Installation Instructions

Allen-Bradley

1732E ArmorBlock Dual-Port EtherNet/IP 4-Point Thermocouple and RTD Input Modules

Catalog Numbers 1732E-IT4IM12R, 1732E-IR4IM12R

Table of Contents

Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (Publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://www.rockwellautomation.com/literature/) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard and recognize the consequences.
	**SHOCK HAZARD:** Labels may be on or inside the equipment (for example, drive or motor) to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment (for example, drive or motor) to alert people that surfaces may reach dangerous temperatures.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Environment and Enclosure

ATTENTION: This equipment is intended for use in overvoltage Category II applications (as defined in IEC 60664-1), at altitudes up to 2000 m (6562 ft) without derating.
This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR 11. Without appropriate precautions, there may be difficulties with electromagnetic compatibility in residential and other environments due to conducted and radiated disturbances.
This equipment is supplied as enclosed equipment. It should not require additional system enclosure when used in locations consistent with the enclosure type ratings stated in the Specifications section of this publication. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings, beyond what this product provides, that are required to comply with certain product safety certifications.
In addition to this publication, see:

- Industrial Automation Wiring and Grounding Guidelines, Rockwell Automation publication 1770-4.1, for additional installation requirements.
- NEMA Standard 250 and IEC 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.

Preventing Electrostatic Discharge

ATTENTION: This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- Use a static-safe workstation, if available.
- Store the equipment in appropriate static-safe packaging when not in use.

Additional Resources

Resource	Description
1732E ArmorBlock™ Dual-Port EtherNet/IP 4-Point Analog Modules Wiring Diagrams 1732E-WD003	Pinout guide wiring diagram for the ArmorBlock dual-port EtherNet/IP 4-Point Analog modules (1732E-IF4M12R, 1732E-OF4M12R, 1732E-IT4IM12R, 1732E-IR4IM12R).
1732E ArmorBlock Dual-Port EtherNet/IP 4-Point Thermocouple and RTD Input Modules User Manual 1732E-UM004	A detailed description of module functionality, configuration, installation procedure and information on how to use the ArmorBlock dual-port EtherNet/IP 4-Point Thermocouple and RTD modules (1732E-IT4IM12R, 1732E-IR4IM12R).
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	More information on proper wiring and grounding techniques.

If you would like a manual, you can:

- download a free electronic version from the internet: http://rockwellautomation.com/literature
- purchase a printed manual by contacting your local Allen-Bradley distributor or Rockwell Automation representative

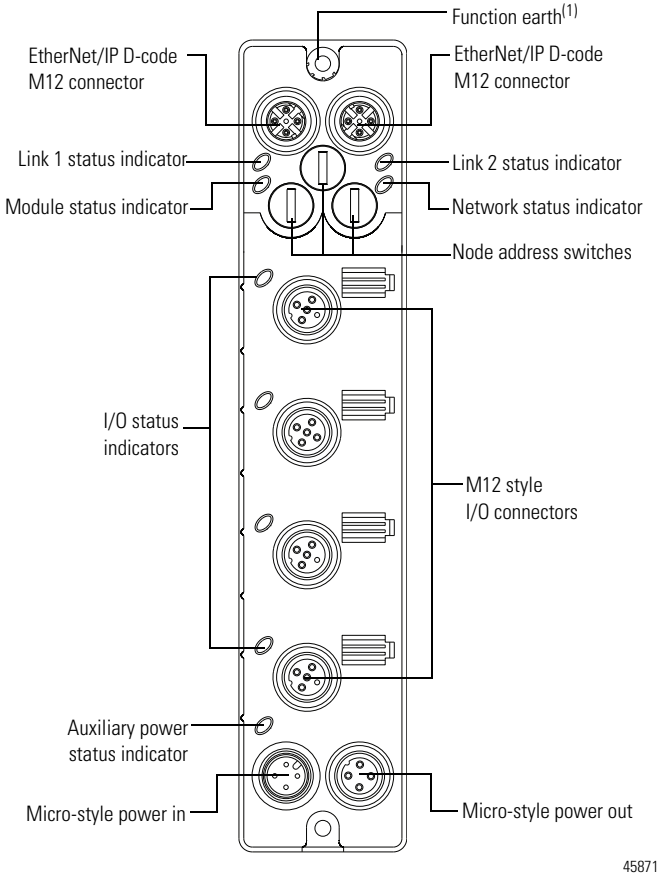
Overview

The EtherNet/IP ArmorBlock is a 24V DC I/O module that communicates via EtherNet/IP. The sealed IP65, IP67 and IP69K housing of these modules requires no enclosure. Note that environmental requirements other than IP65, IP67 and IP69K may require an additional appropriate enclosure. I/O connectors are micro M12 style.

