

UniOP Local I/O Module UIM05

This document provides a description of the UIM05 local I/O module designed for use in the UniOP panels. The technical note includes a technical description of the hardware and of the ISaGRAF support for the I/O board.

Note: *The UIM05 I/O module requires operator panels with hardware type –0050 and later, using firmware version V4.24 and later.*

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1. Overview

UIM05 is general purpose (multifunction) I/O board, compatible with all UniOP CPU boards; please note it can only be mounted on hardware type –0050 and later. UIM05 should satisfy most of the typical process I/O signals. The main feature of the UIM05 is the programmability. Due to the high level of integration, UIM05 offers a “one-board solution” for most typical I/O configurations.

The current version of UIM05 board provides the following:

- 1) Optically isolated digital inputs (20 points)
- 2) Optically isolated digital outputs (12 points)
- 3) Non isolated (four channels) 12 bit Analog outputs (user programmable as current 0-20mA, current 4-20mA or voltage 0-10V)
- 4) Non isolated (four differential or eight single ended channels) 12bit Analog inputs with different types of input
- 5) Dedicated PT100 channel-input for general usage or external thermocouple compensation of thermocouples.
- 6) Support for fast counter inputs

2. ISaGRAF Support for UIM05

In order to use UIM05 hardware with the SCM03 Internal Controller, the proper I/O boards have to be installed in the ISaGRAF Workbench.

Support for UIM04 consists of 6 I/O boards available in the standard ISaGRAF archived format:

UIM05AI.BIA	Board for Analog Outputs
UIM05AO.BIA	Board for Analog Inputs
UIM05DI.BIA	Board for Digital Inputs
UIM05DO.BIA	Board for Digital Outputs
UIM05CT.BIA	Counter7Timer configuration Board
UIM05ENC.BIA	Encoder Zero search enable board

2.1 I/O Boards Installation

To install I/O boards, open the ISaGRAF Project Manager and select “Libraries” from the “Tool” menu. From the List box visible in the upper left corner select I/O boards like shown in Figure 1.

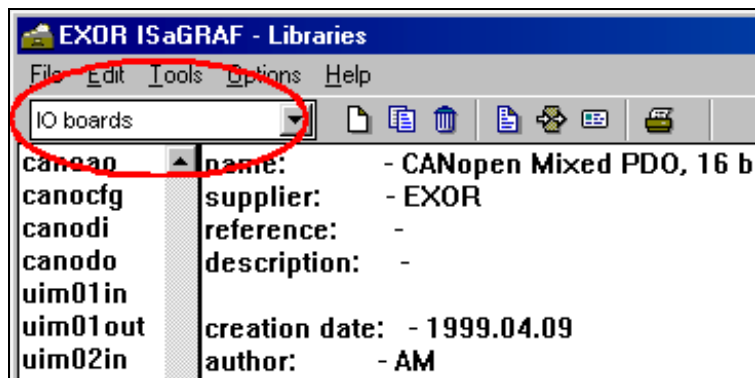


Figure 1

From the “Tools” menu select then “Archive” and reach the directory where the I/O Board descriptor files are located. Once they are located and displayed in the “Archive” part of the dialog box, select all the names and click “Restore”.

Once the installation is completed, the four I/O Boards will be available in the “I/O Connection” tool to configure the rack (see Figure 2).

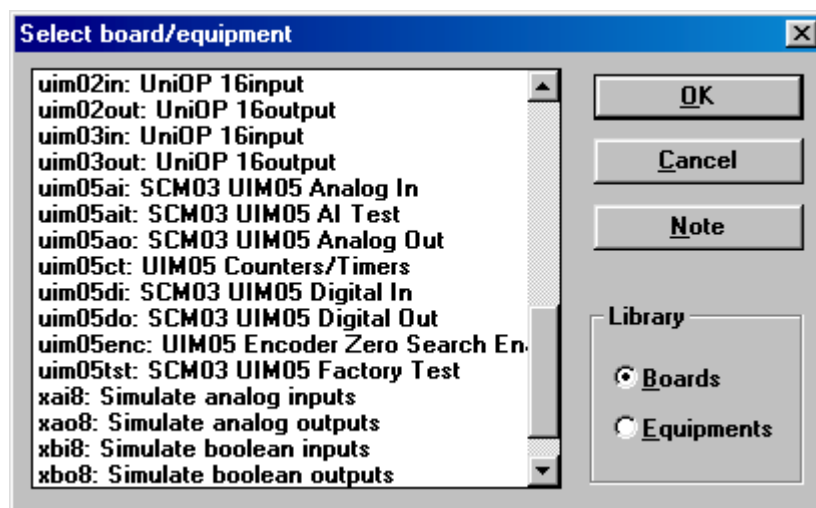


Figure 2

3. Analog Input Configuration

The UIM05 Analog Input board has several parameters that have to be properly configured according to the operation mode you desired for each channel.

