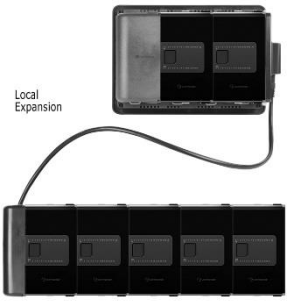
Uni-I/O™ Wide Modules

User Guide
UIS-WCB1

Uni-I/O™ Wide is a family of Input/Output modules that are compatible with the UniStream™ control platform. Wide Modules are 1.5 times as wide as Uni-I/O™ modules, and comprise more I/O points in less space.
This guide provides basic installation information for UIS-WCB1 Uni-I/O™ module.
Technical specifications may be downloaded from the Unitronics website.

The UniStream™ platform comprises CPU controllers, HMI panels, and local I/O modules that snap together to form an all-in-one Programmable Logic Controller (PLC).



Install Uni-I/O™ modules:

- Onto the back of any UniStream™ HMI Panel comprising a CPU-for-Panel.
- Onto a DIN-rail, using a Local Expansion Kit.

The maximum number of Uni-I/O™ Wide modules that can be connected to a single CPU controller is limited. For details, please refer to the specification sheets of the UniStream™ CPU or any of the relevant Local Expansion Kits.

Before You Begin

Before installing the device, the installer must:

- Read and understand this document.
- Verify the Kit Contents.

Installation option requirements

If you are installing a Uni-I/O™ module onto:

- A UniStream™ HMI Panel; the Panel must comprise a CPU-for-Panel, installed according to the CPU-for-Panel installation guide.
- A DIN-rail; you must use a Local Expansion Kit, available by separate order, to integrate the Uni-I/O™ modules on the DIN-rail into a UniStream™ control system.

Alert Symbols and General Restrictions

When any of the following symbols appear, read the associated information carefully.

Symbol	Meaning	Description
⚡	Danger	The identified danger causes physical and property damage.
⚠	Warning	The identified danger could cause physical and property damage.
Caution	Caution	Use caution.

- All examples and diagrams are intended to aid understanding, and do not guarantee operation. Unitronics accepts no responsibility for actual use of this product based on these examples.
- Please dispose of this product according to local and national standards and regulations.
- This product should be installed only by qualified personnel.

⚠
- Failure to comply with appropriate safety guidelines can cause severe injury or property damage.
- Do not attempt to use this device with parameters that exceed permissible levels.
- Do not connect/disconnect the device when power is on.

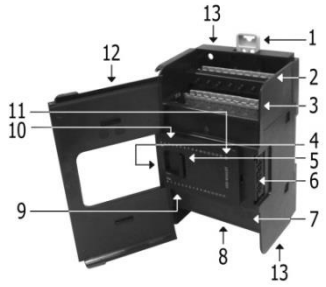
Environmental Considerations

⚠
- Ventilation: 10mm (0.4”) of space is required between the device top/bottom edges and the enclosure’s walls.
- Do not install in areas with: excessive or conductive dust, corrosive or flammable gas, moisture or rain, excessive heat, regular impact shocks or excessive vibration, in accordance with the standards and limitations given in the product’s technical specification sheet.
- Do not place in water or let water leak onto the unit.
- Do not allow debris to fall inside the unit during installation.
- Install at maximum distance from high-voltage cables and power equipment.

Kit Contents

- 1 Uni-I/O™ module
- 4 I/O terminal blocks (2 black and 2 gray)

Uni-I/O™ Diagram



1	DIN-rail clips	Provide physical support for CPU and modules. There are two clips: one at the top (shown), one at the bottom (not shown).
2	I/Os	I/O connection points
3		
4	I/O Bus - Left	Left-side Connector
5	Bus Connector Lock	Slide the Bus Connector Lock to the left, to electrically connect the Uni-I/O™ module to the CPU or adjacent module.
6	I/O Bus - Right	Right-Side Connector, shipped covered. Leave covered when not in use.
	Bus Connector Cover	
7	I/Os	I/O connection points
8		

9	Output LEDs	Green / Red LEDs
10	Input LEDs	Green / Red LEDs
11	Status LED	Tricolor LED, Green/Red/Orange
NOTE	▪ Refer to the module's specification sheet for LED indications.	
12	Module door	Shipped covered with protective tape to prevent the door from being scratched. Remove tape during installation.
13	Screw holes	Enable panel-mounting; hole diameter: 4mm (0.15”).

About the I/O Bus Connectors

The I/O Bus connectors provide the physical and electrical connection points between modules.
The connector is shipped covered by a protective cover, protecting the connector from debris, damage, and ESD.

The I/O Bus - Left (#4 in diagram) can be connected to either a CPU-for-Panel, a Uni-COM™ Communication module, to another Uni-I/O™ module or to the End Unit of a Local Expansion Kit.

The I/O Bus - Right (#6 in diagram) can be connected to another I/O module, or to the Base Unit of the Local Expansion Kit.

Caution
- If the I/O module is located last in the configuration, and nothing is to be connected to it, do not remove its Bus Connector Cover.

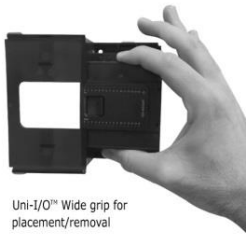
Installation

⚠
- Turn off system power before connecting or disconnecting any modules or devices.
- Use proper precautions to prevent Electro-Static Discharge (ESD).

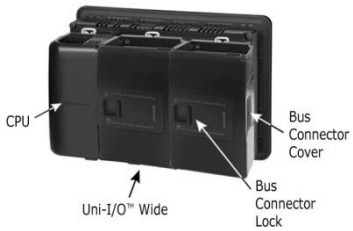
Installing a Uni-I/O™ Module onto a UniStream™ HMI Panel

NOTE The DIN-rail type structure on the back of the panel provides the physical support for the Uni-I/O™ module.

1. Check the unit to which you will connect the Uni-I/O™ module to verify that its Bus Connector is not covered.
   If the Uni-I/O™ module is to be the last one in the configuration, do not remove the cover of its I/O Bus Connector - Right.
2. Open the door of the Uni-I/O™ module and hold it as shown in the accompanying figure.
3. Use the upper and lower guide-tunnels (tongue & groove) to slide the Uni-I/O™ module into place.
4. Verify that the DIN-rail clips located at the top and bottom of the Uni-I/O™ module have snapped onto the DIN-rail.



5. Slide the Bus Connector Lock all the way to the left as shown in the accompanying figure.
6. If there is already a module located to its right, complete the connection by sliding the Bus Connector lock of the adjacent unit to the left.
7. If the module is the last in the configuration, leave the I/O bus connector covered.