EtherNet/IP networks use advanced network technology, for example, producer/consumer communication, to increase network functionality and throughput.

To learn more about features, configuration requirements, and calibration process for the 1732E-IT4IM12R and 1732E-IR4IM12R modules, see the 1732E ArmorBlock Dual-Port EtherNet/IP 4-Point Thermocouple and RTD Input Modules User Manual, publication 1732E-UM004.

Module Identification



(1) Function Earth grounds the I/O block's EtherNet/IP communication circuitry which is designed to mitigate the effect of noise on the network. The device requires a solid earth ground connection, either through a metal screw to a grounded metal panel or through a wire. See Ethernet Connector on page 11 for connections.

Optional Accessories

The following table identifies optional accessories that you can use with the modules that have to be ordered separately.

Option	Catalog Number
Snap-in individual marker card[1]	1492-MD6X9
Cold Junction Compensation Terminal Chamber (with embedded thermistor)[2]	871A-TS4CJC-DM or 871A-TR4CJC-DM

(1) Provides labelling for the terminal blocks to allow for easy identification and description.

(2) Recommended for use with the 1732E-IT4IM12R module.

Catalog Number Explanation

Refer to the table for a description of the module catalog numbers.

Catalog Number	Description	Network Connector	Power Connector
1732E-IT4IM12R	24V DC power, 4-Point Isolated Thermocouple Input, Dual-Port EtherNet/IP Module	Dual D-code M12	Dual 4-pin micro
1732E-IR4IM12R	24V DC power, 4-Point Isolated RTD Input, Dual-Port EtherNet/IP Module		

Install the Module

To install the module:

- Set the network address
- Mount the module
- Connect the Functional Ground and Module power/Auxiliary power cables
- Connect the I/O and Network cables to the module

Set the Network Address

The I/O block ships with the rotary switches set to 999 and DHCP enabled.

To change the network address, you can do one of the following:

- adjust the switches on the front of the module.
- use a Dynamic Host Configuration Protocol (DHCP) server, such as Rockwell Automation BootP/DHCP.
- retrieve the IP address from nonvolatile memory.

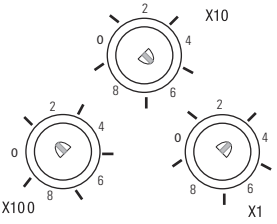
The I/O block reads the switches first to determine if the switches are set to a valid number. To set the network address:

1. Remove power.
2. Remove the switch dust caps.
3. Rotate the three (3) switches on the front of the module using a small blade screwdriver.
4. Line up the small notch on the switch with the number setting you wish to use. Valid settings range from 001...254.
5. Replace switch dust caps. Make sure not to over tighten.
6. Reapply power.
7. Record IP address on product label found on the side of enclosure.

Set Network Address

Example shows the node address switches at **163**, which sets the module IP address to 192.168.1.163.

Note: You need to remove the protective switch dust caps before you can adjust the address settings.



When the switches are set to a valid number, the I/O block's IP address is 192.168.1.xxx, where xxx represents the number set on the switches. The I/O block's subnet mask is 255.255.255.0 and default gateway address is set to 192.168.1.1.

When the I/O block uses the network address set on the switches, the I/O block does not have a host name assigned to it or use any Domain Name Server.

If the switches are set to an invalid number (for example, 000 or a value greater than 254 excluding 888), the I/O block checks to see if DHCP is enabled. If DHCP is enabled, the I/O block asks for an address from a DHCP server. The DHCP server also assigns other Transport Control Protocol (TCP) parameters. The modules are shipped with the network switches set to 999.

If DHCP is not enabled, the I/O block uses the IP address (along with other TCP configurable parameters) stored in nonvolatile memory.