For all the four channels it is required to specify the operating mode and the full-scale limit.

Each channel can be used for:

- 1 differential measure, or
- 2 single ended measures. or
- 1 resistance measure.

The next Figure 3 shows the ISaGRAF rack in the I/O Connection tool with the configuration parameters on the right part of the screen shot.

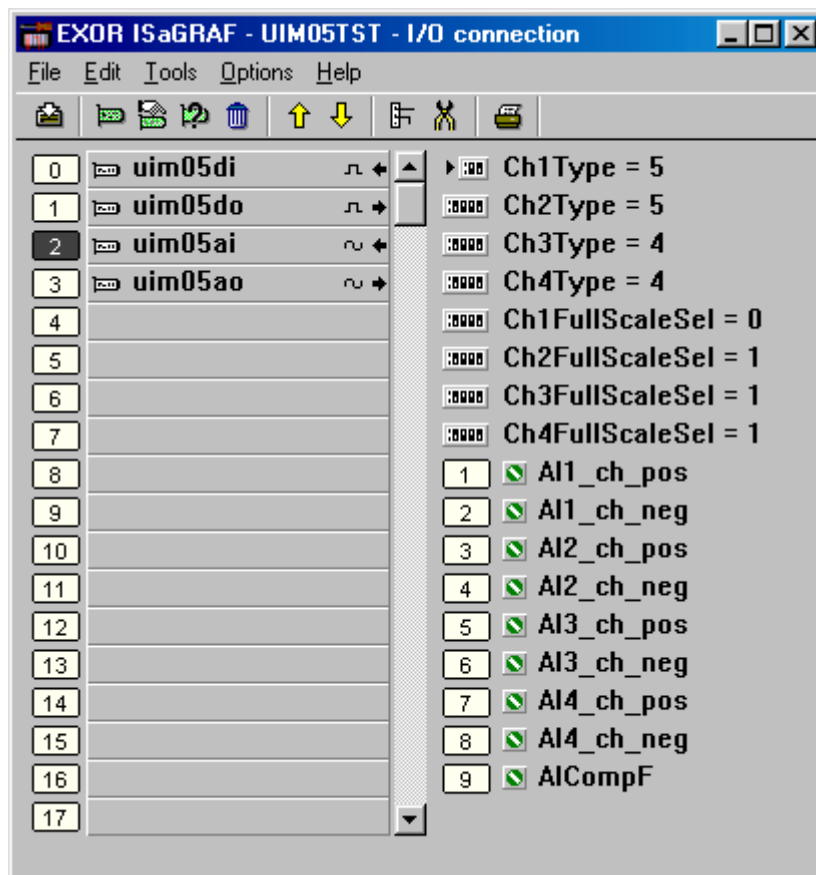


Figure 3

All the four channels are independently programmable to execute five different types of measurements. The parameters Ch1Type, Ch2Type, Ch3Type and Ch4Type can be configured like show in Table 1.

Parameter value	Measure Mode	Units
0	Voltage Differential	μV
1	Voltage Single Ended	μV
2	Current	μA
3	Resistance 2 wires	$m\Omega$
4	Resistance 3 wires	$m\Omega$
5	Voltage Thermocouple	μV

Table 1

All the different measurements executed by the UIM05 analog input channels, are internally converted in voltage measurement. For this reason the full scale limit adjustable for each channel using the configuration parameters Ch1FullScaleSel, Ch2FullScaleSel, Ch3FullScaleSel and Ch4FullScaleSel, is expressed in voltage units like shown in Table 2.

Full Scale parameter value	Full Scale
0	+/- 100mV
1	+/- 500mV
2	+/- 1V

3	+/- 5V
4	+/- 10V

Table 2

Full Scale parameters are clear in their meaning when the measure type is voltage. Because current and resistance measurements are internally executed in voltage, the full scale limits have to be set in volts according to the expected value. In order to avoid any additional calculation, the suggested setting for the full scale parameters in case of current measure and PT100 resistance measures are shown in Table 3.

