

Control with UniOP - DeviceNet Scanner

This Technical Note contains the information needed to use the DeviceNet Scanner capabilities included in the SCM03 Control module.

Note: *DeviceNet Scanner support is included in SCM03 starting from the module with serial number 234(corresponding to the introduction of the ISaGRAF run-time firmware V1.03). DeviceNet Master capabilities represent an additional option to the CANopen Master that is always available in the SCM03.*

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1. Introduction

The SCM03 modules equipped with the firmware V1.03 or greater can be used to control a DeviceNet network acting as a Master device. The EXOR implementation of the DeviceNet master stack is based on the original Rockwell software.

The current implementation in the SCM03 module of the Rockwell software is comparable to a Rockwell DeviceNet scanner equipped with firmware version...

This technical note covers all the argument related to the SCM03 DeviceNet interface.

As a standard DeviceNet scanner, the SCM03 module accepts a network configuration that can be commissioned using the standard Rockwell programming package for DeviceNet Networks called “RSNetWorx for DeviceNet”.

2. RSNetWorx Configuration

The DeviceNet network configuration is prepared and transferred to the SCM03 using the “**RSNetWorx for DeviceNet**” programming package from Rockwell Automation.

The SCM03 DeviceNet Master corresponds functionally to the “1756-DNB/A Communication Adapter”.

The corresponding EDS file can be easily imported into the RSNetWorx environment using the “EDS Wizard” utility. Please refer to RSNetWorx documentation for any information about importing new EDS files.

When devices in the hardware catalogue are sorted by vendor name, the SCM03 Scanner will appear as presented in the picture below.

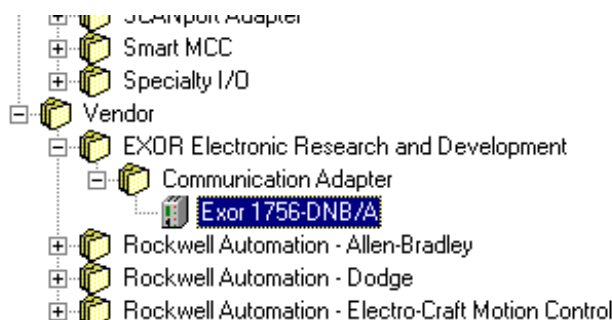


Figure 1

Thee default network parameters assigned to SCM03 are:

- node address: 63
- baud rate: 500Kbps

These parameters can eventually be changed using the “Node Commissioning” function available in RSNetWorx.

Use the communication adapter Rockwell 1770-KFD to connect the computer running RSNetWorx to the SCM03 Scanner. The 1770-KFD is actually a RS-232 to DeviceNet interface.

The communication between the RSNetWorx software and the SCM03 module can only be activated if the SCM03 module is in STOP mode; if the SCM03 module is running a program, it is necessary to stop it before communication with RSNetWorx.

A program in the SCM03 can be stopped by sending the Stop command via ISaGRAF or cycling the power of the panel hosting the module and holding down three keys together during the UniOP power up phase; the panel will start in Configuration Mode and the program in the SCM03 will be stopped.

3. ISaGRAF Configuration

Configuration of the ISaGRAF controller for use with DeviceNet master is described in this chapter.

3.1 I/O boards Installation

The ISaGRAF support for DeviceNet consists of some I/O boards that must be installed. Several boards are available to properly configure the scanner according to the needs of each application. The list of available boards is described in Table 1.

DEVNCFG.BIA	DeviceNet Configuration Board
DEVNAIx1.BIA	Single Analog Input
DEVNAIx8.BIA	Multiple Analog Inputs
DEVNAOx1.BIA	Single Analog Output
DEVNAOx8.BIA	Multiple Analog Outputs
DEVNDIx8.BIA	Multiple Digital Input
DEVNDOx8.BIA	Multiple Digital Outputs

Table 1

The board libraries are normally distributed with the EXOR ISaGRAF package. However, any standard ISaGRAF package can be easily upgraded with the DeviceNet I/O boards for SCM03 by retrieving them using the ISaGRAF Library tool.

