmental conditions typical of rolling-stock applications, the *Train Switch* is fully EN 50155 compliant and provides the highest level of reliability and robustness required by the railway industry. Besides the standard features provided by this class of devices, the *Train Switch* provides advanced software facilities for on-board network discovery and configuration. The device includes a sophisticated programming interface and is capable of completely auto-configure itself from an abstract project definition right after power-on. Both these features dramatically ease maintenance activities and provide smart tools for fine-grained control over device operation and configuration.

Technical Specifications

- Up to 13 Fast Ethernet ports or 5 Gigabit Ethernet ports + 8 Fast Ethernet ports
- M12 circular connectors (4-ways for Fast Ethernet / 8-ways for Gigabit Ethernet)
- IPv4 protocol supported
- 2 hardware bypasses for maximum reliability
- Spanning tree (STP 802.1D) and Rapid Spanning Tree (RSTP 802.1w)
- Link aggregation protocol (LACP 802.3ad)
- Up to 4096 802.1Q VLANs
- DHCP option 82 handling
- Integrated per-port DHCP server
- IGMP versions 1, 2 and 3 snooping
- SNMP v1,v2c,v3 device management
- Extended RMON counters
- Link Layer Discovery Protocol (LLDP 802.1ab) with LLDP-MED extensions
- 802.1X port authentication
- RADIUS authentication
- DSCP/802.1p Class of Service
- 4 output hardware queues for each port
- Strict priority or weighted (WRR) scheduler
- Ingress rate limiting
- In-band (SSH) and out-of-band (console) CLI interface for device management
- In-band and out-of-band firmware upgrade
- Fallback firmware image for maximum reliability
- Proprietary Train Topology and Configuration Management Protocol (TTCMP) technology for support of project-based device configuration management, including network discovery and auto-configuration
- Coupled switch configuration



Technical Specifications

PHYSICAL DATA

System status indicators:	8 LEDs
Fast Ethernet connectors:	M12, female, 4-ways, D-coding
Gigabit Ethernet connectors:	M12, female, 8-ways, X-coding
Power supply connector:	M12, male, 4-ways, A-coding
Maintenance ports connectors:	M12, female, 5-ways, A-coding M12, female, 5-ways, B-coding

Power supply voltage range (isolated):

24 Vdc nominal	14,4 Vdc ÷ 40 Vdc, according to EN-50155
96/110 Vdc nominal	66 Vdc ÷ 165 Vdc, according to EN-50155

Power supply current:	0,6 A max @ 24 Vdc 0,2 A max @ 110 Vdc
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Power supply class:	S2, according to EN-50155
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Power consumption (without PoE):

24 Vdc version	15 W max
110 Vdc version	22 W max

Overall dimensions:

24 Vdc version	207 x 184 x 51 mm
96/110 Vdc version	207 x 184 x 73 mm

Weight:

24 Vdc version	2,0 Kg
96/110 Vdc version	2,5 Kg

Operating temperature:

Standard	-25 ÷ +55 °C (+70 °C for 10 min. according with EN-50155 class T1)
Optional	-25 ÷ +70 °C (+85 °C for 10 min. according with EN-50155 class T3)
Optional	-40 ÷ +70 °C (+85 °C for 10 min. according with EN-50155 class TX)

Relative humidity (non condensing):	0 ÷ 95 %
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Storage temperature:	-40 ÷ +85 °C
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Color codes:	Pantone 430 / RAL 7045 (frame) Pantone 431 / RAL 7046 (front panel)
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Degree of protection:

Standard	IP40
Optional	IP54, IP65

APPROVALS / COMPLIANCE

EN 50155	Railway applications: electronic equipment used on rolling stock
EN 50121-3-2	Railway applications: electromagnetic compatibility
EN 55011	Railway applications: conducted emission / radiated emission
IEC 61000-4-2	Electrostatic discharge immunity test
IEC 61000-4-3	Radiated, radio-frequency, electromagnetic field immunity test
IEC 61000-4-4	Electrical fast transient/burst immunity test
IEC 61000-4-5	Surge immunity test

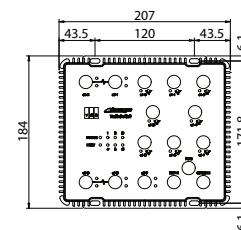
IEC 61000-4-6	Immunity to conducted disturbances, induced by radio-frequency fields
IEC 60068-2-1	Environmental testing - Part 2-1: Tests - Test Ad: cooling test
IEC 60068-2-2	Environmental testing - Part 2-2: Tests - Test Bd: dry heat test
EN 61373	Shock & Vibration - Category 1 class B
EN 60950	Information technology equipment – Safety

INTERNETWORKING STANDARDS

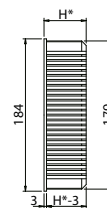
IEEE 802.3u	Fast Ethernet 802.3ab
IEEE 802.1Q	Tagged VLANs
IEEE 802.1D	Spanning Tree Protocol
IEEE 802.1w	Rapid Spanning Tree
IEEE 802.1X	Port-based network access control
IEEE 802.1AB	Link Layer Discovery Protocol (LLDP)
IEEE 802.3ad	Link Aggregation Protocol (LACP)

Wall Mounting

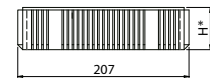
Dimensions only for reference



FRONT VIEW



SIDE VIEW



TOP VIEW

H*: see overall dimensions specification

Products list

Code	PSU	GbE ports	FE ports	Bypass
TS-1406	24 Vdc	0	13	2
TS-141E	24 Vdc	5	8	2
TS-141D	24 Vdc	5	8	1
TS-1446	110 Vdc	0	13	2
TS-145D	110 Vdc	5	8	1
TS-145E	110 Vdc	5	8	2
TS-1444	110 Vdc	0	13	0