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## BlueLinQ Modules

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## **Installation Guide (Original instructions)**

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# 1 General information

**WARNING!** *This equipment must be installed, operated and maintained only by trained competent personnel and in accordance with all appropriate international, national and local standard codes of practice and site regulations for process connected apparatus and in accordance with the instructions contained here. Ensure that all power is off, and that all output devices to be connected to the controller also is turned off before you connect anything!*

## 1.1 Mount the controller

The BlueLinQ modules are a set of complimentary units to the BlueLinQ Pro controller. They will connect to a common backplane which will provide power and communication from the BlueLinQ Pro. The modules provide power and status information via LEDs on the top of the module. A unique address for the module can be set by adjusting a decimal rotary switch on the top of the module.

There are six modules types which provide specific functions namely:

**BlueLinQ DI-12 module (CA 811):** Digital input module for connection of up to 12 digital inputs.

**BlueLinQ DO-8 module (CA 821):** Digital output module for the connection of up to 8 digital outputs.

**BlueLinQ AI-6 module (CA 831):** 4-20mA Analog Input module for connection of up to 6 inputs.

**BlueLinQ AO-6 module (CA 841):** 4-20mA Analog Output module for connection of up to 6 outputs.

**BlueLinQ TI-6 module (CA 832):** Temperature analog input module for connection of up to 6 temperature signals.

**BlueLinQ LI-6 module (CA 861):** Leakage analog input module for connection of up to 6 leakage signals.

# 2 Installation

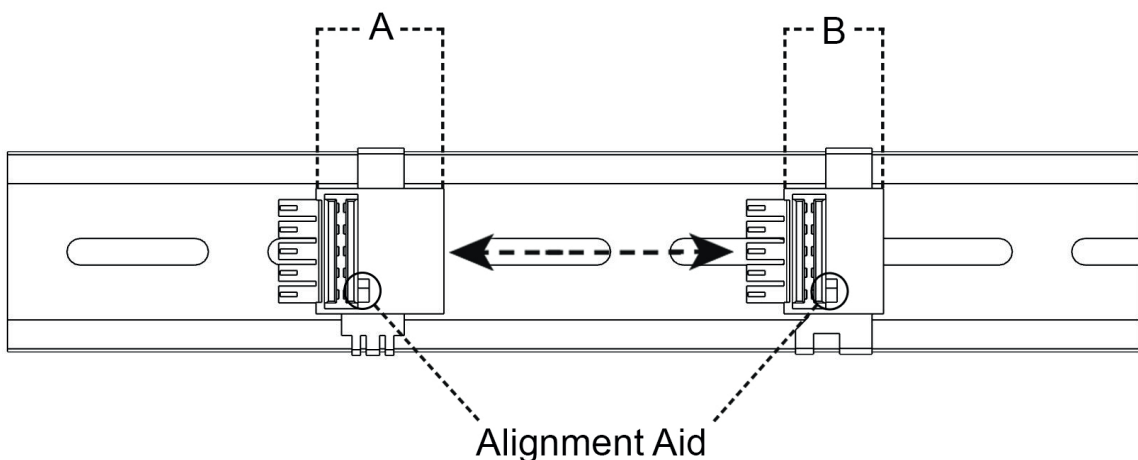
## 2.1 Physical installation

Each BlueLinQ module comes with a DIN rail mounted CAN-bus connector. This connector can be easily snapped onto a 35 mm DIN rail for each required module and connect to each other. The modules may be in any order on the rail. The power and communication to the BlueLinQ Pro is connected directly to the bus using the appropriate plugin connector and wiring set.

The modules are IP20 rated and will need to be installed in a final enclosure which has a suitable type rating.