Removing a Module

1. Turn off the system power.
2. Disconnect the I/O terminals (#2,3,7,8 in the diagram).
3. Disconnect the Uni-I/O™ module from the adjacent units: slide its Bus Connector Lock to the right. If there is a unit located on its right, slide the lock of this module to the right as well.
4. On the Uni-I/O™ module, pull the top DIN-rail clip up and the bottom clip down.
5. Open the door of the Uni-I/O™ module and hold it with two fingers as shown in the figure on page 3; then pull it carefully from its place.

Installing Uni-I/O™ modules onto a DIN-rail

To mount modules onto a DIN-rail, follow steps 1-7 in Installing a Uni-I/O™ Module onto a UniStream™ HMI Panel on page 3.

In order to connect the modules to a UniStream™ controller, you must use a Local Expansion Kit.

These kits are available with and without power supplies, and with cables of varying lengths. For complete information, please refer to the installation guide of the relevant Local Expansion Kit.

Numbering Modules

You can number modules for reference purposes. A set of 20 stickers is provided with every CPU-for-Panel; use these stickers to number the modules.

- The set contains numbered and blank stickers as shown in the figure to the left.
- Place them on the modules as shown in the figure to the right.

UL Compliance

The following section is relevant to Unitronics' products that are listed with the UL.

The following models: UIS-WCB1 is UL listed for Hazardous Locations.

The following models: UIS-WCB1 is UL listed for Ordinary Location.

UL Ratings, Programmable Controllers for Use in Hazardous Locations, Class I, Division 2, Groups A, B, C and D

These Release Notes relate to all Unitronics products that bear the UL symbols used to mark products that have been approved for use in hazardous locations, Class I, Division 2, Groups A, B, C and D.

Caution

- This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D, or Non-hazardous locations only.
- Input and output wiring must be in accordance with Class I, Division 2 wiring methods and in accordance with the authority having jurisdiction.
- WARNING—Explosion Hazard—substitution of components may impair suitability for Class I, Division 2.
- WARNING – EXPLOSION HAZARD – Do not connect or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- WARNING – Exposure to some chemicals may degrade the sealing properties of material used in Relays.
- This equipment must be installed using wiring methods as required for Class I, Division 2 as per the NEC and/or CEC.

Certification UL des automates programmables, pour une utilisation en environnement à risques, Class I, Division 2, Groups A, B, C et D.

Cette note fait référence à tous les produits Unitronics portant le symbole UL - produits qui ont été certifiés pour une utilisation dans des endroits dangereux, Classe I, Division 2, Groupes A, B, C et D.

Attention

- Cet équipement est adapté pour une utilisation en Classe I, Division 2, Groupes A, B, C et D, ou dans Non-dangereux endroits seulement.
- Le câblage des entrées/sorties doit être en accord avec les méthodes de câblage selon la Classe I, Division 2 et en accord avec l'autorité compétente.
- AVERTISSEMENT: Risque d'Explosion – Le remplacement de certains composants rend caduque la certification du produit selon la Classe I, Division 2.
- AVERTISSEMENT - DANGER D'EXPLOSION - Ne connecter pas ou ne débranche pas l'équipement sans avoir préalablement coupé l'alimentation électrique ou la zone est reconnue pour être non dangereuse.
- AVERTISSEMENT - L'exposition à certains produits chimiques peut dégrader les propriétés des matériaux utilisés pour l'étanchéité dans les relais.
- Cet équipement doit être installé utilisant des méthodes de câblage suivant la norme Class I, Division 2 NEC et /ou CEC.

Wiring

⚠
- This equipment is designed to operate only at SELV/PELV/Class 2/Limited Power environments.
- All power supplies in the system must include double insulation. Power supply outputs must be rated as SELV/PELV/Class 2/Limited Power.
- Do not connect either the 'Neutral' or 'Line' signal of the 110/220VAC to device's 0V point.
- Do not touch live wires.

⚠
- All wiring activities should be performed while power is OFF.
- Use over-current protection, such as a fuse or circuit breaker, to avoid excessive currents into the UIS-WCB1 module supply port.
- Unused points should not be connected (unless otherwise specified). Ignoring this directive may damage the device.
- Double-check all wiring before turning on the power supply.

Caution
- To avoid damaging the wire, use a maximum torque of 0.5 N·m (5 kgf·cm).
- Do not use tin, solder, or any substance on stripped wire that might cause the wire strand to break.
- Install at maximum distance from high-voltage cables and power equipment.

Wiring Procedure

Use crimp terminals for wiring; use 26-12 AWG wire (0.13 mm^2 –3.31 mm^2).

1. Strip the wire to a length of 7±0.5mm (0.250–0.300 inches).
2. Unscrew the terminal to its widest position before inserting a wire.
3. Insert the wire completely into the terminal to ensure a proper connection.
4. Tighten enough to keep the wire from pulling free.

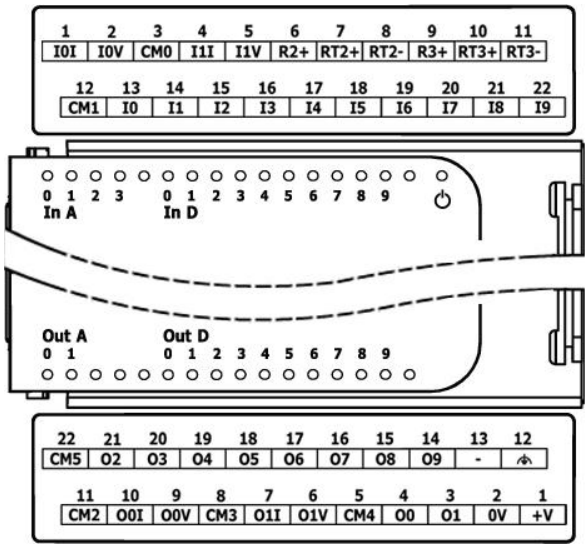
UIS-WCB1 Connection Points

All wiring diagrams and instructions in this document refer to the UIS-WCB1 connection points. These are arranged in four groups of eleven points each, as shown in the figure to the right.

Two top groups
Input connection points

Two bottom groups
Outputs and power supply connection points

The function of certain I/Os may be adapted via wiring and software settings.



