I/O Configuration for E1 and E2 Brain Boards

Introduction

The Opto 22 software utility **PAC Manager**™ must be used to configure E1 and E2 brain boards with compatible racks and modules. (This combination of brain board with I/O rack and modules is called an *I/O unit*.) This technical note describes how to configure E1 and E2 I/O units for an I/O system that uses one—or more—of the following applications:

- **PAC Control**™, **OptoOPCServer**™, or **OptoDataLink**™—PAC Control is Opto 22's flowchart-based programming application for creating control programs that run on Opto 22's SNAP PAC programmable automation controllers. OptoOPCServer is an OPC 2.0-compliant data server for data connectivity with OPC clients. OptoDataLink provides bi-directional data exchange with common SQL databases.

  PAC Control is part of Opto 22's PAC Project Basic™ software suite, which also includes PAC Display™ human-machine interface (HMI) software. Since PAC Display uses the control program you create in PAC Control, no additional changes are needed to use E1 or E2 brain boards with PAC Display. OptoOPCServer and OptoDataLink can be purchased separately or as part of PAC Project Professional; they also use the I/O configuration you set up here.

- A **Modbus/TCP** application such as a SCADA package.

- A **custom application** written using Opto 22's memory-mapped OptoMMP™ protocol.

Configuring an E1 or E2 I/O unit is usually a one-time task that is done as part of commissioning a new E1 or E2 brain board for use in an I/O system. After an E1 or E2 I/O unit is configured and its configuration information stored to flash memory, the I/O unit is ready for use with the kinds of applications listed above.

For Optomux Users

This technical note does not apply to E1 or E2 brain boards used in an Optomux I/O system (on either a serial or Ethernet network). Configuration for Optomux operation is done using jumpers on the brain board and in the Optomux application itself. See the *E1 and E2 User's Guide* (Opto 22 form 1563) and the *Optomux Protocol Guide* (Opto 22 form 1572) for instructions and more information.

Requirements

This technical note assumes the following:

- E1 and/or E2 I/O units are already attached to your Ethernet network and have been assigned network IP addresses. If an I/O unit does not yet have an IP address and other network information assigned to it, configure these settings now, following the instructions in the *PAC Manager User's Guide* (Opto 22 form 1714).

- PAC Manager software is already installed on your computer. PAC Manager is included on the CD shipped with E1 and E2 brain boards, and is also available as a free download from the Opto 22 website.

Documentation

See the following guides for additional information on using E1 and E2 I/O units and related software applications:

For using	See these guides	Opto 22 form
E1 and E2	*E1 and E2 User's Guide*	1563
PAC Manager	*PAC Manager User's Guide, Legacy Edition*	1714
PAC Control	*PAC Control User's Guide* *PAC Control Command Reference* *PAC Control Commands Quick Reference Card*	1700 1701 1703
OptoOPCServer	*OptoOPCServer User's Guide*	1439
PAC Display	*PAC Display User's Guide*	1702

For Help

If you are having trouble and cannot find the help you need in this technical note or in the documentation listed above, contact Opto 22 Product Support.

Phone: 800-TEK-OPTO (800-835-6786)
951-695-3080
(Hours are Monday through Friday,
7 a.m. to 5 p.m. Pacific Time)

NOTE: Email messages and phone calls to Opto 22 Product Support are grouped together and answered in the order received.

Fax: 951-695-3017

Email: support@opto22.com

Opto 22 website: www.opto22.com

Preparing for Configuration

When you use E1 and E2 I/O units with any protocol *except Optomux,* you are communicating with the E1's or E2's memory map. Because the memory map was originally developed for SNAP Ethernet brains, it is based on SNAP modules, which differ from the modules used with the brain boards. Currently, E1 and E2 I/O units must be configured as if they were SNAP Ethernet I/O units.

I/O System Inventory

Before starting to configure E1 and E2 I/O units, collect information on the I/O units in your I/O system, including network settings and installed I/O modules. You can use the "E1 and E2 I/O Unit Inventory Form" on page 25 for this purpose. Copy the form for each I/O unit and fill it in so all the information you need is in one place.

For each analog module on the inventory form, determine the corresponding SNAP module and initial scaling from the following tables and write it on the form.

Analog Input Modules and Initial Scaling

For this G1 analog input module...	...select this SNAP analog input module and initial scaling.
AD2T: 0 - 20 mA	SNAP-AIMA: -20 - +20 mA
AD3 or AD3T: 4 - 20 mA	SNAP-CUSTOM-AI: Mode 1
AD4: ICTD Temp. Probe	SNAP-AICTD: ICTD Temp. Probe, Degrees C
AD5 or AD5T: Type J TC	SNAP-AITM: Type J Thermocouple, Degrees C
AD6, AD6T, or AD6HS: 0 - 5 VDC	SNAP-AIV2-i: -50 - +50 VDC
AD7: 0 - 10 VDC	SNAP-AIV2-i: -100 - +100 VDC
AD8 or AD8T: Type K TC	SNAP-AITM: Type K Thermocouple
AD9T: 0 - 50 mV	SNAP-AITM2-i: -50 - +50 mV
AD10T2: 100 Ohm RTD	SNAP-AIRTD: 100 Ohm Pt 3-wire
AD11: -5 - +5 VDC	SNAP-AIV: -5 - +5 VDC
AD12: -10 - +10 VDC	SNAP-AIV: -10 - +10 VDC
AD13T: 0 - 100 mV	SNAP-AITM: -150 - +150 mV
AD14T: 10 Ohm RTD	SNAP-AIRTD: 120 Ohm Ni 3-wire
AD15T: 28 - 140 VAC	SNAP-AIVRMS: 0 - 250 VAC/VDC
AD16T: 0 - 5 A AC/DC	SNAP-AIARMS: 0 - 10 A AC/DC
AD17T: Type R TC	SNAP-AITM2: Type R Thermocouple
AD17T: Type S TC	SNAP-AITM2: Type S Thermocouple
AD18T: Type T TC	SNAP-AITM2: Type T Thermocouple
AD19T: Type E TC	SNAP-AITM: Type E Thermocouple
AD20: Rate (Freq)	SNAP-AIRATE: Rate (Frequency)

Analog Output Modules

For this G1 analog output module...	...select this SNAP analog output module.
DA3: 4 - 20 mA DA3T: 4 - 20 mA	SNAP-AOA-3: 4 - 20 mA
DA5: 0 - 10 VDC	SNAP-AOV-5: 0 - 10 VDC
DA7: -10 - +10 VDC	SNAP-AOV-7: -10 - +10 VDC
DA4: 0 - 5 VDC DA4T: 0 - 5 VDC	SNAP-AOV-25: 0 - 10 VDC
DA6: -5 - +5 VDC	SNAP-AOV-27: -10 - +10 VDC
DA8: 0 - 20 mA	SNAP-AOA-28: 0 - 20 mA