**Note:** *The BlueLinQ DI-12 has a wider connector than the other modules*

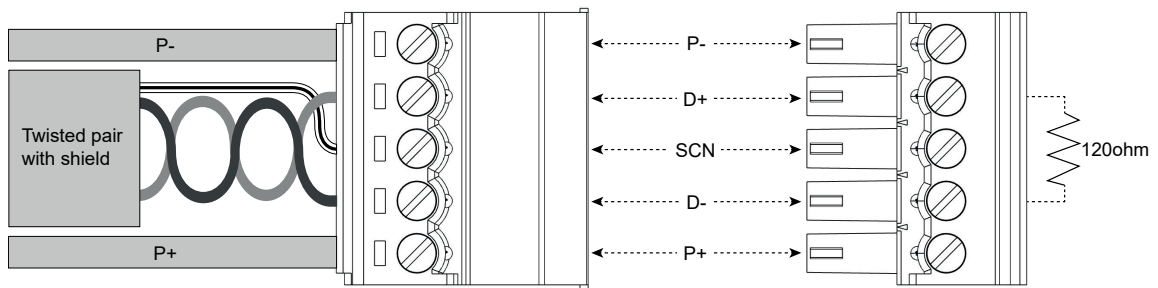
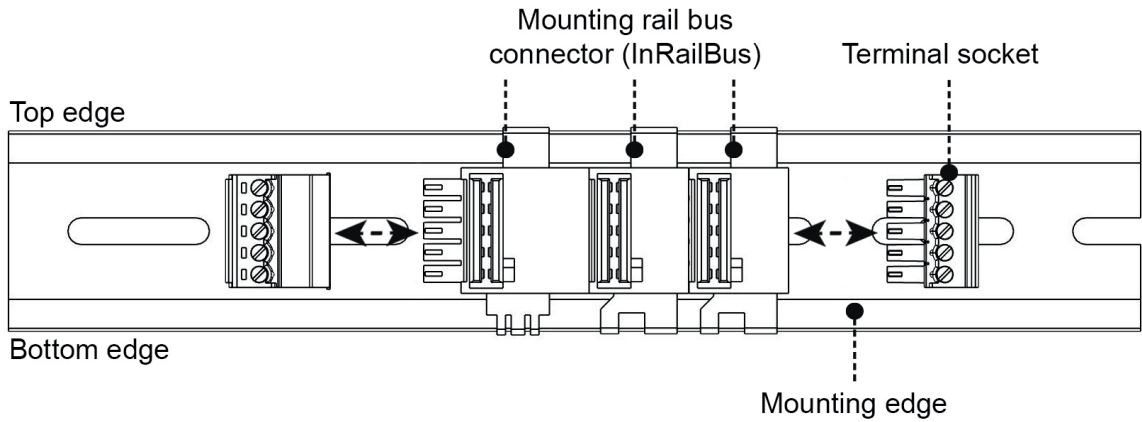
**Attention:** *The modules are not hot swappable, when adding or removing modules remove power first.*



A = BlueLinQ DI-12 (99 x 22.6 x 113.65 mm)

B = BlueLinQ DO-8, BlueLinQ AI-6, BlueLinQ TI-6, BlueLinQ AO-6, BlueLinQ LI-6 (99 x 17.6 x 113.65 mm)

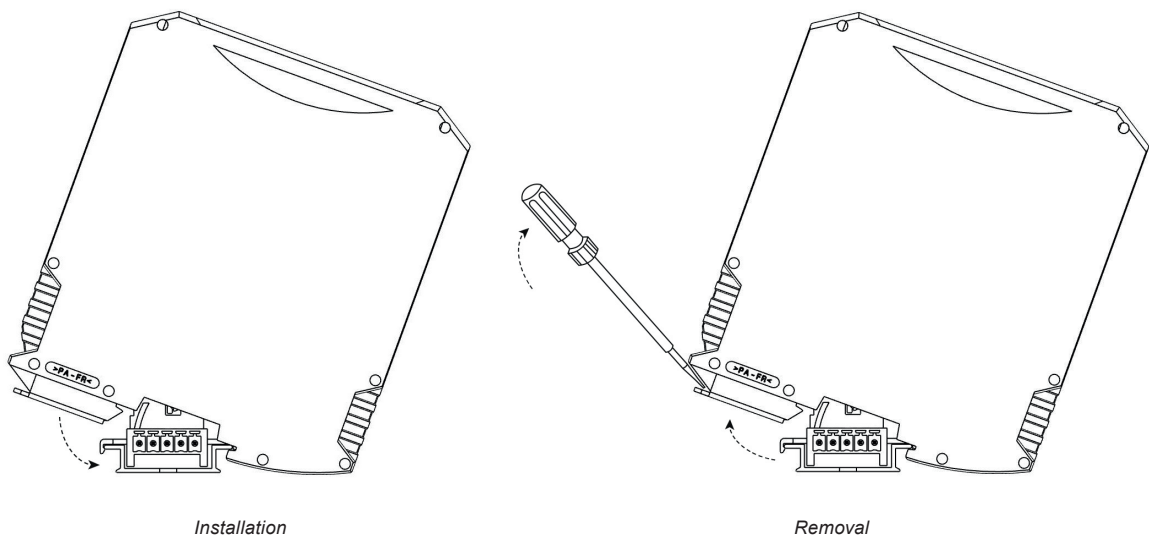
The wiring set consists of two screw terminal connectors, one that plugs directly into the FieldBus and Power connector on the BlueLinQ Pro and the other to the mounting rail bus connector at one end of the modules in series on the DIN rail. The connector that is on the opposite end of the series of modules must be populated with the supplied plugin connector which has a 120 Ω resistor terminator.



