I/O Pro 812u
Installation Guide

OEMCtrl®

⚠️ Verify that you have the most current version of this document. Go to **https://accounts.oemctrl.com**, then select **Support** > **Download** > **Documents**.

Important changes are listed in **Document revision history** at the end of this document.

Contents

Introduction

What is this document about?

Use this document to install and configure the I/O Pro 812u into the Building Automation System (BAS).

What is a I/O Pro 812u?

The I/O Pro 812u is a **general** purpose controller. It provides the communications circuitry, non-volatile memory, and removable screw terminals for I/O connections.

To add inputs or outputs to the I/O Pro 812u, you can attach up to 5 expanders of the same type:

- Any combination of I/O ProEx816u and/or I/O ProEx48u and/or I/O Flex Ex8160 expanders connected to the Xnet

  or

- I/O 8168-R expanders connected to Port 1 or Port 2a

NOTE See the *I/O Pro Ex816u, I/O Pro Ex48u, I/O Flex Ex8160, or I/O 8168-R Installation Guide* for more details.

24Vac 26Vdc Gnd

Power Off On

Without Keypad: 24Vac, 50VA 2A, 50-60 Hz 26Vdc, 23W, 0.9A ONLY Use Copper Conductors Class 2

Power

Port 1
Net +
Net –
Shield
ARC-156

Port 1 BT485
485 Port 1
Port 2a BT485

2 wire	4 wire	EIA-232
Net+	Tx +	Tx
Net-	Tx -	Rx
n/c	Rx +	DTR
n/c	Rx -	DCD
	Signal Ground	

Port 2a

Gnd
Rnet+
Rnet-
+12V
Sense

Local Access

Port 2a
EIA-232
EIA-485
4-wire
2-wire

Gnd
Rnet +
Rnet –
+12V

Rnet

Xnet +
Xnet –
Gnd

Xnet Expansion

1 + 2 Gnd UI-1
3 + 4 Gnd UI-2
5 + 6 Gnd UI-3
7 + 8 Gnd UI-4
1 + 2 Gnd UI-5
3 + 4 Gnd UI-6
5 + 6 Gnd UI-7
7 + 8 Gnd UI-8
1 + 2 Gnd UI-9
3 + 4 Gnd UI-10
5 + 6 Gnd UI-11
7 + 8 Gnd UI-12

Inputs: All 10V Max, 20mA Max

Universal Input Mode Select
mA Volts
Thermistor/ dry-contact/ RTD

XFMRS XFATM9N-COMBO1-2MS 0544

10/100 BaseT Ethernet Port E1

100 LAN LINK

Port 2b

Aux Power Out
24 Vdc
24 Vdc
200mA maximum

Panasonic

3V Lithium Battery CR-123A

Module Status
Status Codes
Chase = OK
Blinking Dot = 'Run'
0 = Download required
1 = Control Program Error
2 = RAM full
3 = Comm setup error
4 = System error
8 = Formatting

Port 1 Tx
Port 1 Rx

Archive Valid
Port 2a Tx
Port 2a Rx
Brownout
Battery low

External Battery
Gnd
+3V

Ext. Batt.
Int. Batt.

Format

Ext Int

See BAS Table Below
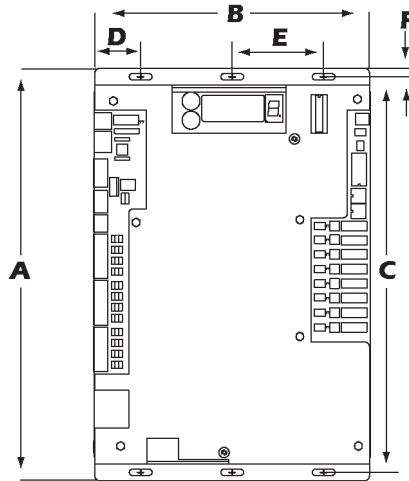BAS Port
IP Addr
Assigned Default
Enhanced
Access Port 2a On Off

1's
Controller Address
10's

BAUD	4	5		Protocols	6	7	8
9600	Off	Off	MS/TP m	Off	Off	Off	
19.2 K	Off	On	MS/TP s	On	Off	Off
38.4 K	On	Off	PTP	Off	On	Off
76.8 K	On	On	N2	On	On	Off
			Modbus	Off	Off	On
			Lon SLTA	On	Off	On
			Lon Option	Off	On	On

BAS Port Settings

BACnet

UO-8
UO-7
UO-6
UO-5
UO-4
UO-3
UO-2

0-20mA Relay
0-10Vdc
Set Pot Full CW

Pot Auto Off On

UO-1

I/O Pro 812u
CONTROLLER

A 0 H

EXTERNAL 24VDC RELAY COIL ONLY
WARNING: DO NOT APPLY 24 VAC

Open Energy Management Equipment

BTL
c UL us LISTED 88F0 E143900 TYPE: 002003

CE

24Vac
DO NOT APPLY 24Vac TO UNIVERSAL OUTPUTS
External 24Vdc relay coil only

Outputs 24Vdc Max, 50mA Max

BACnet®
Over ARCNET158 KBaud
Made in USA

UO-8 Gnd 8 + 7
UO-7 Gnd 6 + 5
UO-6 Gnd 4 + 3
UO-5 Gnd 2 + 1
UO-4 Gnd 8 + 7
UO-3 Gnd 6 + 5
UO-2 Gnd 4 + 3
UO-1 Gnd 2 + 1

I/O Pro Ex48u — CONTROL MODULE (left)

24ac/26dc Return

Power Off On

24Vac, 45VA, 1.9A, 50-60 Hz
26Vdc, 21W, 0.8A
Use Copper Conductors Only
Class 2

Module Address

Power
Error
Run

200mA max
24 Vdc
24 Vdc
Aux Power Out

Xnet +
Xnet -
Gnd
Xnet Remote Expansion

Term.

