How to configure, monitor, and control Motor Insight via Modbus, DeviceNet, and PROFIBUS

Application

Motor Insight® is an advanced motor protective relay with thermal motor overload, supply, and load protection; configurable ground fault detection; power monitoring; an intuitive user interface; and optional communications. The optional communications allow for remote control and reset of faults, and remote monitoring of numerous operating and configuration parameters. The communication modules also include inputs that can be used to bring the status of sensors or switches back to the system controller, as well as outputs to control the contactor or turn on pilot lights.

Overview

The industrial networks supported by the Motor Insight relay are all open networks. This means that there are many software tools already available that can be used to configure the device over these networks. Each of the supported networks will be discussed in this document, including suggestions for various configuration tools, many of which are free downloads from the Internet. In many cases, the network tools supplied by the manufacturer of the network master can be used to configure any device on that network.

Overview of Modbus®, DeviceNet™ and PROFIBUS®

For most applications, the Motor Insight relay parameters can be easily configured using its intuitive user interface. Then, the communication network master can be used to control and monitor the device during operation. This network master reads status information from each slave device and writes control information. The communication interface modules for Motor Insight allow control for the following:

1. Remote reset of a fault
2. Remote trip
3. Control of on-board field outputs

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Numerous parameters are available to be monitored from Motor Insight, including:

1. Device status bits
2. rms current IA
3. rms current IB
4. rms current IC
5. rms current average
6. rms voltage VAB
7. rms voltage VBC
8. rms voltage VCA
9. rms voltage average
10. Total kW
11. Voltage unbalance percent
12. Current percent
13. Apparent power factor
14. Residual ground current deciamps
15. Frequency
16. Overload thermal pile
17. Trip reason
18. Overload status
19. Error code
20. Field inputs

The following is a discussion concerning the third-party software tools available for the open networks supported by Motor Insight.

Modbus

Motor Insight supports both Modbus RTU and Modbus ASCII modes, as well as baud rates from 9600 to 115.2K baud. It will communicate with any Modbus master.

The unique aspect of Modbus is that special configuration tools are typically not necessary as they are with many other industrial networks. The reason is that Modbus requires Modbus Data Register addresses for all parameters in all Modbus devices. This allows a Modbus master to easily read and write data to a Modbus slave device for configuration, control, and monitoring purposes. Motor Insight is no different. It has assigned a Modbus Data Address to all available parameters. This information is published in the Motor Insight overload and monitoring relays user manual, publication MN04209001E.

If a third-party Modbus software package is desired to configure or verify the configuration or operation of Motor Insight, there are numerous software tools available. Many of these tools are free downloads, such as ModScan. Others can be found by simply searching the Web for Modbus Software Tools.

Eaton has a line of electronic operator interface devices called HM*i*. A program for a 4-inch HM*i* is available as a free download from www.eaton.com/motorinsight or via this direct link. This program communicates via Modbus to multiple Motor Insight devices. It contains screens for configuring, monitoring, and controlling up to 16 Motor Insights from a single HM*i*. To obtain the HM*i* software needed to download the program to an HM*i*, visit www.eaton.com/electrical. Then, click the "Tools & Downloads" link. Next, select "Software Downloads." On the next page, under the Products drop-down, select "Operator Interface..." and then select "HM*i* Operator Interface Configuration Software." Also note that the HM*i* software allows for changing the HM*i* program so it can be downloaded to any size HM*i*: 4-, 6-, 8-, or 10-inch unit.

Another source of available Modbus tools can be found on the official Modbus Web site: www.modbus.org.

DeviceNet

Unlike Modbus, where all parameters in a device have a data address assigned to them, DeviceNet slave devices use input and output assemblies. Each input assembly will include the same status bits indicating operational status of the device. The various input assemblies differ by the additional data that can be monitored with each. The Motor Insight relay has five different input assemblies. Two of these input assemblies allow the user to select the parameters to monitor. The various output assemblies are for control. They provide the ability to reset faults, trip the overload, and turn the outputs on-board the DeviceNet module on and off.

