



Expansion Modules

Installation Manual

OP464-30/31 Pulse Input (2 channel)

OP653 Digital Input (8 channel, isolated)

OP465 Analog Input (4 channel)

OP461 Analog Output (2 channel)

Welcome,

Thank you for choosing Mission Communications for your monitoring and alarm needs. Mission is committed to providing the highest quality of SCADA solutions. All of our products go through a strict testing regimen before leaving our facility to ensure a seamless installation experience.

Mission provides customers with 24-hour access to our technical support team. Additionally, we host a wide range of information that can be remotely accessed through your web portal. At Mission, it is our goal to provide customers with the latest technology and designs while ensuring great value.

Weekly training webinars are available most Wednesdays at 2 p.m., Eastern. We also provide quarterly newsletters and training videos on our website. We encourage you and your staff to take advantage of these resources. Visit 123mc.com to sign up for the webinar and to find our training videos and newsletter archives. Our technical support staff is available at (877) 993-1911, option 2 for further assistance.

Thank you,
The Mission Team



WARNING: This symbol indicates there is caution or warning to avoid damage to your property or product.



WARNING: Follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes.



NOTE: This symbol indicates that there is something that requires your special attention.



This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Contents

Overview.....	4
Location.....	6
Communications Cable.....	6
Single Expansion Module Hookup.....	7
Multiple Module Hookups.....	8
Long Cable Runs, Terminating Resistor.....	9
Firmware.....	10
Pulse Input (PN OP464).....	11
Dry Inputs.....	11
Active Pulse.....	12
Digital Input (PN OP653).....	13
Analog Input (PN OP465).....	14
Analog Output (PN OP461).....	15
Installation Notes.....	16

Mission offers a variety of related documents. Scan the QR code with your smartphone or visit 123mc.com/literature to view.



Overview

This family of expansion modules increases the monitoring possibilities of the MyDro remote terminal unit (RTU). The MyDro RTU will automatically recognize the module once it is installed and will publish the readings to the LCD screen and your web portal. Configurable options will be presented on the LCD screen under the “Config.” button. Your web portal is used to create alarm notification rules for the new input/output (I/O) including alarm delays, analog threshold, and flow (pulse) thresholds.

The MyDro 850 series RTU is recommended for use with Digital Input, Analog Input, and Analog Output Expansion Modules. Either the MyDro 150 or 850 is appropriate for use with the Pulse Input Expansion Module.

Setup forms for the modules are available online. You can use the camera of your smartphone to email the form. Please complete and send the form to our technical support team as quickly as possible so reports will be labeled appropriately and the notification system will enunciate call-outs properly.

The expansion modules provide signal conditioning, isolation, ranging, and A/D and D/A conversion. Digital communication to the MyDro is based on a unique device ID and cable (RS485 2-wire, plus power). The device ID has been set by Mission at the factory as indicated on the label.

Multiple expansion modules can be daisy-chained together (wired in parallel). At this time the MyDro supports one each of the Digital Input, Analog Input, and Analog Output Expansion Modules. It supports two Pulse Input Expansion Modules. See Table 1 for more details.

Table 1:
Expansion module part numbers, function, and power requirements.
Max power* requirement of the Module does not include instrumentation.

MyDro Expansion Modules	On Main Board	Expansion Available I/O	Dev ID in Decimal	Max Power*	RTU	ADAM PN
Pulse Input OP464-30	0	1–2	30	2 W	M150 or M850	4080-DE
Pulse Input OP464-31	0	3–4	31	2 W	M150 or M850	4080-DE
Digital Input OP653	8	D9–D16	10	1 W	M850	4051-BE
Analog Input OP485	2	A3–A6	20	1.2 W	M850	ADAM-4017+-CE
Analog Output OP461	0	1–2	40	3 W	M850	4024-B1E

Mission has attached labels that reflect our I/O nomenclature. For example, Mission expanded Digital I/O starts with Digital Input (DI) 9 to complement the way expanded digital inputs appear on the web portal. ADVANTECH documentation describes that input as DI 0. Mission does not currently support all features and inputs of some expansion modules.

