UniStream™ Uni-I/O™ Modules

Technical Specifications
UIS-WCB2

This guide provides specifications for Unitronics' Uni-I/O™ Wide module UIS-WCB2. This module comprises:

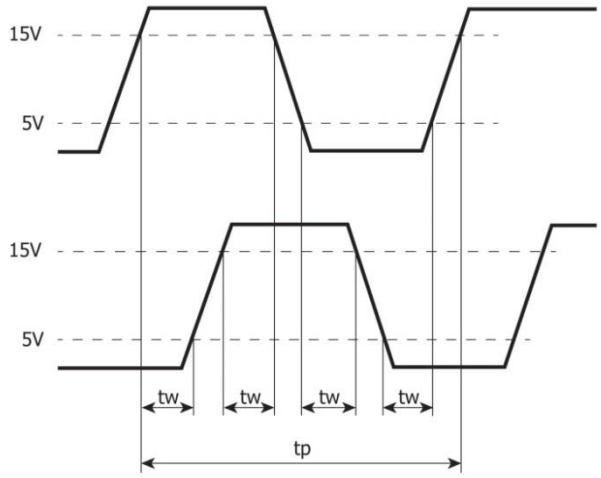
- 10 Digital inputs, 24VDC, sink/source,
  including 2 High speed counter input channels (1) (2)
- 2 x Analog inputs, 0÷10V / 0÷20mA, 14 bits
- 2 x Temperature inputs, RTD / Thermocouple
- 8 x Transistor outputs, source
- 2 x Transistor outputs, sink
  including 2 High speed PWM output channels (1) (3)
- 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 PLC + HMI controller, or installed on a standard DIN Rail using a Local Expansion Adapter.

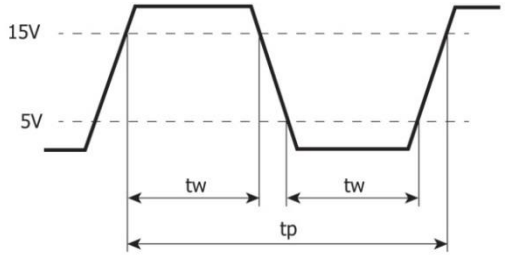
Installation Guides are available in the Unitronics Technical Library at www.unitronics.com.

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 (1) (2)	
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 (4) (5)	**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** (6) is declared when an input value exceeds the Over-range boundary.		
Absolute maximum rating	±30V (Voltage), ±30mA (Current)		
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 [7] (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 [7]	**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 [6]	Analog input overflow				

Temperature Inputs			
Number of inputs	2		
Sensor Type	RTD (4, 3 and 2 wire[8]), Themocouple		
Input range [9]	**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** (6) 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) (10) 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 (11)	± 0.4°C / ± 0.7°C (± 0.72°F / ± 1.26°F)
	Thermocouple type K (11)	± 0.5°C / ± 1.0°C (± 0.9°F / ± 1.8°F)
	Thermocouple type T (11)	± 0.6°C / ± 1.2°C (± 1.08°F / ± 2.16°F)
	Thermocouple type E (11)	± 0.4°C / ± 0.8°C (± 0.72°F / ± 1.44°F)
	Thermocouple type R (11)	± 1.2°C / ± 2.4°C (± 2.16°F / ± 4.32°F)
	Thermocouple type S (11)	± 1.2°C / ± 2.4°C (± 2.16°F / ± 4.32°F)
	Thermocouple type B (11)	± 2.0°C / ± 3.8°C (± 3.46°F / ± 6.84°F)
	Thermocouple type N (11)	± 1.0°C / ± 1.5°C (± 1.8°F / ± 2.7°F)
	Thermocouple type C (11)	± 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 (7) (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 [7]	**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 [11]	±1.5°C (±2.7°F)	
Cable	Shielded, see installation guide for details	
Diagnostics [6]	Input Overflow or Underflow, sensor connection fault [12]	

Source Transistor Outputs	
Number of outputs	8 (O2 to O9)
Output type	Transistor, Source (pnp)
Isolation voltage	
Output to bus	500VAC for 1 minute
Output to output	None
Outputs power supply to bus	500VAC for 1 minute
Outputs power supply to output	None
Current	0.5A maximum per output
Voltage	See Source Transistor Outputs Power Supply specfication
ON state voltage drop	0.5V maximum
OFF state leakage current	10µA maximum
Switching times	Turn-on/off: 80µs max. (Load resistance < 4kΩ)
Short-circuit protection	Yes

Source Transistor Outputs Power Supply	
Nominal operating voltage	24VDC
Operating voltage	20.4 – 28.8VDC
Maximum current consumption	30mA@24VDC Current consumption does not include load current

Sink 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 (1) (3)	
PWM Frequency	6Hz min. 250kHz max. (470Ω load) 100kHz max. (4kΩ load)
Cable	Shielded twisted pair

Analog Outputs			
Number of outputs	2		
Output range (14)	**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		