Important Notes

E1 I/O units—Because the E1 is not exactly like any SNAP brain, there is one limitation: to use counters, you can use no more than eight points on the unit (similar to a SNAP-B3000-ENET, which supports a maximum of eight digital modules on the rack). If you are *not* using counters, up to 16 points can be used (similar to a digital-only SNAP-ENET-D64, which does not support counters).
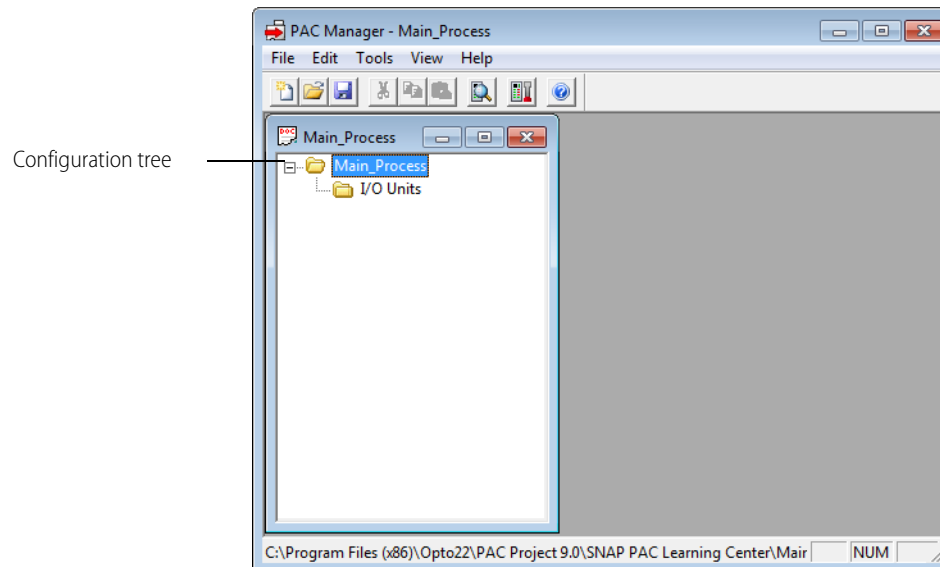
Configuring I/O Units

Follow the steps in each section to configure each E1 and E2 I/O unit on your network. Note that you can include multiple E1 and E2 I/O units in a single configuration file.

IMPORTANT: *Even if you plan on using E1 and E2 I/O units with PAC Control, you must use PAC Manager to create a new configuration file, configure points, and save the configuration to flash memory on the brain. For an E2, custom scaling (and calibrating offset and gain, if necessary) are separate steps that require a second save to flash. Follow the steps below.*

Creating a New Configuration File

1. If PAC Manager is not already open, choose Start > Programs > Opto 22 > PAC Project Software > PAC Manager.

2. In the PAC Manager main window, click the New button [icon] or choose File > New.

3. In the Create New Tag Database dialog box, navigate to the location where you want the file to be. Type a filename. Click Open.

A new configuration tree appears. (If you are familiar with PAC Control, ioControl, or OptoControl, you'll notice that this window looks like part of a Strategy Tree.)

Configuration tree

You can expand and collapse the folders to see or hide the I/O units and points in them. Closing the configuration tree is the same as closing the configuration file.

4. To save the configuration file, click the Save button [icon] or choose File > Save.

5. Once the file is saved, continue with the next section, "Adding an E1 or E2 I/O Unit."

Adding an E1 or E2 I/O Unit

An E1 or E2 *I/O unit* consists of a mounting rack, plus the E1 or E2 brain board and I/O modules mounted on it. In PAC Manager you must add an I/O unit before you can configure its modules and I/O points.

1. Make sure the configuration file is open. On the configuration tree, double-click the I/O Units folder to open the Configure I/O Units dialog box:
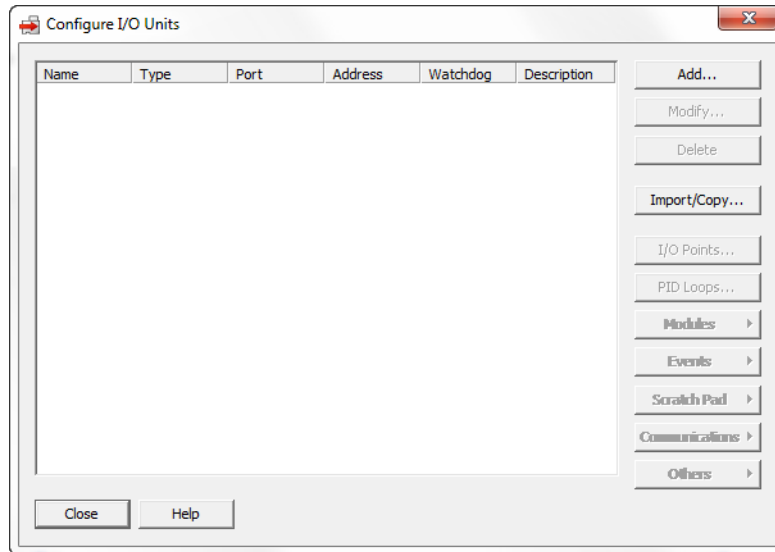
2. To add a new I/O unit, click Add or double-click anywhere in the box below any listed units.

   The Add I/O Unit dialog box appears:
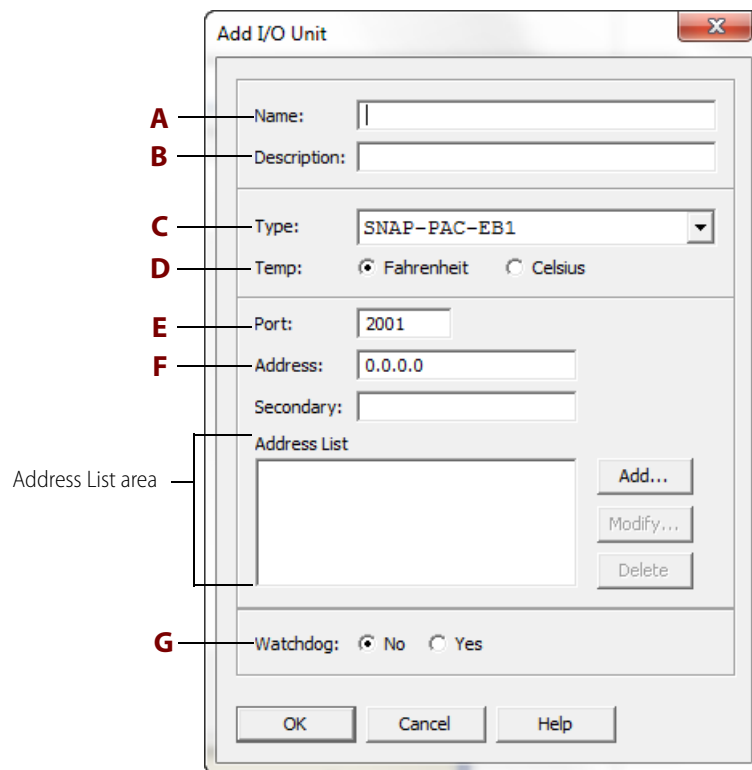

3. Complete the fields as follows:

A Enter a name for the I/O unit. The name must start with a letter and may contain letters, numbers, and underscores. Spaces are converted to underscores.

B (Optional) Enter a description of the unit.

C Select the type of I/O unit from the drop-down list.

For this E1- or E2-based I/O unit...	...select this SNAP I/O unit.
E1 brain board with: • up to 8 digital I/O points • any digital point configured as a counter	SNAP-B3000-ENET
E1 brain board with: • up to 16 digital I/O points • no digital point configured as a counter	SNAP-ENET-D64
E2 brain board	SNAP-B3000-ENET

D Choose whether temperatures will be handled in Fahrenheit or Celsius.

E Specify the communication port to use (2001, unless you have changed it for security purposes according to the instructions in the *PAC Manager User's Guide*).

F Enter the I/O unit's IP address. Leave the Secondary field blank.

The Address List area shows IP addresses of the I/O units that should receive this configuration. If you have I/O units that are exactly alike (having exactly the same modules and features), list all of them here. That way you can download the configuration file to all the I/O units at once.