DeviceNet is an open network that requires a software tool to configure slave devices and to map their data into the scan list of the master. The manufacturer of the DeviceNet master will provide a software tool to map slave devices into the scan list of the master so the system controller can control and monitor each Motor Insight.

Motor Insight contains an intuitive user interface for configuration, but when on a DeviceNet network, it can be configured by any third-party DeviceNet commissioning tool as well. The DeviceNet specification requires that all DeviceNet products have an eds file (electronic data sheet). This file is a text file that is used to uniquely define each parameter in the device. DeviceNet commissioning tools are designed with the ability to import eds files for any valid DeviceNet slave device. The software tool can then be used to configure the device. There are two eds files and an icon file available for Motor Insight. They may be downloaded from www.eaton.com/motorinsight. These files can then be imported into any valid DeviceNet commissioning software, such as:

1. Eaton's CHStudio™
2. Eaton's ELCSoft (DNET CONFIG Tool)
3. Rockwell's RSNetWorx™ for DeviceNet

CHStudio is a free download from the Eaton Web site; search for CHStudio and download the software and activation code. It can be used to configure any DeviceNet slave device, but not the network master.

ELCSoft is the programming software for the Eaton PLC line called ELC. This PLC line includes a complete DeviceNet master, the ELC-CODNETM module. The commissioning software is included in the ELCSoft programming software. It can configure any DeviceNet slave device by importing the eds file for the device and can fully configure the ELC-CODNETM DeviceNet master module.

The manufacturer of the network master typically supplies the software tools needed to configure the master. RSNetWorx for DeviceNet can be purchased from Rockwell or a Rockwell distributor. Motor Insight eds files can be imported into RSNetWorx for DeviceNet, allowing the software to configure the Motor Insight and a Rockwell DeviceNet master.

Once all slave devices on a DeviceNet network have been configured and mapped into the DeviceNet master's scan list, the master will continuously poll the slave devices, like the Motor Insight, writing control data to them and monitoring various parameters. Motor Insight has more data available to monitor than any other overload relay of its type. This information is published in the Motor Insight overload and monitoring relay user manual, MN04209001E.

Another source of available DeviceNet tools can be found on the official DeviceNet Web site: www.odva.org.

PROFIBUS

PROFIBUS is very similar to DeviceNet in that the network configuration tools are typically supplied by the manufacturer of the PROFIBUS master. There is also a file for PROFIBUS similar to the eds file for DeviceNet, called a GSD file. All valid PROFIBUS slave devices must have a GSD file. This file is imported into the PROFIBUS commissioning tool or the programming software, allowing the software to configure the device and map its I/O data so the PROFIBUS master can poll the slave devices for control and monitoring purposes. These PROFIBUS tools are supplied by the manufacturer of the PROFIBUS master. The GSD file may be downloaded from www.eaton.com/motorinsight. This file can then be imported into any valid PROFIBUS software tool, such as Siemens's SIMATIC Software. Other PROFIBUS network product vendors are Woodhead Connectivity, Bihl+Wiedemann GmbH and PROCENTEC.

Another source of available PROFIBUS tools can be found on the official PROFIBUS Trade Organization Web site: www.us.profibus.com/.

Supporting documentation

Motor Insight User Manual	MN04209001E
Motor Insight DeviceNet Instructional Leaflet	IL04209005E
Motor Insight Modbus Instructional Leaflet	IL04209004E
Motor Insight PROFIBUS Instructional Leaflet	IL0420900XE
ELC System Manual	MN05003003E
ELC-CODNETM Instructional Leaflet	IL05001003E
HM*i* User manual	MN04802014E

Additional help

In the event that additional help is needed, please contact the Technical Resource Center at 1-877-ETN-CARE (386-2273).

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