

SNAP QUADRATURE INPUT MODEL

Features

- > 4,000 Vrms optical isolation
- > Built-in LED status indicators
- > 4 times encoder resolution
- > Input signals in 4–24 VDC range

DESCRIPTION

The SNAP-IDC5Q quadrature input module is part of the SNAP PAC System. It mounts on a SNAP PAC rack and is designed to allow a SNAP PAC brain or R-series controller with high-speed counting capability (either a standard wired model or a Wired+Wireless™ model) to resolve two axes of rotating position information from quadrature encoder devices. The module outputs a pulse to the SNAP PAC processor upon each change in quadrature state. The processor counts the module output pulses and keeps track of the direction and position.

The SNAP-IDC5Q can be used with most quadrature devices, including transducers with TTL, CMOS, and open collector outputs. All inputs are isolated from each other and do not share any common connections.

SNAP racks have a retention rail locking system. Use two 4-40 by ½-inch standard machine screws to hold each module securely in position on the SNAP rack.

Module Operation

For each axis, the SNAP-IDC5Q quadrature module converts a quadrature signal to a stream of pulses that is sent to the I/O processor on one of two input channels. The rotation direction of the encoder determines which output is used.

The position count is incremented when the signal into the A channel leads the signal into the B channel. It is decremented when the signal into the B channel leads the signal into the A channel.

Since the I/O processor (brain or on-the-rack controller) has a maximum input count rate, the maximum allowable RPM at which the encoder may turn is related to the number of cycles per turn that the encoder outputs. See charts on the next two pages.

Notes for legacy hardware: The SNAP-IDC5Q is also compatible with Ethernet-based SNAP-B3000-ENET and SNAP-UP1-ADS brains, as well as B3000, B3000-B, and B3000-HA brains, which use the *mistic* protocol. From a mounting standpoint the module is treated as a standard SNAP I/O digital module, which means it can be installed only in the first eight positions (0–7) of larger SNAP B-series racks.



SNAP-IDC5Q

FEATURES AND SPECIFICATIONS

| | |
|---|---|
| Logic Voltage | 5 VDC |
| Operating Ambient Temperature | -20 to 70 °C |
| Isolation input-to-output | 4,000 Vrms |
| Input Voltage Range | 4–24 VDC |
| Input Resistance | 1K ohms @ 4 V 560 ohms @ 24 V |
| Input Allowed for No Output | 1 V |
| Logic Supply Current @ 5 VDC | 120 mA |
| Maximum Input Frequency, 50% Duty Cycle | 25 kHz for SNAP PAC brains and controllers with high-speed digital functions Legacy brains vary* |
| Maximum Reverse Input Voltage | –21 V |
| Torque, hold-down screws | Not to exceed 1 in-lb (0.11 N-m) |
| Torque, connector screws | 5.22 in-lb (0.59 N-m) |
| Agency Approvals | CE, ATEX, RoHS, DFARS; UKCA |
| Warranty | Lifetime |

* The SNAP-IDC5Q supports an encoder input frequency of 25 kHz. However, legacy I/O brains have limited quadrature counting capability. The following limits apply to them:
2.5 kHz for SNAP-B3000-ENET brains
4 kHz for SNAP-UP1-ADS brains
5 kHz for other legacy brains with high-speed counting

Part Number

| Part | Description |
|------------|---|
| SNAP-IDC5Q | SNAP Two-Axis Quadrature Position Input |

Using the SNAP-IDC5Q with SNAP PAC I/O Processors (with High-speed Counting)

Processor part numbers:

- SNAP-PAC-R1
- SNAP-PAC-R1-FM [OBSOLETE]
- SNAP-PAC-R1-W [OBSOLETE]
- SNAP-PAC-EB1 [OBSOLETE]
- SNAP-PAC-EB1-FM [OBSOLETE]
- SNAP-PAC-EB1-W [OBSOLETE]
- SNAP-PAC-SB1 [OBSOLETE]

