

Unitronics' UniStream<sup>®</sup> PLCs are DIN-rail mounted Programmable Logic Controllers (PLCs) with a built-in I/O configuration. This document provides the specifications for the built-in I/O configurations for the models USC-Bx-RA28 and USC-Bx-TA30.

The series is available in three versions: Pro, Standard, and Basic.

Note that a model number that includes:

- **B10** refers to Pro version (e.g. USC-B**10**-T24)
- **B5** refers to Standard version (e.g. USC-B**5**-RA28)
- **B3** refers to Basic version (e.g. only for USC-B**3**-T20)

Installation Guides are available in the Unitronics Technical Library at [www.unitronicsplc.com](http://www.unitronicsplc.com).

USC-Bx-RA28	USC-Bx-TA30
<ul style="list-style-type: none"> <li>• 14 x Digital inputs, isolated, 24VDC, sink/source, including 2 High speed counter input channels <sup>(1)</sup></li> <li>• 2 x Analog inputs, isolated, 0÷10V / 0÷20mA, 14 bits</li> <li>• 2 x Temperature inputs, isolated, RTD / Thermocouple</li> <li>• 8 x Relay outputs, isolated</li> <li>• 2 x Analog outputs, 0÷10V / -10÷10V / 0÷20mA / 4÷20mA, 12 bits</li> </ul>	<ul style="list-style-type: none"> <li>• 14 x Digital inputs, isolated, 24VDC, sink/source, including 2 High speed counter input channels <sup>(1)</sup></li> <li>• 2 x Analog inputs, isolated, 0÷10V / 0÷20mA, 14 bits</li> <li>• 2 x Temperature inputs, isolated, RTD / Thermocouple</li> <li>• 10 x Transistor outputs, isolated, pnp, including 2 PWM output channels</li> <li>• 2 x Analog outputs, 0÷10V / -10÷10V / 0÷20mA / 4÷20mA, 12 bits</li> </ul>

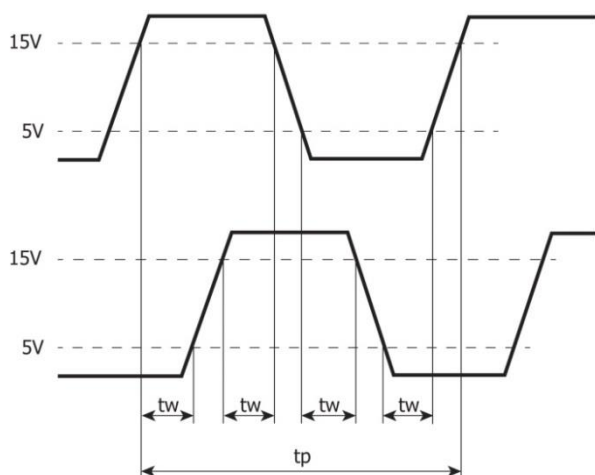
Power Supply	USC-Bx-RA28	USC-Bx-TA30
Input voltage	24VDC	24VDC
Permissible range	20.4VDC to 28.8VDC	20.4VDC to 28.8VDC
Max. current consumption	0.46A@24VDC	0.42A@24VDC
Isolation	None	

General		
I/O support	Up to 2,048 I/O points	
Built-in I/O	According to model	
Local Uni-I/O™ support <sup>(2)</sup>	Up to 8 I/O modules with no additional power supply Up to 16 I/O modules with a Local Expansion <sup>(3)</sup> Power Kit	
Remote I/O	Up to 8 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 <sup>(4)</sup> .	
Internal memory	<b>Standard (B5)</b>	<b>Pro (B10)</b>
	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 <sup>(5)</sup> Battery lifetime: 4 years typical, at 25°C Battery Low detection and indication (via BATT. LOW indicator and via System Tag).	