Network Address Switch value 001

The module IP address cannot be the same as the gateway address. If the address switches are set to 001, the module IP address becomes 192.168.1.1, which is the same as the default gateway address. In this case, the module gateway address will be set to 0.0.0.0.

Default Factory Configuration

The switch value 888 resets the module to default factory configuration on power up. The module will not operate properly when powered up with this setting. The switches must be set to a different (and valid) value and then power cycled after a reset.

While in reset state, the module LED flashes red and the network LED goes off.

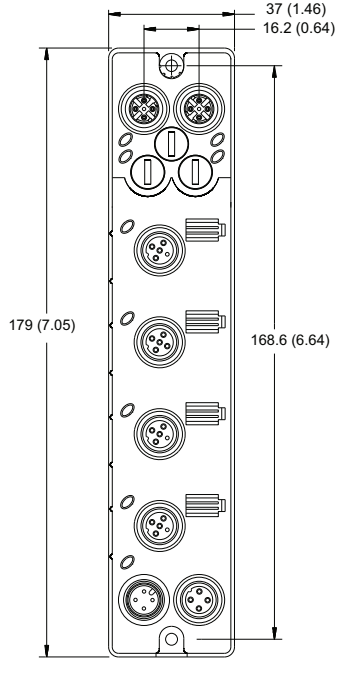
Mount the Module

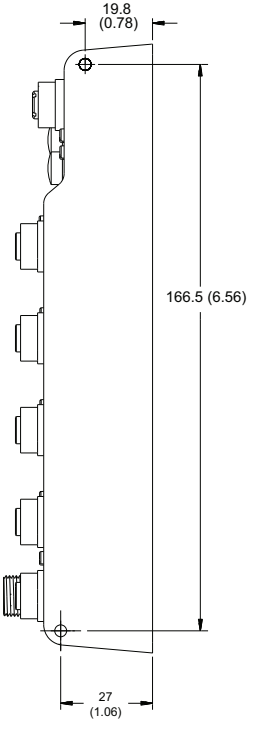
Two sets of mounting holes are used to mount the module directly to a panel or machine. Mounting holes accommodate #6 (M3) pan head screws. The torque specification is 0.68 Nm (6 lb-in.).

Product Dimensions

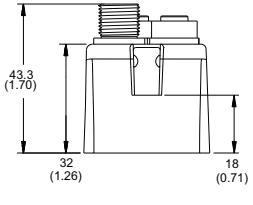
Refer to the mounting dimensions illustration to help you mount the module.

Module Dimensions





Side Mounting



Front Mounting

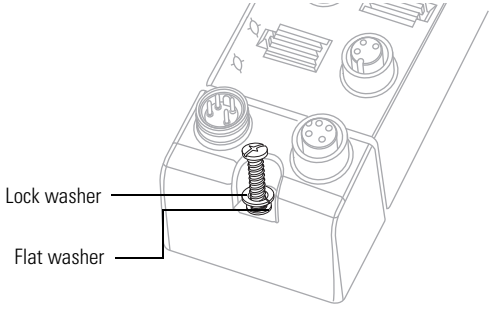
Measurements are in millimeters (inches)

45870

Mount the Module in High Vibration Areas

If you mount the module in an area that is subject to shock or vibration, we recommend you use a flat and a lock washer to mount the module. Mount the flat and the lock washer as shown in the mounting illustration. Torque the mounting screws to 0.68 Nm (6 lb-in.).

High Vibration Area Mounting

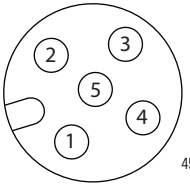


Connect the I/O, Network and Auxiliary Cables to the Module

The 1732E-IT4IM12R and 1732E-IR4IM12R modules have 5-pin micro-style M12 I/O connectors. We provide caps to cover the unused connectors on your module. Connect the quick-disconnect cord sets you selected for your module to the appropriate ports.