To determine maximum RPM, use the following chart or the equation below:

$$\text{Maximum Encoder RPM} = \frac{1,500,000}{\text{Encoder Pulses per Revolution}}$$

| SNAP PAC I/O Processors | |
|-------------------------|-------------|
| Encoder PPR | Maximum RPM |
| 1 | 1,500,000 |
| 10 | 150,000 |
| 12 | 125,000 |
| 60 | 25,000 |
| 100 | 15,000 |
| 120 | 12,500 |
| 200 | 7500 |
| 240 | 6250 |
| 256 | 5859 |
| 300 | 5000 |
| 360 | 4167 |
| 400 | 3750 |
| 500 | 3000 |
| 600 | 2500 |
| 720 | 2083 |
| 900 | 1667 |
| 1000 | 1500 |
| 1024 | 1465 |
| 2000 | 750 |

Using the SNAP-IDC5Q with a SNAP Ultimate I/O Processor

Processor part number:

- SNAP-UP1-ADS

(Legacy product) To determine maximum RPM, use the following chart or the equation below:

$$\text{Maximum Encoder RPM} = \frac{240,000}{\text{Encoder Pulses per Revolution}}$$

| SNAP-UP1-ADS | |
|--------------|-------------|
| Encoder PPR | Maximum RPM |
| 1 | 240,000 |
| 10 | 24,000 |
| 12 | 20,000 |
| 60 | 4000 |
| 100 | 2400 |
| 120 | 2000 |
| 200 | 1200 |
| 240 | 1000 |
| 256 | 938 |
| 300 | 800 |
| 360 | 667 |
| 400 | 600 |
| 500 | 480 |
| 600 | 400 |
| 720 | 333 |
| 900 | 267 |
| 1000 | 240 |
| 1024 | 234 |
| 2000 | 120 |

Using the SNAP-IDC5Q with Legacy Ethernet Brains

Processor part numbers:

- SNAP-B3000-ENET
- SNAP-ENET-RTC

To determine maximum RPM, use the following chart or the equation below:

$$\text{Maximum Encoder RPM} = \frac{150,000}{\text{Encoder Pulses per Revolution}}$$

| Legacy SNAP Ethernet Brains | |
|-----------------------------|-------------|
| Encoder PPR | Maximum RPM |
| 1 | 150,000 |
| 10 | 15,000 |
| 12 | 12,500 |
| 60 | 2500 |
| 100 | 1500 |
| 120 | 1250 |
| 200 | 750 |
| 240 | 625 |
| 256 | 586 |
| 300 | 500 |
| 360 | 417 |
| 400 | 375 |
| 500 | 300 |
| 600 | 250 |
| 720 | 208 |
| 900 | 167 |
| 1000 | 150 |
| 1024 | 146 |
| 2000 | 75 |

Using the SNAP-IDC5Q with Legacy Serial-based Brains

Processor part numbers:

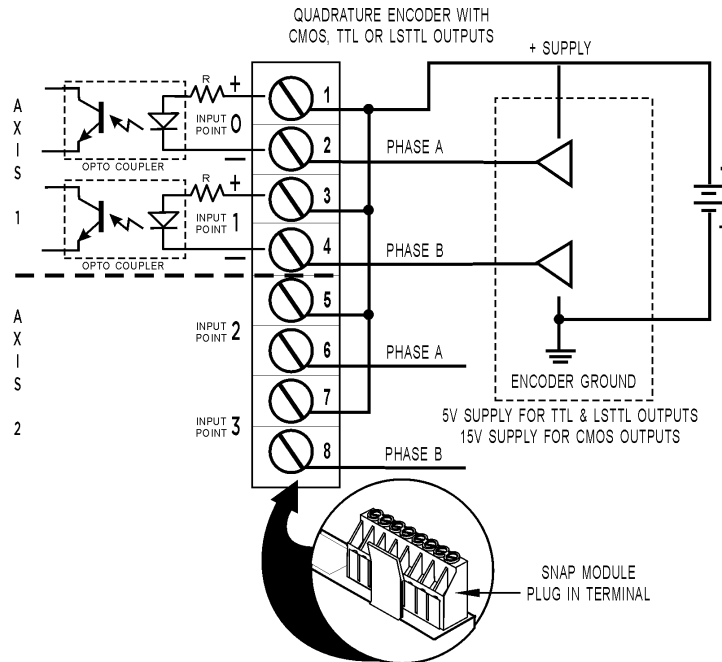
- B3000
- B3000-B
- B3000-HA [OBSOLETE]