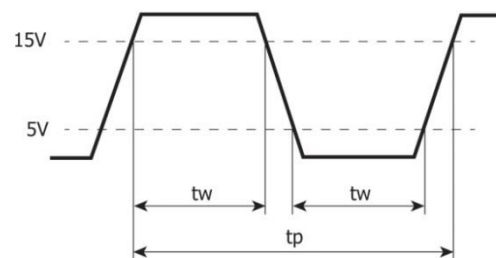
<b>Communication (Built-in Ports)</b>	
Ethernet port	
Number of ports	2
Port type	10/100 Base-T (RJ45)
Auto crossover	Yes
Auto negotiation	Yes
Isolation voltage	500VAC for 1 minute
Cable	Shielded CAT5e cable, up to 100 m (328 ft)
USB device <sup>(6)</sup>	
Number of ports	1
Port type	Mini-B
Data rate	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	14
Type	Sink or Source
Isolation voltage	
Input to bus	500VAC for 1 minute
Input to input	None
Nominal voltage	I0-I9: 24VDC @ 6mA I10-I13: 24VDC @ 8mA
Input voltage	
Sink/Source	On state: 15-30VDC, 4mA min. Off state: 0-5VDC, 1mA max.
Nominal impedance	I0-I9: 4kΩ I10-I13: 3kΩ
Filter	I0-I9: 6ms typical I10-I13: 5.5μs, 50μs, 0.5ms, 6ms, 12ms
High speed inputs <sup>(1)</sup>	
Frequency / Period	Pulse/Direction mode: 90kHz max. / 11.1μs min (t <sub>p</sub> in the Pulse/Dir Mode figure below). Quadrature mode: 80kHz max. / 12.5μs min (t <sub>p</sub> in the Quadrature Mode figure below).
Pulse width	Pulse/Direction mode: 5.1μs min. for each state (t <sub>w</sub> in Pulse/Dir Mode figure below). Quadrature mode: 2.5μs min. for each state (t <sub>w</sub> in Quadrature Mode figure below).
Cable	Shielded twisted pair

Quadrature Mode



Pulse/Direction mode



<b>Analog Inputs</b>					
Number of inputs	2				
Input range <sup>(7) (8)</sup>	<b>Input Type</b>	<b>Nominal Values</b>		<b>Over-range Values *</b>	
	0 ÷ 10VDC	0 ≤ Vin ≤ 10VDC		10 < Vin ≤ 10.15VDC	
	0 ÷ 20mA	0 ≤ Iin ≤ 20mA		20 < Iin ≤ 20.3mA	
	* <b>Overflow</b> <sup>(9)</sup> is declared when an input value exceeds the Over-range boundary.				
Absolute maximum rating	±30V (Voltage), ±30V (Current)				
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 <sup>(10)</sup> (0 to 100% of final value)	<b>Smoothing</b>	<b>Noise Rejection Frequency</b>			
		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 <sup>(10)</sup>	<b>Noise Rejection Frequency</b>		<b>Update Time</b>		
	400Hz		154.9ms		
	60Hz		242ms		
	50Hz		242ms		
	10Hz		1234.9ms		
Cable	Shielded twisted pair				
Diagnostics <sup>(9)</sup>	Analog input overflow				