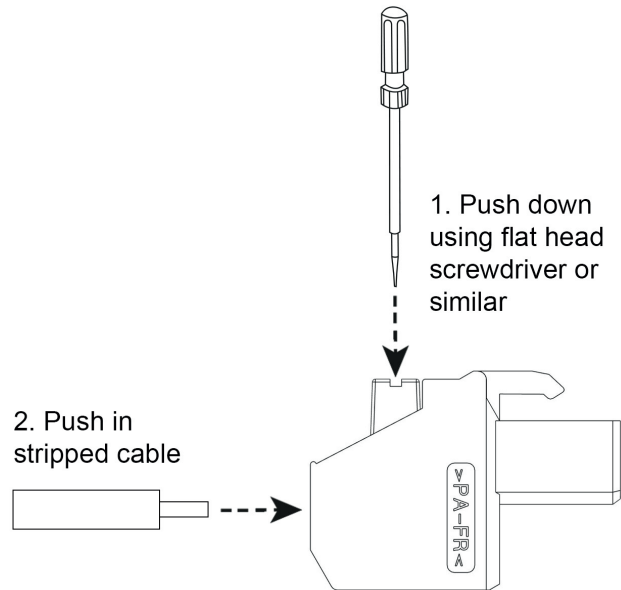
Conductor cross section: 0.2 mm<sup>2</sup> to 2.5 mm<sup>2</sup> (24 to 16 AWG)  
Stripping length: 7 mm

It is recommended that you use the wire to support the current loads required, if in doubt use largest gauge wire. If using bootlace terminals use the manufacturer recommendations.

The modules are mounted on the DIN rail by attaching the clip, furthest from the module release clip, on to the DIN rail first. Rotate the module down onto the DIN rail and clip into place. To release, use a flat bladed screwdriver to release the module clip, hold the module and rotate upwards to remove.



## 2.2 Wiring to module channel connectors



Conductor cross section: 0.2 mm<sup>2</sup> to 2.5 mm<sup>2</sup> (24 to 16 AWG)

Stripping length: 10 mm

It is recommended that you use the wire to support the current loads required, if in doubt use largest gauge wire. If using bootlace terminals use the manufacturer recommendations.

## 2.3 CAN ID

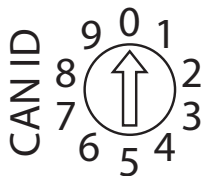
The bus communication is via a multi drop CAN network and all units are connected in parallel. For a module to operate correctly on the bus it must have a unique address or ID-number. Each module type has the same base address and is set by default, the unique part of the address is set by a decimal switch, marked "CAN ID" on the front of the module.

A CAN ID of "0" removes the unit from the communication bus and will not be seen by the BlueLinQ Pro, modules will still remain powered. A CAN ID of "1" to "9" will allow the BlueLinQ Pro to communicate with the module.