Wiring Guidelines

In order to ensure that the device will operate properly and to avoid electromagnetic interference:

- Use a metal cabinet. Make sure the cabinet and its doors are properly earthed.
- Use wires that are properly sized for the load.
- Use shielded twisted pair cables for wiring High Speed and Analog I/O signals.
  Use shielded cables for wiring thermocouple and RTD signals.
  In either case, do not use the cable shield as a signal common / return path.
- Route each I/O signal with its own dedicated common wire. Connect common wires at their respective common (CM) points at the I/O module.
- Individually connect each 0V point and each common (CM) point in the system to the power supply 0V terminal, unless otherwise specified.
- Individually connect each functional earth point (⏚) to the earth of the system (preferably to the metal cabinet chassis). Use the shortest and thickest wires possible: less than 1m (3.3') in length, minimum thickness 14 AWG (2 mm2).
- Connect the power supply 0V to the earth of the system.
- Earthing the cables' shield:
  - Connect the cable shield to the earth of the system - preferably to the metal cabinet chassis. Note that the shield must be connected only at one end of the cable; typically, earthing the shield at the UIS-WCB1 end performs better.
  - Keep shield connections as short as possible.
  - Ensure shield continuity when extending shielded cables.

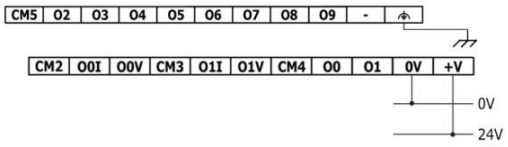
NOTE For detailed information, refer to the document System Wiring Guidelines, located in the Technical Library in the Unitronics' website.

Wiring the Power Supply

This module requires an external, regulated 24VDC power supply.

⚠ - The power supply port is not isolated from the bus; therefore the 0V of the power supply port must be connected to the HMI Panel's 0V.
Ignoring this directive may damage the device.

Connect the 24V and 0V terminals as shown in the accompanying figure.



Wiring the Digital Inputs

All 10 digital inputs share the common point CM1. The digital inputs may be wired altogether as sink or source.

Inputs I0, I1, I3, and I4 can be configured as either normal digital inputs or as high speed inputs that can receive high speed pulse signals from sensors or shaft encoders.

Inputs I2 and I5 through I9 can function only as normal digital inputs.

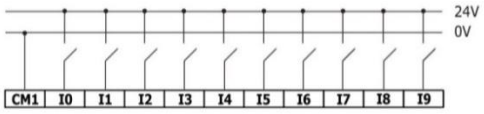
High Speed Input Modes

Following are the different pin assignments for the high speed channels:

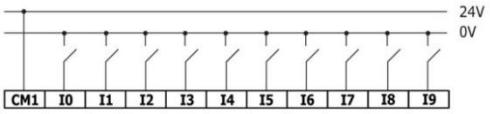
	Channel 1			**Channel 2**	
	I0	I1		I3	I4
Quadrature	Phase A	Phase B		Phase A	Phase B
Pulse/Direction	Pulse	Direction		Pulse	Direction

NOTE
- Input modes are set both by wiring and software.
- When connecting pulse sources without a direction signal, leave the direction pin unconnected. Note that in this configuration, the direction pin cannot be used as normal input.

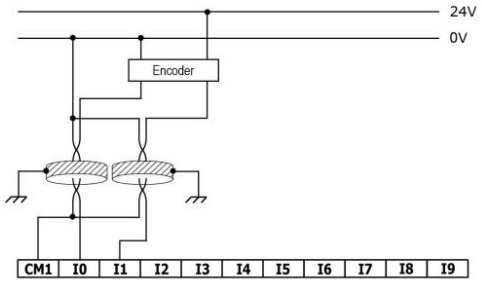
Input wiring, sink



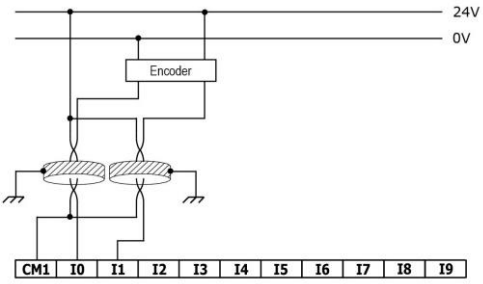
Input wiring, source



High Speed Input wiring, sink



High Speed Input wiring, source



NOTE
- Use sink input wiring to connect a sourcing (pnp) device.
- Use source input wiring to connect a sinking (npn) device.

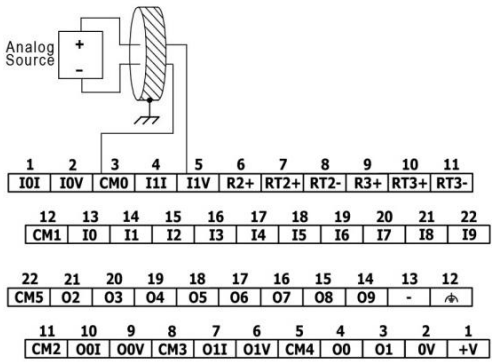
Wiring the Analog Inputs

Both inputs share the common point CM0.

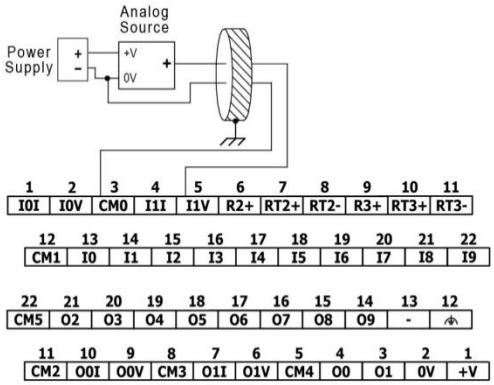
NOTE
- Each input offers two modes: voltage or current. You can set each input independently. The mode is determined both by wiring and by the hardware configuration within the software application.
- Voltage and current modes use distinct points. Connect only the point associated with the selected mode; leave the other point unconnected.