Tx
Rx
62.5k
500k Baud Select

1 + Gnd IN-1
2
3 + Gnd IN-2
4
5 + Gnd IN-3
6
7 + Gnd IN-4
8

1 + Gnd IN-5
2
3 + Gnd IN-6
4
5 + Gnd IN-7
6
7 + Gnd IN-8
8

LED Pot
Auto Off On
0-20mA Relay
0-10Vdc
Set Pot full CW

Universal Input Mode Select

mA Volts
Thermistor/ dry-contact/ RTD

UO-4
UO-3
UO-2
UO-1

Inputs: All 10V Max, 20mA Max

1 + Gnd IN-9
2
3 + Gnd IN-10
4
5 + Gnd IN-11
6
7 + Gnd IN-12
8

1 + Gnd IN-13
2
3 + Gnd IN-14
4
5 + Gnd IN-15
6
7 + Gnd IN-16
8

Open Energy Management Equipment

c UL us LISTED 88FO
E143900
TYPE: 002303

CE

Made in USA

Inputs: All 10V Max, 20mA Max

Outputs 24VDC Max 50mA Max

UO-4 Gnd 8 + 7
UO-3 Gnd 6 + 5
UO-2 Gnd 4 + 3
UO-1 Gnd 2 + 1

24VAC
DO NOT APPLY 24VAC TO UNIVERSAL OUTPUTS
External 24VDC relay coil only

I/O Pro Ex816u — CONTROL MODULE (right)

24ac/26dc Return

Power Off On

24Vac, 45VA, 1.9A, 50-60 Hz
26Vdc, 21W, 0.8A
Use Copper Conductors Only
Class 2

Module Address

Power
Error
Run

200mA max
24 Vdc
24 Vdc
Aux Power Out

Xnet +
Xnet -
Gnd
Xnet Remote Expansion

Term.

Tx
Rx
62.5k
500k Baud Select

UO-7
UO-6

1 + Gnd IN-1
2
3 + Gnd IN-2
4
5 + Gnd IN-3
6
7 + Gnd IN-4
8

LED Pot
Auto Off On
0-20mA Relay
0-10Vdc
Set Pot full CW

UO-4
UO-3

1 + Gnd IN-5
2
3 + Gnd IN-6
4
5 + Gnd IN-7
6
7 + Gnd IN-8
8

Universal Input Mode Select

mA Volts
Thermistor/ dry-contact/ RTD

UO-2
UO-1

Open Energy Management Equipment

c UL us LISTED 88FO
E143900
TYPE: 002303

CE

Made in USA

Outputs 24VDC Max 50mA Max

UO-8 Gnd 8 + 7
UO-7 Gnd 6 + 5
UO-6 Gnd 4 + 3
UO-5 Gnd 2 + 1

UO-4 Gnd 8 + 7
UO-3 Gnd 6 + 5
UO-2 Gnd 4 + 3
UO-1 Gnd 2 + 1

24VAC
DO NOT APPLY 24VAC TO UNIVERSAL OUTPUTS
External 24VDC relay coil only

Specifications

Driver	drv_iopro
Maximum number of control programs	999
Maximum number of BACnet objects*	12000
* Depends on available memory	

Power	24 Vac ±10%, 50–60 Hz 50 VA power consumption 26 Vdc (25 V min, 30 V max), 23 W Single Class 2 source only, 100 VA or less
Third-party integration points	300
10/100 BaseT Ethernet Port	For communication on the Ethernet at 10 or 100 Mbps, half duplex
Comm Ports	**Port 1:** For communication with the ARC156 and MS/TP networks. **Port 2a:** For communication on EIA-232 or EIA-485 (2-wire or 4-wire). Network protocol selectable for: • BACnet (MS/TP or PTP) • Modbus • N2 • LonWorks SLTA **Port 2b:** For LonWorks Option Card
Rnet port	• Supports up to 15 wireless and/or ZS sensors, and one Equipment Touch or OptiCORE™ ET display • Supplies 12 Vdc/210 mA power to the Rnet at an ambient temperature of 77°F (25°C) with a 24 Vac nominal power source. NOTE Ambient temperature and power source fluctuations may reduce the power supplied by the Rnet port. **NOTE** If the total power required by the sensors on the Rnet exceeds the power supplied by the Rnet port, use an external power source. The Wireless Adapter, Equipment Touch, or OptiCORE™ ET display must be powered by an external power source. See the specifications in each device's Installation Guide to determine the power required.
Local Access port	For local communication with a laptop computer running Field Assistant or the WebCTRL® for OEMs application.
Xnet Expansion port	Up to 5 expanders
Universal inputs	12 inputs, configurable for 0–5 Vdc, 0–10 Vdc, 0–20 mA, RTD, thermistor, or dry contact
Input resolution	14 bit A/D

Input pulse frequency	Maximum of 40 pulses per second. Minimum pulse width required for each pulse: • ON to OFF time (half cycle) is 25 msec • ON to OFF to ON time (full cycle) is 50 msec
Universal outputs	8 outputs for 24 Vdc relay driver, 0–10 Vdc, or 0-20 mA
Output resolution	12 bit D/A
Microprocessor	32-bit Motorola Power PC microprocessor with cache memory, Fast Ethernet controller, high performance 32-bit communication co-processor, ARCNET communication co-processor, and I/O expansion CAN co-processor
Memory	16 MB non-volatile battery-backed RAM (with 12 MB available for use), 8 MB Flash memory, 32-bit memory bus
Real-time clock	Battery-backed real-time clock keeps track of time in event of power failure
Battery	10-year Lithium CR123A battery ensures the following data is retained for a maximum of 720 hours during power outages: • Time • Graphics • Control programs • Editable properties • Schedules • Trends To conserve battery life, you can set the driver to turn off battery backup after a specified number of days and depend on the archive function to restore data when the power returns. A low battery is indicated by the **Battery Low** LED or a low battery alarm in the WebCTRL® for OEMs application, an Equipment Touch, OptiCORE™ ET display, or Field Assistant.
Data Archive	Control programs, graphics, touchscreen, editable properties, and schedules are archived to non-volatile Flash memory after every download or manual archive. If memory is corrupt or a power outage occurs and the battery backup fails or is turned off, the data is automatically restored from this archive, or you can manually restore from archived memory.
Protection	Built-in surge and transient protection for power and communications in compliance with EN61000-6-1. Incoming power is protected by a replaceable 3 Amp Pico® fuse. Network connections are protected by non-replaceable internal solid-state polyswitches that reset themselves when the condition that causes a fault returns to normal. The power, network, input, and output connections are also protected against transient excess voltage/surge events lasting no more than 10 msec. ⚠ **CAUTION** To protect against large electrical surges on serial EIA-485 networks, place a PROT485 at each place wire enters or exits the building.
Status indicators	LEDs indicate status of communications and low battery status. Seven segment display indicates running, error, and power status.