**Note:** Each Module type can have up to 9 modules connected to the system.

**Note:** It is not allowed to have the same CAN ID on two modules of the same type.

**Note:** A maximum of 30 modules are allowed on the bus.



Use a small flat head screwdriver or similar to select the CAN ID number for the unit.

## 2.4 LED Status

Red/Green LED on the module indicates power and status on the module.

**Steady Green:** Module is powered and operating OK.

**Flashing Green:** Module is powered and waiting to connect to communication bus.

**Steady Red:** CAN-ID in position 0, communication switched off.

**Flashing Red:** Two or more units set to same CAN ID, communication error.

The module also has either a Green or Yellow LED for each channel on the module. The LED status is dependent on the module type.

## 3 Module Types

### 3.1 BlueLinQ DI-12 module (CA 811)

The BlueLinQ DI-12 has 12 isolated digital inputs. There are 6, 4-way user terminals and each has a pair of isolated digital inputs.

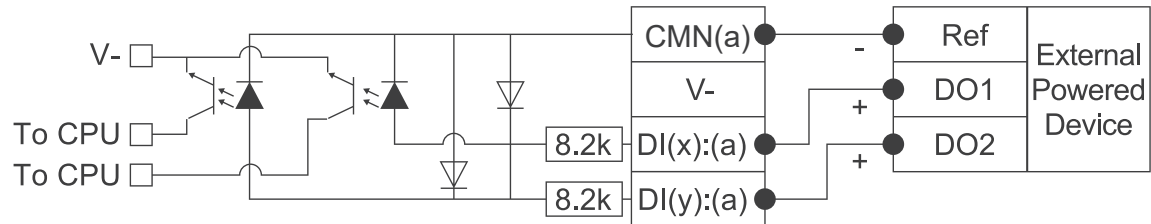
<b>Number of Inputs (DI):</b>	12 (Configurable logic)
<b>Input resistance:</b>	8.2 k $\Omega$
<b>Input voltage:</b>	0–30 VDC
<b>Min. Logic LOW Level:</b>	1.5 VDC
<b>Max. Logic HIGH Level:</b>	6 VDC
<b>Max. pulse rate:</b>	1 kHz (pulse channels)

Position	Function	Position	Function	Position	Function	Position	Function	Position	Function	Position	Function
■ 11	DI1:1	■ 21	DI3:2	■ 31	DI5:3	■ 41	DI7:4	■ 51	DI9:5	■ 61	DI11:6
■ 12	DI2:1	■ 22	DI4:2	■ 32	DI6:3	■ 42	DI8:4	■ 52	DI10:5	■ 62	DI12:6
■ 13	V-	■ 23	V-	■ 33	V-	■ 43	V-	■ 53	V-	■ 63	V-
■ 14	CMN1	■ 24	CMN2	■ 34	CMN3	■ 44	CMN4	■ 54	CMN5	■ 64	CMN6

The pair of inputs on each connector are galvanically isolated from the rest of the module, i.e. the CMNx is not internally connected to V-. Signal cables that come from remotely situated sensors with long cables should have a surge and transient protection added.

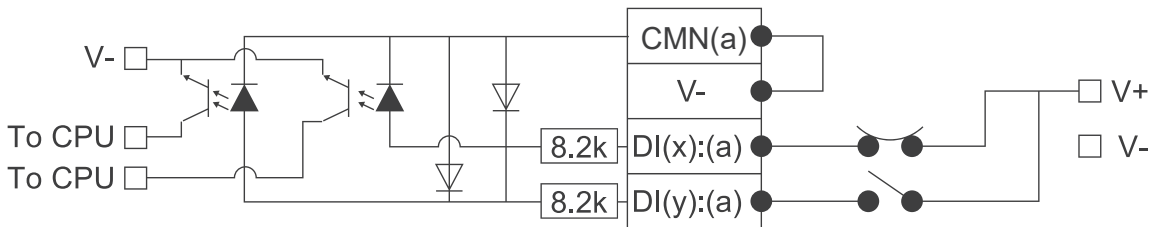
The figure below shows how the digital inputs should be connected if galvanic isolation is required.

**Note:** *CMNx should be connected to the negative side of the input signal.*



When galvanic isolation is not required the units can be connected as shown below.