Location

In most cases the included 8' communications cable allows the expansion module(s) to be mounted on the back panel of the control cabinet and the other end connected to the nearby MyDro.

The expansion module(s) can be mounted on a DIN rail or directly to a backplate in the control cabinet. Signal cables should be run in conduit if the module is mounted in the Mission NEMA 1 or NEMA 4 enclosures. No load carrying wires should be run in the same conduit as signal wires.

The RS485 communications standard (differential balanced line over twisted pair) supports distances up to 4,000 feet.

Communications Cable

The RJ45 end of the included cable plugs into the RS485 port (left side) of the MyDro. One twisted pair is for communications while the other powers the expansion module(s). Do not connect or remove the RJ45 end into the MyDro board until all wiring to the expansion module is complete. The four conductors terminate on the expansion modules as follows (see Table 2):

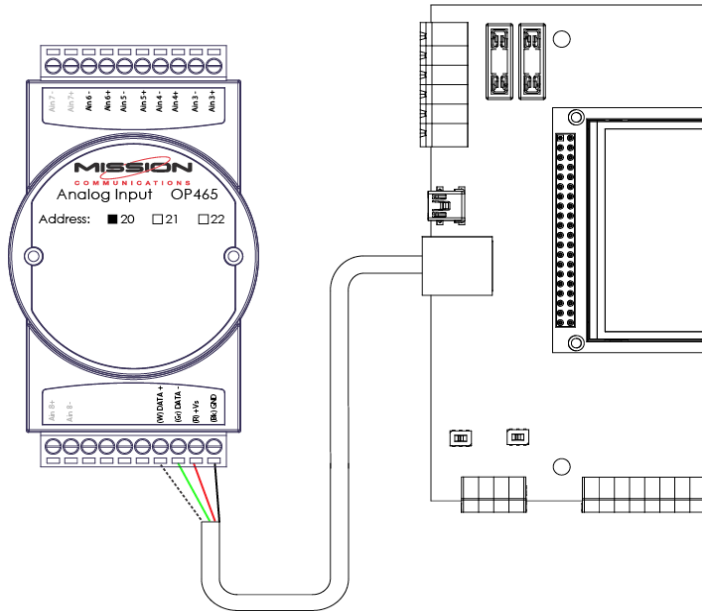
**Table 2:
RS485 Connection**

Module Pin #	Label	Wire Color
10	GND	Bk—Black
9	+Vs	R—Red
8	DATA -	Gr—Green
7	DATA +	W—White

Single Expansion Module Hookup

Avoid routing the communications cable parallel to other load carrying conductors.

Figure 1:
A single module network powered by communications cable



Warning: Wiring the expansion modules with the RJ45 communications cable connected to the MyDro can potentially cause damage to the circuit board.

Wiring Best Practices:

- Do not run signal wires parallel to load wires. If they must cross, do so at a right angle.
- Extend the RS485 cable, rather than the cables running to the instruments, if the remote sensors are a distance away.