Voltage

Differential

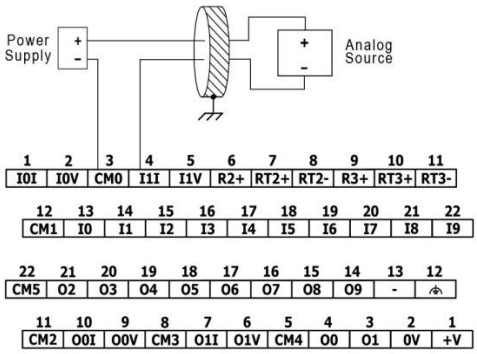


Single-ended

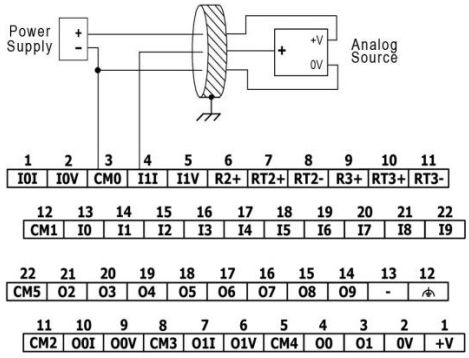


Current

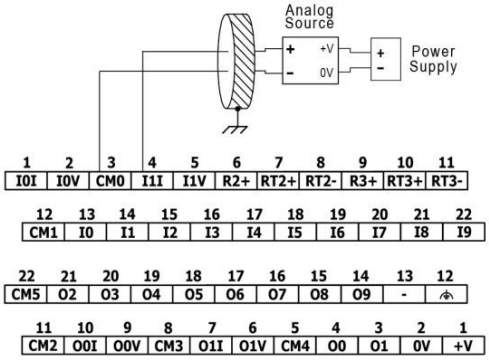
2-wire



3-wire



4-wire



Wiring the Temperature Inputs

NOTE

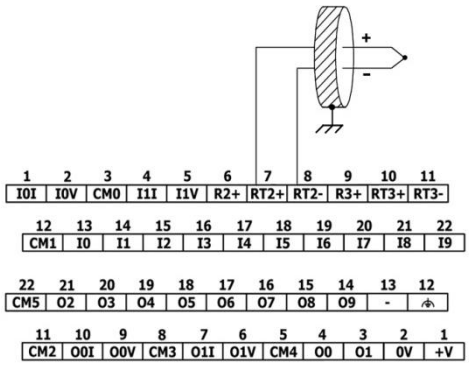
- Each input offers three modes: thermocouple, mV or RTD. You can set each input independently. The mode is determined both by wiring and by the hardware configuration within the software application.

In order to maintain correct operation of the temperature inputs, connect together points RTn+ and RTn- of unused temperature inputs and leave point Rn+ unconnected (n designates input number).

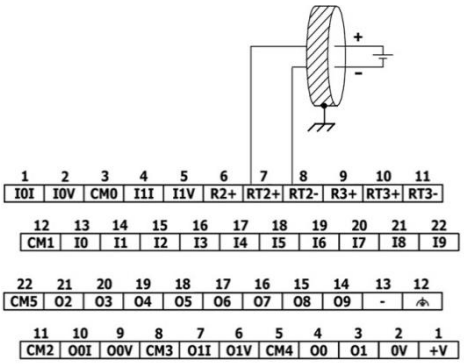
Thermocouple and mV

NOTI ▪ When using thermocouple or mV modes, leave point Rn+ unconnected (n designates input number).

Thermocouple



mV



About thermocouple isolation

Although the temperature inputs are isolated from the bus and the module's power-supply port, they are neither isolated from each other nor from the analog inputs. Therefore, temperature inputs isolation may be bypassed when using an exposed-junction (non-isolated) thermocouple in conjunction with analog inputs or another exposed-junction thermocouple, which can lead to flow of unwanted currents through the thermocouple wires that might interfere with thermocouple voltage reading.

In order to maintain temperature inputs isolation when using one or more of the analog inputs or when using more than one thermocouple, either:

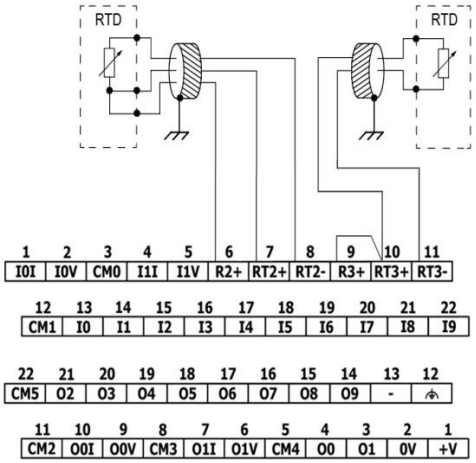
- Use isolated-junction thermocouples, or, if you are not using the analog inputs, you may use up to one exposed-junction thermocouple per UIS-WCB1 module;
- Electrically isolate exposed-junction thermocouples from other electrically-conductive parts of the system.

RTD

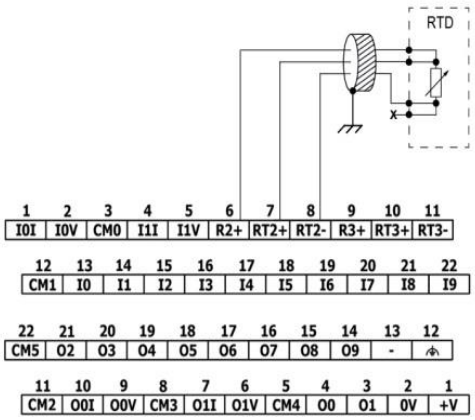
NOTE

- When connecting 3- or 4-wire RTDs, make sure to use conductors of the same type, width, and length for all RTD wires, otherwise module accuracy will degrade.
- When connecting 4-wire RTDs, use 3-wire cable and leave the unused wire unconnected with minimal length.

3-wire and 2-wire



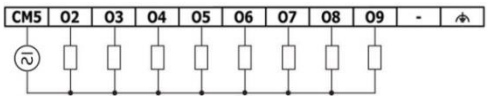
4-wire



Wiring the Relay Outputs

⚠ ▪ To avoid risk of fire or property damage, always use a limited current source or connect a current limiting device in series with the relay contacts.

All 8 relay outputs share the common point CM5.

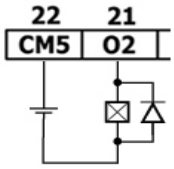


Increasing contact life span

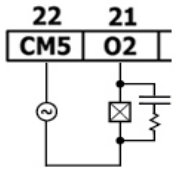
To increase the life span of the relay contacts and protect the module from potential damage by reverse EMF, connect:

- a clamping diode in parallel with each inductive DC load.
- an RC snubber circuit in parallel with each inductive AC load.

DC Load



AC Load



Wiring the Transistor Outputs

Both transistor outputs are of Sink (npn) type.

NOTE ▪ The outputs are not isolated.

⚠ ▪ Connect a current limiting device in series with outputs O0 and O1. These outputs are not short-circuit protected.

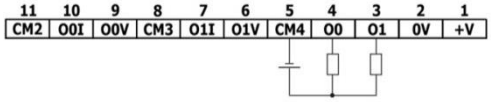
Outputs O0 and O1 can independently be configured as either normal digital outputs or as high speed PWM outputs.

Outputs O0 and O1 share the common point CM4.