**Note:** *CMN(x) must be connected to V- externally for the inputs that use a common power supply as the BlueLinQ Pro.*



Channel Indicator			
<b>LED State</b>	Off	On	Flashing at frequency of incoming pulse
<b>Channel State</b>	Low	High	Configured as pulse channel

### 3.2 BlueLinQ DO-8 module (CA 821)

The BlueLinQ DO-8 has up to 8 digital outputs. There are 4, 3-way user terminals and each has a pair of digital outputs. One connector on each side of the module also has a voltage input for the 4 digital output signals on that side. This allows for two groups of 4 digital outputs to be configured on each module.

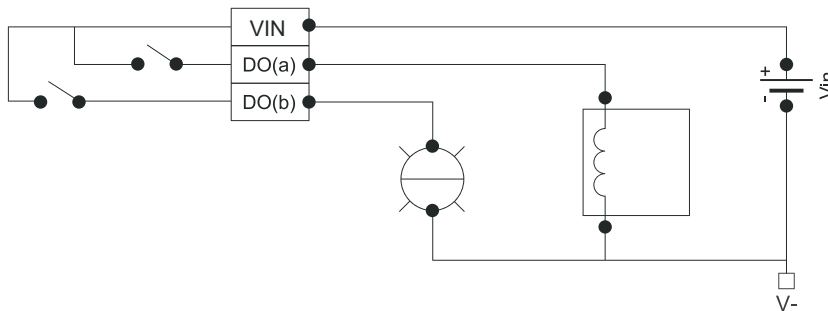
**Number of Outputs:** 8 (Configurable logic)  
**Output Load:** Maximum 1 A per channel, sourcing only  
**Voltage V1, V2:** 10–30 VDC  
**Max. total load:** 4 A for all outputs

Position	Function	Position	Function	Position	Function	Position	Function
11	DO1	21	DO3	31	DO5	41	DO7
12	DO2	22	DO4	32	DO6	42	DO8
13	VIN (1-4)	23	NC	33	VIN (5-8)	43	NC

NC = No Connect

The figure below shows how the digital outputs can be connected.

**Note** V1 needs to be connected to power digital outputs DO1 to DO4 and V2 needs to be connected to power digital outputs DO5 to DO8.



Channel Indicator		
LED State	Off	On
Channel State	Low	High

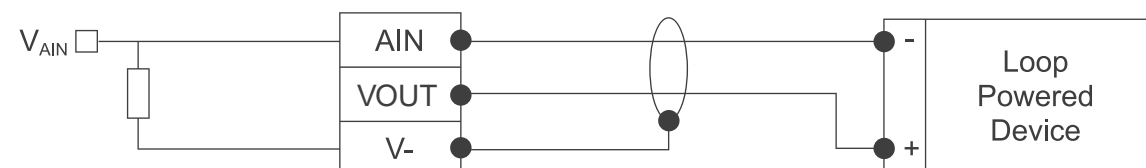
### 3.3 BlueLinQ AI-6 module (CA 831)

The BlueLinQ AI-6 has up to 6 analog inputs. There are 6, 3-way user terminals and each has an analog current input, a voltage output, for powering external devices, and a ground return.

**Number of Inputs:** 6  
**Input Range:** 4–20 mA  
**Input Resistance:** 136 Ω protected by 50 mA self-resetting fuse  
**Resolution:** 0.01 mA

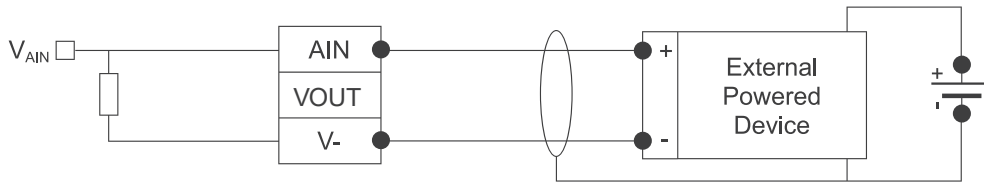
Position	Function	Position	Function	Position	Function	Position	Function	Position	Function	Position	Function
11	AIN1	21	AIN2	31	AIN3	41	AIN4	51	AIN5	61	AIN6
12	VOUT	22	VOUT	32	VOUT	42	VOUT	52	VOUT	62	VOUT
13	V-	23	V-	33	V-	43	V-	53	V-	63	V-

To connect a loop powered device, connect the positive to Vout and the signal to the AIN of the connector. If required a shielded cable can be used with the shield connected to V- of the connector, see below.