5

Electrostatic Discharge (ESD) Protection	• Level: 2 • Contact Discharge (kV): ±4 • Air-Gap Discharge (kV): ±4
Environmental operating range	-20 to 140°F (-29 to 60°C), 10–90% relative humidity, non-condensing **NOTE** Install in a UL Listed enclosure only.
Physical	Rugged aluminum cover, removable screw-type terminal blocks

Overall dimensions	A:	11-5/16 in. (28.7 cm)
	B:	7-1/2 in. (19 cm)
Mounting dimensions	C:	10-7/8 in. (27.6 cm)
	D:	1-1/4 in. (3.2 cm)
	E:	2-1/2 in. (6.4 cm)
	F:	1/4 in. (.6 cm)
Depth	1-9/16 in. (4.0 cm)	
Weight	1.7 lbs (0.8 kg)	
BACnet support	Conforms to the BACnet Building Controller (B-BC) Standard Device Profile as defined in ANSI/ASHRAE Standard 135-2012 (BACnet) Annex L, Protocol Revision 9	
Listed by	UL-916 (PAZX), cUL-916 (PAZX7), FCC Part 15-Subpart B-Class A	

Mounting and wiring the I/O Pro 812u

To mount the I/O Pro 812u

Screw the I/O Pro 812u into an enclosed panel using the mounting slots on the coverplate. Leave about 2 in. (5 cm) on each side of the controller for wiring.

See mounting dimensions in *Specifications* (page 4).

If using expanders, see the following section(s) before mounting the controller.

To connect to expanders

Wiring restrictions for connecting the expander to the controller

- Maximum length: 100 feet (30 meters)

- 22 AWG, low-capacitance, twisted, stranded, shielded copper wire

Wire the expander to the controller using ARC156 wiring. Wire the I/O Pro 812u's **Xnet Expansion** port to the **Xnet Remote Expansion** port on the expander.
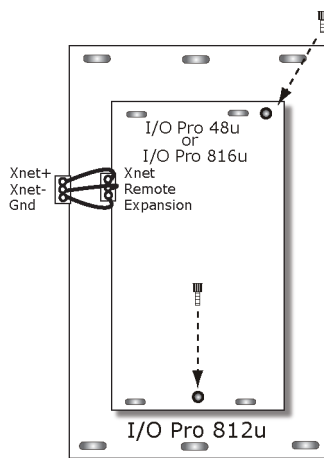
The expander may also be mounted separately within the mounting enclosure. Screw the I/O Pro 812u into an enclosed panel using the mounting slots on the coverplate. Leave about 2 in. (5 cm) on each side of the controller for wiring.
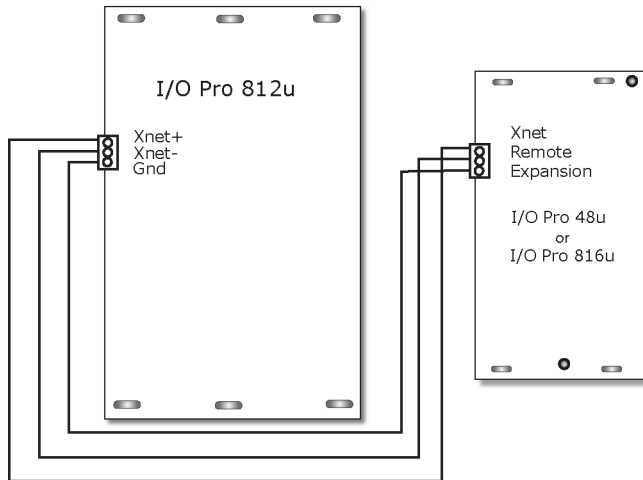
CAUTION! Connect the expander to the I/O Pro 812u before applying power to either one.

NOTES

- To use more than one expander, wire their **Xnet Remote Expansion** ports together in a daisy-chain configuration. The I/O Pro 812u must be the first device on the expander network.

- See the *I/O Pro Ex816u, I/O Pro Ex48u, I/O Flex Ex8160, or I/O 8168-R Installation Guide* for more details.

To wire for power

⚠️ **CAUTIONS**

- The I/O Pro 812u is powered by a Class 2 power source. Take appropriate isolation measures when mounting it in a control panel where non-Class 2 circuits are present.

- Do not power pilot relays from the same transformer that powers the I/O Pro 812u.

- OEMCtrl controllers can share a power supply as long as you:
  - Maintain the same polarity
  - Use the power supply only for OEMCtrl controllers

- The I/O Pro 812u has an operating range of 21.6 Vac to 26.4 Vac. If voltage measured at the I/O Pro 812u's input terminals is outside this range, the I/O Pro 812u may not work properly.