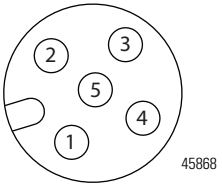
I/O Connectors

Micro-style M12 5-Pin Input Female Connector – 1732E-IT4IM12R

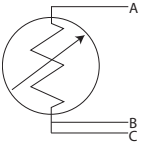


(View into connector)
Pin 1 CJC +
Pin 2 TC +
Pin 3 CJC -
Pin 4 TC -
Pin 5 No Connect

Micro-style M12 5-Pin Input Female Connector – 1732E-IR4IM12R

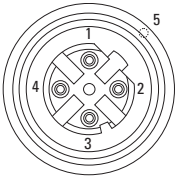


(View into connector)
Pin 1 No Connect
Pin 2 A
Pin 3 B
Pin 4 C
Pin 5 No Connect



Ethernet Connector

D-Code Micro Network Female Connector



(View into connector 1)
Pin 1 M12_Tx+
Pin 2 M12_Rx+
Pin 3 M12_Tx-
Pin 4 M12_Rx-
Pin 5 Connector shell shield GND

IMPORTANT Use the 1585D–M4DC–H: Polyamide small body unshielded mating connectors for the D-Code M12 female network connector.

Note that the distance between the center of each Ethernet connector is 16.2 mm (see Module Dimensions on page 9). Rockwell Automation recommends the use of suitable cable based on this measurement. Some of the recommended cables are 1585D-M4TBJM-x and 1585D-M4TBDM-x for daisychains.

IMPORTANT Use two twisted pair CAT5E UTP or STP cables.

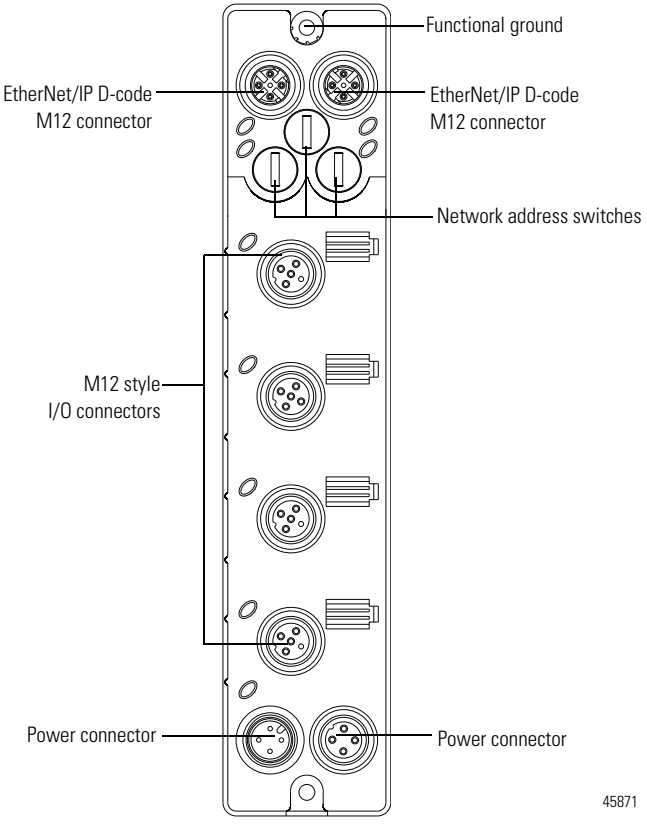
D-Code M12 Pin	Wire Color	Signal	8-way Modular RJ45 Pin
1	White-orange	TX+	1
2	White-green	RX+	3
3	Orange	TX-	2
4	Green	RX-	6

ATTENTION: The device does not provide bonding or grounding terminal. Customer shall provide own bonding or grounding.

Configure the Module

Refer to the illustration for configuration operations.

Configure Operations



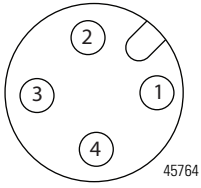
Refer to On-Machine Connectivity Catalog, publication M117-CA001, for Rockwell Automation cable and cord set offerings or use the configuration tools available at www.ab.com/e-tools/.

Power Connectors

Attach the micro-style 4-pin connector to the micro-style 4-pin receptacle as shown below.

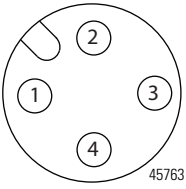
Micro-style 4-Pin Input Male Receptacle

Male Input



(View into receptacle)
Pin 1 Auxiliary power+
Pin 2 Module power+
Pin 3 Module power-
Pin 4 Auxiliary power-

Female Output



The power required by the module is based on a 4-pin micro-style connector system. Power can be daisy chained through the module either left to right or right to left. The standard configuration is with Module/Auxiliary power entering the module on the left connector.