3.2 Configuration of the ISaGRAF Connection Tool

The ISaGRAF Connection Tool must be configured to activate the DeviceNet capabilities and to properly interface the application with all the DeviceNet remote I/O points.

3.2.1 DEVNCFG

The board **DEVNCFG** must be inserted in the first available slot of the I/O rack to enable the DeviceNet scanner. Figure 2 shows the board; this board does not have configuration parameters.

Note: *the DeviceNet configuration board **DEVNCCFG** and the CANopen configuration board **CANOCFG** are mutually exclusive.*

After inserting the DEVNCFG board, the DeviceNet Scanner is activated and will be running until the unit hosting the SCM03 is powered down. This also means that if the ISaGRAF program is stopped, restarted or a different ISaGRAF program is downloaded, the DeviceNet Scanner Software will always be running.

This is necessary to allow an IDLE mode of the scanner in which the RSNetWorx software can connect to the master through the network interface.

The channels of this ISaGRAF board return the following information:

- Channel 1 returns the “QuickStatus”; it is 1 if at least one node is in fault; it is 0 otherwise.
- Channel 2 returns the “Scanner Status”; for a list of possible status codes please refer to the next chapter (Operate function that reads the status).

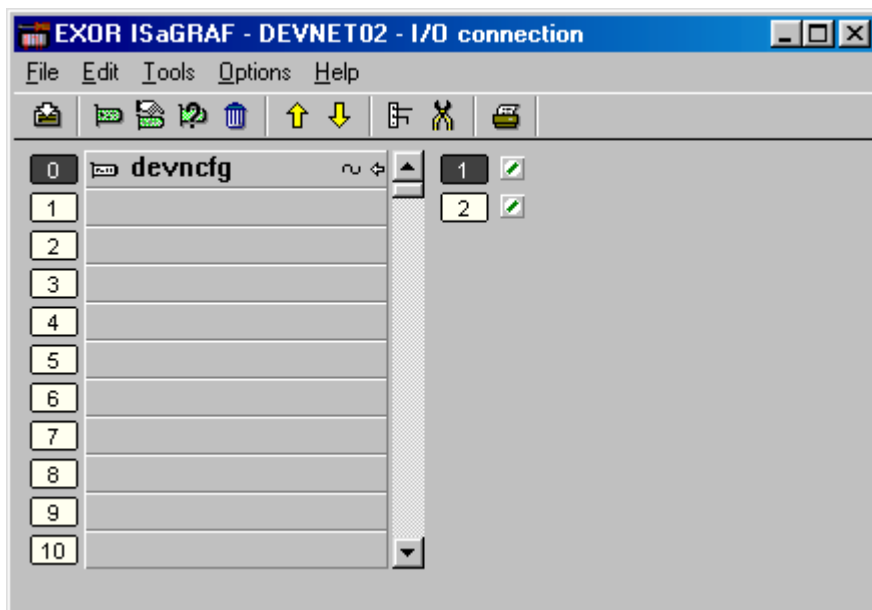


Figure 2

Each slave device included in the network configuration has its own produced and consumed data. Depending on the size of these data, several different I/O boards can be inserted in the Connection Tool to properly connect the ISaGRAF I/O variable to the Scanner I/O buffers.

The ISaGRAF boards allow grouping the produced and consumed information of the Slave Devices according to their intrinsic size.

For instance, an analog input coming from a temperature sensor will be connected to an ISaGRAF 16 bit input board, but a digital input will be attached to an ISaGRAF digital input board.

Note: Input and Output are always referred to the Scanner module; an Input is a signal that comes to the module; an Output is a signal going out of the module.

3.2.2 DEVNAIx1

The **DEVNAIx1** board allows mapping one analog word of the Input buffer to an ISaGRAF Input variable. The number of bits of this analog word can be set in the “NrOfBits” parameter; possible values are: 8, 16 and 32.