– To add an IP address, click Add. (In the dialog box, you can add a single IP address or a range of addresses.)
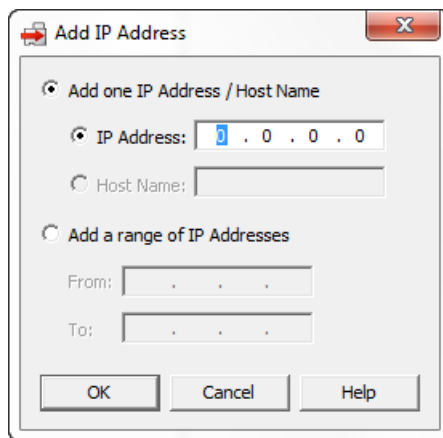
– Enter the IP address(es) and click OK.

The addresses appear in the Address List area.

G Select whether you want a Watchdog on the unit. The default is No (disabled). If you select Yes, a new field appears; enter the Watchdog timeout value in seconds. The default timeout is 0.5 seconds.

4. When information in the Add I/O Unit dialog box is complete, click OK.

The new I/O unit appears in the Configure I/O Units dialog box:
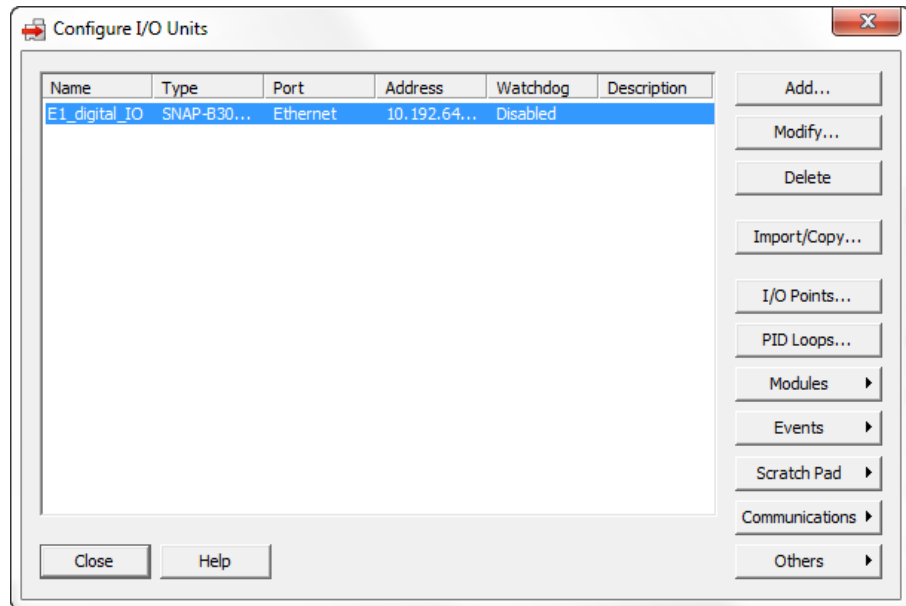
5. Add other I/O units or continue with the next section on configuring I/O points.

Configuring I/O Points

Modules used with E1s and E2s have only one point per module. However, PAC Manager was originally developed for SNAP modules, which accommodate up to four points each. When you use PAC Manager with E1s and E2s, each module on the E1 or E2 corresponds to the *first point* (point 0) on a similar SNAP module.

EXCEPTION: *Point numbering for Modbus/TCP operation starts with 1, not 0. See the E1 and E2 Brain Board User's Guide (Opto 22 form 1563) for more information on using Modbus/TCP.*

When you use PAC Manager or the memory map with E1s and E2s, each module on the E1 or E2 corresponds to the *first point* on a similar SNAP module.

E1 brain boards can be used with a variety of modules. The maximum number of points is 16 on the largest rack, as shown below.

E1 shown with G4 modules.

Since each module has just one point, use only the first point for each module in the memory map.
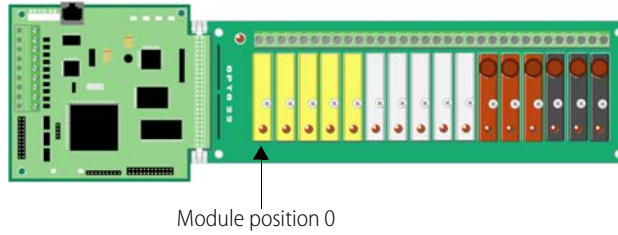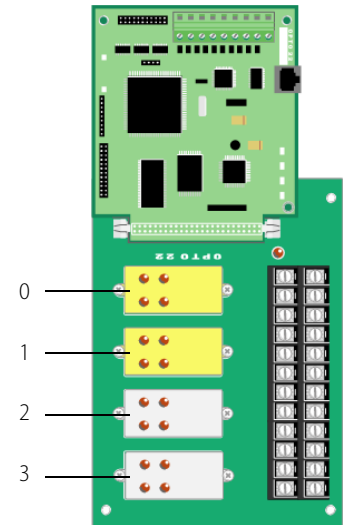
Module #	Point #
00	0
↓	↓
15	0

Module position 0

E1 with Quad Pak modules.

Quad Pak modules have four input or four output points, but each point is treated as if it were a separate one-point module.

Module position on Quad Pak rack	Module number	Point number
0	00 01 02 03	0 0 0 0
1	04 05 06 07	0 0 0 0
2	08 09 10 11	0 0 0 0
3	12 13 14 15	0 0 0 0

E2 brain boards are used with analog G1 modules only. The largest rack (shown below) holds 16 single-point modules.

E2 with G1 modules.

Since each module has just one point, use only the first point for each module in the memory map.
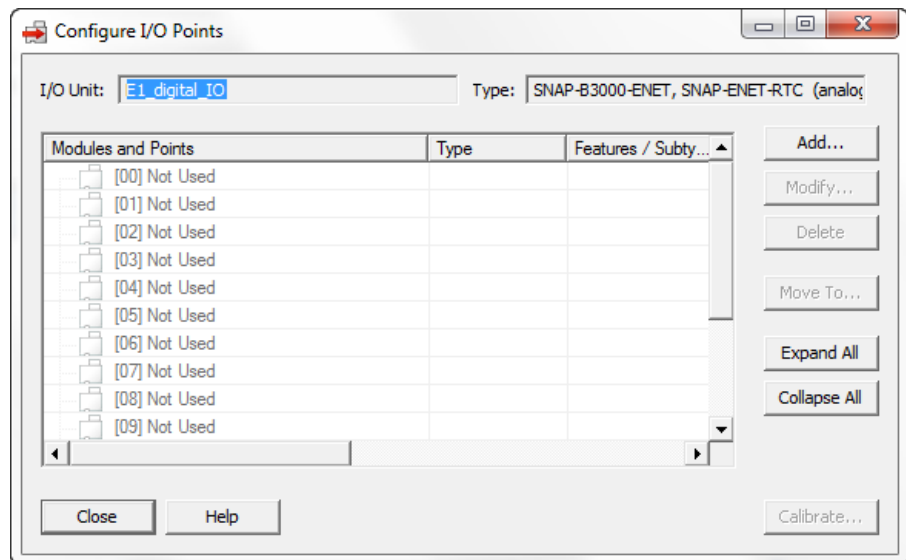

Module position 0

Module #	Point #
00	0
↓	↓
15	0

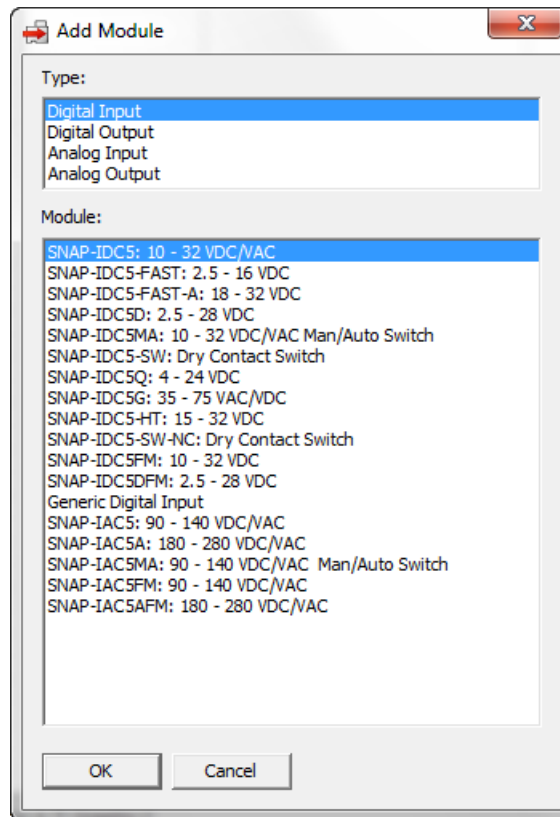## Adding and Configuring E1 Modules and Points

For E2, see .

