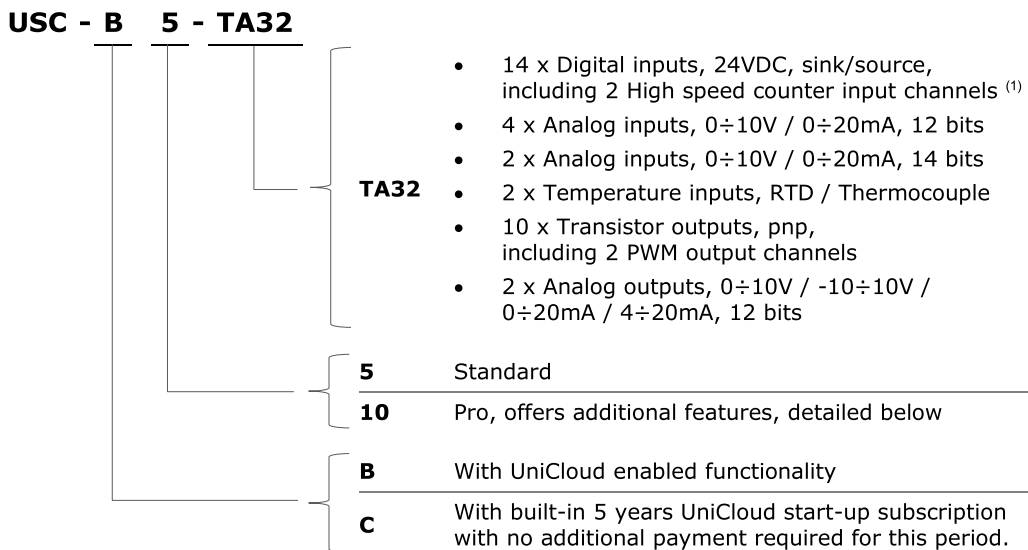|	
# UniStream® PLC	## Technical Specifications **USC-B5-TA32, USC-B10-TA32,** **USC-C5-TA32, USC-C10-TA32**

Unitronics' UniStream® PLCs are DIN-rail mounted Programmable Logic Controllers (PLCs) with a built-in I/O configuration.

UniStream connects directly to UniCloud, Unitronics' IIoT cloud platform using built-in UniCloud connectivity. More information about UniCloud is available at www.unitronics.cloud.

Model numbers in this document

USC - B   5 - TA32

TA32	• 14 x Digital inputs, 24VDC, sink/source, including 2 High speed counter input channels [1] • 4 x Analog inputs, 0÷10V / 0÷20mA, 12 bits • 2 x Analog inputs, 0÷10V / 0÷20mA, 14 bits • 2 x Temperature inputs, RTD / Thermocouple • 10 x Transistor outputs, pnp, including 2 PWM output channels • 2 x Analog outputs, 0÷10V / -10÷10V / 0÷20mA / 4÷20mA, 12 bits
5	Standard
10	Pro, offers additional features, detailed below
B	With UniCloud enabled functionality
C	With built-in 5 years UniCloud start-up subscription with no additional payment required for this period.

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

Power Supply	
Input voltage	24VDC
Permissible range	20.4VDC to 28.8VDC
Max. current consumption	0.42A@24VDC
Isolation	None

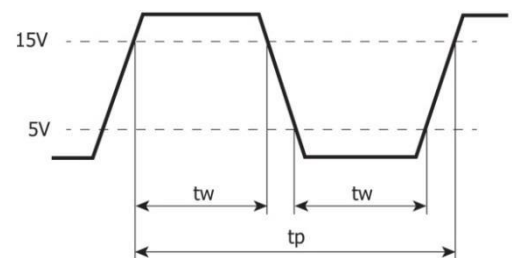| General		
I/O support	Up to 2,048 I/O points	
Built-in I/O	According to model	
Local Uni-I/O™ support	Up to 8 I/O modules can be connected directly to the controller. You can connect up to 88 I/O modules to a single controller using Local I/O Expansion adapters [2]. For complete details refer to Local I/O Expansion adapters technical specification.	
Remote I/O	Up to 8 UniStream Remote I/O Adapters (URB)	
Communication ports		
Built-in COM ports	Specifications are provided below in the section Communications	
Add-on Ports	Add up to 3 ports to a single controller using Uni-COM™ UAC-CB Modules [3].	
Internal memory	**Standard (B5/C5)**	**Pro (B10/C10)**