Resistance Measure	500mV
Current Measure	1V

Table 3

Table 4 shows the different meaning assumed by the nine channels of the Analog Input board depending on the measure mode selected in the configuration parameters.

CH	Board Signal	MODE			
		VOLTAGE DIFFERENTIAL	VOLTAGE SINGLE ENDED	2/3 WIRES RESISTANCE	CURRENT
1	Ana. Inp. Couple 1	Diff. measure	Single Ended (CH+)	Res. Measure	Current Measure
2	Ana. Inp. Couple 1	Nothing	Single Ended (CH-)	Nothing	Nothing
3	Ana. Inp. Couple 2	Diff. measure	Single Ended (CH+)	Res. measure	Current Measure
4	Ana. Inp. Couple 2	Nothing	Single Ended (CH-)	Nothing	Nothing
5	Ana. Inp. Couple 3	Diff. measure	Single Ended (CH+)	Res. measure	Current Measure
6	Ana. Inp. Couple 3	Nothing	Single Ended (CH-)	Nothing	Nothing
7	Ana. Inp. Couple 4	Diff. measure	Single Ended (CH+)	Res. measure	Current Measure
8	Ana. Inp. Couple 4	Nothing	Single Ended (CH-)	Nothing	Nothing
9	Compens at. PT100	Res. Measure	-	-	

Table 4

The 9th channel is an input channel dedicated to thermocouple cold junction compensation. Please refer to the hardware description for additional details.

All the configuration parameters of the UIM05 Analog Input board can be easily changed run time using the OPERATE function. The OPERATE function is a standard ISaGRAF operator dedicated to change I/O board configuration parameters at run time.

The OPERATE function can be called with any input variable connected to this board.

Function Code	Argument	Description
0	0 ÷ 4	Set Analog Input Full Scale for Channel 1

1	0 ÷ 4	Set Analog Input Full Scale for Channel 2
2	0 ÷ 4	Set Analog Input Full Scale for Channel 3
3	0 ÷ 4	Set Analog Input Full Scale for Channel 4
4	0 ÷ 5	Set Analog Input Mode for Channel 1
5	0 ÷ 5	Set Analog Input Mode for Channel 2
6	0 ÷ 5	Set Analog Input Mode for Channel 3
7	0 ÷ 5	Set Analog Input Mode for Channel 4

Table 5

The list of Function Codes is show in Table 5.

Other Function Codes are reserved for factory test procedures and they can not be used.

4. Analog Output Configuration

The UIM05 Analog Output board has several parameters that have to be properly configured according to the operation mode you desired for each channel.

For all the four channels it is required to specify the operating mode; the full-scale limit is fixed to a certain value depending on the selected mode.

Each channel can be used for:

- Voltage Output
- Current Output

The next Table 5 shows the ISaGRAF rack in the I/O Connection tool with the configuration parameters on the right part of the screen shot.

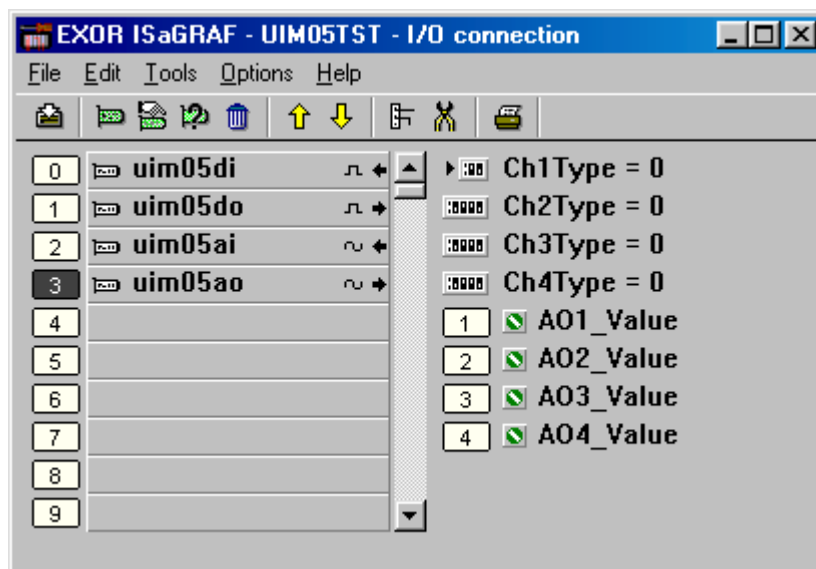


Figure 4

All the four channels are independently programmable to be used like voltage or current outputs. The parameters Ch1Type, Ch2Type, Ch3Type and Ch4Type can be configured like show in Table 6.