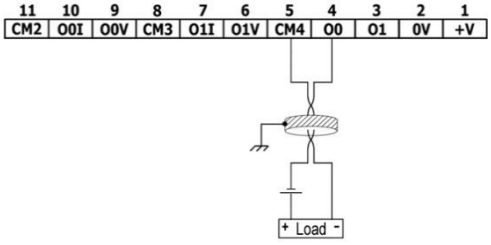
CM4 is internally connected to the 0V point. To minimize EMI emission by high-speed signals' wiring, do not externally connect CM4 to the system 0V.

⚠ ▪ Do not use point CM4 for any purpose other than connecting the digital output load. Using it for any other purpose may damage the module.

Normal Transistor Output



High Speed PWM Output



Wiring the Analog Outputs

NOTE

- The outputs are not isolated.
- Each output offers two modes: voltage or current. You can set each output independently. The mode is determined both by wiring and by the hardware configuration within the software application.
- Voltage and current modes use distinct points. Connect only the point associated with the selected mode; leave the other point unconnected.

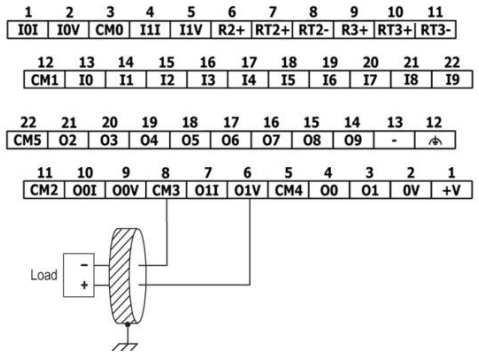
Each output has its own common point (CM2 for O0, CM3 for O1). Connect each analog output using its corresponding CM point.

CM2 and CM3 are internally connected to the 0V point. To minimize EMI pickup by analog signals' wiring, do not externally connect CM2 or CM3 to the system 0V.

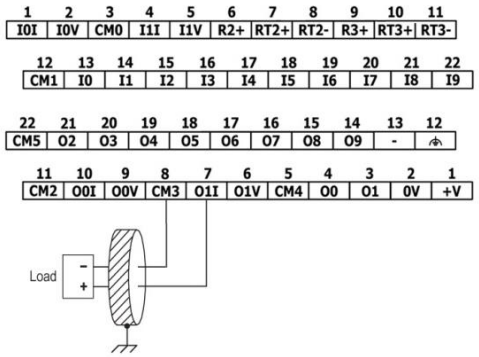
⚠

- Do not use points CM2 or CM3 for any purpose other than connecting the analog output load. Using them for any other purpose may damage the module.

Voltage



Current



UniStream® Uni-I/O™ Modules

Technical Specifications
UIS-WCB1

This guide provides specifications for Unitronics' Uni-I/O™ Wide module UIS-WCB1. This module comprises:

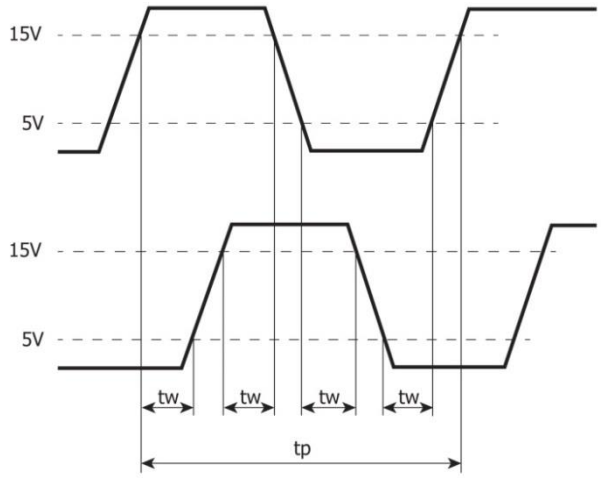
- 10 Digital inputs, 24VDC, sink/source, including 2 High speed counter input channels (8) (9)
- 2 x Analog inputs, 0÷10V / 0÷20mA, 14 bits,
- 2 x Temperature inputs, RTD / Thermocouple,
- 8 x Relay outputs,
- 2 x Transistor outputs, npn, including 2 High speed PWM output channels (8) (10)
- 2 x Analog outputs, 0÷10V / -10÷10V / 0÷20mA / 4÷20mA, 13/14 bits.

Uni-I/O Wide modules are compatible with UniStream™ Programmable Logic Controllers. They may be either snapped onto the back of a UniStream™ HMI Panel next to a CPU-for-Panel to create an all-in-one HMI + PLC controller, or installed on a standard DIN Rail using a Local Expansion Adapter.

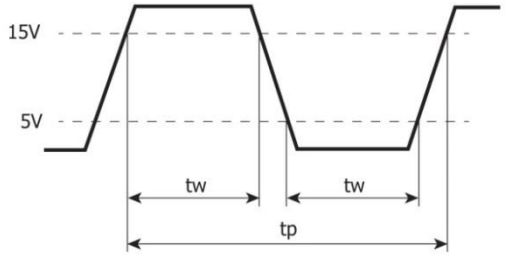
Installation Guides are available in the Unitronics Technical Library at www.unitronics.com.

Power Supply	
Nominal operating voltage	24VDC
Operating voltage	20.4 – 28.8VDC
Maximum current consumption	180mA@24VDC
Isolation	None

Digital Inputs	
Number of inputs	10
Type	Sink or Source
Isolation voltage	
Input to bus	500VAC for 1 minute
Input to input	None
Input to power supply	500VAC for 1 minute
Nominal voltage	24VDC @ 6mA
Input voltage	
Sink/Source	On state: 15-30VDC, 4mA min. Off state: 0-5VDC, 1mA max.
Nominal impedance	4kΩ
Filter	Settable between 1 to 32ms
High speed inputs (8) (9)	
Frequency / Period	Pulse/Direction mode: 10kHz max. / 100µs min. (t_p in the Pulse/Dir Mode figure below) Quadrature mode: 5kHz max. / 200µs min. (t_p in the Quadrature Mode figure below)
Pulse width	40µs min. for each state (t_w in the figures below)
Cable	Shielded twisted pair



Quadrature Mode



Pulse/Direction mode

Analog Inputs			
Number of inputs	2		
Input range (11) (12)	**Input Type**	**Nominal Values**	**Over-range Values ***
	0 ÷ 10VDC	0 ≤ Vin ≤ 10VDC	10 < Vin ≤ 10.15VDC
	0 ÷ 20mA	0 ≤ Iin ≤ 20mA	20 < Iin ≤ 20.3mA
	***** **Overflow** (13) is declared when an input value exceeds the Over-range boundary.		
Absolute maximum rating	±30V (Voltage), ±30mA (Current)		
RTD Maximum excitation current	0.17mA		
Isolation voltage			
Input to bus	500VAC for 1 minute		
Input to input	None		
Input to temperature inputs	None		
Input to power supply	500VAC for 1 minute		
Conversion method	Delta-sigma		
Resolution	14 bits		
Accuracy (25°C / -20°C to 55°C)	±0.2% / ±0.5% of full scale (Voltage) ±0.2% / ±0.3% of full scale (Current)		
Input impedence	492kΩ (Voltage), 30Ω (Current)		
Noise rejection	10Hz, 50Hz, 60Hz, 400Hz		