1. In the Configure I/O Units dialog box, make sure the I/O unit for the point you are adding is highlighted. Click the I/O Points button.

   The Configure I/O Points dialog box appears:

2. Double-click the number that represents the digital module's position on the rack.

3. In the Add Module dialog box, choose the type and then choose the module:

- Select any SNAP-IDC5 module for a digital input.
- Select any SNAP-ODC5 module for a digital output.

4. Back in the Configure I/O Points dialog box, click the plus sign next to the new module to expand it.

Module icon

Expand or collapse points on the module by clicking the + or - sign in the box.
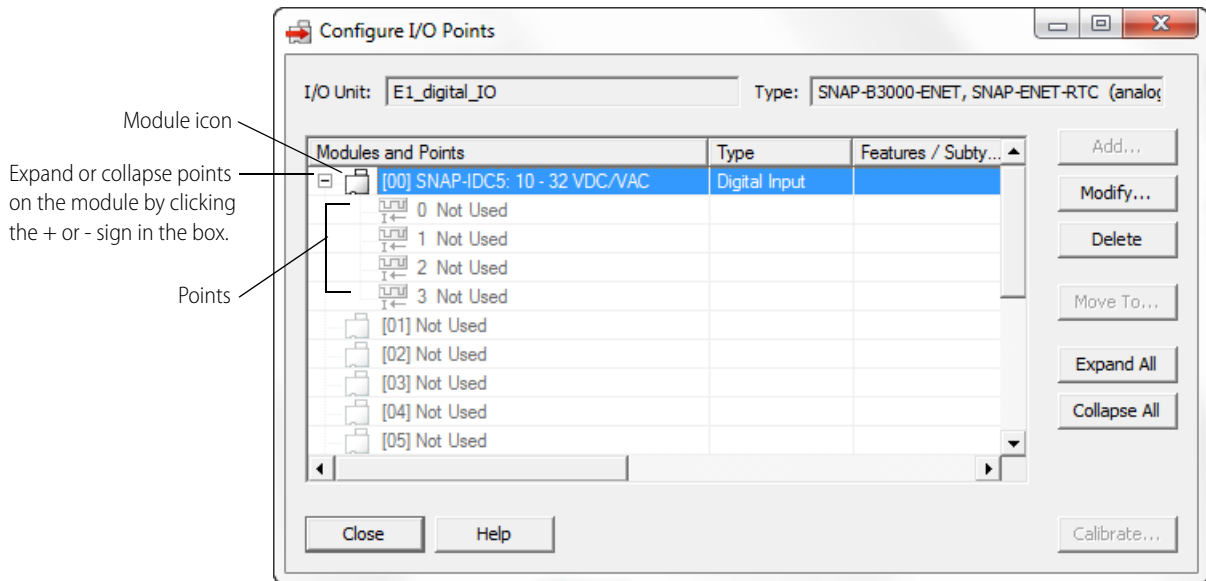
Points

5. Double-click the first point (point 0) of the module you want to configure. (Remember that points 1–3 don't apply. See "Configuring I/O Points" on page 8.)

The Add Digital Point dialog box opens.
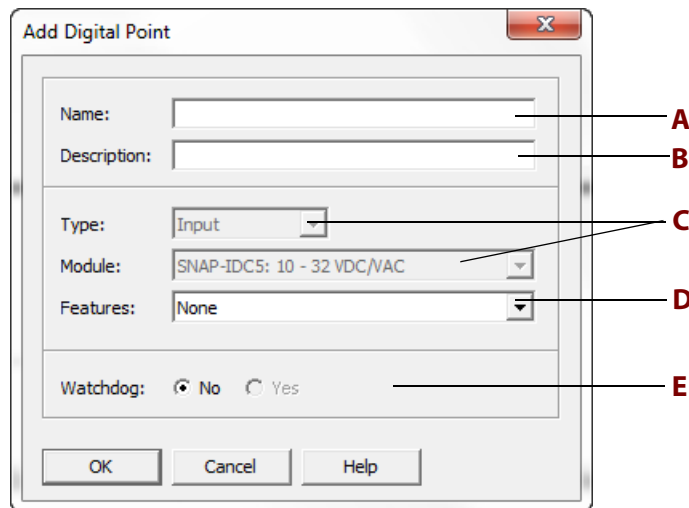
6. Complete the fields as follows:
   A Enter a name for the point. The name must start with a letter and may contain letters, numbers, and underscores. Spaces are converted to underscores.
   B (Optional) Enter a description of the point.
   C Type and module are already filled in for you.
   D (Input points only) To use the point as a counter, choose Counter from the Features list. Note that Quadrature Counter may appear in the Features list, but this feature
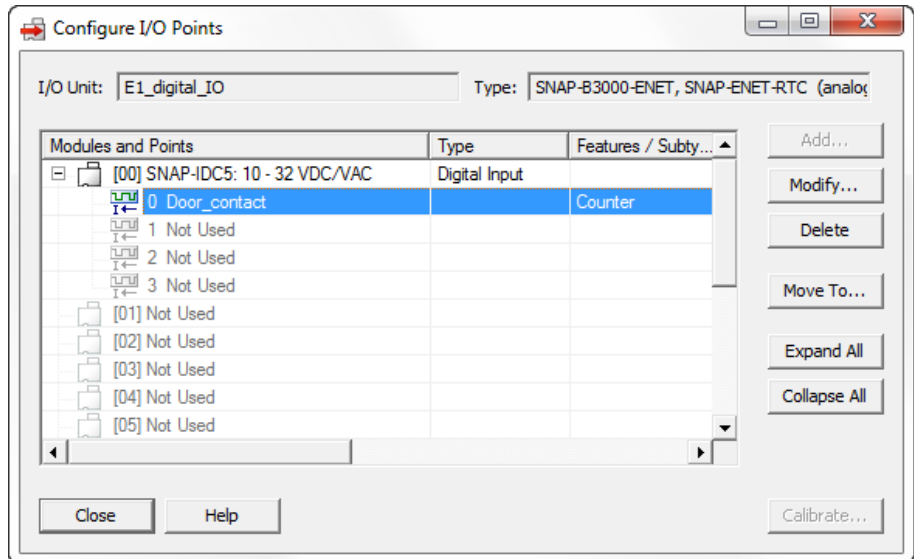
cannot be used here.

For output points, leave the Features field as None.

E (Output points only) To set a Watchdog, click Yes and choose On or Off from the drop-down list.

7. When you have completed the fields, click OK.

The new point appears in the list:

8. To configure more digital points, repeat the steps. Remember for each module, configure only the first point (point 0).

9. When you have finished adding digital points to the I/O unit, click Close and then Close again.

10. Click the Save button 💾 or choose File > Save to save the configuration file.

11. Follow steps in "Saving I/O Unit Configuration to Flash on the Brain" on page 16 to save the configuration to the E1 brain board's flash memory.

Adding and Configuring E2 Modules and Points

If you don't already have an E2 I/O unit in the configuration file, follow the instructions in "Adding an E1 or E2 I/O Unit" on page 5.