	RAM: 512MB
	ROM: 3GB system memory
	    1GB user memory
		RAM: 1GB
		ROM: 6GB system memory
		    2GB user memory

Ladder memory	1 MB	
External memory	microSD or microSDHC card Size: up to 32GB, Data Speed: up to 200Mbps	
Bit operation	0.13 µs	
Battery	Model: 3V CR2032 Lithium battery [4] Battery lifetime: 4 years typical, at 25°C Battery Low detection and indication (via BATT. LOW indicator and via System Tag).	

Communication (Built-in Ports)	
Ethernet port	
Number of ports	2
Port type	10/100 Base-T (RJ45)
Auto crossover	Yes
Auto negotiation	Yes
Isolation voltage	500VAC for 1 minute
Cable	Shielded CAT5e cable, up to 100 m (328 ft)
USB device [5]	
Number of ports	1
Port type	Mini-B
Data rate	USB 2.0 (480Mbps)
Isolation	None
Cable	USB 2.0 compliant; < 3 m (9.84 ft)
USB host	
Number of ports	1
Port type	Type A
Data rate	USB 2.0 (480Mbps)
Isolation	None
Cable	USB 2.0 compliant; < 3 m (9.84 ft)
Over current protection	Yes

Digital Inputs	
Number of inputs	13
Type	Sink or Source
Isolation voltage	
Input to bus	500VAC for 1 minute
Input to input	None
Nominal voltage	I0-I8: 24VDC @ 6mA I9-I12: 24VDC @ 8mA
Input voltage	
Sink/Source	On state: 15-30VDC, 4mA min. Off state: 0-5VDC, 1mA max.
Nominal impedance	I0-I8: 4kΩ I9-I12: 3kΩ
Filter	I0-I8: 6ms typical I9-I12: 5.5μs, 50μs, 0.5ms, 6ms, 12ms
High speed inputs [1]	
Frequency / Period	Pulse/Direction mode: 90kHz max. / 11.1μs min (t_p in the Pulse/Dir Mode figure below). Quadrature mode: 80kHz max. / 12.5μs min (t_p in the Quadrature Mode figure below).
Pulse width	Pulse/Direction mode: 5.1μs min. for each state (t_w in Pulse/Dir Mode figure below). Quadrature mode: 2.5μs min. for each state (t_w in Quadrature Mode figure below).
Cable	Shielded twisted pair
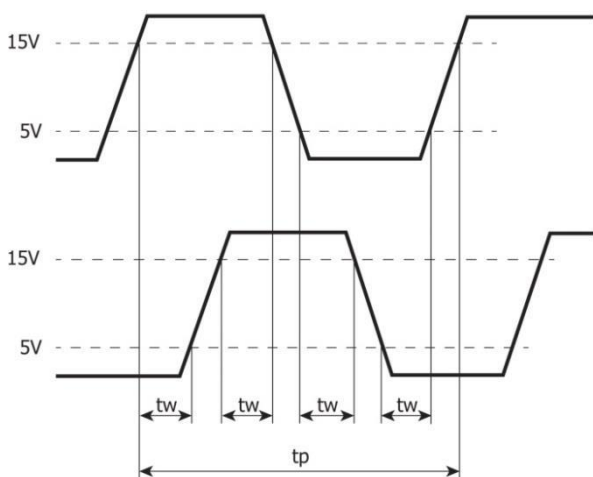
Quadrature Mode   Pulse/Direction mode