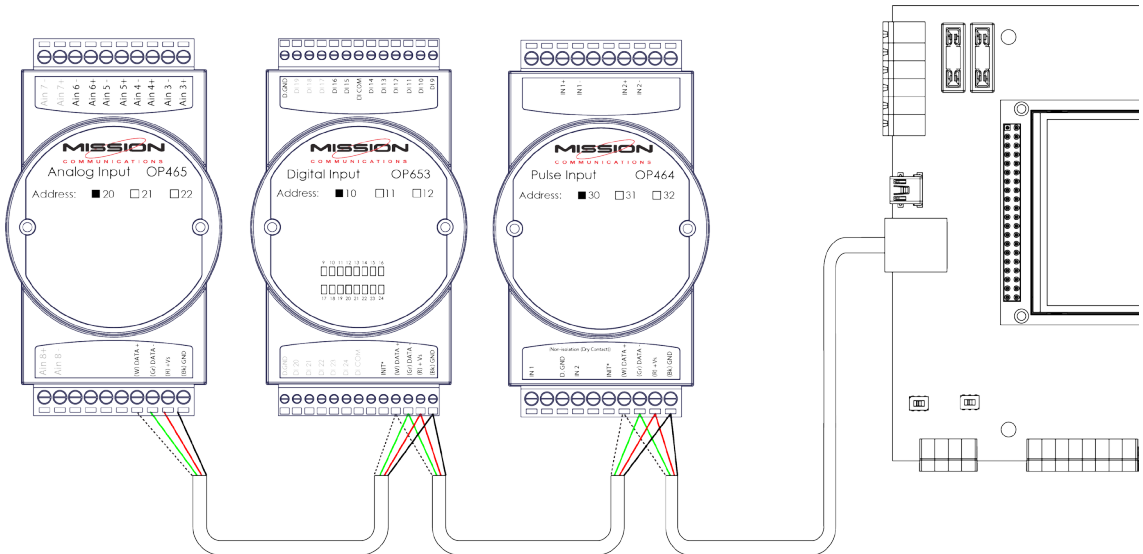
Multiple Module Hookups:

The RS485 standard allows multiple expansion modules on the same communications bus (see Figure 2).

Generally, several expansion modules can be powered on the same power bus. Table 1 (page 5) shows the power required for each expansion module in watts. When powered by a healthy battery or AC transformer, the MyDro RTU supplies ~12–16.5 VDC, and is protected by a 0.5 amp thermal (PTC) fuse. In other words, up to about 24 watts maximum power is available from the RS485 communications jack.

Transducers should be powered via the aux out terminal rather than the communications cable since the auxiliary power is software selectable as 24 or 12 VDC. Higher voltage is generally recommended for analog (4–20 mA) instruments to reduce the chance of voltage starvation in long current loops or those with multiple taps (instruments).

Figure 2:
Multiple module network powered by communications cable

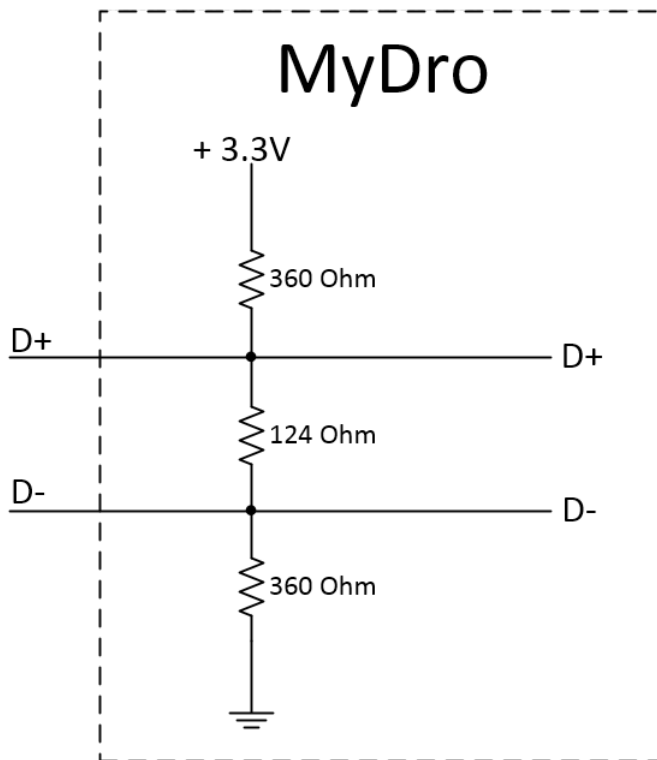


Long Cable Runs, Terminating Resistor

Generally, terminating resistors on the communications bus are not required because instruments and the expansion modules are relatively close to the RTU. Long cable runs of 50 feet or more to an expansion module may require additional consideration.