- Avoid running communication wires or sensor input wires next to AC power wires or the controller's relay output wires. The resulting noise can affect signal quality. Common sources of noise are:
  - Spark igniters
  - Radio transmitters
  - Variable speed drives
  - Electric motors (> 1hp)
  - Generators
  - Relays
  - Transformers
  - Induction heaters
  - Large contactors (i.e., motor starters)
  - Video display devices
  - Lamp dimmers
  - Fluorescent lights

1 Make sure the I/O Pro 812u's power switch is in the **OFF** position to prevent it from powering up before you can verify the correct voltage.

2 Remove power from the power supply.

3 Pull the screw terminal connector from the controller's power terminals labeled **24 Vac/26 Vdc** and **Gnd**.

4 Connect the transformer wires to the screw terminal connector.

5 Apply power to the power supply.

6 Measure the voltage at the I/O Pro 812u's power input terminals to verify that the voltage is within the operating range of 21.6–26.4 Vac.

7 Insert the screw terminal connector into the I/O Pro 812u's power terminals.

8 Turn **on** the I/O Pro 812u's power.

9 Verify that the Run LED (a dot in the lower right corner of the **Module Status** LED) begins blinking. The **Module Status** LED will show a chase pattern when the controller is running with no errors.

Addressing the I/O Pro 812u

The I/O Pro 812u needs two addresses, one for the network and one for the Ethernet.

The I/O Pro 812u needs...	That is unique on the...	Notes
A MAC address	Network	You set the MAC address on the controller's rotary switches.

An IP address	Ethernet	You can do one of the following:
		
		• Use the following **default** IP address that your system creates:
		   ○ IP address = 192.168.168.**x** where **x** is the MAC address.
		   ○ Subnet mask = 255.255.255.0
		
		• Assign a **custom** IP address

NOTES

• Carefully plan your addressing scheme to avoid duplicating addresses. If third-party devices are integrated into the system, make sure your addresses do not conflict with their addresses.

• You can address the I/O Pro 812u before or after you wire it for power.

To address the I/O Pro 812u

The I/O Pro 812u's two rotary switches determine the I/O Pro 812u's MAC address when it is placed on a BACnet/ARC156 or BACnet MS/TP network. The rotary switches define the MAC address portion of the device's BACnet address, which is composed of the network address and the MAC address. They also set the slave address on a Modbus or N2 network, when less than 100.

1 If the I/O Pro 812u has been wired for power, pull the screw terminal connector from its power terminals labeled **Gnd** and **Hot**. The controller reads the address each time you apply power to it.

2 Using the rotary switches, set the controller's address. Set the **Tens** (**10's**) switch to the tens digit of the address, and set the **Ones** (**1's**) switch to the ones digit.

EXAMPLE If the controller's address is 25, point the arrow on the **Tens** (**10**'s) switch to 2 and the arrow on the **Ones** (**1**'s) switch to 5.
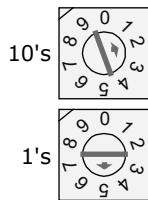
NOTE The I/O Pro 812u recognizes its address only after power has been cycled.

To use a default IP address

⚠️ **CAUTION** The IP address must be unique on the Ethernet.

1   If wired for power, turn off the controller's power.

2   **NOTE** The controller only reads the rotary switch positions during power up or upon reset.

3   Set the **Default/Assigned** DIP switch to the **Default** position.

NOTE The default address is an intranet address. Data packets from this address are not routable to the Internet.

To assign a custom IP address

1   Connect a computer to the I/O Pro 812u's **Local Access** port. See *To communicate through the local access port* (page 18).

2   Set the I/O Pro 812u's **Enhanced Access** DIP switch to **ON**.

3   Turn the I/O Pro 812u's power **Off**, then **On**.

4   Assign your IP address using PuTTY - a free open source terminal emulation program that works with all Windows operating systems. See *Using PuTTY* (page 11).

Using PuTTY

1   Download and install PuTTY from the *PuTTY website* (*http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html*).

2   Turn off the controller's power, make sure the **Enhanced Access Port** DIP switch is set to **ON**, then turn the power on again.

3   Set the controller's **IP Address** DIP switch to **Assigned**.

4   Start PuTTY.

5   Under **Serial line**, `COMX`, replacing X with the computer's port number that the USB Link Kit cable is connected to.

NOTE To find the port number, select **Start** > **Control Panel** > **System** > **Hardware** > **Device Manager** > **Ports (Com & LPT)**. The COM port number is beside **CP210x USB to UART Bridge Controller**.
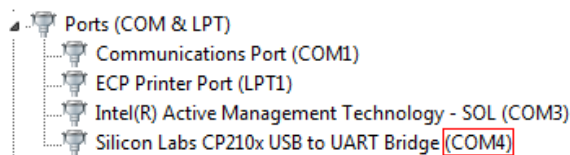
6   In the **Speed** field, type the appropriate baud rate.

7   Under **Connection type**, select **Serial**.

8   Under **Category** > **Connection**, select **Serial**.

OEMCtrl Proprietary and Confidential
11

9   Under **Options controlling local serial lines**, verify the following settings.

Field	Value
Serial line to connect to	The COM port number you entered in step 5
Speed (baud)	The speed you entered in step 6.
Data Bits	8
Stop Bits	1
Parity	None
Flow Control	None

10   Click **Open**. A window similar to the one below appears.

```
BACnet Router, Ethernet MAC address = 00-E0-C9-00-4E-B8

1) Restart
2) Display Modstat
3) IP Address [192.168.168.1]
4) Subnet Mask [255.255.255.0]
5) Default Gateway [0.0.0.0]
6) BACnet/IP UDP Port [0xBAC0]
7) BACnet/IP Network [4824+]
8) BACnet/Ethernet Network [4829]
9) BACnet/ARCNET Network [4825]
10) BACnet/MSTP Network [4834]
11) Display B/IP PAD Table
12) Add B/IP PAD Table Entry
13) Delete B/IP PAD Table Entry
14) Clear B/IP PAD Table
15) Set baud rate for MSTP [76800]
16) Set baud rate for PTP [38400]

+ The HOME network is updated each time a network number
  is changed (#7-10).

Enter selection: _
```

11   Type the number of the address field, then press **Enter**.

12   Type the new address, then press **Enter**.

13   Type 1, then press **Enter** to restart the controller.

14   Close PuTTY.

15   Turn off the controller's power, set its **Enhanced Access Port** DIP switch to **OFF**, then turn its power on again..