Both modules require two 24V DC (nominal) supplies. These supplies are called the Module Power and the Auxiliary Power. The Module power supplies the microprocessor and Ethernet portions of the module, while the Auxiliary power supplies the I/O circuits.

Internally, the Module Power and Auxiliary Power are electrically isolated.

IMPORTANT The maximum current that any pin on the power connectors can carry is 4 A.

ATTENTION: To comply with the CE Low Voltage Directive (LVD), this equipment and all connected I/O must be powered from a source compliant with the following:
Safety Extra Low Voltage (SELV) or Protected Extra Low Voltage (PELV).

ATTENTION: To comply with UL restrictions, this equipment must be powered from a source compliant with the following: Limited Voltage/Limited Current.

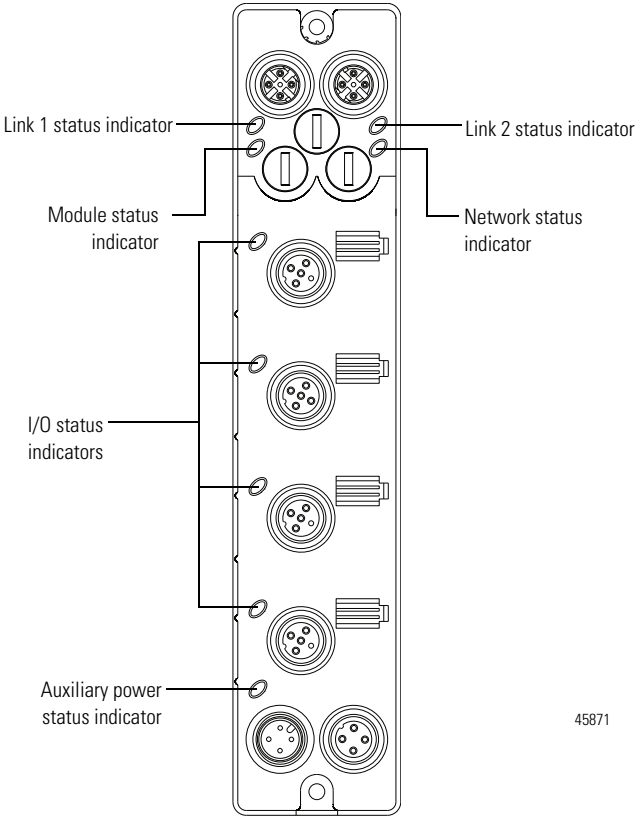
ATTENTION: The device meets UL Type 1 Enclosure rating.

Interpret LED Indicators

This module has the following indicators:

- Network, Module, and Link status indicators for EtherNet/IP
- Auxiliary power status indicator
- Individual I/O status indicators for inputs

Status Indicators



Indicator Status for the Modules

Indicator	Status	Description
Module status	Off	No power applied to the device.
	Flashing red/green	The module is performing POST (Power-On Self Test), which completes within 30 s.
	Green	Device operating normally.
	Flashing red	Module has experienced a recoverable fault. Possible minor faults include the following: • IP Address switches do not match configuration in use. • The device has completed a reset to factory default request due to the switches being set to 888 at power up, and a power cycle is required. • The device is performing a firmware flash update. • Channel fault • No auxiliary power
	Red	Unrecoverable fault – may require device replacement.
Network status	Off	The device is not initialized or the module does not have an IP address.
	Flashing green	The device has no CIP connections. The device has an IP address, but no CIP connections are established.
	Green	Device is online, has an IP address. CIP connections are established.
	Flashing red	One or more connections have timed out.
	Red	The module has detected that its IP address is already in use.
	Flashing red/green	The module is performing a power-on self test (POST).
Network link status (Link 1/Link 2)	Off	No link established.
	Green	Link established on indicated port at 100 Mbps.
	Flashing green	Link activity present on indicated port at 100 Mbps.
	Yellow	Link established on indicated port at 10 Mbps.
	Flashing yellow	Link activity present on indicated port at 10 Mbps.
Auxiliary Power status	Off	Auxiliary power off or not connected.
	Green	Auxiliary Power applied to device.