The RS485 specification recommends, but does not specifically dictate, that the characteristic impedance of the twisted data cable be 120 ohms (see Figure 4). The value of the terminating resistor is ideally the same value as the characteristic impedance of the cable (~120 ohms).

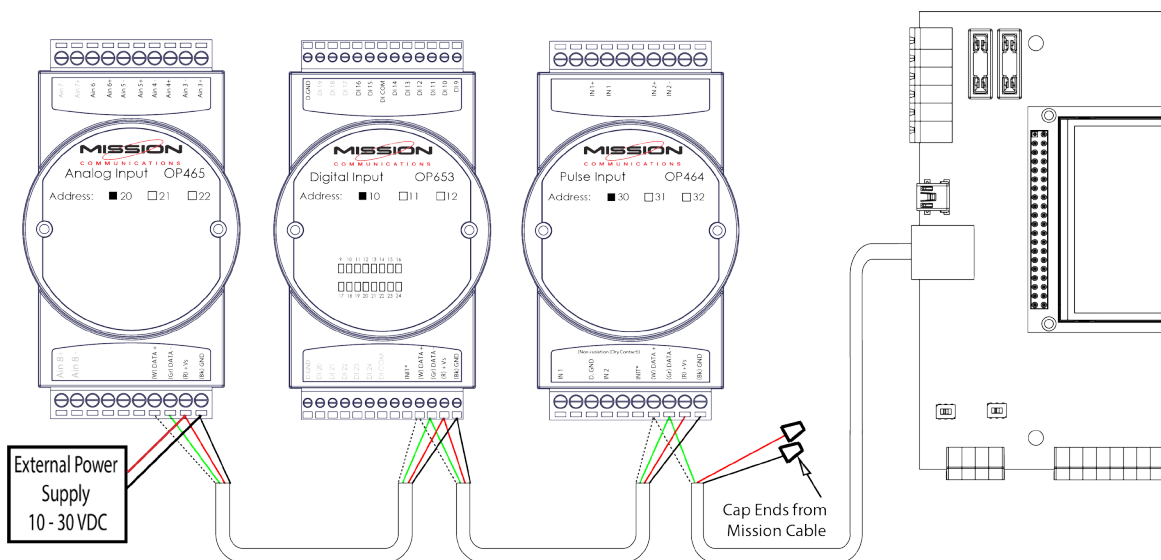
Figure 4:
RS485 impedance characteristic internal to the MyDro



The voltage drop associated with a long cable run should be considered. The expansion modules require 10–30 VDC (see Figure 3). The voltage drop caused by a long cable run can be addressed with heavier conductors or a power supply that is closer to the expansion module.

Precautions should be taken to reduce interference (induced voltages) that increase with length. It is recommended to use a shielded, twisted pair wire installed in a conduit with no other noisy conductors.

Figure 3:
Multiple module network powered by external supply
Cap the power ends (red, black) of the communications cable to avoid a short



Firmware

Technical Support can advise whether your MyDro firmware is appropriate.

Pulse Input Expansion Module (PN OP464)

The MyDro supports two Pulse Input Expansion Modules for a total of four channels. It is generally used with rain tipping buckets and pulse flow meters. If used, the second Pulse Input Expansion Module must be ordered as PN OP464-31 so the device address is set to 31.

