# Monitoring made simple

Eaton's C441 communications modules

F·T·N

*Powering Business Worldwide*

# C441 series communication modules

## Features

- Common C441 communication modules cover both traditional starter and solid-state reduced voltage starter applications

- C441 family modules provide support for multiple communication protocols
  - Modbus® RTU
  - Modbus TCP
  - DeviceNet™
  - PROFIBUS®
  - EtherNet/IP

- C441 communication modules come standard with four inputs and two outputs

- 120 Vac and 24 Vdc input options

- Each I/O module is optically isolated between the field I/O and the network adapter to protect the I/O and communication circuits from possible damage due to transients and ground loops

- Outputs support a user-definable safe state for loss of communication; hold last state, ON or OFF

## Benefits

- Provide communication, monitoring and control of motor starters and soft starters

- Input modules feature a user-definable input debounce that limits the effect of transients and electrical noise

- C441 DeviceNet modules contain backwards compatible I/O assemblies to legacy Advantage and *IT.* motor control platforms for seamless migration to newer starter technology

- C441 Ethernet modules offer embedded web services for easy configuration and monitoring directly through Internet Explorer®

- Available for use as general purpose I/O, giving users the ability to monitor status of non-communicating products over their preferred network

- Unique locking mechanism provides for easy removal of the terminal block with the field wiring installed

## The motor control center (MCC) is ready to be connected to your industrial network when it arrives.

Below is an image of the Eaton FlashGard® arc flash preventive MCC prewired for DeviceNet. Depending on the industrial network chosen, the prewired MCC will have a trunk drop–type configuration (DeviceNet), a daisy-chain configuration (PROFIBUS and Modbus) or an Ethernet configuration (Modbus TCP and EtherNet/IP). With any of these options, connecting your MCC is as easy as plugging in a lamp.

# Monitoring and control made simple

## C441 series communication modules

Eaton's motor control products offer the widest range of communication protocol support for easy integration into any PLC or DCS system.

Both starters and soft starters use the same C441 family of modules for communications. The modules come standard with four inputs and two relay outputs. C441 communication modules can also be used independently for standalone I/O applications.

# Determining your communication needs

There are many reasons to choose a particular industrial communication network. Most important is what your controller supports; after that, speed, data size, configuration, plant standards and other parameters all come into play.

Need help determining which network to choose? Refer to the table below.

## Network configuration guide

| Key network value | DeviceNet | Modbus RTU | PROFIBUS | EtherNet/IP | Modbus TCP |
|---|---|---|---|---|---|
| Maximum speed (distance dependent) ❶❷ | 500 kb/s | 115.2 kb/s | 12 Mb/s | 100 Mb/s | 100 Mb/s |
| Maximum cable length ❸ | 500 m | 1200 m | 1200 m | Unlimited ❹ | Unlimited ❹ |
| Supported controllers | ▲ | ▲ | ● | ▼ | ● |
| Node count / network | 64 | 32 | 32 | Infinite | Infinite |
| Determinism | ▲ | ▼ | ▲ | ▲ | ● |
| Tools support | ▲ | ● | ▼ | ▼ | ● |
| Maturity | ▲ | ▲ | ▲ | ● | ● |
| Future | ● | ● | ● | ▲ | ▲ |

▲ = Good, ● = Neutral, ▼ = Low

❶ Data rates and distances for Modbus RTU and PROFIBUS are based on single segments, without using repeaters.

❷ Maximum speeds shown are cable-length dependent. Example: PROFIBUS is 12 Mbit/s at a cable length of 100 m. At 1200 m cable length, PROFIBUS is capable of only 9600 kbit/s.

❸ Maximum cable lengths shown are speed dependent. Example: DeviceNet can run 500 m at 125 kbit/s. If the speed is 500 kbit/s, the cable length is limited to 100 m.

❹ The maximum cable distance between any two nodes on Ethernet is 100 m; however, the number of nodes is unlimited.