The “ByteOffset” parameter represents the position of this analog word within the Input Buffer expressed using the byte offset.

The “Signed” parameter allows specifying whenever the contents of the analog Input has to be interpreted using the signed or unsigned convention. Allowed values are: false and true.

Figure 3 shows the board in the ISaGRAF Connection Tool.

Note: According to the Rockwell standard, the Scanner I/O buffers are organized in bytes; each position inside them has to be expressed in terms of offset using the index of the first byte assigned to the current slave device.

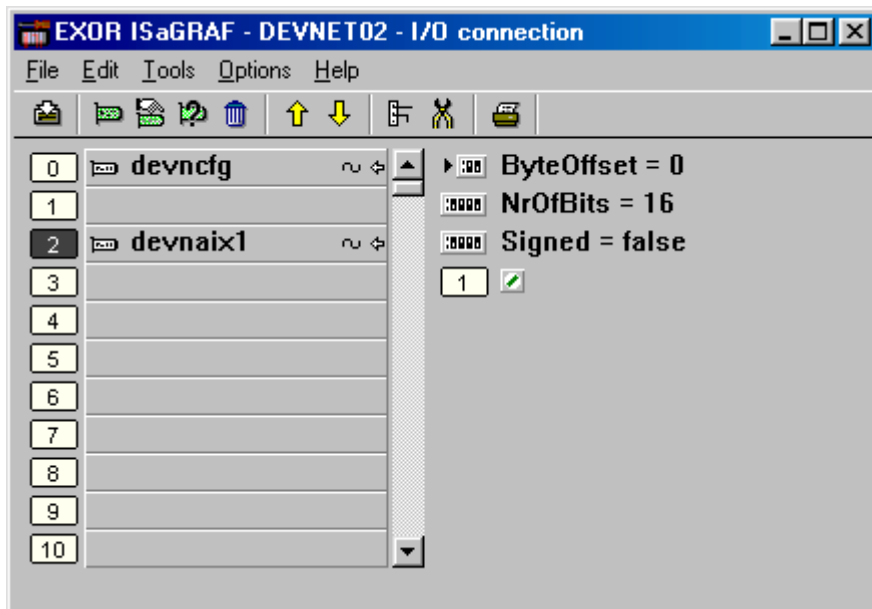


Figure 3

3.2.3 DEVNAIx8

The **DEVNAIx8** board allows mapping up to eight analog words of the Input buffer to eight ISaGRAF Input variables.

In the Input buffer the eight analog words must be contiguous.

The number of bits of each analog word can be set in the “NrOfBits” parameter; possible values are: 8, 16 and 32.

The “ByteOffset” parameter represents the position of this analog word within the Input Buffer expressed using the byte offset.

The “Signed” parameter allows specifying whenever the contents of the analog Input has to be interpreted using the signed or unsigned convention. Allowed values are: false and true.

Figure 4 shows the board in the ISaGRAF Connection Tool.