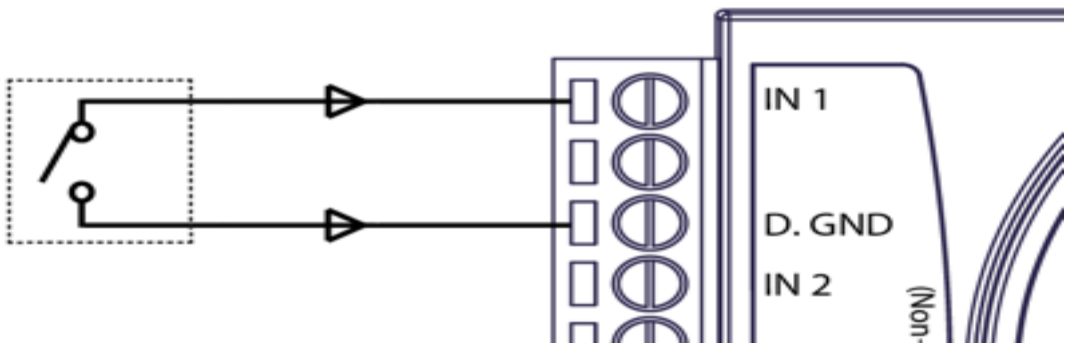
Changes to pulse readings are reported every 15 minutes for the MyDro 150 and every two minutes for the MyDro 850.

The minimum pulse width is set by firmware to be 16 milliseconds (8 ms high and 8 ms low). Input impedance is 50 megohms. The module consumes 2 watts.

Dry Inputs

Dry inputs (no voltage), typical of a rain tipping bucket, for channel 1 connect to terminal IN 1 and terminal D.GND. Likewise, channel 2 inputs connect to terminal IN 2 and terminal D.GND (see Figure 5a).

Figure 5a:
Dry contact input (rain tipping bucket) for channel 1

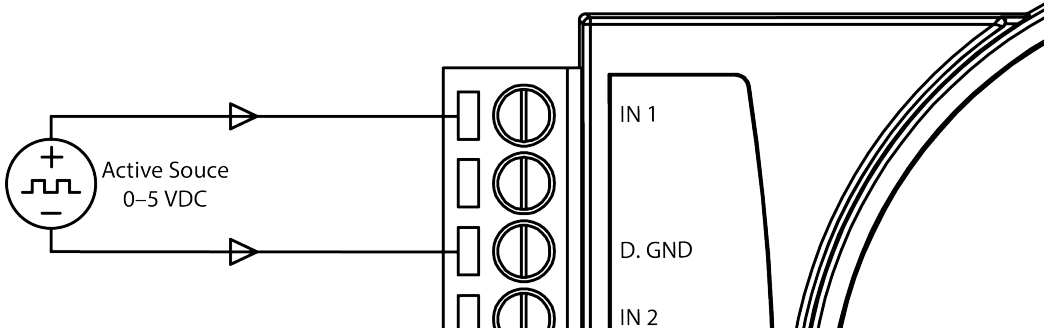


Active Pulse

Some flow meters source the voltage (active pulse). The Pulse Input Expansion Module supports up to 5 VDC wetted circuits (see Figure 5b). Polarity must be observed.

Figure 5b:

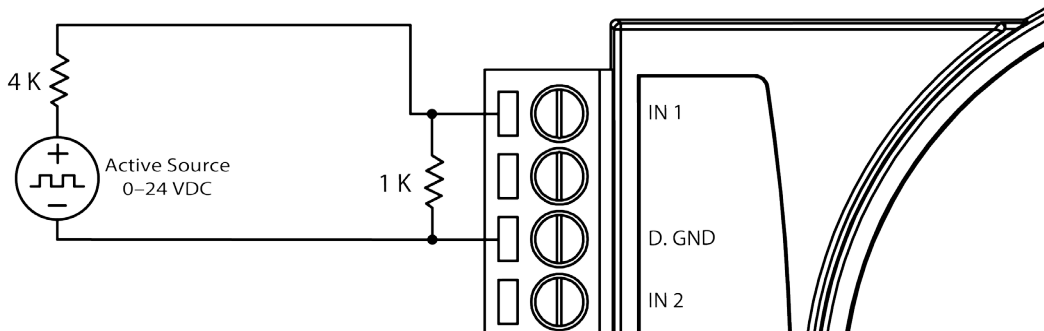
Active pulse wiring: Logic level 0: 0–0.8 V. Logic level 1: +2.4 V to 5 V
D.GND is common to (BIK) GND terminal



Flow meters that source voltages greater than 5 volts can be accommodated with a voltage divider circuit consisting of properly sized resistors (see Figure 5c).