To connect a self-powered device, connect the signal to the AIN of the connector and connect a cable between the negative terminal of the device and V- on the connector to get the same ground potential for both the device and the module. If required a shielded cable can be used with the shield connected to negative of the device, see below.



Channel Indicator		
LED State	Off	On
Channel State	$A_{in} < 4 \text{ mA}$ or $A_{in} > 20 \text{ mA}$	$4 \text{ mA} \leq A_{in} \leq 20 \text{ mA}$

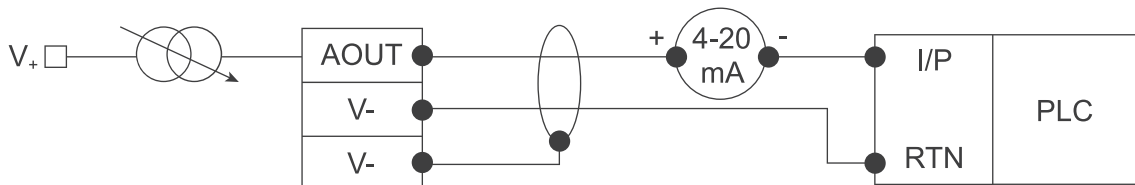
### 3.4 BlueLinQ AO-6 module (CA 841)

The BlueLinQ AO-6 has 6 analog outputs. There are 6, 3-way user terminals and each has an analog output and two ground returns.

<b>Number of Outputs:</b>	6
<b>Output Range:</b>	3.6 - 21.6 mA, sourcing from power supply
<b>Output voltage:</b>	10–30 VDC protected with 200 mA self-resetting fuse
<b>Max. load:</b>	400 $\Omega$ @ 10 VDC, 1100 $\Omega$ @ 30 VDC
<b>Resolution:</b>	0.01 mA

Position	Function	Position	Function	Position	Function	Position	Function	Position	Function	Position	Function
■ 11	AOUT1	■ 21	AOUT2	■ 31	AOUT3	■ 41	AOUT4	■ 51	AOUT5	■ 61	AOUT6
■ 12	V-	■ 22	V-	■ 32	V-	■ 42	V-	■ 52	V-	■ 62	V-
■ 13	V-	■ 23	V-	■ 33	V-	■ 43	V-	■ 53	V-	■ 63	V-

An example connection is shown below, when more units are used on the same output these can be connected serially. If required a shielded cable can be used with the shield connected to V- of the connector, see below.



Channel Indicator		
LED State	Off	On
Channel State	$A_{out} < 3.6 \text{ mA}$ or $A_{out} > 21.6 \text{ mA}$	$3.6 \text{ mA} \leq A_{out} \leq 21.6 \text{ mA}$

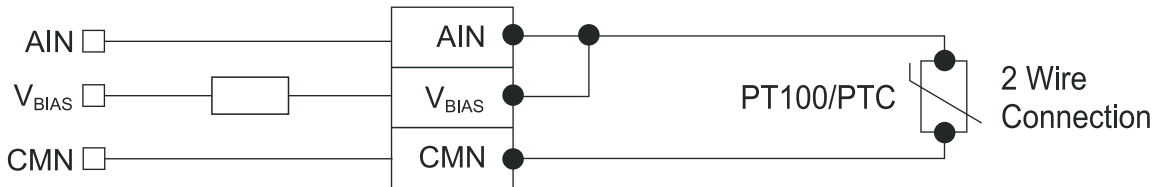
### 3.5 BlueLinQ TI-6 Module (CA 832)

The BlueLinQ TI-6 has 6 analog inputs. There are 6, 3-way user terminals and each has an analog input, a biasing voltage and a ground return. The inputs are galvanic isolated from the rest of the module, in other words the CMN is not internally connected to V-.