Analog Inputs 0 to 3			
Number of inputs	4		
Input range [6] [7]	**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 [8] is declared when an input value exceeds the Over-range boundary.		
Absolute maximum rating	±30V (Voltage), ±30mA (Current)		
Isolation	None		
Conversion method	Successive approximation		
Resolution	12 bits		
Accuracy (25°C / -20°C to 55°C)	±0.3% / ±0.9% of full scale		
Input impedance	541kΩ (Voltage), 248Ω (Current)		
Noise rejection	10Hz, 50Hz, 60Hz, 400Hz		

Step response [9] (0 to 100% of final value)	**Smoothing**	**Noise Rejection Frequency**			
		400Hz	60Hz	50Hz	10Hz
	None	2.7ms	16.86ms	20.2ms	100.2ms
	Weak	10.2ms	66.86ms	80.2ms	400.2ms
	Medium	20.2ms	133.53ms	160.2ms	800.2ms
	Strong	40.2ms	266.86ms	320.2ms	1600.2ms

Update time [9]	**Noise Rejection Frequency**	**Update Time**
	400Hz	5ms
	60Hz	4.17ms
	50Hz	5ms
	10Hz	10ms

Operational signal range (signal + common mode)	Voltage mode – AIx: -1V ÷ 10.5V ; CM1: -1V ÷ 0.5V Current mode – AIx: -1V ÷ 5.5V ; CM1: -1V ÷ 0.5V (x=0 to 3)
Cable	Shielded twisted pair
Diagnostics [8]	Analog input overflow

Analog Inputs 4 to 5			
Number of inputs	2		
Input range [6] [7]	**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 [8] is declared when an input value exceeds the Over-range boundary.		
Absolute maximum rating	±30V (Voltage), ±30V (Current)		
RTD Maximum excitation current	0.26mA		
Isolation voltage			
Input to bus	500VAC for 1 minute		
Input to input	None		
Input to temperature inputs	None		
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 impedance	527kΩ (Voltage), 60.4Ω (Current)		
Noise rejection	10Hz, 50Hz, 60Hz, 400Hz		

Step response [9] (0 to 100% of final value)	**Smoothing**	**Noise Rejection Frequency**			
		400Hz	60Hz	50Hz	10Hz
	None	162.4ms	249.5ms	249.5ms	1242.4ms
	Weak	317.3ms	491.5ms	491.5ms	2477.3ms
	Medium	627.2ms	975.4ms	975.4ms	4947ms
	Strong	1246.9ms	1943.3ms	1943.3ms	9886.5ms

Update time [9]	**Noise Rejection Frequency**	**Update Time**
	400Hz	154.9ms
	60Hz	242ms
	50Hz	242ms
	10Hz	1234.9ms
Cable	Shielded twisted pair	
Diagnostics [8]	Analog input overflow	

Temperature Inputs			
Number of inputs	2		
Sensor Type	RTD (4, 3 and 2 wire[10]), Thermocouple		
Input range [11]	**Input type**	**Nominal values**	**Over/Under-range Values ***
	RTD PT100 0.00385 0.00392 0.00391 PT1000 0.00385 0.00392	-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 NI1000 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)
	RTD NI1000 LG	-50°C ≤ T ≤ 190°C (-58°F ≤ T ≤ 374°F)	Under-range: -60°C ≤ T < -50°C (-76°F ≤ T < -58°F) Over-range: 190°C < T ≤ 200°C (374°F < T ≤ 392°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 [8] is declared when an input value exceeds the Over-range or Under-range boundaries respectively.		

Absolute maximum rating	±9 V			
Isolation voltage				
Input to bus	500 VAC for 1 minute			
Input to input	None			
Input to analog inputs	None			
Conversion method	Delta-sigma			
Resolution	Temperature – 0.1°C (0.1°F) [12] 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 [13]	± 0.4°C / ± 0.7°C (± 0.72°F / ± 1.26°F)
	Thermocouple type K [13]	± 0.5°C / ± 1.0°C (± 0.9°F / ± 1.8°F)
	Thermocouple type T [13]	± 0.6°C / ± 1.2°C (± 1.08°F / ± 2.16°F)
	Thermocouple type E [13]	± 0.4°C / ± 0.8°C (± 0.72°F / ± 1.44°F)
	Thermocouple type R [13]	± 1.2°C / ± 2.4°C (± 2.16°F / ± 4.32°F)
	Thermocouple type S [13]	± 1.2°C / ± 2.4°C (± 2.16°F / ± 4.32°F)
	Thermocouple type B [13]	± 2.0°C / ± 3.8°C (± 3.46°F / ± 6.84°F)
	Thermocouple type N [13]	± 1.0°C / ± 1.5°C (± 1.8°F / ± 2.7°F)
	Thermocouple type C [13]	± 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, 50Hz, 60Hz, 400Hz			