Figure 5c:

Active pulse wiring with voltage divider circuit $(1K/(1K+4K)) = 20\%$.
24 V source is reduced to 4.8 V.



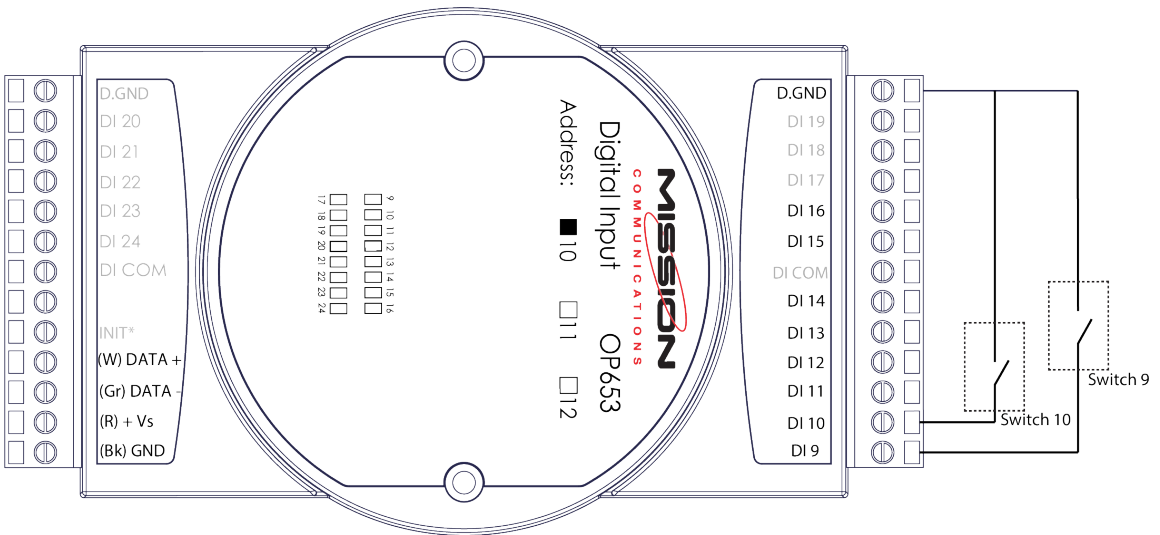
Digital Input Expansion Module (PN OP653)

Eight digital inputs can be added to the MyDro (for a total of 16) with the Digital Input Expansion Module (see Figure 6). These inputs are logically treated as alarm inputs, meaning that changes in state are reported in real-time. They cannot be configured as Pump Start/Runtime accumulators.

End-of-line resistors (wire supervision) are not supported by the Digital Input Expansion Module.

The status of expanded inputs (9–16) can be read from LEDs on the expansion module as well as the MyDro LCD screen.

Figure 6:
Dry Contact Wiring Diagram
Logic level 1: close to GND, Logic level 0: open



Analog Input Expansion Module (PN OP465)

The Analog Input Expansion Module adds four analog inputs to the two that are on the mainboard.

Analog values are reported every two minutes with the MyDro 850. Analog expansion is not supported with the MyDro 150.

The module supports 4–20 mA current inputs or 0–5 volt inputs (see Table 3 and Figure 7). Selection between these inputs requires the configuration of a jumper inside the expansion module as well as a software switch selection on the MyDro configuration screen.