Parameter value	Channel Mode	Output Range
0	Voltage Output	$-10.000 \div 10.000[mV]$
1	Current Output	$0 \div 20.000[\mu A]$

Table 6

The output range is fixed and specified in the previous table. The value written by the PLC program to the output channels is an integer value between 0 and 10.000 in case of voltage and between 0 and 20.000 in case of current. Units are specified in the previous Table 6.

All the configuration parameters of the UIM05 Analog Output board can be easily changed run time using the OPERATE function. The OPERATE function is a standard ISaGRAF operator dedicated to change I/O board configuration parameters at run time.

The OPERATE function can be called with any input variable connected to this board.

Function Code	Argument	Description
10	$0 \div 1$	Set Analog Output Mode Channel 1
11	$0 \div 1$	Set Analog Output Mode Channel 2
12	$0 \div 1$	Set Analog Output Mode Channel 3
13	$0 \div 1$	Set Analog Output Mode Channel 4

Table 7

The list of Function Codes is shown in Table 5.

Other Function Codes are reserved for factory test procedures and they can not be used.

5. Digital Input and Digital Output Configuration

UIM05 has 20 digital inputs configurable in the I/O rack like shown in Figure 5 where they appear already connected to the digital input variables declared in the ISaGRAF Dictionary tool.

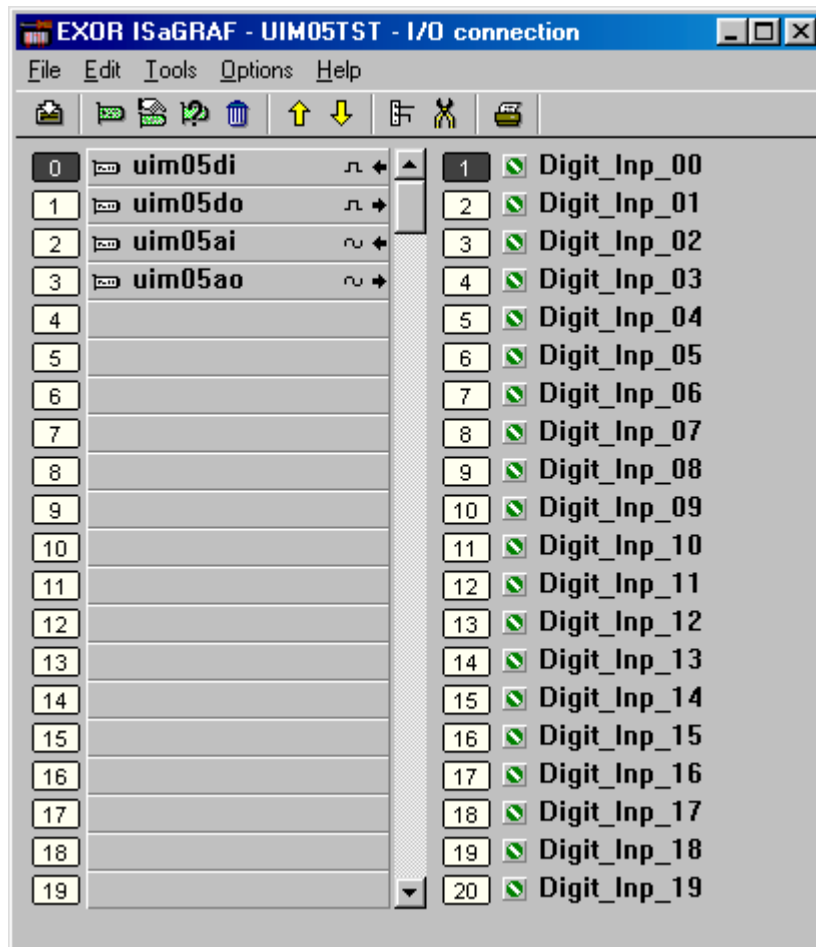


Figure 5

UIM05 has 12 digital outputs configurable in the I/O rack like shown in Figure 6, where they appear already connected to the digital output variables declared in the ISaGRAF Dictionary tool.