IMPORTANT: f you plan to use custom scaling with any analog module, follow the steps below to first add the modules and points and save the configuration to flash memory on the brain. Then you'll apply custom scaling, calibrate the modules if necessary, and save the configuration to flash again.

1. Make sure the unit is highlighted, and then click the I/O Points button to open the Configure I/O Points dialog box.

2. In the Configure I/O Points dialog box, double-click the number that represents the analog module's position on the rack.
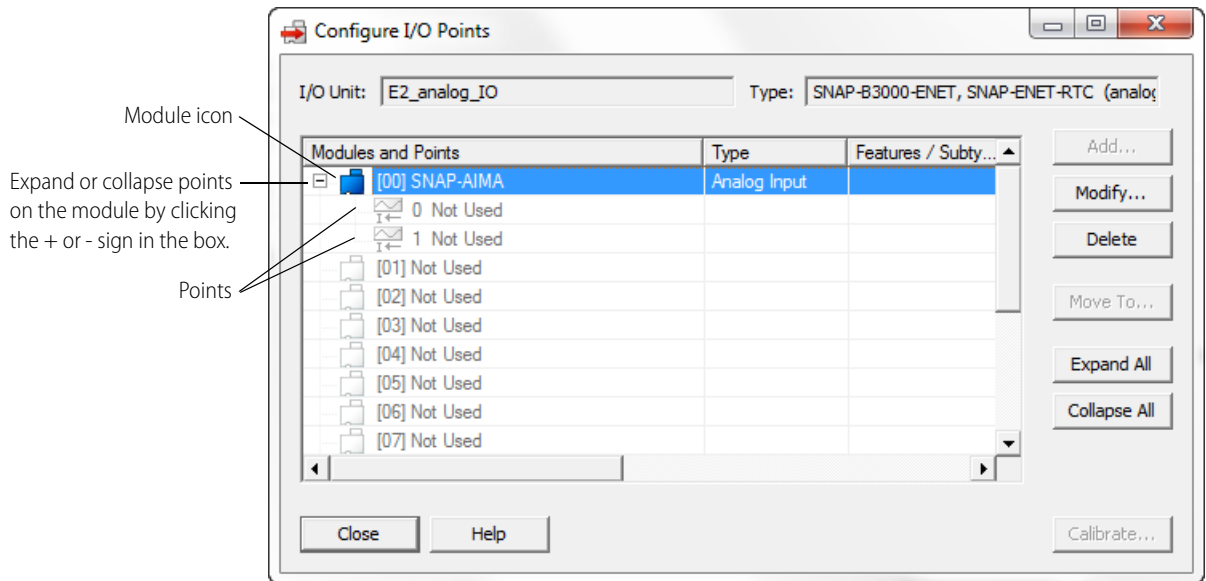
The Add Module dialog box opens.
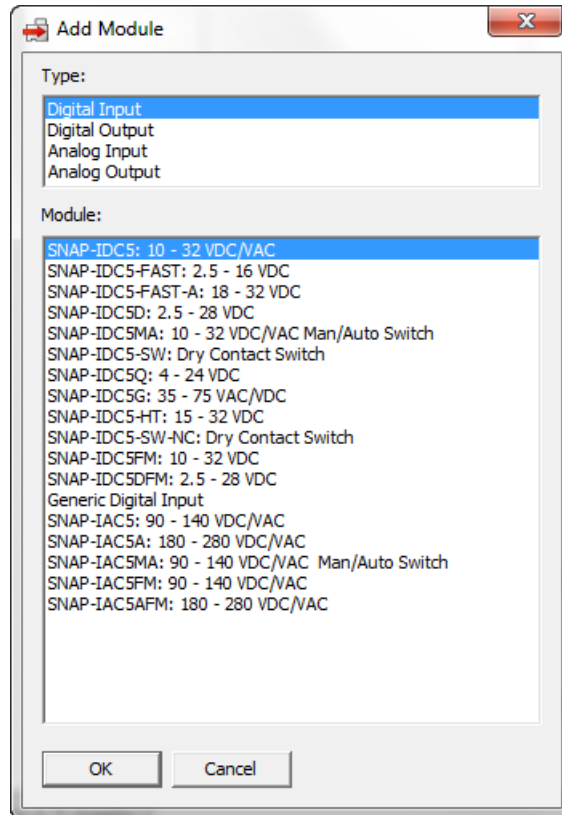
**3.** Choose the type (Analog Input or Analog Output) and then the corresponding SNAP module from the list.

If you completed the inventory form earlier, the SNAP module you need to select should be listed there. Otherwise, see "Analog Input Modules and Initial Scaling" on page 3 or "Analog Output Modules" on page 4.

4. Click OK.

5. In the Configure I/O Points dialog box, click the plus sign next to the new module to expand it.

Module icon

Expand or collapse points on the module by clicking the + or - sign in the box.

Points

6. Double-click the *first point* (point 0) for the SNAP module you just added. Remember that other points on the module don't apply (see "Configuring I/O Points" on page 8).

    The Add Analog Point dialog box opens.
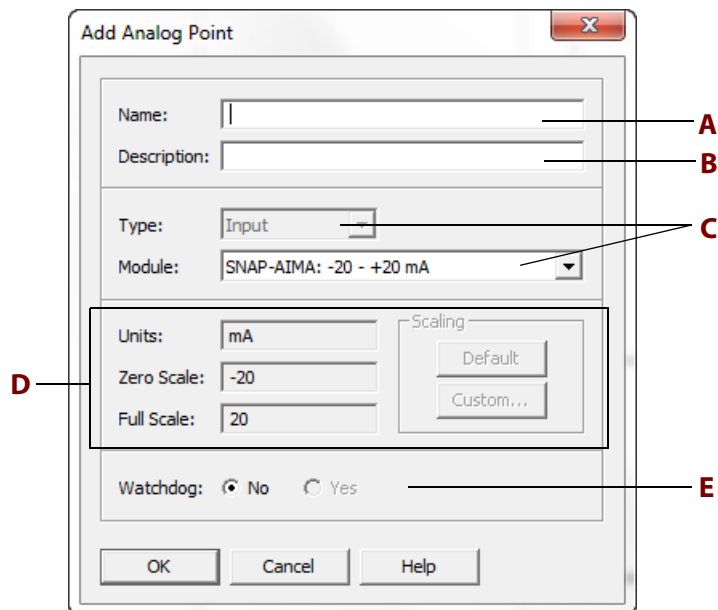
7. Complete the fields as follows:
    A Enter a name for the point. The name must start with a letter and may contain letters, numbers, and underscores. (Spaces are converted to underscores.)
    B (Optional) Enter a description of the point.
    C Type and Module are inserted for you.

D ***Scaling will be configured in a later step. Don't do it now.*** *Scaling is a two-step process. The default point scaling must be saved to the I/O unit first; later you can scale the points and save the configuration again.*

E (Outputs only.) To set a Watchdog on this point, click Yes, and define the value to be assigned to the output if the Watchdog is triggered. A Watchdog is triggered if no communication activity is detected for the amount of time specified in the Watchdog field of this point's I/O unit.