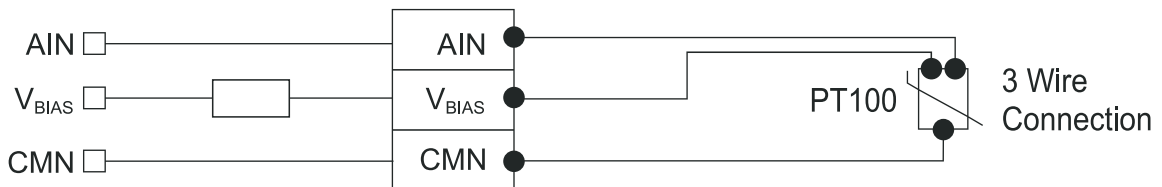
<b>Number of Inputs:</b>	6
<b>PT100 Range:</b>	-20 °C to +220 °C (-4 °F to +428 °F)
<b>PT100 Wiring:</b>	2 wire or 3 wire
<b>PT100 Bias Current:</b>	950 $\mu\text{A}$
<b>PTC Bias Current:</b>	40 $\mu\text{A}$
<b>PTC Range:</b>	Trigger level > 3 k $\Omega$
<b>PT100 Resolution:</b>	0.1 °C

Position	Function	Position	Function	Position	Function	Position	Function	Position	Function	Position	Function
11	AIN1	21	AIN2	31	AIN3	41	AIN4	51	AIN5	61	AIN6
12	VBIAS1	22	VBIAS2	32	VBIAS3	42	VBIAS4	52	VBIAS5	62	VBIAS6
13	CMN	23	CMN	33	CMN	43	CMN	53	CMN	63	CMN

An example connection of a 2 wire PT100 or a PTC is shown below. Note that Vbias must be connected to AIN+ externally on the connector.



An example connection of a 3 wire PT100 is shown below.



		Channel Indicator	
LED State		Off	On
Channel State	PTC	PTC Open ( $> 3\text{ k}\Omega$ )	PTC Closed ( $< 3\text{ k}\Omega$ with small hysteresis)
	PT100	Temp $< -20\text{ }^\circ\text{C}$ or Temp $> 200\text{ }^\circ\text{C}$	$-20\text{ }^\circ\text{C} \leq \text{Temp} \leq 200\text{ }^\circ\text{C}$

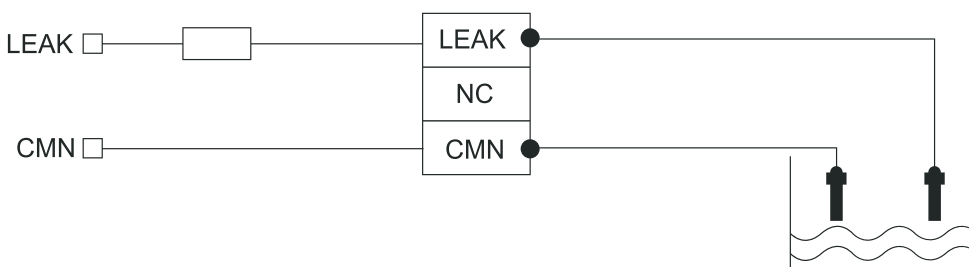
### 3.6 BlueLinQ LI-6 module (CA 861)

The BlueLinQ LI-6 has 6 analog inputs. There are 6, 3-way user terminals and each has a biasing voltage and a ground return. The inputs are galvanic isolated from the rest of the module, in other words the CMN is not internally connected to V-.