# C441 communication card offering

### Designed for use with ...

| Protocol | Catalog number | Input signal type | C441 | S611 | C440 | S811+ | General purpose I/O ❶ | Mounting options |
|---|---|---|---|---|---|---|---|---|
| Modbus RTU | C441M | None | ■ | — | — | — | — | Direct to C441 |
| | C441N | 120 Vac | ■ | — | — | — | — | Direct to C441 |
| | C441P | 24 Vdc | ■ | — | — | — | — | Direct to C441 |
| | C441NS | 120 Vac | — | ■ | ■ ❷ | ■ | ■ | Standalone—DIN/panel |
| | C441PS | 24 Vdc | — | ■ | ■ ❷ | ■ | ■ | Standalone—DIN/panel |
| DeviceNet | C441K | 120 Vac | ■ | — | — | — | — | Direct to C441 |
| | C441L | 24 Vdc | ■ | — | — | — | — | Direct to C441 |
| | C441KS | 120 Vac | — | ■ | ■ ❷ | ■ | ■ | Standalone—DIN/panel |
| | C441LS | 24 Vdc | — | ■ | ■ ❷ | ■ | ■ | Standalone—DIN/panel |
| PROFIBUS | C441S | 120 Vac | ■ | — | — | — | — | Direct to C441 |
| | C441Q | 24 Vdc | ■ | — | — | — | — | Direct to C441 |
| | C441SS | 120 Vac | — | ■ | ■ ❷ | ■ | ■ | Standalone—DIN/panel |
| | C441QS | 24 Vdc | — | ■ | ■ ❷ | ■ | ■ | Standalone—DIN/panel |
| Modbus TCP, EtherNet/IP | C441R | 120 Vac | ■ | — | — | — | — | Direct to C441 |
| | C441T | 24 Vdc | ■ | — | — | — | — | Direct to C441 |
| | C441U | 120 Vac | — | ■ | ■ ❷ | ■ | ■ | Standalone—DIN/panel |
| | C441V | 24 Vdc | — | ■ | ■ ❷ | ■ | ■ | Standalone—DIN/panel |

❶ C441 standalone communication modules can be used as general purpose I/O. This allows a customer to monitor the status of any non-communicating product over the selected protocol by wiring fault or auxiliary contacts from that product to the C441 communication module on-board I/O.

❷ A C440-XCOM expansion module is required to connect any C441 communication module to a C440 Electronic Overload Relay. Note—Prior to the launch of standalone modules, communicating C440 assemblies used a C440-XCOM as well as an L-adapter part C440-COM-ADP, which was wired to the direct mount C441 module. When using the new standalone modules with C440, the C440-COM-ADP is no longer required.

# PROFIBUS (C441Q/S/QS/SS)



| C441Q/S | C441QS/SS Standalone |
|---------|----------------------|

- Capable of baud rates up to 12 Mb
- PROFIBUS address set via convenient DIP switches on the device
- LEDs display PROFIBUS status
- Configuration using common PROFIBUS tools

# Modbus (C441M/N/P/NS/PS)



| C441M (without I/O) | C441N/P (with I/O) | C441NS/PS Standalone |
|---------------------|--------------------|-----------------------|

- Capable of baud rates up to 115 k
- Modbus address and baud rate set via convenient DIP switches on the device
- LEDs display Modbus traffic
- Configuration using common Modbus tools

# DeviceNet (C441K/L/KS/LS)



| C441K/L | C441KS/LS Standalone |
|---------|----------------------|

- Communication to DeviceNet uses only one DeviceNet MAC ID
- MAC ID and baud rate set via DIP switches on the device with an option to set from the network
- Configuration using common DeviceNet tools
- Contain backwards compatible I/O assemblies. See C441 DeviceNet notes below

## C441 DeviceNet

### Backwards compatibility with legacy motor control platforms

C441K/L/KS/LS DeviceNet communication modules contain I/O assemblies with the same size and layout as Advantage (WPONIDNA) and *IT.* starter (DNSAP) platforms. These assemblies provide seamless migration paths from legacy motor control platforms to the new C440/C441 solutions. No program changes are required, meaning users can retrofit or upgrade starter technology quickly and seamlessly. Refer to C441K/L/KS/LS User Manual MN122001EN for detailed instructions on replacing an Advantage or *IT.* starter on DeviceNet.



# EtherNet/IP and Modbus TCP (C441R/T/U/V)



| C441R/T | C441U/V Standalone |
|---------|--------------------|

- Supports Modbus TCP or EtherNet/IP in a single device
- Contains an embedded two-port switch, allowing linear or ring network configurations
- Embedded web services enable simple configuration and monitoring through Internet Explorer
- IP address set via convenient DIP switches on the device



EATON C441 series communication modules

# We make what matters work.*

**\*** At Eaton, we believe that power is a fundamental part of just about everything people do. Technology, transportation, energy and infrastructure—these are things the world relies on every day. That's why Eaton is dedicated to helping our customers find new ways to manage electrical, hydraulic and mechanical power more efficiently, safely and sustainably. To improve people's lives, the communities where we live and work, and the planet our future generations depend upon. Because that's what really matters. And we're here to make sure it works.

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For more information, visit

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