To determine maximum RPM, use the following chart or the equation below:

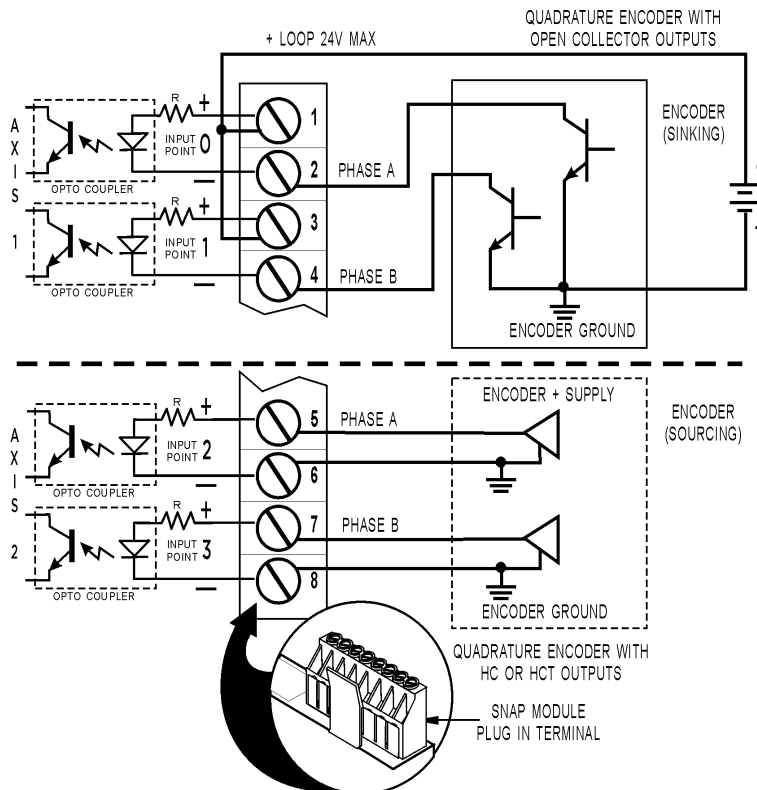
$$\text{Maximum Encoder RPM} = \frac{300,000}{\text{Encoder Pulses per Revolution}}$$

| B3000, B3000-B, and B3000-HA Brains | |
|-------------------------------------|-------------|
| Encoder PPR | Maximum RPM |
| 1 | 300,000 |
| 10 | 30,000 |
| 12 | 25,000 |
| 60 | 5000 |
| 100 | 3000 |
| 120 | 2500 |
| 200 | 1500 |
| 240 | 1250 |
| 256 | 1172 |
| 300 | 1000 |
| 360 | 833 |
| 400 | 750 |
| 500 | 600 |
| 600 | 500 |
| 720 | 417 |
| 900 | 333 |
| 1000 | 300 |
| 1024 | 293 |
| 2000 | 150 |

CONNECTION DIAGRAMS



ALL INPUTS ARE ISOLATED FROM EACH OTHER
AND DO NOT SHARE ANY COMMON CONNECTIONS INTERNALLY.



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PRODUCTS

Opto 22 develops and manufactures reliable, easy-to-use, open standards-based hardware and software products. Industrial automation, process control, remote monitoring, data acquisition, and industrial internet of things (IIoT) applications worldwide all rely on Opto 22.

groov RIO®

[groov RIO edge I/O](#) offers a single, compact, PoE-powered industrial package with web-based configuration and IIoT software built in, support for multiple OT and IT protocols, and security features like a device firewall, data encryption, and user account control.