Wiring inputs and outputs

Input wiring specifications

Input	Maximum length	Minimum gauge	Shielding
0–5 Vdc 0–10 Vdc	1000 feet (305 meters)	26 AWG	Shielded
0–20 mA	3000 feet (914 meters)	26 AWG	Shielded or unshielded
Thermistor Dry contact Pulse counter TLO	1000 feet (305 meters)	22 AWG	Shielded
RTD	100 feet (30 meters)	22 AWG	Shielded
ZS Sensor Wireless Adapter Equipment Touch OptiCORE™ ET display	See individual specifications in the device's *Installation Guide*.		

NOTE OEMCtrl recommends use of an external current transducer between an RTD and the I/O Pro 812u to improve accuracy and resolution.

Inputs

The I/O Pro 812u has 12 inputs that accept the following signal types.

Signal Type	Description
Thermistor	Precon type 2 (10 kOhm at 77°F). Input voltages should be from 0.489 Vdc to 3.825 Vdc for thermistors.
Dry contact	A 5 Vdc wetting voltage detects contact position, resulting in a 1 mA maximum sense current when the contacts are closed.
0–5 Vdc 0–10 Vdc	The input impedance of the I/O Pro 812u is approximately 20 kOhm.
0–20 mA	The input resistance on the positive (+) terminal is 250 Ohms. The **Aux Power Out** connector is capable of supplying 24 Vdc to multiple 4–20 mA transducers, but the total current demanded must not exceed 200 mA. If the voltage measured from the **Aux Power Out** connector to **Gnd** is less than 18 Vdc, you need to use an external power supply.

Signal Type	Description
RTD	Platinum - 1 kOhm at 32°F (0°C) Nickel/Iron - 1 kOhm at 70°F (21°C) Balco TS8000 - 1 kOhm at 70°F (21°C) Input voltages should be from 0.6–1.2 V
Pulse counter*	Maximum of 40 pulses per second. Minimum pulse width required for each pulse: • ON to OFF time (half cycle) is 25 msec • ON to OFF to ON time (full cycle) is 50 msec

* The I/O Pro 812u can perform pulse counting for dry contact or voltage inputs if you assign the input to a Pulse to Analog Input microblock.

To wire inputs

1   Verify that the I/O Pro 812u's power and communications connections work properly.

2   Turn **off** the I/O Pro 812u's power.

3 Connect the input wiring to the screw terminals on the I/O Pro 812u. See figure below.

 NOTES

 ○ Connect the shield wire to the **GND** terminal with the ground wire.

 ○ For a loop-powered 4-20 mA sensor, wire the sensor's positive terminal to the **+** terminal on the I/O Pro 812u's **Aux Power Out** connector. Wire the sensor's negative terminal to an input's **+** terminal.
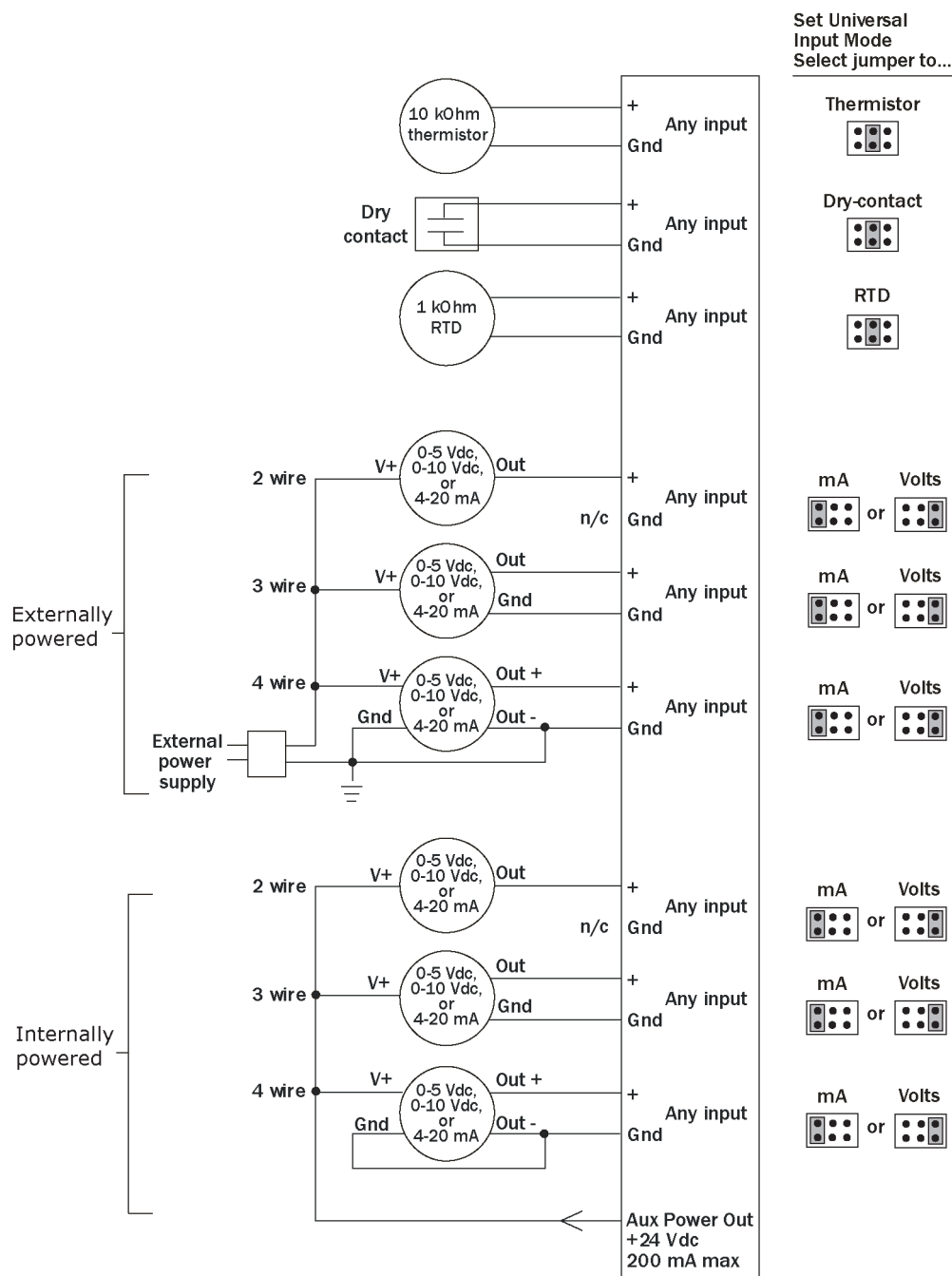
4 Set each input's **Universal Input Mode Select** jumper to indicate the type of input.