Indicator Status for the Modules

Indicator	Status	Description
I/O status	Off	The input channel is inactive, can be calibrated.
	Flashing Green	Channel is calibrating.
	Green	Normal operation, inputs being scanned.
	Flashing Yellow	Thermistor fault.
	Flashing Red	Fault. Overrange, underrange, or process alarm is present.
	Red	No power is detected.

IMPORTANT The Module Status LED indicator will flash red and green for a maximum 30 s while the module completes its POST (Power-On Self Test).

Specifications

General Specifications

Attributes	Value
Voltage, power, max	30V DC
Voltage, power, min	12V DC
Module power	12…30V DC @ 300 mA
Power consumption	3 W @ 24V DC, typical 3.5 W, max (module unloaded)
Isolation voltage	50V (continuous), Basic Insulation Type Type tested @ 707V DC for 60 s
Communication rate	EtherNet/IP 10/100 Mbps Full or half-duplex 100 meter per segment

General Specifications

Attributes	Value
Status indicators	Module status – red/green Network status – red/green Link status – green/yellow Auxiliary power status – green I/O LED – red/green
Dimensions, approx., HxWxD	179 x 37 x 27 mm (7.05 x 1.46 x 1.06 in.)
Weight, approx.	0.34 kg (0.75 lb)
Wiring category[1]	1 – on signal ports 1 – on power ports 1 – on communication ports

(1) Use this Conductor Category information for planning conductor routing. Refer to publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.

Input Specifications – 1732E-IT4IM12R

Attributes	Value
Number of inputs	4, isolated
Resolution, min	16 bits
Data format	Signed integer

Input Specifications – 1732E-IT4IM12R

Attributes	Value			
Thermocouple types	Type	Material	Temperature Range °C (°F)	Voltage Range (mV)
	B	Pt /30% Rh vs. Pt/5% Rh	40…1820 (104…3308)	0…13.820
	C	W/5% Re vs. W/26% Re	0…2320 (32…4208)	0…37.107
	E	Ni/Cr vs. Cu/Ni	-270…1000 (-454…1832)	-9.835…76.373
	J	Ni/Cr vs. Cu/Ni	-210…1200 (-346…2192)	-8.095…69.553
	K	Ni/Cr vs. Ni/Al	-270…1372 (-454…2501.6)	-6.458…54.886
	N	Ni/14.2%Cr/1.4%Si vs. Ni/4.4%Si/0.1%Mg	-270…1300 (-454…2372)	-4.345…47.513
	R	Pt/13%Rh vs. Pt	-50…1768 (-58…3214.4)	-0.226…21.101
	S	Pt/10%Rh vs. Pt	-50…1768 (-58…3214.4)	-0.236…18.693
	T	Cu vs. Cu/Ni	-270…400 (-454…752)	-6.258…20.872
CJC Terminal Chamber recommended	Rockwell Automation 871A-TS4CJC-DM, 871A-TR4CJC-DM			
Cold junction compensation range	0…70 °C (32…158 °F) for 302 type thermistors			
Cold junction compensation modes	Average Selected, Channel Independent, and CJC Offset (For more information, see the User Manual, publication 1732E-UM004)			
Thermistor types supported	Thermometrics MF65F302V/W or DC95F302V/W			
Input voltage range	±78.125 mV 0…78.125 mV			
Accuracy	0.1% Full Scale @ 25 °C (77 °F)			
Accuracy drift with temperature	30 ppm % Full Scale /°C @ 25 °C (77 °F)			
Calibration	Factory calibrated. Calibration is also supported through RSLogix 5000.			

Input Specifications – 1732E-IT4IM12R

Attributes	Value
Common mode rejection rate	120 dB @ 50/60 Hz
Normal mode rejection rate	100 dB @ 50/60 Hz
Sample Rate Filters[1]	50 Hz 60 Hz 250 Hz 500 Hz

(1) Sample Rate/Notch Filter Frequency, selectable per channel.