8. When you have completed the fields, click OK.

The new point is added:
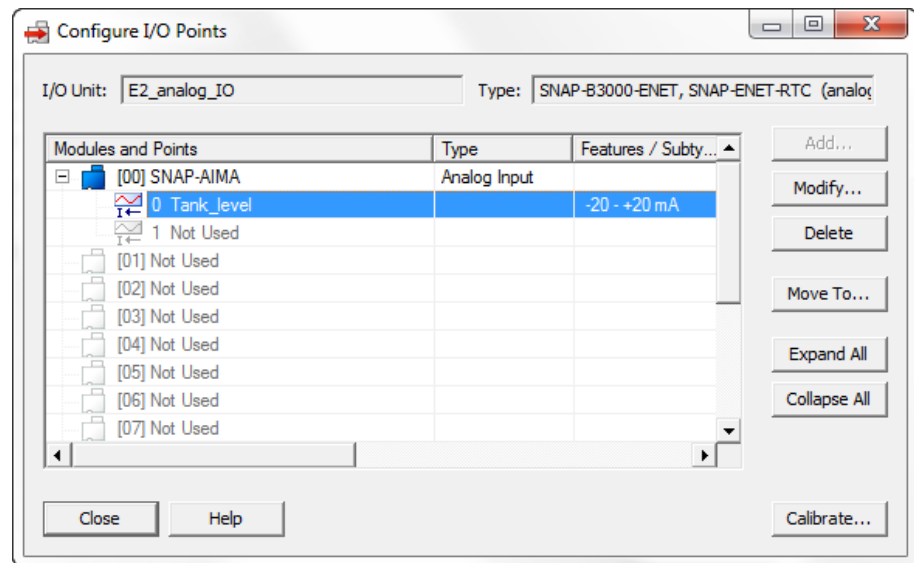
Point types and features are shown in the Features/Subtype column.

9. To add more analog points, repeat the steps.

10. When done, click Close and then Close again.

11. Click the Save button 💾 or choose File > Save to save the configuration file.

Note the location where you saved the file so you can open it in PAC Manager to complete scaling (and calibrating, if necessary) later.

Saving I/O Unit Configuration to Flash on the Brain

IMPORTANT: *You must now download the current I/O unit configuration to the brain board and save it to flash memory. If you're configuring an E2 analog I/O unit, this is an intermediate step; after you've finished scaling analog I/O points (and calibrating them, if necessary), you will again need to download the I/O unit configuration to the brain board and save it to flash.*

1. Choose Tools > Send Configuration to I/O Unit to save the I/O unit configuration to the E1 or 2 brain board's flash memory.
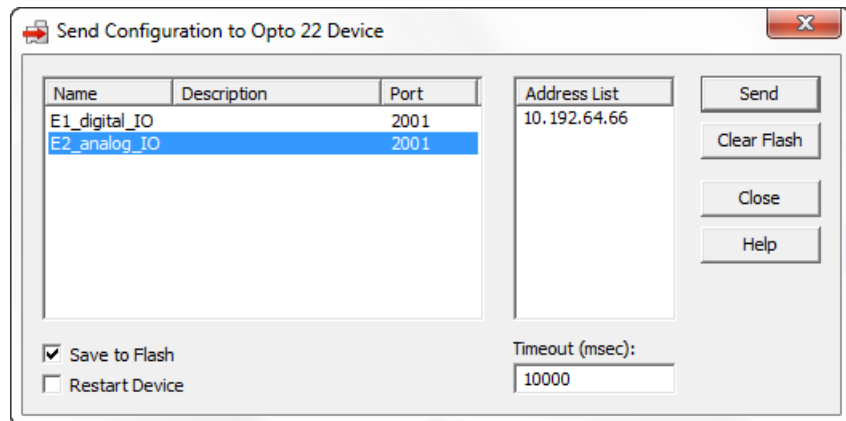
2. In the Send Configuration to I/O Unit dialog box, do the following:
   a. Select the configuration name from the list on the left.
   b. Make sure the Save to Flash checkbox is selected.
   c. Select the IP address of the I/O unit that will receive the configuration.
   d. Click Send to send the configuration to the I/O unit.
3. Click Close.

To configure analog point scaling and offset and gain, if necessary, continue with the next sections.

Using Custom Scaling

Scalable analog modules can be set to show something other than the actual inputs or outputs. For example, you could scale the readings of a voltage input point to measure its input as a percentage between 0% and 100% rather than volts.

NOTE: Custom scaling has no effect on the resolution or accuracy of the module.

IMPORTANT: *The range of the G1 module is usually different from the range of the corresponding SNAP module, so scaling isn't intuitive. For example, the AD2T has a range of 0–20 mA, but the equivalent SNAP-AIMA's range is -20 to +20 mA.*

Counts may be different as well; for example, all G1 analog modules are 0–4095 counts, but the SNAP-CUSTOM-A1: Mode 1 that is equivalent to the AD3 shows -25,000 to +25,000 counts.

Follow the steps and examples in this section to make sure your points are scaled correctly.

1. In PAC Manager, open the configuration file you just saved. If you wish, choose File > Save As and add "scaled" to the filename.

   You will then have two configuration files, one with the points before scaling and one with the points scaled. That way, if you ever have to download the configuration to this brain again, you'll have both files you need to download: first the non-scaled file and then the scaled file.

2. In the configuration tree, double-click the Points folder for the I/O unit you will configure.
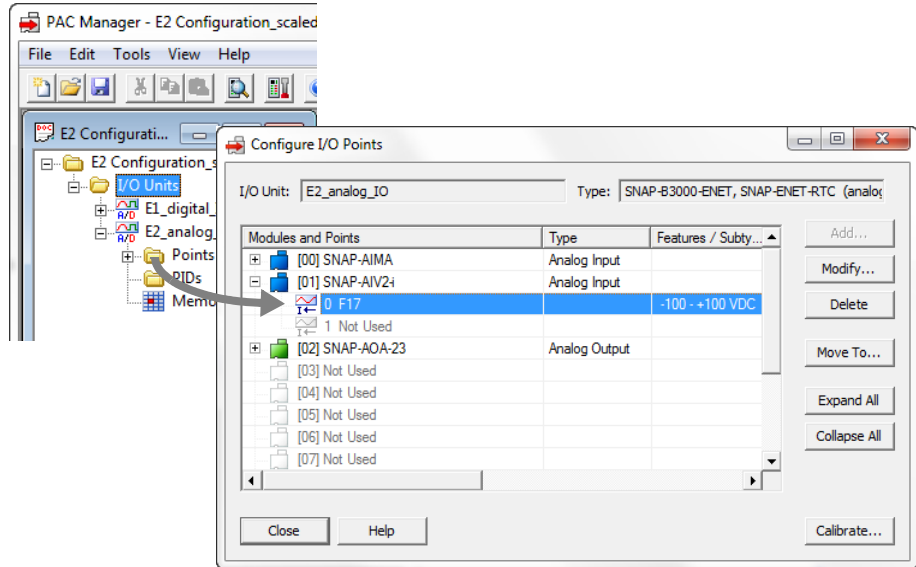
3. Now double-click the analog I/O point you want to scale.

4. In the Edit Analog Point dialog box, select the Module that has "(Scalable)" at the end of the description, and then click Custom.
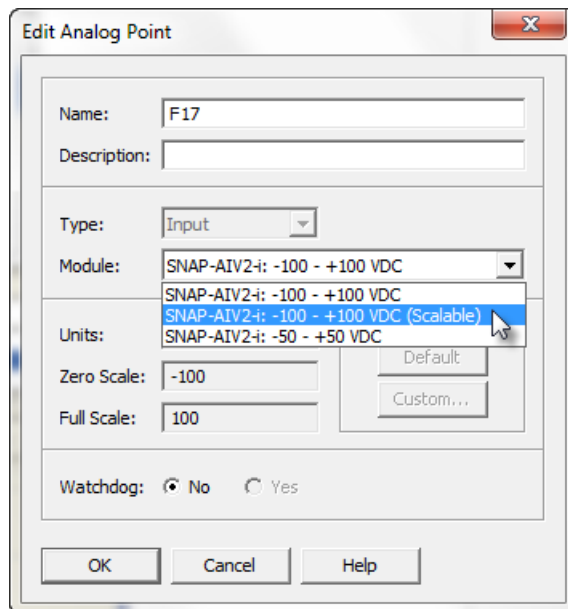
5. Complete the fields in the Scale Analog Readings dialog box.
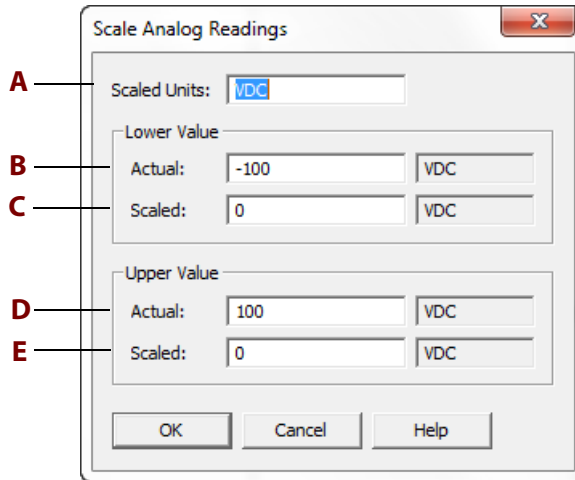

A   Enter new engineering units for the module.