5 Turn **on** the I/O Pro 812u's power.

Output wiring specifications

To size output wiring, consider the following:

- Total loop distance from the power supply to the controller, and then to the controlled device

  NOTE Include the total distance of actual wire. For 2-conductor wires, this is twice the cable length.

- Acceptable voltage drop in the wire from the controller to the controlled device

- Resistance (Ohms) of the chosen wire gauge

- Maximum current (Amps) the controlled device requires to operate

Outputs

The I/O Pro 812u has 8 universal outputs that you can use as binary outputs or analog outputs. The outputs support:

- driving external 24 Vdc relays
- 0-10 Vdc devices
- 0-20 mA devices

⚠️ **WARNING** Do not apply 24 Vac to these universal outputs.

If output controls a...	Resistance to ground must be...
0–10 Vdc device	500 Ohms minimum
0–20 mA device	800 Ohms maximum

NOTES

- The device must share the same ground as the controller.

- The total output current from all outputs and the **Aux Power Out** connector must not exceed:

  500 mA at 115°F
  300 mA at 140°F

  For temperatures above 115°F, use the following equation to calculate the total current at 8 mA per degree:

  500mA - ((max. expected temp. - 115°F) * 8mA/F)

16

To wire outputs

1   Verify that the I/O Pro 812u's power and communications connections work properly.

2   Turn **off** the I/O Pro 812u's power.

3   Connect binary and analog output wiring to the **UO** screw terminals on the I/O Pro 812u and to the controlled device. Connect the ground wire to the UO's **Gnd** terminal.

        WARNING   Do not apply 24 Vac to these universal outputs.
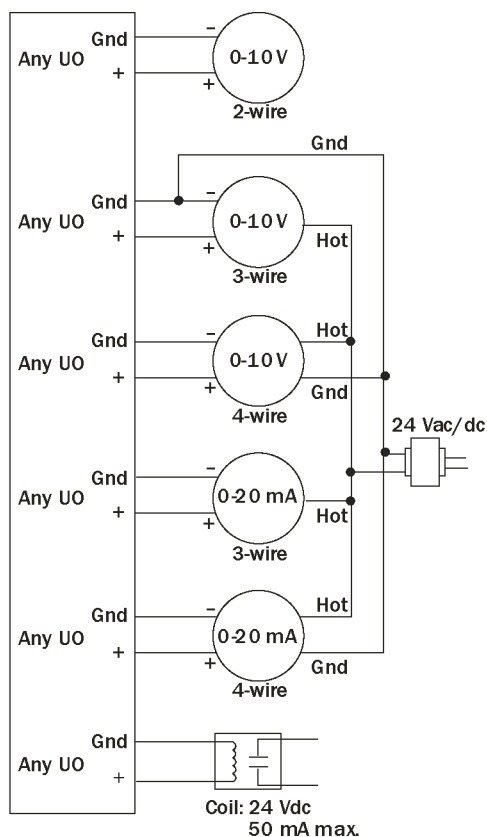

4   Set each output's jumper to the type of device wired to the output.

5   For each binary output, turn the output's potentiometer clockwise until it stops (maximum output).

6   Turn **on** the I/O Pro 812u's power.

Local Access

To communicate through the local access port

Using a computer and a USB Link Kit, you can communicate locally with the I/O Pro 812u to download or to troubleshoot.

PREREQUISITES

- A computer with a USB port

- A USB Link

⚠️ **CAUTION**   If multiple controllers share power but polarity was not maintained when they were wired, the difference between the controller's ground and the computer's AC power ground could damage the USB Link and the controller. If you are not sure of the wiring polarity, use a USB isolator between the computer and the USB Link. Purchase a USB isolator online from a third-party manufacturer.

1   If your computer does not already have the USB Link driver installed, install it before you connect the USB Link to your computer.

NOTE   The driver is installed with WebCTRL® for OEMs v5 or later system. But if needed, you can get the latest driver from *http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx*.

2   Connect the computer to the local access port of the controller using the USB Link cable(s).
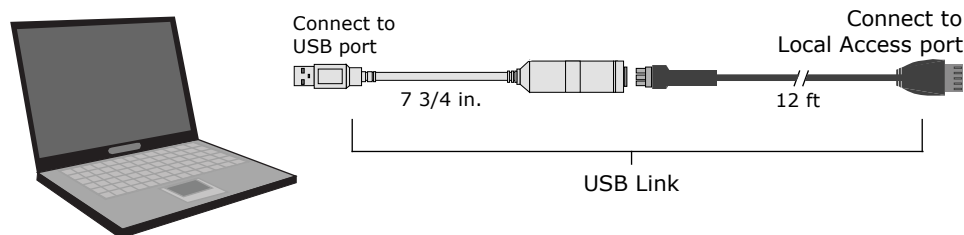
NOTE   If using a USB isolator, plug the isolator into your computer's USB port, and then plug the USB Link cable into the isolator.