Input Specifications – 1732E-IR4IM12R

Attributes	Value
Number of inputs	4, isolated
Resolution, min	16 bits
Data format	16-bit sign magnitude
Sensors supported	100…200Ω α=0.00385/0.003916 Pt RTD 100/120Ω Ni RTD 10 Ω Cu α =0.00427 RTD
Sensor Types	100 Ω Pt 385 200 Ω Pt 385 100 Ω Pt 3916 200 Ω Pt 3916 10 Ω Cu 427 120 Ω Ni 672 100 Ω Ni 618 120 Ω Ni 618

Input Specifications – 1732E-IR4IM12R

Attributes	Value			
Input range	**RTD type**		**Temperature Range (°C)**	**Voltage Range**
	100 Ω Pt 385	0…390.48 Ω	-200…850 °C	0…156.25 mV
	200 Ω Pt 385	0…781 Ω	-200…850 °C	0…312.5 mV
	100 Ω Pt 3916	0…337.03 Ω	-200…630 °C	0…156.25 mV
	200 Ω Pt 3916	0…674.06 Ω	-200…630 °C	0…312.5 mV
	10 Ω Cu 427	0…19.116 Ω	-320…500 °C	0…19.53 mV
	120 Ω Ni 672	0…445.10 Ω	-70…445 °C	0…156.25 mV
	100 Ω Ni 618	0…198.88 Ω	-60…180 °C	0…78.125 mV
	120 Ω Ni 618	0…238.65 Ω	-90…140 °C	0…78.125mV
Accuracy	0.1% Full Scale @ 25 °C (77 °F)			
Accuracy drift with temperature	30 ppm % Full Scale /°C @ 25 °C (77 °F)			
Calibration	Factory calibrated. Calibration is also supported through RSLogix 5000.			
Sample Rate Filters[1]	50 Hz 60 Hz 250 Hz 500 Hz			
Common Mode Rejection Ratio	120 dB @ 50/60 Hz			
Normal Mode Rejection Ratio	100 dB @ 50/60 Hz			

(1) Sample rate filter selectable on a module basis only.

Environmental Specifications

Attribute	Value
Temperature, operating	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -20…60 °C (-4…140 °F)
Temperature, nonoperating	IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock): -40…85 °C (-40…185 °F)
Temperature, ambient, max	60 °C (140 °F)
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5…95% noncondensing
Vibration	IEC60068-2-6 (Test Fc, Operating): 5 g @ 10…500 Hz
Shock, operating	IEC60068-2-27 (Test Ea, Unpackaged Shock): 30 g
Shock, nonoperating	IEC60068-2-27 (Test Ea, Unpackaged Shock): 50 g
Emissions	CISPR 11: Group 1, Class A
ESD immunity	IEC 61000-4-2: 6 kV contact discharges 8 kV air discharges
Radiated RF immunity	IEC 61000-4-3: 10V/m with 1 kHz sine-wave 80% AM from 80…2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 1890 MHz 10V/m with 1 kHz sine-wave 80% AM from 2000…2700 MHz
EFT/B immunity	IEC 61000-4-4: ±3 kV at 5 kHz on power ports ±3 kV at 5 kHz on signal ports ±3 kV at 5 kHz on communication ports
Surge transient immunity	IEC 61000-4-5: ±1 kV line-line (DM) and ±2 kV line-earth (CM) on power ports ±2 kV line-earth (CM) on communication ports
Conducted RF immunity	IEC 61000-4-6: 10V rms with 1 kHz sine-wave 80% AM from150 kHz…80 MHz
Enclosure type rating	Meets IP65/66/67/69K (when marked)

Certifications

Certification (when product is marked)[1]	Value
c-UR-us	UL Recognized Component Industrial Control Equipment, certified for US and Canada. See UL File E322657.
CE	European Union 2004/108/EC EMC Directive, compliant with: EN 61326-1; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: Article 58-2 of Radio Waves Act, Clause 3
EtherNet/IP	ODVA conformance tested to EtherNet/IP specifications.

(1) See the Product Certification link at http://www.ab.com for Declarations of Conformity, Certificates, and other certification details.

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.rockwellautomation.com/support/, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/support/.

Installation Assistance

If you experience a problem within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/support/americas/phone_en.html, or contact your local Rockwell Automation representative.

New Product Satisfaction Return

Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete this form, publication RA-DU002, available at http://www.rockwellautomation.com/literature/.

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