Step response [9] (0 to 100% of final value)	**Smoothing**	**Noise Rejection Frequency**			
		400Hz	**60Hz**	**50Hz**	**10Hz**
	None	162.4ms	249.5ms	249.5ms	1242.4ms
	Weak	317.3ms	491.5ms	491.5ms	2477.3ms
	Medium	627.2ms	975.4ms	975.4ms	4947ms
	Strong	1246.9ms	1943.3ms	1943.3ms	9886.5ms

Update time [9]	**Noise Rejection Frequency**	**Update Time**
	400Hz	154.9ms
	60Hz	242ms
	50Hz	242ms
	10Hz	1234.9ms

Thermocouple Cold junction error [13]	±1.5°C (±2.7°F)
Cable	Shielded, see installation guide for details
Diagnostics [8]	Input Overflow or Underflow, sensor connection fault [14]

Source Transistor Outputs	
Number of outputs	8
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 specification below
ON state voltage drop	0.5V maximum
OFF state leakage current	10µA maximum
Switching times	Turn-on/off: 80µs maximum, Turn-off: 155µs maximum (Load resistance < 4kΩ)
PWM Frequency [16]	O0, O1: 3kHz 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

Analog Outputs	
Number of outputs	3

Output range [17]	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 – 12 bit -10 ÷ 10VDC – 11 bit + sign 0 ÷ 20mA – 12 bit 4 ÷ 20mA – 12 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 – 1kΩ 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 [8]	Current – Open circuit indication Supply level – Normal / Low or missing

LED Indications

I/O LEDs	Color	Indication
Digital Input	Green	Input state
Analog Input	Red	On: Input value is in Overflow
Temperature Input	Red	On: Input value is in Overflow, Underflow, or a connection fault occurs
Relay and Transistor Output	Green	Output state
Analog Output	Red	On: Open Circuit (when set to Current mode)

Status LEDs	Color & State		Indication
RUN	Green	On	Run mode
		Blink	This indication is in conjunction with the USB LED. See table below, USB Actions Indications, for details
	Orange	On	Start-up mode
		Blink	Stop mode
ERROR	Red	On/Blink	The Error LED can give indications in conjunction with the RUN and/or USB LED. See the next tables Error Indications and USB Actions Indications for details
USB	Green	On	A USB drive is detected that contains valid action file(s). See table below, USB Actions Indications, for details
		Blink	USB Action in progress
BATT. LOW	Red	On	Battery is low or missing
FORCE	Red	On	I/O Force on

Error Indications	LED, Color & State			
	RUN	ERROR	USB	Indication
		Red blink	Off	USB Action has failed – disconnect the USB drive to dismiss the error
		Red blink		HW Configuration Mismatch – the HWC in the UniLogic application does not match the Uni-I/O modules physically connected to the PLC
	Orange blink	Red blink		Application Invalid or Version Mismatch (UniLogic version is not supported by device firmware)
		Red On		Uni-I/O Error (check wiring connections)
	Orange blink	Red On		OS/Application error

USB Actions Indications	LED, Color & State			
	RUN	**ERROR**	**USB**	**Indication**
			Green On	USB drive detected with valid Action file(s) - press CONFIRM [18] to start Action or USB Action finished successfully.
			Green blink	USB Action in progress.
	Green blink		Green On	USB Action requires reset; press CONFIRM to restart system
		Red blink	Green Off	USB drive detected, but contains corrupt Action file(s)
		Red blink	Green ON	USB Action ran with error – disconnect the USB drive to dismiss the error.