Table 3:
Jumper settings for 4–20 mA or 0–5 V


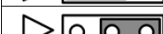
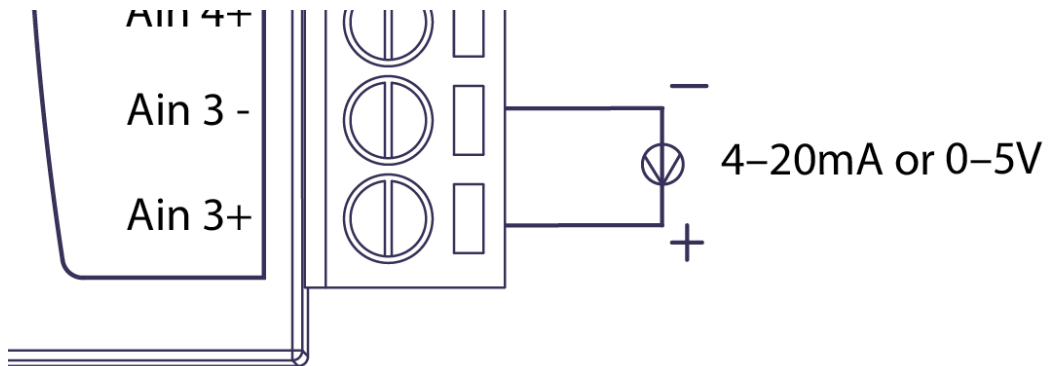
JP0-		4–20mA Input Range			
JP7		0–5V Input Range			
Mapping to Channel	Ain 3	Ain 4	Ain 5	Ain 6	
	JP0	JP1	JP2	JP3	

Figure 7:

4–20 mA current loop on Channel 3, where + is the signal from the transducer

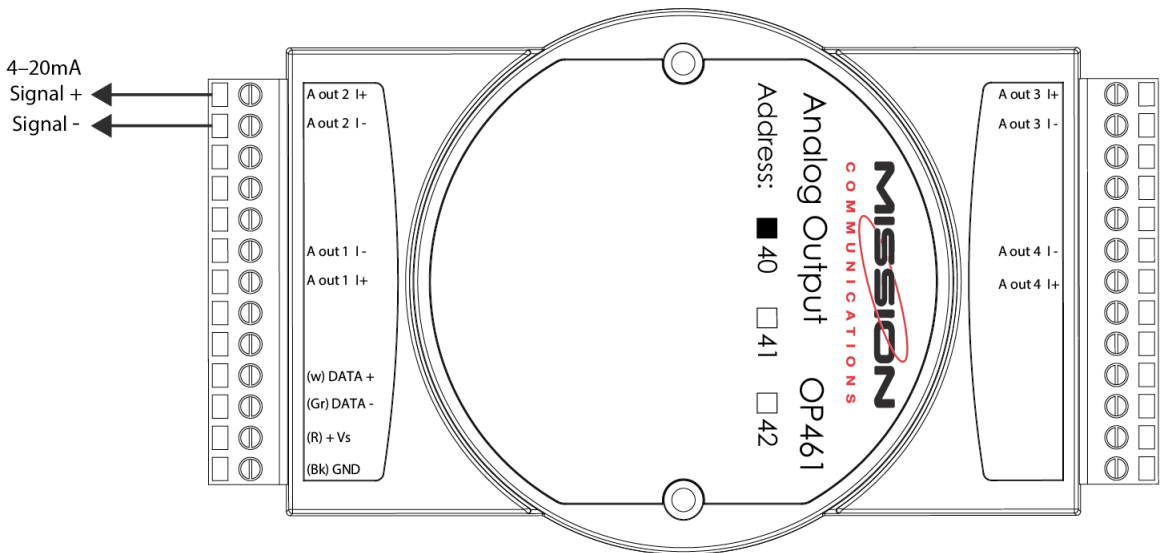


Analog Output Expansion Module (PN OP461)

The Analog Output Expansion Module adds 4–20 mA output channels. Two current loop output channels are supported at this time (see Figure 8).

The output impedance of the Analog Output Expansion Module is 0.5 ohms. The maximum current load resistance is 500 ohms.

Figure 8:
Analog output current loop on output channel 2



Installation Notes

Installation Notes



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