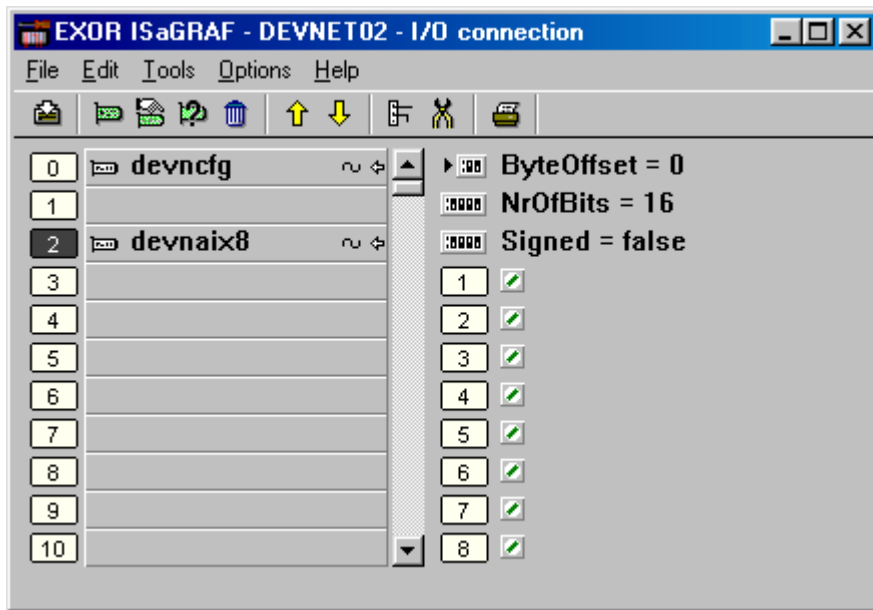


Figure 4

3.2.4 DEVNAOx1

The **DEVNAOx1** board allows mapping one analog word of the Output buffer to one ISaGRAF Output variable.

The number of bits of the analog word can be set in the “NrOfBits” parameter; allowed values are: 8, 16 and 32.

The “ByteOffset” parameter represents the position of this analog word within the Output Buffer expressed using the byte offset.

Figure 5 shows the board in the ISaGRAF Connection Tool.

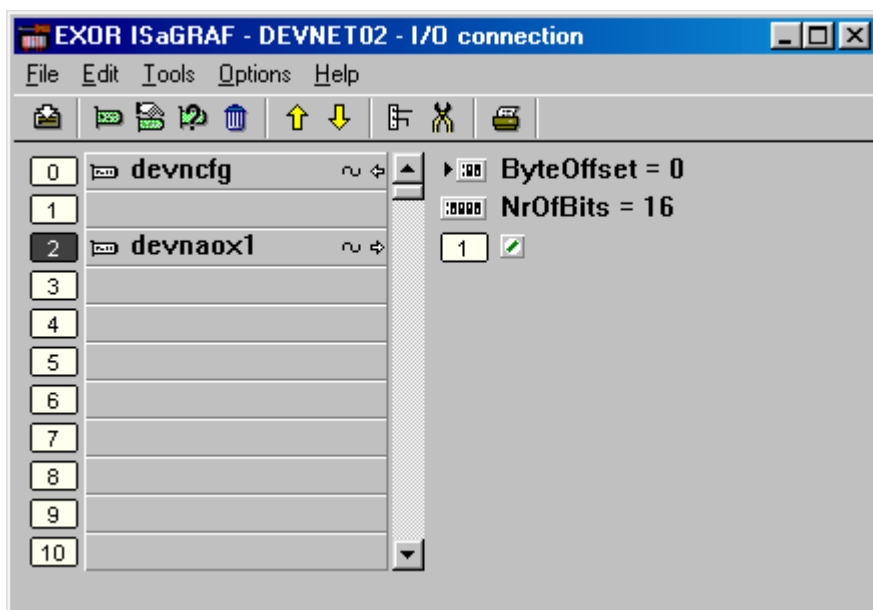


Figure 5

3.2.5 DEVNAOx8

The **DEVNAOx8** board allows mapping up to eight analog words of the Output buffer to eight ISaGRAF Output variables.

In the Output buffer the eight analog words have to be contiguous.

The number of bits of each analog word can be set in the “NrOfBits” parameter; allowed values are: 8, 16 and 32.

The “ByteOffset” parameter represents the position of the first analog word within the Output Buffer expressed using the byte offset.

Figure 6 shows the board in the ISaGRAF Connection Tool.