<b>Temperature Inputs</b>			
Number of inputs	2		
Sensor Type	RTD (4, 3 and 2 wire <sup>(11)</sup> ), Thermocouple		
Input range <sup>(12)</sup>	<b>Input type</b>	<b>Nominal values</b>	<b>Over/Under-range Values *</b>
	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)
	PT1000 0.00385 0.00392		
	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)
	NI1000 0.00618		
	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	$-200^{\circ}\text{C} \leq T \leq 400^{\circ}\text{C}$ ( $-328^{\circ}\text{F} \leq T \leq 752^{\circ}\text{F}$ )	Under-range: $-270^{\circ}\text{C} \leq T < -200^{\circ}\text{C}$ ( $-454^{\circ}\text{F} \leq T < -328^{\circ}\text{F}$ ) Over-range: $400^{\circ}\text{C} < T \leq 430^{\circ}\text{C}$ ( $752^{\circ}\text{F} < T \leq 806^{\circ}\text{F}$ )
Thermocouple type E	$-200^{\circ}\text{C} \leq T \leq 1,000^{\circ}\text{C}$ ( $-328^{\circ}\text{F} \leq T \leq 1,832^{\circ}\text{F}$ )	Under-range: $-270^{\circ}\text{C} \leq T < -200^{\circ}\text{C}$ ( $-454^{\circ}\text{F} \leq T < -328^{\circ}\text{F}$ ) Over-range: $1,000^{\circ}\text{C} < T \leq 1,010^{\circ}\text{C}$ ( $1,832^{\circ}\text{F} < T \leq 1,850^{\circ}\text{F}$ )
Thermocouple type R	$0^{\circ}\text{C} \leq T \leq 1,768^{\circ}\text{C}$ ( $32^{\circ}\text{F} \leq T \leq 3,214.4^{\circ}\text{F}$ )	Under-range: $-50^{\circ}\text{C} \leq T < 0^{\circ}\text{C}$ ( $-58^{\circ}\text{F} \leq T < 32^{\circ}\text{F}$ ) Over-range: $1,768^{\circ}\text{C} < T \leq 1,800^{\circ}\text{C}$ ( $3,214.4^{\circ}\text{F} < T \leq 3,272^{\circ}\text{F}$ )
Thermocouple type S	$0^{\circ}\text{C} \leq T \leq 1,768^{\circ}\text{C}$ ( $32^{\circ}\text{F} \leq T \leq 3,214.4^{\circ}\text{F}$ )	Under-range: $-50^{\circ}\text{C} \leq T < 0^{\circ}\text{C}$ ( $-58^{\circ}\text{F} \leq T < 32^{\circ}\text{F}$ ) Over-range: $1,768^{\circ}\text{C} < T \leq 1,800^{\circ}\text{C}$ ( $3,214.4^{\circ}\text{F} < T \leq 3,272^{\circ}\text{F}$ )
Thermocouple type B	$200^{\circ}\text{C} \leq T \leq 1,820^{\circ}\text{C}$ ( $392^{\circ}\text{F} \leq T \leq 3,308^{\circ}\text{F}$ )	Under-range: $100^{\circ}\text{C} \leq T < 200^{\circ}\text{C}$ ( $212^{\circ}\text{F} \leq T < 392^{\circ}\text{F}$ ) Over-range: $1,820^{\circ}\text{C} < T \leq 1,870^{\circ}\text{C}$ ( $3,308^{\circ}\text{F} < T \leq 3,398^{\circ}\text{F}$ )
Thermocouple type N	$-210^{\circ}\text{C} \leq T \leq 1,300^{\circ}\text{C}$ ( $-346^{\circ}\text{F} \leq T \leq 2,372^{\circ}\text{F}$ )	Under range: $-270^{\circ}\text{C} \leq T < -210^{\circ}\text{C}$ ( $-454^{\circ}\text{F} \leq T < -346^{\circ}\text{F}$ ) Over-range: $1,300^{\circ}\text{C} < T \leq 1,350^{\circ}\text{C}$ ( $2,372^{\circ}\text{F} < T \leq 2,462^{\circ}\text{F}$ )
Thermocouple type C	$10^{\circ}\text{C} \leq T \leq 2,315^{\circ}\text{C}$ ( $50^{\circ}\text{F} \leq T \leq 4,199^{\circ}\text{F}$ )	Under-range: $0^{\circ}\text{C} \leq T < 10^{\circ}\text{C}$ ( $32^{\circ}\text{F} \leq T < 50^{\circ}\text{F}$ ) Over-range: $2,315^{\circ}\text{C} < T \leq 2,370^{\circ}\text{C}$ ( $4,199^{\circ}\text{F} < T \leq 4,298^{\circ}\text{F}$ )
Resistance	$0\Omega \leq R \leq 390\Omega$	$390\Omega < R \leq 395.85\Omega$
mV	$-70\text{mV} \leq V \leq 70\text{mV}$	Under-range: $-71.05\text{mV} \leq V < -70\text{mV}$ Over-range: $70\text{mV} \leq V < 71.05\text{mV}$
* <b>Overflow or Underflow</b> <sup>(9)</sup> 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) <sup>(13)</sup> Resistance – 14 bits mV – 13 bits plus sign				
Accuracy (25°C / -20°C to 55°C)	<b>Input type</b>	<b>Accuracy</b>			
	RTD, all types	± 0.5°C / ± 1.0°C (± 0.9°F / ± 1.8°F)			
	Thermocouple type J <sup>(14)</sup>	± 0.4°C / ± 0.7°C (± 0.72°F / ± 1.26°F)			
	Thermocouple type K <sup>(14)</sup>	± 0.5°C / ± 1.0°C (± 0.9°F / ± 1.8°F)			
	Thermocouple type T <sup>(14)</sup>	± 0.6°C / ± 1.2°C (± 1.08°F / ± 2.16°F)			
	Thermocouple type E <sup>(14)</sup>	± 0.4°C / ± 0.8°C (± 0.72°F / ± 1.44°F)			
	Thermocouple type R <sup>(14)</sup>	± 1.2°C / ± 2.4°C (± 2.16°F / ± 4.32°F)			
	Thermocouple type S <sup>(14)</sup>	± 1.2°C / ± 2.4°C (± 2.16°F / ± 4.32°F)			
	Thermocouple type B <sup>(14)</sup>	± 2.0°C / ± 3.8°C (± 3.46°F / ± 6.84°F)			
	Thermocouple type N <sup>(14)</sup>	± 1.0°C / ± 1.5°C (± 1.8°F / ± 2.7°F)			
	Thermocouple type C <sup>(14)</sup>	± 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 <sup>(10)</sup> (0 to 100% of final value)	<b>Smoothing</b>	<b>Noise Rejection Frequency</b>			
		<b>400Hz</b>	<b>60Hz</b>	<b>50Hz</b>	<b>10Hz</b>
	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 <sup>(10)</sup>	<b>Noise Rejection Frequency</b>			<b>Update Time</b>	
	400Hz			154.9ms	
	60Hz			242ms	
	50Hz			242ms	
	10Hz			1234.9ms	
Thermocouple Cold junction error <sup>(14)</sup>	±1.5°C (±2.7°F)				
Cable	Shielded, see installation guide for details				
Diagnostics <sup>(9)</sup>	Input Overflow or Underflow, sensor connection fault <sup>(15)</sup>				



