Product size and connectors may vary depending on configuration

TrainWise® Control and Monitoring Server

The TrainWise® Control and Monitoring Server (MS26) is a powerful and expandable rack based server that provides seamless management of onboard train electrical systems.

By employing additional I/O and CPU card slots, it can be configured to handle many different control and monitoring architectures including high availability and redundancy designs.

The MS26 integrates easily with Ethernet and legacy network-enabled systems throughout the train to support both new and modernization applications.

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 for specialized I/O and communication channels available on request.
Dual controller modules	For systems requiring high availability, dual Controller Modules can be installed in a hot-standby configuration.
Full or half width chassis	The Control and Monitoring Server is available in a 10-slot 6U 19'' rack-mount chassis. Alternately, if fewer card slots are required, a 5-slot half-width chassis is available for more compact installation.

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]	19.0 in x 10.5 in x 12.7 in (48.3 cm x 26.7 cm x 32.3 cm) (10-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 19” 10-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

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Product size and connectors may vary depending on configuration

TrainWise® Crew Display Computer

The TrainWise® Crew Display (DS15) is designed to be installed in the operator's cab and features a robust service-proven touchscreen with built in server and Ethernet communications capability.

The sunlight readable display has a wide viewing angle and is well protected behind an industrial hardened glass face well suited for high use operator equipment.

The DS15 user screens are customized to match client needs and ensure easy adoption of operating workflows for drivers and maintenance crew. It operates over a wide range of voltages for direct connection to the vehicle's low-voltage bus.

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 and communication interfaces	Interfaces to the DS15 can be expanded by adding additional I/O or communication channels such as RS-485 serial, CAN and LonWorks.
Audible alert	Piezoelectric, multi-tone buzzer available for operator alerts.

Display

Display	12.1" diagonal, LED Backlight, 60fps
Resolution	Spatial: 1024 x 768 Pixel; Color: 262,144 colors
Brightness	800 nit, Sunlight readable
Brightness adjustment	Manual via screen input or automatically via ambient light sensor
Viewing angle	50° Up | Down - 70° Left | Right
Contrast ratio	1000:1
Touch sensor	Projective capacitive, allows operation with gloved hands Robust chemically toughened edge-to-edge glass on front of display

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	2	IEEE 1473 (Type E) Ethernet, 100 Mbps, M12 D-Coded
USB ports	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		45 Watts (Max)
Status output	1	Form A, 0.5 Amp, normally open, solid state output
Digital inputs	4	Type II (independent returns), wetting current, 2 kV protection

Mechanical characteristics

Dimensions	12.5” x 10.3” x 2.5” (31.8 cm x 26.2 cm x 6.4 cm)
Weight	10 lbs | 4.6 Kg (Approximate)
Connectors	Ethernet: 2 x M12 D-coded USB: 1 x M8, 1 x Type C Vehicle Interface: 2 x 17 pin MIL-C-5015, 1 x 24 pin MIL-DTL-5015
Ingress protection	Front: IP51 - Back | Top | Bottom | Sides: IP30

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

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Product size and connectors may vary depending on configuration

TrainWise® Event Recorder System

The TrainWise® Event Recorder (ER10) Computer collects critical information about train systems, driver activities, and vehicle performance and stores it in a Hardened Memory Module (MM01). Recorded data provides vital information following an incident to determine root cause and identify preventive measures.

Redundant network connections allow the ER10 to obtain data reliably from train subsystems over the Ethernet network, reducing the need for discrete wired connections.

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
Data logging capacity	Hardened Memory Module (HMM) available in 1GB to 16GB versions

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 for specialized I/O and communication channels available on request.
Dual controller modules	For systems requiring high availability, dual Controller Modules can be installed in a hot-standby configuration.
Full or half width chassis	The ER Computer is available in a 5-slot 6U half- rack chassis. Alternately, if more card slots are required, a full 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]	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

Mechanical characteristics

Power supply	1	Operating voltage range: 16VDC – 90VDC
Power consumption[1]		45Watts
Status output[1]	1	Form A, 0.5 Amp, normally open, solid state output
Configuration inputs[1]	4	Self-powered, jumpered in vehicle interface connector cable plug to define unit location or other identification
Digital inputs[1]	32	Type I. Status inputs, sampled, with wetting current. 4kV protection
	4	Type II. Frequency / PWM / Digital inputs. 4kV protection
Analog inputs[1]	4	4-20 mA
Discrete outputs[1]	4	Form A, 1 Amp, normally open, solid state outputs
Status LEDs	✓	Power, Health status, Network status

Mechanical characteristics

Dimensions[1]	Control unit: 9.5 in x 10.5 in x 12.7 in (24.1 cm x 26.7 cm x 32.3 cm) (5-slot enclosure) HMM: 10.1” x 8.7” x 6.5” (25.7cm x 22.1cm x 16.5cm) (cable length 35” / 90cm))
Weight[1]	Control unit: 17 lbs / 7.7 kg (Approximate) HMM: 32 lbs / 14.5 kg
Connectors[1]	Control unit: Ethernet: M12 D-coded; USB M8; USB Type C; MIL-DTL-5015; DIN 41612 Rectangular HMM: USB M8
Ingress protection	Control unit: Front: IP40 – Back / Top / Sides: IP30. HMM: Greater than IP68

[1]I/O quantity, number of ports, power consumption, dimensions, and weight are based on the QFG-ER10-2211 19” 5-slot chassis with 1x Controller Module and 1x 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	Outputs: IEC 62236-3-2, Table 7 Digital inputs: IEEE 1482.1-1999
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

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Product size and connectors may vary depending on configuration

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.

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

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