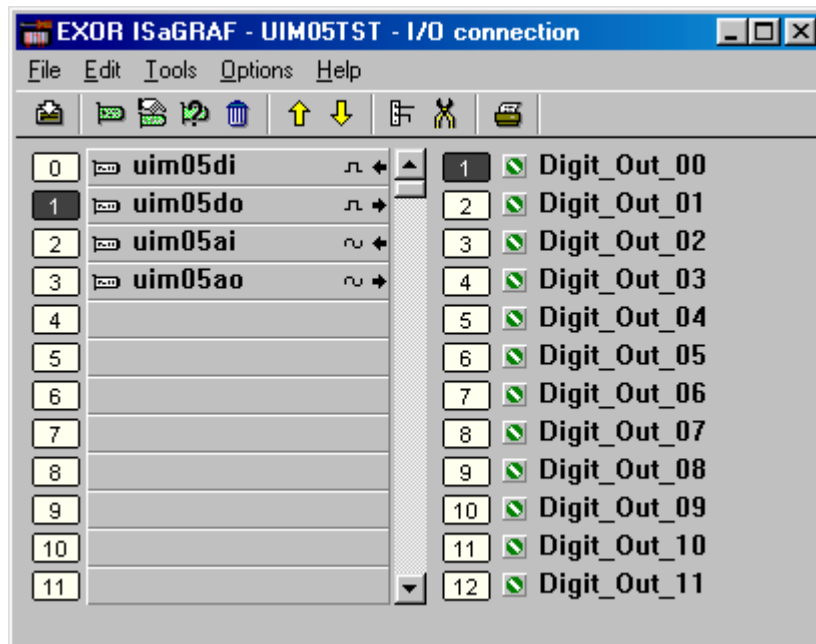


Figure 6

6. Counter/Timer Inputs

The UIM05 board features 4 counter/timer inputs.

Each channel of Counter/Timer type consumes up to 4 digital inputs. In case all the 4 Counter/Timer inputs are enabled, 4 digital inputs are still free for standard operation. Please refer to UIM05 hardware manual for additional specification and wiring diagrams.

For each counter/timer input you want to use a "UIM05CT" board has to be configured in the ISaGRAF I/O rack. Figure 7 shows the an example of possible configuration with 4 channels enabled.

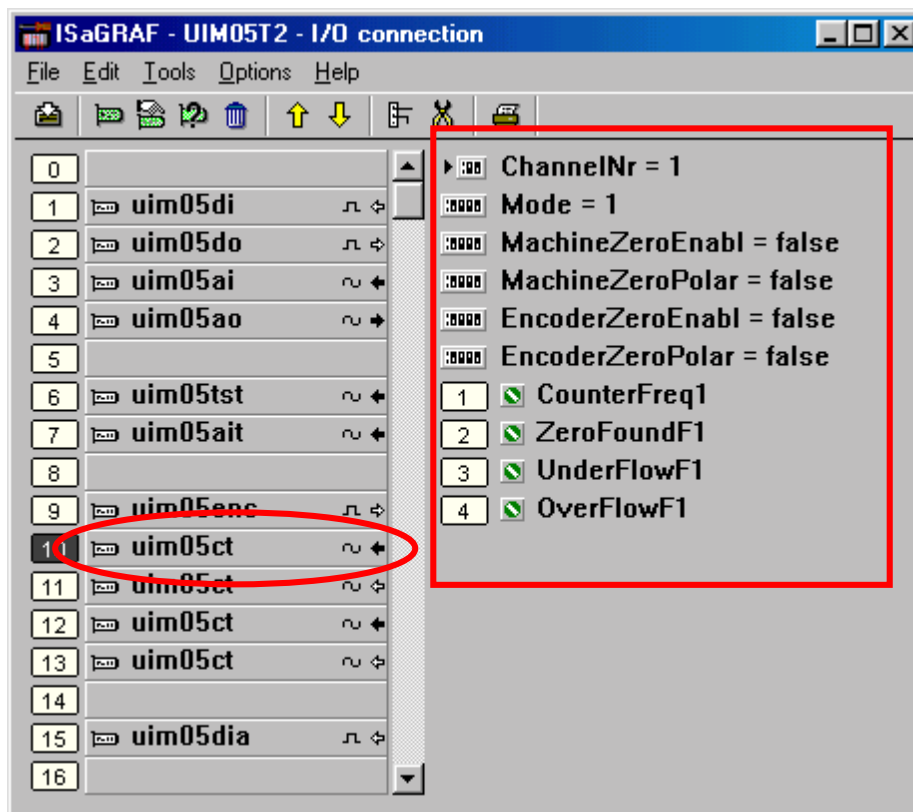


Figure 7

The parameter "**ChannelNr**" specifies the number of the associated counter/timer input; allowed range is 1...4.