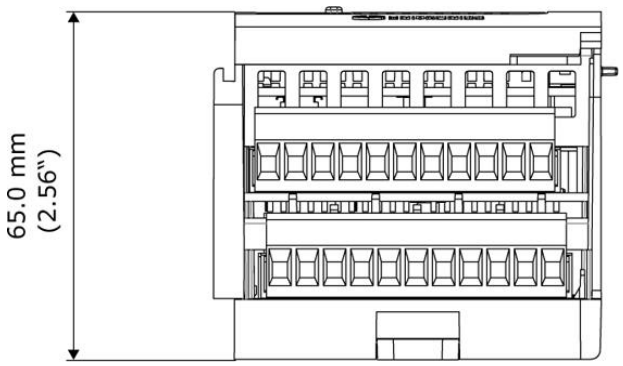
Diagnostics [6]	Current – Open circuit indication Supply level – Normal / Low or missing

IO/COM Bus	
Bus maximum current consumption	110mA

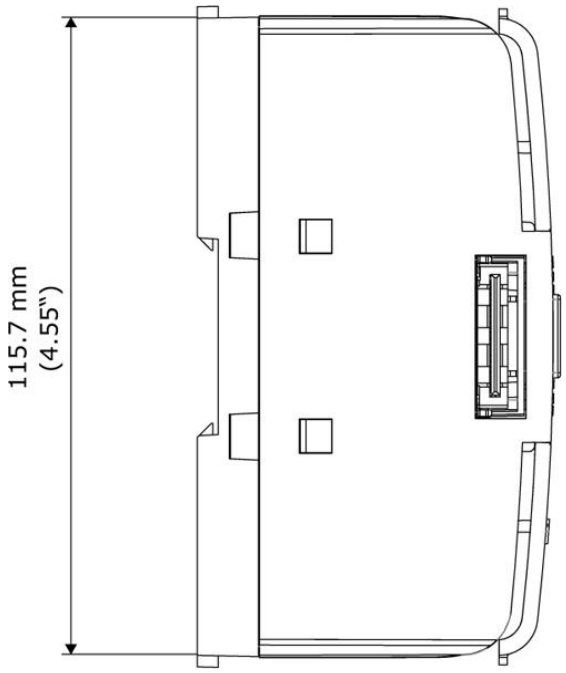
LED Indications			
Digital Input LEDs	Green	Input state	
Analog Input LEDs	Red	On: Input value is in Overflow	
Temperature Input LEDs	Red	On: Input value is in Overflow, Underflow, or a connection fault occurs	
Relay and Transistor Output LEDs	Green	Output state	
Analog Output LEDs	Red	On: Open Circuit (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	Slow blink	No IO exchange
		Rapid blink	Communication error
	Orange	Rapid blink	OS Upgrade

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.

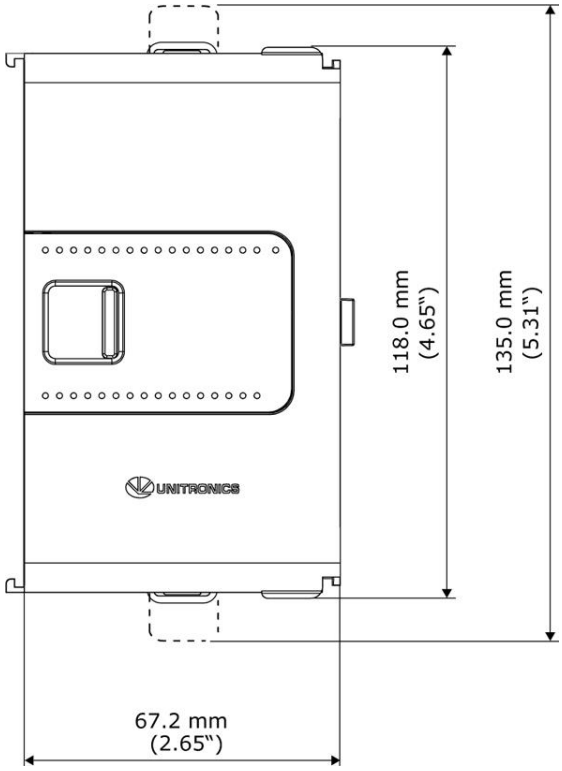
Dimensions	
Weight	0.250 kg (0.551 lb)
Size	Identical for all models, as shown in the images below



Top View



Side View



Front View

Notes

1. The UIS-WCB1 utilizes two high speed blocks that can each be assigned either to the inputs or to the outputs.
2. 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.
3. The two transistor outputs may be configured to function either as normal, or as high speed PWM outputs.
4. The 4-20mA input option is implemented using 0-20mA input range.
5. 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.

6. 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™.
7. Step response and update time are independent of the number of channels that are used.
8. 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.
9. 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

10. 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.
11. 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.
12. 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.
13. 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.
14. 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).