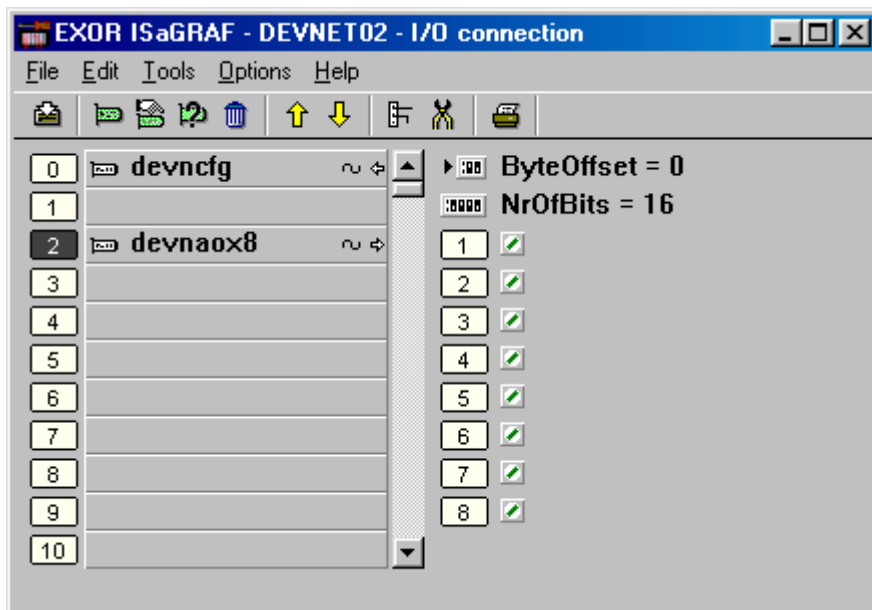


Figure 6

3.2.6 DEVNDIx8

The **DEVNDIx8** board allows mapping up to eight digital inputs points of the Input buffer to eight ISaGRAF Digital Input variables.

In the Input buffer the eight digital inputs must be contiguous.

The “ByteOffset” parameter represents the position of the first digital input expressed using the byte offset within the Input Buffer.

Figure 7 shows the board in the ISaGRAF Connection Tool.

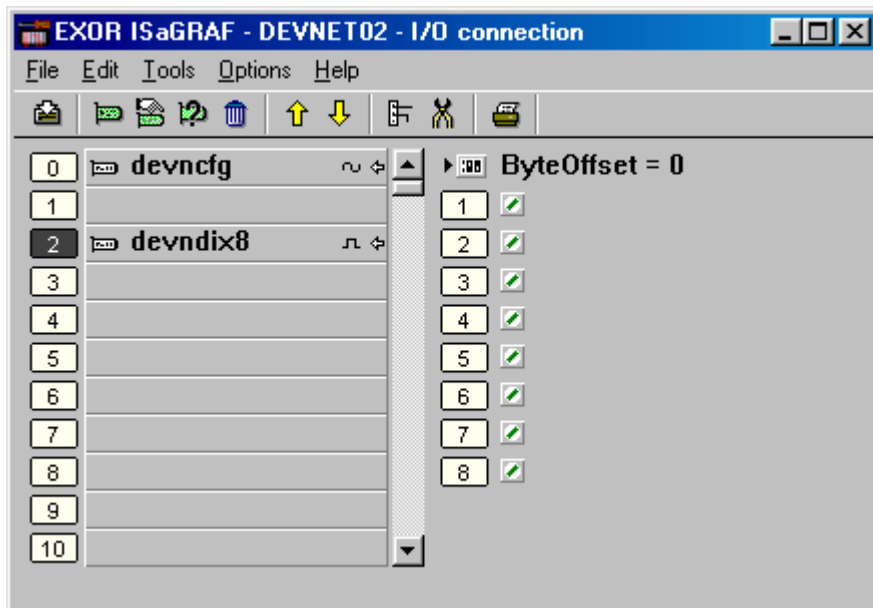


Figure 7

3.2.7 DEVNDOx8

The **DEVNDOx8** board allows mapping up to eight digital outputs point of the Output buffer to eight ISaGRAF Digital Output variables.

In the Output buffer the eight digital outputs must be contiguous.

The “ByteOffset” parameter represents the position of the first digital output within the Output Buffer expressed using the byte offset.

Figure 8 shows the board in the ISaGRAF Connection Tool.