Step response [14] (0 to 100% of final value)	**Smoothing**	**Noise Rejection Frequency**			
		400Hz	**60Hz**	**50Hz**	**10Hz**
	None	251.6 ms	411.6 ms	491.6 ms	2411.6 ms
	Weak	503.2 ms	823.2 ms	983.2 ms	4823.2 ms
	Medium	1006.4 ms	1646.4 ms	1966.4 ms	9646.4 ms
	Strong	2012.7 ms	3292.7 ms	3932.7 ms	19292.7 ms
Update time [14]	**Noise Rejection Frequency**			**Update Time**	
	400Hz			251.6 ms	
	60Hz			411.6 ms	
	50Hz			491.6 ms	
	10Hz			2411.6 ms	
Cable	Shielded twisted pair				
Diagnostics [13]	Analog input overflow				

Temperature Inputs			
Number of inputs	2		
Sensor Type	RTD (4, 3 and 2 wire[15]), Themocouple		
Input range [16]	**Input type**	**Nominal values**	**Over/Under-range Values ***
	RTD PT100 0.00385 0.00392 0.00391	-200°C ≤ T ≤ 850°C (-328°F ≤ T ≤ 1,562°F)	Under-range: -220°C ≤ T < -200°C (-364°F ≤ T < -328°F) Over-range: 850°C < T ≤ 860°C (1,562°F < T ≤ 1,580°F)
	RTD NI100 0.00618	-100°C ≤ T ≤ 260°C (-148°F ≤ T ≤ 500°F)	Under-range: -150°C ≤ T < -100°C (-238°F ≤ T < -148°F) Over-range: 260°C < T ≤ 270°C (500°F < T ≤ 518°F)
	RTD NI120 0.00672	-80°C ≤ T ≤ 260°C (-112°F ≤ T ≤ 500°F)	Under-range: -130°C ≤ T < -80°C (-202°F ≤ T < -112°F) Over-range: 260°C < T ≤ 270°C (500°F < T ≤ 518°F)
	RTD NI100 0.00617	-60°C ≤ T ≤ 180°C (-76°F ≤ T ≤ 356°F)	Under-range: -104°C ≤ T < -60°C (-219°F ≤ T < -76°F) Over-range: 180°C < T ≤ 210°C (356°F < T ≤ 410°F)

	Thermocouple type J	-200°C ≤ T ≤ 1,200°C (-328°F ≤ T ≤ 2,192°F)	Under-range: -210°C ≤ T < -200°C (-346°F ≤ T < -328°F) Over-range: 1,200°C < T ≤ 1,250°C (2,192°F < T ≤ 2,282°F)
	Thermocouple type K	-200°C ≤ T ≤ 1,372°C (-328°F ≤ T ≤ 2,501.6°F)	Under-range: -270°C ≤ T < -200°C (-454°F ≤ T < -328°F) Over-range: 1,372°C < T ≤ 1,400°C (2,501.6°F < T ≤ 2,552°F)
	Thermocouple type T	-200°C ≤ T ≤ 400°C (-328°F ≤ T ≤ 752°F)	Under-range: -270°C ≤ T < -200°C (-454°F ≤ T <-328°F) Over-range: 400°C < T ≤ 430°C (752°F < T ≤ 806°F)
	Thermocouple type E	-200°C ≤ T ≤ 1,000°C (-328°F ≤ T ≤ 1,832°F)	Under-range: -270°C ≤ T < -200°C (-454°F ≤ T < -328°F) Over-range: 1,000°C < T ≤ 1,010°C (1,832°F < T ≤ 1,850°F)
	Thermocouple type R	0°C ≤ T ≤ 1,768°C (32°F ≤ T ≤ 3,214.4°F)	Under-range: -50°C ≤ T < 0°C (-58°F ≤ T < 32°F) Over-range: 1,768°C < T ≤ 1,800°C (3,214.4°F < T ≤ 3,272°F)
	Thermocouple type S	0°C ≤ T ≤ 1,768°C (32°F ≤ T ≤ 3,214.4°F)	Under-range: -50°C ≤ T < 0°C (-58°F ≤ T < 32°F) Over-range: 1,768°C < T ≤ 1,800°C (3,214.4°F < T ≤ 3,272°F)
	Thermocouple type B	200°C ≤ T ≤ 1,820°C (392°F ≤ T ≤ 3,308°F)	Under-range: 100°C ≤ T < 200°C (212°F ≤ T < 392°F) Over-range: 1,820°C < T ≤ 1,870°C (3,308°F < T ≤ 3,398°F)
	Thermocouple type N	-210°C ≤ T ≤ 1,300°C (-346°F ≤ T ≤ 2,372°F)	Under range: -270°C ≤ T < -210°C (-454°F ≤ T < -346°F) Over-range: 1,300°C < T ≤ 1,350°C (2,372°F < T ≤ 2,462°F)

	Thermocouple type C	10°C ≤ T ≤ 2,315°C (50°F ≤ T ≤ 4,199°F)	Under-range: 0°C ≤ T < 10 °C (32°F ≤ T < 50°F) Over-range: 2,315°C < T ≤ 2,370°C (4,199°F < T ≤ 4,298°F)
	Resistance	0Ω ≤ R ≤ 390Ω	390Ω < R ≤ 395.85Ω
	mV	-70mV ≤ V ≤ 70mV	Under-range: -71.05mV ≤ V < -70mV Over-range: 70mV ≤ V < 71.05mV
	*** Overflow or Underflow** (13) is declared when an input value exceeds the Over-range or Under-range boundaries respectively.		
Absolute maximum rating	±36 V		
Isolation voltage			
Input to bus	500 VAC for 1 minute		
Input to input	None		
Input to analog inputs	None		
Input to power supply	500 VAC for 1 minute		
Conversion method	Delta-sigma		
Resolution	Temperature – 0.1°C (0.1°F) (17) Resistance – 14 bits mV – 13 bits plus sign		