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	2,000 m (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	Size
USC-xx-TA32	0.38 Kg (0.84 lb)	As shown in the images next page

Mechanical Dimensions

Front View
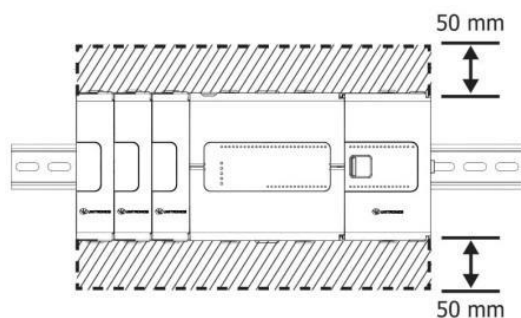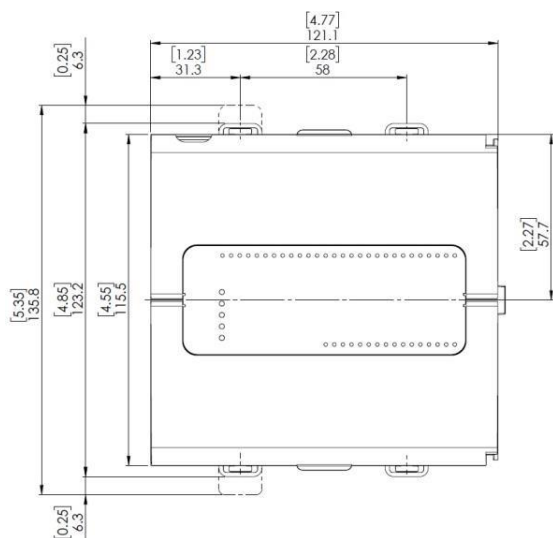
Bottom View
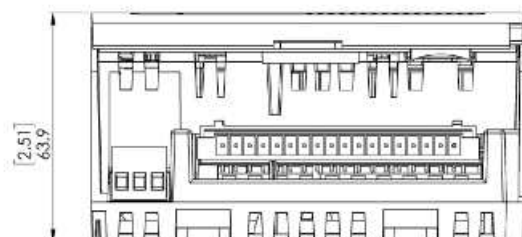
Notes:

1. Four of the digital inputs (I9-I12) 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.

2. The Local Expansion Kits comprise a Base unit, an End unit, and a connecting cable. You must plug the Base Unit into the last Uni-I/O™ module plugged into the controller.
   If no module is present, plug the Base unit into the I/O Bus connector.

3. Uni-COM™ CB modules plug directly into the Uni-COM Jack on the side of the controller.
   Uni-COM modules may be installed in the following configurations:
   - If a module comprising a serial port is plugged directly into the controller, it may be followed only by another serial module, for a total of 2.
   - If your configuration includes a CANbus module, it must be plugged directly into the controller. The CANbus module may be followed by up to two serial modules, for a total of 3.
   For more information, refer to the product's installation guide.

4. When replacing the unit's battery, make sure that the new one has environmental specifications that are similar or better than the one specified in this document.

5. The USB device port is used to connect the device to a PC.

6. The 4-20mA input option is implemented using 0-20mA input range.

7. The 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 as well as by the respective input LED (see LED Indications), 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.

8. 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®.

9. Step response and update time are independent of the number of channels that are used.

10. The controller 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 controller installation guide for detailed installation instructions.

11. The controller 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

12. 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.

13. The overall accuracy for thermocouples is a combination of the per-sensor specified accuracy and the thermocouple cold junction error specification.

14. 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 controller.

   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 controller will not check, or report, connection faults; thus, the reading in such case is unpredictable.

15. 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.

16. Outputs O0 and O1 can be configured as either normal digital outputs or as PWM outputs. PWM outputs specifications apply only when outputs are configured as PWM outputs.

17. The controller 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).

18. This refers to the CONFIRM button on the controller USB Actions; press it if the indication requires.