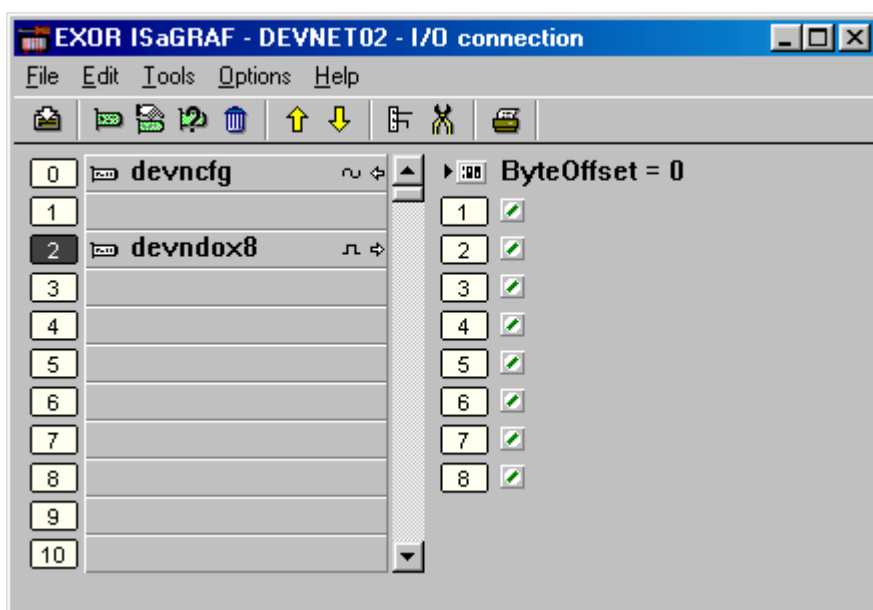


Figure 8

3.3 Supported Operate Functions

On any variable connected on any DeviceNet ISaGRAF board it is possible to use the following operate functions:

Function Code	Arguments	Description
0	0, 1	Returns the fault table; with argument 0 the first 32 bits of the fault table are returned; with argument 1 the second 32 bits are returned. Each bit is associated to one node number in the network. If the bit is set, that node is a configured slave device that is in fault.
1	0, 1	Returns the idle table; with argument 0 the first 32 bits of the fault table are returned, with argument 1 the second 32 bits are returned. Each bit is associated to one node number in the network. If the bit is set, that node is a configured slave device that is idle.
2	0, 1, 2, ..., 63	Returns the status of the device specified in the argument. Possible Device Status Codes follows: 0 Node OK or not in scan list 70 Failed DUP MAC check. 71 Illegal value in Scan List. 72 Device stopped communicating. 73 Device does not match Scan List. 74 Port has detected data overrun. 75 Network comm have failed. 76 Timeout with no net traffic for scanner. 77 Data size returned not match Scan List. 78 Device in Scan List not answering. 79 Port failed to transmit msg. 80 Port is in IDLE MODE operation. 81 Port is in FAULT MODE operation. 82 I/O fragment out-of-sequence. 83 Device refused to be initialized. 84 Device not yet initialized. 85 Data too big for frag buffer. 86 Device went into idle itself 87 Shared master has not allocated slave 88 Shared master has not allocated 89 Keeper download failed 90 User has disabled port. 91 Bus Off detected on port. 92 No power on CAN transceiver 95 Appl FLASH is being modified by tool 96 Port is in TEST MODE operation. 97 User halted scanner 98 Esc, Overflow, Divide or other proc err. 99 Watchdog has timed-out.

Table 2

Appendix A. Technical Data

The SCM03 Scanner supports up to 1024 bytes of Input data and 1024 bytes of Output data. The RSNetWorx is the tool required to map in the proper position within the I/O buffers, the produced and consumed data of each slave device.

The SCM03 Scanner supports the following DeviceNet baud rates: 125 Kbps, 250 Kbps and 500 Kbps.

Connection between the UniOP panel hosting the SCM03 DeviceNet Master and the DeviceNet network can be done using the CA150 cable. Please refer to the DeviceNet official documentation for any additional detail regarding electrical connection to the DeviceNet network.