Accuracy (25°C / -20°C to 55°C)	**Input type**	**Accuracy**
	RTD, all types	± 0.5°C / ± 1.0°C (± 0.9°F / ± 1.8°F)
	Thermocouple type J (18)	± 0.4°C / ± 0.7°C (± 0.72°F / ± 1.26°F)
	Thermocouple type K (18)	± 0.5°C / ± 1.0°C (± 0.9°F / ± 1.8°F)
	Thermocouple type T (18)	± 0.6°C / ± 1.2°C (± 1.08°F / ± 2.16°F)
	Thermocouple type E (18)	± 0.4°C / ± 0.8°C (± 0.72°F / ± 1.44°F)
	Thermocouple type R (18)	± 1.2°C / ± 2.4°C (± 2.16°F / ± 4.32°F)
	Thermocouple type S (18)	± 1.2°C / ± 2.4°C (± 2.16°F / ± 4.32°F)
	Thermocouple type B (18)	± 2.0°C / ± 3.8°C (± 3.46°F / ± 6.84°F)
	Thermocouple type N (18)	± 1.0°C / ± 1.5°C (± 1.8°F / ± 2.7°F)
	Thermocouple type C (18)	± 0.8°C / ± 2.0°C (±1.44°F / ± 3.46°F)
	Resistance	± 0.05% / ± 0.1% of full scale
	mV	± 0.05% / ± 0.1% of full scale

Noise rejection	10Hz, 50 Hz, 60 Hz, 400 Hz

Step response (14) (0 to 100% of final value)	**Smoothing**	**Noise Rejection Frequency**			
		400Hz	**60Hz**	**50Hz**	**10Hz**
	None	251.6 ms	411.6 ms	491.6 ms	2411.6 ms
	Weak	503.2 ms	823.2 ms	983.2 ms	4823.2 ms
	Medium	1006.4 ms	1646.4 ms	1966.4 ms	9646.4 ms
	Strong	2012.7 ms	3292.7 ms	3932.7 ms	19292.7 ms

Update time (14)	**Noise Rejection Frequency**	**Update Time**
	400Hz	251.6 ms
	60Hz	411.6 ms
	50Hz	491.6 ms
	10Hz	2411.6 ms
Thermocouple Cold junction error (18)	±1.5°C (±2.7°F)	
Cable	Shielded, see installation guide for details	
Diagnostics (13)	Input Overflow or Underflow, sensor connection fault (19)	

Relay Outputs	
Number of outputs	8 (O2 to O9)
Output type	Relay, SPST-NO (Form A)
Isolation voltage	
Output to bus	1,500VAC for 1 minute
Output to output	None
Output to power supply	1,500VAC for 1 minute
Current	2A maximum per output Total 8A maximum (Resistive load)
Voltage	250VAC / 30VDC maximum
Minimum load	1mA, 5VDC
Switching time	10ms maximum
Short-circuit protection	None
Life expectancy (20)	100k operations at maximum load

Transistor Outputs	
Number of outputs	2 (O0 and O1)
Output type	Transistor, Sink
Isolation	None
Current	50mA max. per output
Voltage	Nominal: 24VDC Range: 3.5V to 28.8VDC
On state voltage drop	1V max
Off state leakage current	10µA max
Short circuit protection	None
Switching times	Turn-on: 0.4µs max. (470Ω and 4kΩ load) Turn-off: 1.1µs max. (470Ω load), 3.4µs max. (4kΩ load)
High speed outputs (8) (10)	
PWM Frequency	6Hz min. 250kHz max. (470Ω load) 100kHz max. (4kΩ load)
Cable	Shielded twisted pair

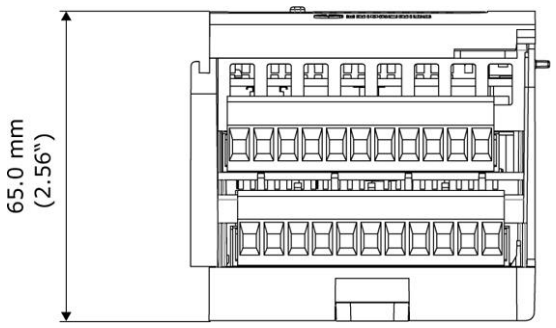
Analog Outputs			
Number of outputs	2		
Output range (21)	**Output Type**	**Nominal Values**	**Over/Under-range Values ***
	0 ÷ 10VDC	0 ≤ Vout ≤ 10VDC	10 < Vout ≤ 10.15VDC
	-10 ÷ 10VDC	-10 ≤ Vout ≤ 10VDC	-10.15 ≤ Vout < -10VDC 10 < Vout ≤ 10.15VDC
	0 ÷ 20mA	0 ≤ Iout ≤ 20mA	20 ≤ Iout ≤ 20.3mA
	4 ÷ 20mA	4 ≤ Iout ≤ 20mA	20 ≤ Iout ≤ 20.3mA
	*** Overflow or Underflow** is declared when an output value exceeds the Over-range or Under-range boundaries respectively.		
Isolation	None		
Resolution	0 ÷ 10VDC – 14 bit -10 ÷ 10VDC – 13 bit + sign 0 ÷ 20mA – 13 bit 4 ÷ 20mA – 13 bit		
Accuracy (25°C /-20°C to 55°C)	±0.3% / ±0.5% of full scale (Voltage) ±0.5% / ±0.7% of full scale (Current)		
Load impedance	Voltage – 2kΩ minimum Current – 600Ω maximum		
Settling time (95% of new value)	0 ÷ 10VDC – 1.8ms (2kΩ resistive load), 3.7ms (2kΩ + 1uF load) -10 ÷ 10VDC – 3ms (2kΩ resistive load), 5.5ms (2kΩ + 1uF load) 0 ÷ 20mA and 4 ÷ 20mA – 1.7ms (600Ω load), 1.7ms (600Ω + 10mH load)		
Short circuit protection (voltage mode)	Yes (no indication)		
Cable	Shielded twisted pair		
Diagnostics (13)	Current – Open circuit indication Supply level – Normal / Low or missing		