<b>Relay Outputs (USC-Bx-RA28)</b>	
Number of outputs	8
Output type	Relay, SPST-NO (Form A)
Isolation groups	Two groups of 4 outputs each
Isolation voltage	
Group to bus	1,500VAC for 1 minute
Group to group	1,500VAC for 1 minute
Output to output within group	None
Current	2A maximum per output (Resistive load)
Voltage	250VAC / 30VDC maximum
Minimum load	1mA, 5VDC
Switching time	10ms maximum
Short-circuit protection	None
Life expectancy <sup>(16)</sup>	100k operations at maximum load

<b>Source Transistor Outputs (USC-Bx-TA30)</b>	
Number of outputs	10
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 max. (Load resistance < 4kΩ)
PWM Frequency <sup>(17)</sup>	O0, O1: 3kHz max. (Load resistance < 4kΩ)
Short-circuit protection	Yes

Source Transistor Outputs Power Supply (USC-Bx-TA30)	
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	2		
Output range <sup>(18)</sup>	<b>Output Type</b>	<b>Nominal Values</b>	<b>Over/Under-range Values *</b>
	0 ÷ 10VDC	$0 \leq V_{out} \leq 10VDC$	$10 < V_{out} \leq 10.15VDC$
	-10 ÷ 10VDC	$-10 \leq V_{out} \leq 10VDC$	$-10.15 \leq V_{out} < -10VDC$ $10 < V_{out} \leq 10.15VDC$
	0 ÷ 20mA	$0 \leq I_{out} \leq 20mA$	$20 \leq I_{out} \leq 20.3mA$
	4 ÷ 20mA	$4 \leq I_{out} \leq 20mA$	$20 \leq I_{out} \leq 20.3mA$
* <b>Overflow or Underflow</b> 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 <sup>(9)</sup>	Current – Open circuit indication Supply level – Normal / Low or missing		

<b>LED Indications</b>				
<b>I/O LEDs</b>	<b>Color</b>	<b>Indication</b>		
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)		
<b>Status LEDs</b>	<b>Color &amp; State</b>		<b>Indication</b>	
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 <sup>(19)</sup> for details	
		Blink	USB Action in progress	
BATT. LOW	Red	On	Battery is low or missing	
FORCE	Red	On	I/O Force on	
<b>Error Indications</b>	<b>LED, Color &amp; State</b>			<b>Indication</b>
	<b>RUN</b>	<b>ERROR</b>	<b>USB</b>	<b>Indication</b>
		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

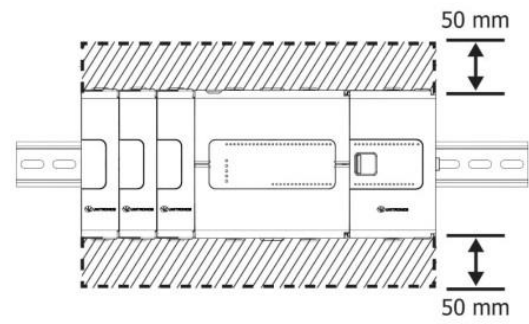
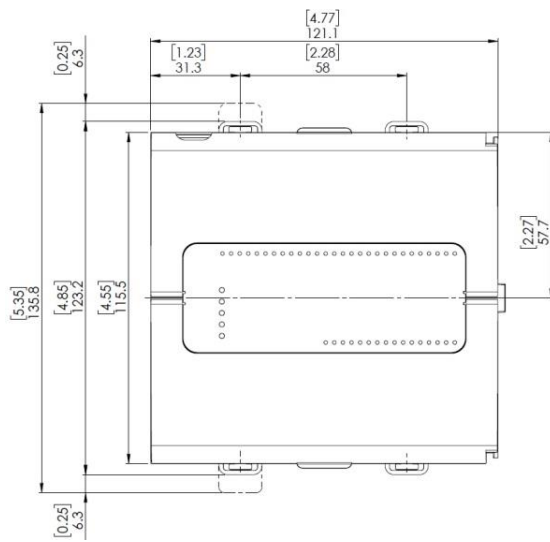
USB Actions Indications	LED, Color & State			Indication
	RUN	ERROR	USB	
			Green On	USB drive detected with valid Action file(s) - press CONFIRM <sup>(19)</sup> to start Action or USB Action finished successfully.
			Green blink	USB Action in progress.
	Green blink		Green On	USB Action requires reset; 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
<b>USC-Bx-RA28</b>	0.39 Kg (0.86 lb)	As shown in the images below
<b>USC-Bx-TA30</b>	0.38 Kg (0.84 lb)	

## Mechanical Dimensions

**Front View**



**Bottom View**