3   Set the controller's **Enhanced Access** DIP switch.

To communicate in...	Set switch to...
The WebCTRL® for OEMs application	Off
PuTTY	On
SiteBuilder to set a custom IP address	On

4   Turn the controller's power off, then on again.

Wiring devices to the I/O Pro 812u's Rnet port

You can wire the following devices to the I/O Pro 812u's Rnet port in a daisy-chain configuration:

- ZS sensors
- Wireless Adapter that communicates with wireless sensors
- Equipment Touch
- OptiCORE™ ET display

NOTES

- The Rnet communicates at a rate of 115 kbps.
- Verify that the **Rnet** jumper is set to **Rnet** (default position).

Zone sensors

You can wire ZS sensors and/or a Wireless Adapter that communicates with wireless sensors to the I/O Pro 812u's Rnet port. You can have up to 15 ZS and/or wireless sensors.

NOTES

- A control program can use no more than 5 ZS sensors, so you must use multiple control programs if your Rnet network has more than 5 sensors.
- ZS and wireless sensors can share the Rnet with an Equipment Touch or OptiCORE™ ET display, but not RS sensors.

Touchscreen devices

You can wire an Equipment Touch or OptiCORE™ ET display to the I/O Pro 812u's Rnet port to view or change the controller's property values, schedule equipment, view trends and alarms, and more, without having to access the system's server. The Rnet can have one Equipment Touch or OptiCORE™ ET display, plus ZS sensors and/or a Wireless Adapter that communicates with wireless sensors.

NOTE These touchscreen devices are not powered by the Rnet.
- The OptiCORE™ ET display requires a 24 Vdc external power source.
- The Equipment Touch requires a 24 Vac external power source.

⚠ **CAUTION** A touchscreen device can share a power supply with the OEMCtrl controller as long as:
- The power source shared by the controller and Equipment Touch is AC power.
- The power source shared by the controller and OptiCORE™ ET display is DC power.
- You maintain the same polarity.
- You use the power source only for OEMCtrl controllers.

See the device's Installation Guide for complete wiring instructions.

Troubleshooting

If you have problems mounting, wiring, or addressing the I/O Pro 812u, contact OEMCtrl Technical Support.

Communication LED's

The **Module Status** LED can display the following error codes.

Error Code...	Indicates...	Possible solutions
0	The control program or driver has not been downloaded.	Download memory to the I/O Pro 812u.
1	A control program error	Obtain a Module Status Report (Modstat) and look for error conditions. If you cannot determine the error from the Modstat, send a screenshot of the Modstat to Technical Support.
2	The controller's memory is full	In the WebCTRL® for OEMs application, reduce the amount of trend data being stored in the controller. In SiteBuilder, reduce the amount of control programs.
3	A setup error	Verify: • The address has been set on the rotary switches. See *Addressing the I/O Pro 812u* (page 10). • The address is unique on the network • DIP switches are set correctly
4	A system error	Obtain a Module Status Report (Modstat) and look for error messages. If you cannot determine the error from the Modstat, send a screenshot of the Modstat to Technical Support.
8	The controller is formatting	If this number displays continuously or flashes intermittently with another number, try each of the following: • Turn the I/O Pro 812u's power off, then on. • Restore factory defaults • Download memory to the I/O Pro 812u.* • Replace the I/O Pro 812u.* * Contact the manufacturer or OEM Technical Support.

Other LED's show the status of certain functions.

If this LED is on...	Status is...
Power	The I/O Pro 812u has power.
Link	The controller is connected to the Ethernet
LAN	The Ethernet port is transmitting or receiving data

If this LED is on...	Status is...
100	The connection speed is 100 Mbps. If LED is not lit, the connection speed is 10 Mbps.
Port 1 transmit	The I/O Pro 812u is transmitting data from **Port 1**
Port 1 receive	The I/O Pro 812u is receiving data on **Port 1**
Archive Valid	The controller's memory backup is valid
Port 2a transmit	The I/O Pro 812u is transmitting data from **Port 2a**
Port 2a receive	The I/O Pro 812u is receiving data on **Port 2a**
Brownout	Incoming power is low
Battery low	The battery is low

Recovering from a power outage

The I/O Pro 812u has a 10-year Lithium CR123A battery that ensures the following data is retained for a maximum of 720 hours during power outages:

- Time
- Graphics
- Control programs
- Editable properties
- Trends
- Schedules

To conserve battery life, you can set the driver to turn off battery backup after a specified number of days and use the archive function to restore data when the power returns.
If the above data is lost after power returns, replace the battery and then restore memory from archive. See instructions below.

Archive function

Factories - After a memory download, the firmware stores the touchscreen files, graphics, control programs, and database settings to flash memory. This archiving can take up to a minute, depending on the size of the files.

Site-specific - You can archive site-specific configurations to the I/O Pro 812u by using the WebCTRL® for OEMs application, Field Assistant, a touchscreen device, or by adjusting the control program. We strongly recommend you archive whenever you change factory settings, such as schedules, device instances, network addresses, etc..

Restore memory from archive

The I/O Pro 812u checks the memory configuration during power up and, if it is identified as corrupt, it reconstructs memory from the last archive. In addition, if the battery fails to power the device during a power outage, memory could be lost, but will be reconstructed from the last archive. The device supports factory and site-specific archives, which can be manually restored in the field.

