TrainWise® Remote I/O Processor (RIOP)

The TrainWise® Remote I/O (MS25) Processor provides expandable digital and analog I/O to monitor and manage on-train devices and discrete signals.

The RIOP works in conjunction with the Control and Monitoring Server (CMS) to provide distributed intelligence and redundancy that extends the capabilities of the Train Control and Monitoring System (TCMS).

The MS25 has expandable modules which can increase the I/O count for specific applications and dual Ethernet connectivity for redundancy.

Product size and connectors may vary depending on configuration

Technical compliance

Railway standards	Compliant with IEEE and IEC rail design standards (including IEEE 16 and IEC60571/ EN50155) IEC 61375-3-4 Electronic railway equipment – Train communication network (TCN) – Part 3-4: Ethernet Consist Network (ECN)
Fire, smoke and toxicity	Compliant to 49 CFR Part 238.103 guidelines and NFPA-130

Options

Expanded I/O	Digital and analog I/O capacity can be expanded by adding one or more I/O modules to the unit.
Custom modules	Quester Tangent can develop custom I/O and communication modules to suit any rail car application.
Full or half width chassis	The RIO Processor is available in a 5-slot 6U 9.5'' rack-mount chassis. Alternately, if more card slots are required, a 10-slot full-width 19" chassis is available.

Processor and storage

Processor	i.MX6 with ARM Cortex A9 processor
Operating system	Linux, QNX
OS memory	1 GB DRAM, 1 GB NAND flash
Data logging capacity	4 GB Solid State Flash Memory (Larger memory configurations available)
Real-time clock	Battery backup for up to 8 years

Communication

Ethernet ports[1]	2	IEEE 1473 (Type E) Ethernet, 100 Mbps, M12 D-Coded
USB ports[1]	2	1 x M8 USB 2.0: Supports connection to mass storage device (not supplied) 1 x Type C USB 2.0 On-The-Go (OTG)
Protocol support	✓	Protocols included in IEC 61375-3-4 Electronic railway equipment – Train communication network (TCN) – Part 3-4: Ethernet Consist Network for Standard End Devices
Secure web server	✓	Secure web server providing remote access for PTU, operations, and maintenance

Electrical interfaces

Power supply	1	Operating voltage range: 16VDC – 90VDC
Power consumption[1]		45 Watts (Max)
Status output[1]	1	Form A, 0.5 Amp, normally open, solid state output
Configuration input[1]	4	Self-powered, jumpered in vehicle interface connector cable plug to define unit location or other identification
Digital inputs[1]	112	Type I (grouped returns), wetting current, 2 kV protection
	4	Type II (independent returns), wetting current, 2 kV protection
Analog inputs[1]	8	4-20 mA, includes power supply for sensor
Discrete outputs[1]	20	Form A, 1 Amp, normally open, solid state outputs
Status LEDs	✓	Power, Health, Temperature, Network

Mechanical characteristics

Dimensions[1]	9.5 in x 10.5 in x 12.7 in (48.3 cm x 26.7 cm x 32.3 cm) (5-slot enclosure)
Weight[1]	17 lb (7.7 kg) (approximate)
Connectors[1]	Ethernet: 2 x M12 D-coded USB: 1 x M8, 1 x Type C Vehicle Interface: 1 x 24 pin MIL-DTL-5015 I/O: 6 x 32 pin high density dual-row clamp-style
Ingress protection	Front/Back/Top/Sides: IP20

[1]I/O quantity, number of ports, power consumption, dimensions, and weight are based on the 5-slot chassis with 1x Controller Module and 2x I/O modules.

Environmental conditions

Operating temperature	-40°F to +158°F (-40°C to +70°C)
Storage temperature	-40°F to +185°F (-40°C to +85°C)
Shock and vibration	IEC 61373; Category 1, Class A
Dielectric withstand	1.15kVAC circuit to circuit and circuit to chassis

Electromagnetic compatibility

Surge immunity	IEC 62236-3-2, Table 7
Conducted emissions	IEC 62236-3-2, Table 3, 4, & 5
Conducted immunity	IEC 62236-3-2, Table 7 & 8
Radiated emissions	IEC 62236-3-2, Table 6
Radiated immunity	IEC 62236-3-2, Table 9 (with RF susceptibility verified to 6 GHz)
Electrical fast transient	IEC 62236-3-2, Table 7 & 8
Electrostatic discharge	IEC 62236-3-2, Table 9