B   In most cases, enter the actual lower value of the G1 module's range (NOT the equivalent SNAP module's range). *Exceptions:* See the example tables on page 20.

C   Enter the new scaled lower value. This value can be any floating point value.

D   Enter the actual upper value of the G1 module's range.

E   Enter the new scaled upper value. This value can be any floating point value greater than the scaled lower value.

In the example at right, the point is on an AD7 module, which has a range of 0–10 VDC. It is scaled to percent with a lower value of 0 and an upper value of 100.

When the actual reading is 10 VDC, the scaled reading is 100%.

6. Click OK.

The new custom-scaled units appear in the Edit Analog Point dialog box.
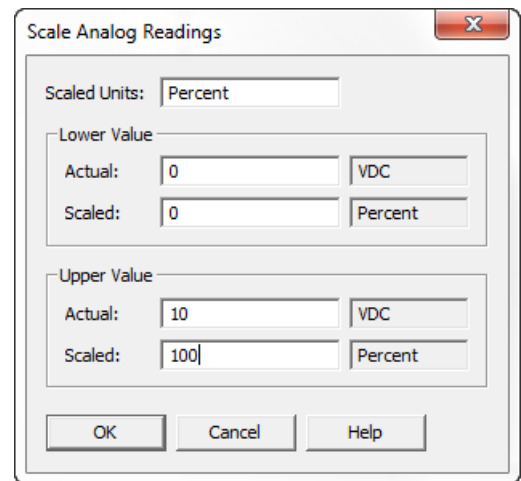
Notice the new units of percent. Don't be concerned about the new zero-scale and full-scale values (in this example, -1000 and +1000). These values are extrapolated from the values you entered. As long as you entered the correct values, the point will give accurate readings.
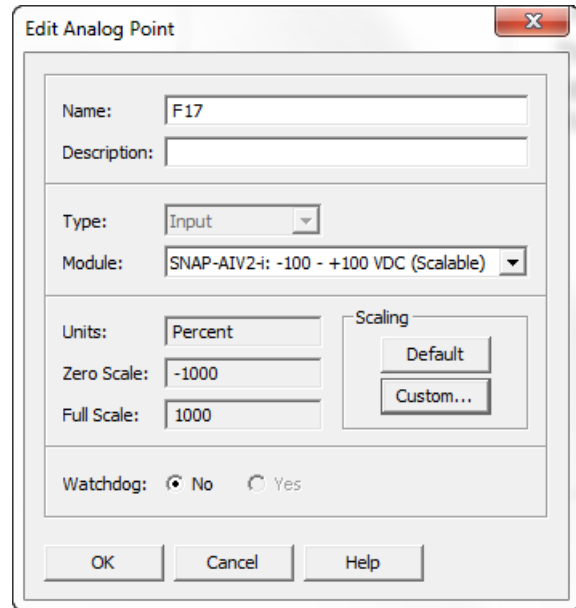
Edit Analog Point

Name: F17

Description:

Type: Input

Module: SNAP-AIV2-i: -100 - +100 VDC (Scalable)

Units: Percent

Zero Scale: -1000

Full Scale: 1000

Scaling: Default / Custom...

Watchdog: ● No ○ Yes

OK   Cancel   Help

7. To calibrate offset and gain, continue with . Otherwise, skip to .

Custom scaling examples: 0–100% Engineering Units

G1 Module	Lower Value Actual	Upper Value Actual	Lower Value Scaled	Upper Value Scaled	Notes
			Percent	Percent	
AD2T	0	20	0	100	
AD3 AD3T	5000	25000	0	100	Use 5000 and 25000 (instead of 4 and 20) for the "Actual" values.
AD6 AD6T AD6HS	0	10	0	100	Use 0 and +10 (instead of 0 and +5) for the "Actual" values.
AD7	0	10	0	100	
AD9T	0	50	0	100	
AD11	-10	10	0	100	Use -10 and +10 (instead of -5 and +5) for the "Actual" values.
AD12	-10	10	0	100	
AD13T	0	100	0	100	
AD15T	28	140	0	100	
AD16T	0	5	0	100	

Custom scaling examples: 300–4500 PSI Engineering Units

| G1 Module	Lower Value Actual	Upper Value Actual	Lower Value Scaled	Upper Value Scaled	Notes
			PSI	PSI	
AD2T	0	20	300	4500	
AD3 AD3T	5000	25000	300	4500	Use 5000 and 25000 (instead of 4 and 20) for the "Actual" values.
AD6 AD6T AD6HS	0	10	300	4500	Use 0 and +10 (instead of 0 and +5) for the "Actual" values.
AD7	0	10	300	4500	
AD9T	0	50	300	4500	
AD11	-10	10	300	4500	Use -10 and +10 (instead of -5 and +5) for the "Actual" values.
AD12	-10	10	300	4500	
AD13T	0	100	300	4500	
AD15T	28	140	300	4500	
AD16T	0	5	300	4500	

Calibrating Offset and Gain

The E2 brain board can calibrate analog input points. If a -50 mV to +50 mV input receives signals that are slightly off (not exactly -50 mV at the lowest point, for example), the offset and gain can be calculated so that values will appear accurately when read.

Offset and gain values affect engineering units. For a temperature input, engineering units are in degrees C or F, depending on how the brain is configured. You can manually set offset and gain or have the brain automatically calculate and set them for you.

IMPORTANT: *To calibrate the point, the I/O unit must be turned on and attached to the network, and you must have access to it to use the calibrator. After calibrating, save the configuration to flash so that it will not be lost when power is turned off. Since each calibration is for a specific point on a specific E2 brain board, the result cannot be saved to the configuration file and cannot be sent to any other brain board.*

Calculate offset first, and then calculate gain. The offset must be calculated at the point's low scale, and the gain must be calculated at the point's high scale.