Standing alone, *groov RIO* connects to sensors, equipment, and legacy systems, collecting and securely publishing data from field to cloud. Choose a universal I/O model with thousands of possible field I/O configurations, with or without Ignition from Inductive Automation®, or a [RIO EMU energy monitoring unit](#) that reports 64 energy data values from 3-phase loads up to 600 VAC, Delta or Wye.

You can even write an IEC 61131-3 compliant control program to run on *groov RIO*, using CODESYS. You can also use *groov RIO* with a Modbus/TCP master or as remote I/O for a *groov EPIC* system.

groov EPIC® System

Opto 22's [groov Edge Programmable Industrial Controller \(EPIC\) system](#) gives you industrially hardened control with a flexible Linux®-based processor with gateway functions, guaranteed-for-life I/O, and software for your automation and IIoT applications.

groov EPIC Processor

The heart of the system is the *groov EPIC* processor. It handles a wide range of digital, analog, and serial functions for data collection, remote monitoring, process control, and discrete and hybrid manufacturing.

In addition, the EPIC provides secure data communications among physical assets, control systems, software applications, and online services, both on premises and in the cloud. No industrial PC needed.

Configuring and troubleshooting I/O and networking is easier with the EPIC's integrated high-resolution color touchscreen. Authorized users can manage the system locally on the touchscreen, on a monitor connected via the HDMI or USB ports, or on a PC or mobile device with a web browser.

groov EPIC I/O

groov I/O connects locally to sensors and equipment. Modules have a spring-clamp terminal strip, integrated wireway, swing-away cover, and LEDs indicating module health and discrete channel status. *groov I/O* is hot swappable, UL Hazardous Locations approved, and ATEX compliant.

groov EPIC Software

The *groov EPIC* processor comes ready to run the software you need:

- Programming: Choose flowchart-based PAC Control, CODESYS Development System for IEC61131-3 compliant programs, or secure shell access (SSH) to the Linux OS for custom applications
- Node-RED for creating simple IIoT logic flows from pre-built nodes
- Efficient MQTT data communications with string or Sparkplug data formats
- Multiple OPC UA server options
- HMI: *groov View* to build your own HMI viewable on touchscreen, PCs, and mobile devices; PAC Display for a

Windows HMI; Node-RED dashboard UI

- Ignition or Ignition Edge® from Inductive Automation (requires license purchase) with OPC-UA drivers to Allen-Bradley®, Siemens®, and other control systems, and MQTT communications

Older products

From solid state relays, to world-famous G4 and SNAP I/O, to SNAP PAC controllers, older Opto 22 products are still supported and working hard at thousands of installations worldwide. You can count on us for the reliability and service you expect, now and in the future.

QUALITY

Founded in 1974, Opto 22 has established a worldwide reputation for high-quality products. All are made in the U.S.A. at our manufacturing facility in Temecula, California.

Because we test each product twice before it leaves our factory rather than testing a sample of each batch, we can afford to guarantee most solid-state relays and optically isolated I/O modules for life.

FREE PRODUCT SUPPORT

Opto 22's California-based Product Support Group offers free technical support for Opto 22 products from engineers with decades of training and experience. Support is available in English and Spanish by phone or email, Monday–Friday, 7 a.m. to 5 p.m. PST.

Support is always available on our website, including [free online training](#) at OptoU, how-to [videos](#), [user's guides](#), the Opto 22 KnowledgeBase, and [OptoForums](#).

PURCHASING OPTO 22 PRODUCTS

Opto 22 products are sold directly and through a worldwide network of distributors, partners, and system integrators. For more information, contact Opto 22 headquarters at **800-321-6786** (toll-free in the U.S. and Canada) or **+1-951-695-3000**, or visit our website at www.opto22.com.



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