**Number of Inputs:** 6  
**Leakage Range:** Trigger Level  $< 100\text{ k}\Omega$   
**Bias Current:**  $1.5\text{ }\mu\text{A}$






Position	Function	Position	Function	Position	Function	Position	Function	Position	Function	Position	Function
11	LEAK1	21	LEAK2	31	LEAK3	41	LEAK4	51	LEAK5	61	LEAK6
12	NC	22	NC	32	NC	42	NC	52	NC	62	NC
13	CMN	23	CMN	33	CMN	43	CMN	53	CMN	63	CMN

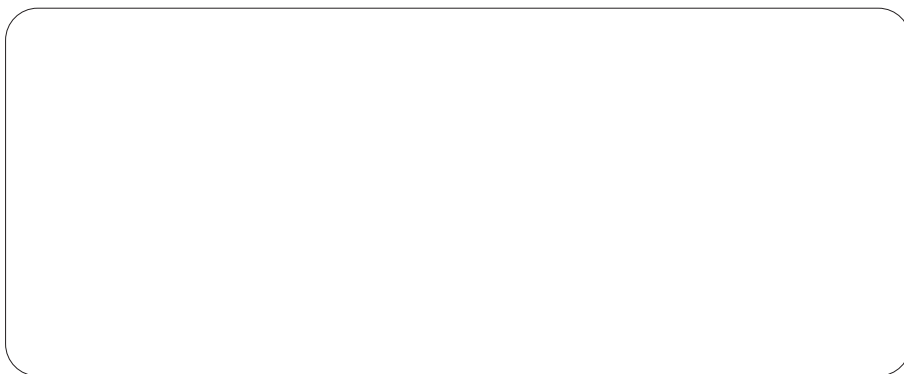
An example connection of a DI sensor or similar Leak Detect sensor shown below.



		Channel Indicator	
LED State		Off	On
Channel State		Leak Open	Leak Closed

## 4 Table of specifications

	BlueLinQ DI-12 module (CA 811)	BlueLinQ DO-8 module (CA 821)	BlueLinQ AI-6 module (CA 831)	BlueLinQ AO-6 module (CA 841)	BlueLinQ TI-6 module (CA 832)	BlueLinQ LI-6 module (CA 861)
<b>Power Consumption</b>	<1 W	<1 W	<5 W	<5 W	<2 W	<2 W
<b>Type</b>	Digital In Isolated in pairs	Digital Out 2 groups of 4	Analog In 4-20 mA	Analog Out 4-20 mA	Analog In PT100/PTC (Isolated)	Analog In Leakage (Isolated)
<b>Range</b>	Max.In: 30 VDC  Min LOW: 1.5 VDC  Max. HIGH: 6 VDC  Max. 1 kHz pulse	1 A per ch.  Max. 4 A all channels  10-30 V supply	4-20 mA In  136 Ω R In	3.6-21.6 mA Out  V sourced from supply  400 Ω @ 10 V  1100 Ω @ 30 V	PT100  -20 to +220 °C (-4 to +428 °F)  Bias 950 uA  PTC  Min Trig: 3 kΩ  Bias 40 uA	Trig 100 kΩ  Bias 1.5 uA
<b>Number of Channels</b>	12	8	6			
<b>Dimension W x H x D</b>	22.6 x 99 x 113.65 mm (0.89 x 3.9 x 4.74 inch)	17.6 x 99 x 113.65 mm (0.69 X 3.9 X 4.74 inch)				
<b>Ambient operating temperature</b>	-20 to +50 °C (-4 to +122 °F)					
<b>Ambient storage temperature</b>	-30 to +80 °C (-22 to +176 °F)					
<b>Mounting</b>	DIN rail 35 mm (1.378 inch)					
<b>Degree of protection</b>	IP20					
<b>Housing material</b>	Polyamide, UL 94 V-0					
<b>Humidity</b>	0-95 % RH non condensing					
<b>Power and Field Bus Connection</b>	DIN Rail connection					
<b>Power supply</b>	10-30 VDC via BlueLinQ Pro Controller EC 541, Device is supplied by Class 2, SELV, Limited Energy Source.					
<b>Installation category</b>	CAT I					
<b>Pollution degree</b>	2					
<b>Power / Bus Connectivity Indicator</b>	Dual color LED: Steady red = Offline. Flashing red = Comms error. Steady green = Connected. Flashing Green = Waiting to connect.					
<b>Channel Indicator</b>	See individual module sections for information					
<b>CAN Bus Termination</b>	Place at last module on Din rail					
<b>Max. Altitude</b>	2000 m (6560 ft)					
<b>Compliance</b>	    					



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