IO/COM Bus	
Bus maximum current consumption	110mA

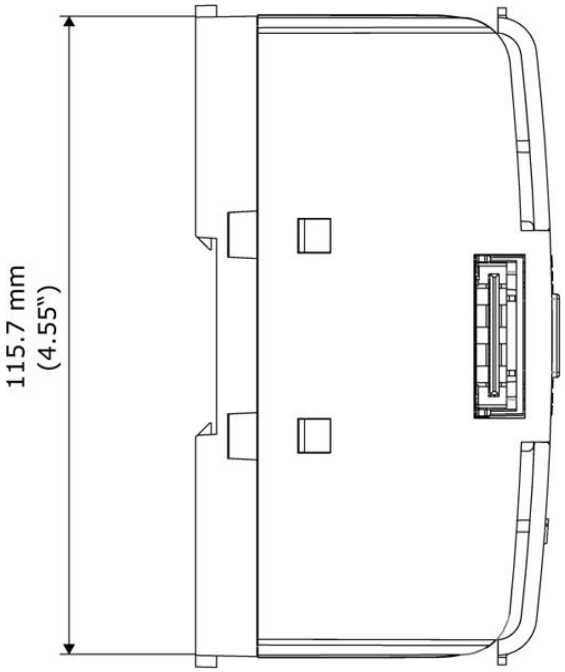
LED Indications			
Digital Input LEDs	Green	Input state	
Analog Input LEDs	Red	On: Input value is in Overflow	
Temperature Input LEDs	Red	On: Input value is in Overflow, Underflow, or a connection fault occurs	
Relay and Transistor Output LEDs	Green	Output state	
Analog Output LEDs	Red	On: Open Circuit (when set to Current mode)	
Status LED	A triple color LED. Indications are as follows:		
	Color	**LED State**	**Status**
	Green	On	Operating normally
		Slow blink	Boot
		Rapid blink	OS initialization
	Green/Red	Slow blink	Configuration mismatch
	Red	On	No power provided to the module
		Slow blink	No IO exchange
		Rapid blink	Communication error
	Orange	Rapid blink	OS Upgrade
		Slow Blink	Firmware Error, Contact Support

Environmental	
Protection	IP20, NEMA1
Operating temperature	-20°C to 55°C (-4°F to 131°F)
Storage temperature	-30°C to 70°C (-22°F to 158°F)
Relative Humidity (RH)	5% to 95% (non-condensing)
Operating Altitude	2,000m (6,562 ft)
Shock	IEC 60068-2-27, 15G, 11ms duration
Vibration	IEC 60068-2-6, 5Hz to 8.4Hz, 3.5mm constant amplitude, 8.4Hz to 150Hz, 1G acceleration.

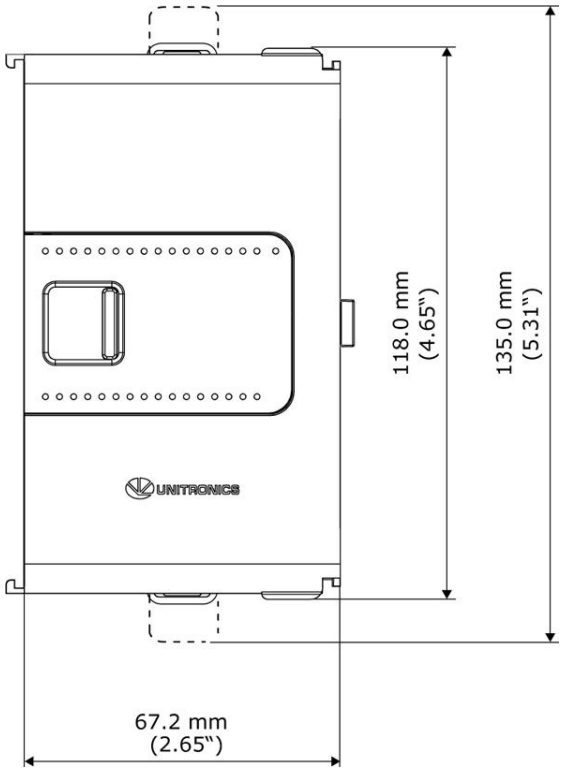
Dimensions	
Weight	0.250 kg (0.551 lb)
Size	Identical for all models, as shown in the images below



Top View



Side View



Front View

Notes

8. The UIS-WCB1 utilizes two high speed blocks that can each be assigned either to the inputs or to the outputs.
9. Four of the digital inputs may be configured to function either as normal, or as high speed digital inputs, that can receive high speed pulse signals from up to two sensors or shaft encoders.
10. The two transistor outputs may be configured to function either as normal, or as high speed PWM outputs.
11. The 4-20mA input option is implemented using 0-20mA input range.
12. The UIS-WCB1 analog inputs measure values that are slightly higher than the nominal input range (Input Over-range).

    Note that when the input overflow occurs, it is indicated in the corresponding I/O Status tag while the input value is registered as the maximum permissible value. For example, if the specified input range is 0 ÷ 10V, the Over-range values can reach up to 10.15V, and any input voltage higher than that will still register as 10.15V while the Overflow system tag is turned on.

13. See LED Indications Table for description of the relevant indications. Note that the diagnostics results are also indicated in the system tags and can be observed through the UniApps™ or the online state of the UniLogic™.
14. Step response and update time are independent of the number of channels that are used.
15. The UIS-WCB1 inherently supports 3-wire sensors.
    4-wire sensors may be connected by utilizing 3 of the sensor wires; in-order to achieve the specified performance, all sensor wires shall be of identical type and length just as with a 3-wire sensor connection.
    2-wire sensors may also be connected; performance in this case will degrade because of the

wires` resistance.
Refer to the UIS-WCB1 installation guide for detailed installation instructions.

16. The UIS-WCB1 temperature inputs measure values that are slightly higher or lower than the nominal input range (Input Over/Under-range respectively).

    Note that when input Overflow, Underflow or a connection fault occurs, it is indicated in the corresponding I/O Status tag (refer to the UniLogic™ help for details) as well as by the respective input LED (see LED Indications), while the input value is registered as follows:

Fault Type	Registered Value in the Input Tag
Overflow	32,767
Underflow	-32,767
Connection fault	-32,768

17. For temperature measurement, the value is represented in 0.1° units. For example, a temperature of 12.3° is represented as 123 at the Value tag.
18. The overall accuracy for thermocouples is a combination of the per-sensor specified accuracy and the thermocouple cold junction error specification.
    The module requires at least 30 minutes of warm-up in order to meet the accuracy specifications.
19. Sensor connection fault check is active by default for temperature, resistance and mV measurements. This may interfere with some test equipment like RTD, thermocouple, resistance and voltage simulators and thus may induce reading errors or cause malfunction of the test equipment and/or the UIS-WCB1.
    In order to interoperate correctly with such equipment, you may set the Disable Fault Detection I/O
    tag. This will disable connection fault check for all inputs.
    Note that when this tag is set, the UIS-WCB1 will not check, or report, connection faults; thus, the reading in such case is unpredictable.
20. Life expectancy of the relay contacts depends on the application that they are used in. The product's installation guide provides procedures for using the contacts with long cables or with inductive loads.
21. The UIS-WCB1 analog outputs are able to output values that are slightly higher or lower (if applicable) than the nominal output range (Output Over/Under-range respectively).