1. In the Configure I/O Points dialog box, highlight the analog input point you want to calibrate.
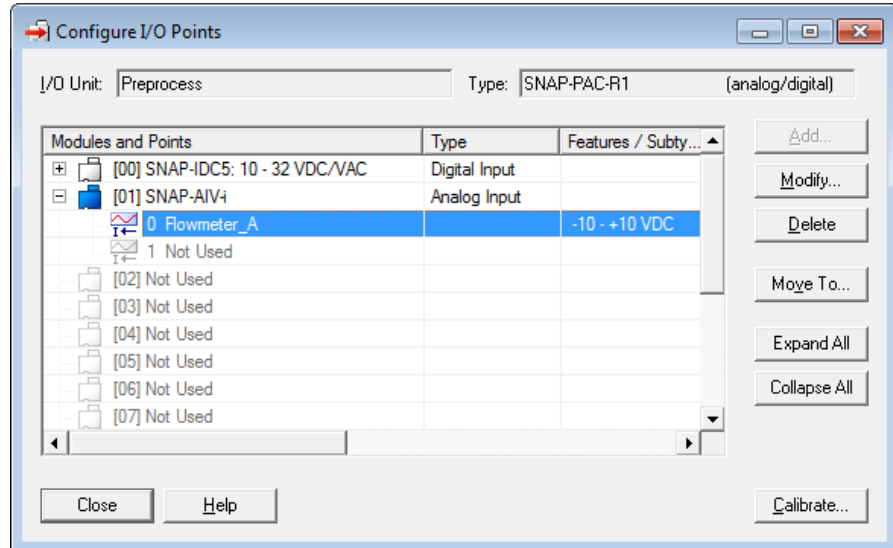
2. Click the Calibrate button in the lower-right corner of the dialog box.
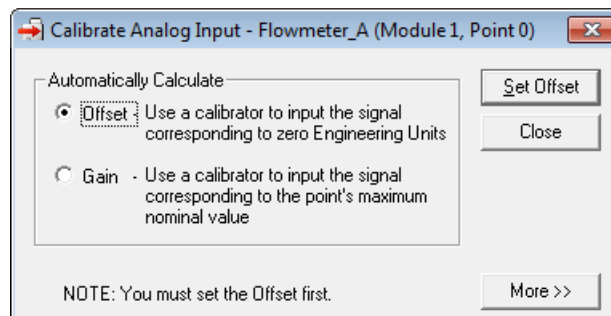
3. To have the Ethernet-based brain calculate offset and gain, do the following:
   a. Use a calibrator to input minimum scale on the analog input point (for example, 0 degrees F or C for a temperature input). Click Offset, then click the Set Offset button.
   b. Use the calibrator to input maximum scale on the analog input. Click Gain, then click the Set Gain button.
4. To manually set offset and gain, do the following:

   a. Click the More button.
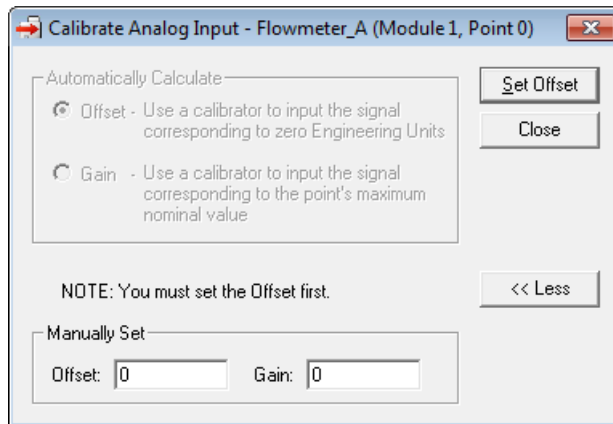
   b. Enter the Offset value. Click the Set Offset button.
   c. Enter the Gain value. Click the Set Gain button.
5. When you have finished calibrating the point, close the dialog box to return to configuring I/O points.

NOTE: To store offset and gain values permanently, you must save the change to flash when you send the configuration data to the I/O unit (next section)

Saving the I/O Unit Configuration

The final step in setting up an E1 or E2 I/O unit is to save the configuration information, both as a file and in the E1 or E2 brain board's flash (non-volatile) memory.

1. To save the configuration file, click the Save button 🖫 or choose File > Save.

   Note the location where you saved the file. You can open this file in PAC Manager to restore the configuration to an I/O unit, and you can also import the file into PAC Control, OptoOPCServer, and OptoDataLink software.

2. To save the I/O unit configuration to the E1 or E2 brain board's flash memory, choose Tools > Send Configuration to I/O Unit.
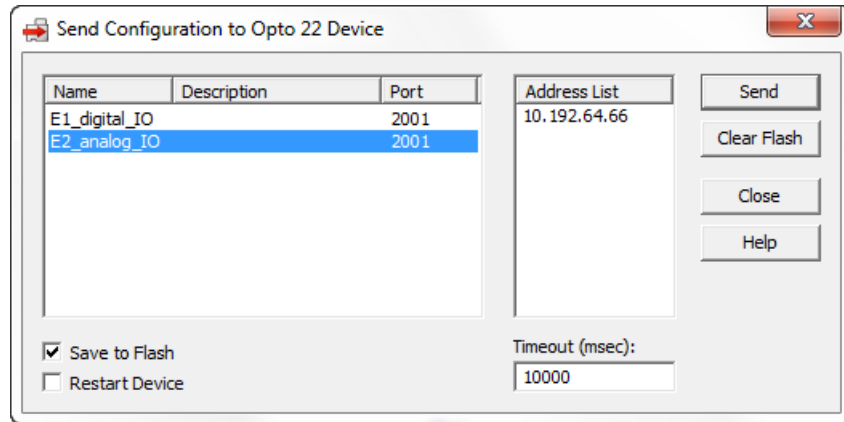
3. In the Send Configuration to I/O Unit dialog box, do the following:
   a. Select the configuration name from the list on the left.
   b. Make sure the Save to Flash checkbox IS selected.
   c. Select the IP address of the I/O unit that will receive the configuration.
4. Click Send to send the configuration and have it saved to flash memory.

Note on Point Numbers

In most cases points appear in the format module xx, point 0 (see page 8). But in some cases, like a Digital Bank or Analog Bank read or in certain tables in PAC Control, you'll see points numbered differently, like this:

Module position on E1 or E2 I/O rack:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Corresponding SNAP point number:	0	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60

What's Next

Configuration of the E1 or E2 I/O unit is complete. Depending on your I/O system and application(s) you plan to use the I/O unit with, do the following:

- For using a Modbus/TCP application, see the Modbus/TCP chapter in the *E1 and E2 User's Guide* (Opto 22 form 1563).

- For using a custom application based on OptoMMP, see the *OptoMMP Protocol Guide* (Opto 22 form 1465).

- For using PAC Control or OptoOPCServer, see the *PAC Control User's Guide* (Opto 22 form 1700) and the *OptoOPCServer User's Guide* (Opto 22 form 1439). In both guides, refer to the information on importing .OTG files from PAC Manager.

E1 and E2 I/O Unit Inventory Form

Brain Board and Network Settings

Brain board model	E1 E2	IP address	
Physical Location		Subnet mask	
MAC address	00-A0-3D-00-_____ - _____	Gateway address	

I/O Rack with G1 Analog, G1 Digital, or G4 Digital I/O Modules

Module Position	Part Number	Input or Output	Corresponding SNAP module	Point Number	Digital Counter?	Analog Scaling?	Scaling Information
0				0	Yes No	Yes No	
1				0	Yes No	Yes No	
2				0	Yes No	Yes No	
3				0	Yes No	Yes No	
4				0	Yes No	Yes No	
5				0	Yes No	Yes No	
6				0	Yes No	Yes No	
7				0	Yes No	Yes No	
8				0	Yes No	Yes No	
9				0	Yes No	Yes No	
10				0	Yes No	Yes No	
11				0	Yes No	Yes No	
12				0	Yes No	Yes No	
13				0	Yes No	Yes No	
14				0	Yes No	Yes No	
15				0	Yes No	Yes No	

I/O Rack with Quad Pak Digital I/O Modules

Module Position	Part Number	Input or Output	Corresponding SNAP Module	Point Number	Digital Counter?
0				0	Yes No
				0	Yes No
				0	Yes No
				0	Yes No
1				0	Yes No
				0	Yes No
				0	Yes No
				0	Yes No
2				0	Yes No
				0	Yes No
				0	Yes No
				0	Yes No
3				0	Yes No
				0	Yes No
				0	Yes No
				0	Yes No

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