To restore the factory archive

1   Turn off the I/O Pro 812u.

2   Address the rotary address switches to 0, 0 (zero, zero).

3   Hold down the **Format** button.

4   Turn on the I/O Pro 812u.

5   The **Archive Valid** LED indicates the archiving process.

To restore the site-specific archive

1   Turn off the I/O Pro 812u.

2   Address the rotary address switches to any numbers greater than 0, 0 (zero, zero). Example (0, 1).

3   Hold down the **Format** button.

4   Turn on the I/O Pro 812u.

5   The **Archive Valid** LED indicates the archiving process.

After restoring from archive

1   Run a module status and check the information message history to confirm the archive.

2   Set the time and date for schedules to operate properly.

NOTE The restore uses June 12, 2002 @ 10:00 AM as a place holder because the battery failure inhibits the real time clock. Use the a touchscreen device, the WebCTRL® for OEMs application, or Field Assistant to set the correct time and date. If the device is integrated with a BACnet-speaking BAS, the time and date are set through the communication network.

To replace the I/O Pro 812u's battery

The I/O Pro 812u's 10-year Lithium CR123A battery retains the following data for a maximum of 720 hours during power outages: time, control programs, editable properties, schedules, and trends.
To conserve battery life, you can set the driver to turn off battery backup after a specified number of days and depend on the archive function to restore data when the power returns.
A low battery is indicated by the **Battery low** LED or a low battery alarm in the WebCTRL® for OEMs application.
You can purchase replacement batteries from any retailer that sells a CR-123A battery.

1   Verify that the I/O Pro 812u's power is on.

2   Using a small flathead screwdriver, pry up each side of the black battery clip until it is free and you can remove it.

3   Remove the battery from the controller, making note of the battery's polarity.

4   Insert the new battery into the controller, matching the polarity of the battery you removed.

5   Push the black clip back onto the battery until you hear both sides click in place.

6   Download the I/O Pro 812u.

Replacing the I/O Pro 812u's fuse

If you turn on the I/O Pro 812u's power switch and the Power LED is not lit, use a multimeter to see if the 3 Amp Pico fuse that protects the incoming power is blown.
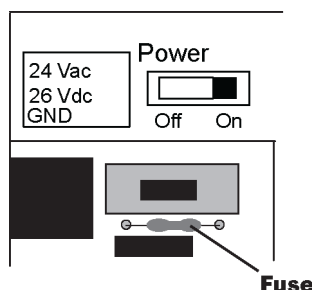

You can order replacement 3 Amp Pico fuses online or from a local retailer.

Before replacing the fuse, try to determine why the fuse blew.

- Check the Power wiring polarity of the I/O Pro 812u, any attached expanders, and any other controllers that share the power supply. Use the same polarity for all of them.

- Verify that outputs are wired to the appropriate types of devices. See *Outputs* (page 16). For example, you cannot wire a 24 Vac device to an output.

- If the **Aux Power Out** port is used, verify that it is wired correctly. See *Wiring inputs and outputs* (page 13).

To replace the fuse:

1   Turn **off** the I/O Pro 812u's power.

2   Using needle-nose pliers, pull the bad fuse from the I/O Pro 812u.

3   Cut the wires on the new fuse so that the total length is approximately 1 inch and the fuse is centered.

1 inch
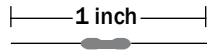
4 Bend the wire ends so that the length is approximately 1/2 inch.

^{1}/2 inch
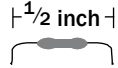
5 Use the pliers to grip one wire end of the fuse and push into a fuse socket on the I/O Pro 812u.

6 Grip the other wire end of the fuse and push into the other fuse socket.

7 Turn on the power and verify that the Power LED is lit.

Serial number

If you need the I/O Pro 812u's serial number when troubleshooting, the number is on:
- a sticker on the back of the main controller board
- a Module Status report (modstat) from the WebCTRL® for OEMs application

Compliance

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

⚠ **CAUTION** Changes or modifications not expressly approved by the responsible party for compliance could void the user's authority to operate the equipment.

CE Compliance

⚠ **WARNING** This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

BACnet Compliance

Compliance of listed products to requirements of ASHRAE Standard 135 is the responsibility of BACnet International. BTL® is a registered trademark of BACnet International.

Document revision history

Important changes to this document are listed below. Minor changes such as typographical or formatting errors are not listed.

Date	Topic	Change description	Code*
1/25/19	Wiring devices to the I/O Pro 812u's Rnet port	Removed star configuration from the first paragraph.	X-TS-TS-O
	Specifications	Added surge CAUTION to Protection specification.	X-TS-AK-E-CC
10/17/18	Outputs	Added /F to end of formula.	X-CC-E
	Wiring inputs and outputs > Input wiring specifications	Removed RS sensor from Input wiring table, and added OptiCORE™ ET display.	O-D
	Wiring devices to the I/O Pro 812u's Rnet port	Added OptiCORE™ ET display. Removed sub-topics and directed user to see each device's Installation Guide.	O-D
	Specifications	Reworded Rnet port specification and added power supplied by Rnet port. Reworded Protection specification and added first paragraph.	X-H-JS-O
9/11/18	Using Hyperterminal	Removed - outdated software.	O-TS-PK-O
	To assign a custom IP address	Removed reference to Hyperterminal.	O-TS-PK-O
	Specifications	Reworded Rnet port specification and added power supplied by Rnet port. Additional information in the Protection specification.	X-H-JS-O
	Wiring inputs and outputs > Wiring specifications	Added Wireless Adapter, Equipment Touch, and OptiCORE™ ET display. Directed the user to the device's Installation Guide.	O-D
	Wiring devices to the I/O Pro 812u's Rnet port	Removed individual device topics and directed user to see each device's Installation Guide for details. Added OptiCORE™ ET display.	O-D
	Replacing the battery	Corrected instructions from the wrong battery to the correct one.	O-D
7/24/14	Specifications What is the Equipment Touch?	Changed number of ZS sensors that can be used with an Equipment Touch, from 5 to 15.	X-D
5/14/14	Specifications	Added backplate dimensions.	X-D

* For internal use only