The board outputs channels have the following meaning:

Channel 1: Counter/Frequency Value

Channel 2: ZeroFound Flag

Channel 3: UnderFlow Flag

Channel 4: OverFlow Flag

Board parameters have different options and they can be selected at programming level or at run-time with the use of specific OPERATE functions (listed below).

An explanation of the parameters follows in Table 8, Table 9, Table 10, Table 11 and Table 12.

Parameter Name	Value	Description
Mode	0	Counter/Timer not active
	1	Quadrature incremental encoder counter
	2	Normal Counting
	3	Gated Counting
	4	Frequency Measurement

Table 8

MachineZeroEnabledF	false	Corresponding terminal block is used as normal digital input
	true	Corresponding terminal block is used as Machine Zero Input

Table 9

MachineZeroPolarityF	false	Means Input is active LOW
	true	Means Input is active HIGH

Table 10

EncoderZeroEnabledF	false	Corresponding terminal block is used as normal digital input
	true	Corresponding terminal block is used as Encoder Zero Input

Table 11

EncoderZeroPolarityF	false	Means Input is active LOW
	true	Means Input is active HIGH

Table 12

These parameters can also be changed run-time with OPERATE function. OPERATE function can be called with any input variable connected to this board. The list of Function Codes is represent in Table 13.

Function Code	Argument	Description
100	0...4	Set Mode
101	0...1	Set MachineZeroEnabledF
102	0...1	Set MachineZeroPolarityF
103	0...1	Set EncoderZeroEnabledF
104	0...1	Set EncoderZeroPolarityF

Table 13

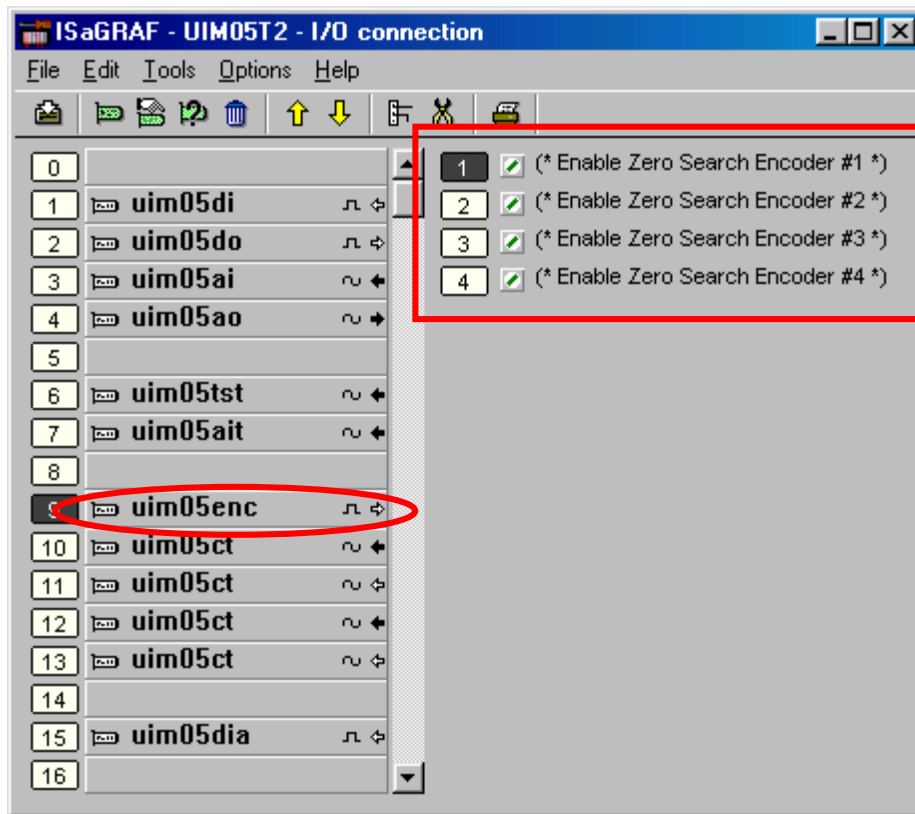
Other Function Codes are reserved and cannot be used.

6.1 Encoder Input

When input is attached to an incremental encoder, then at power up the Encoder Zero Search procedure is usually performed.

The user program should handle the procedure enabling the Zero Search using the channels of the "UIM05ENC" board.

The 4 channels of this board enable the Zero searching process on the corresponding encoder inputs.



7. Diagnostic

UIM05 is able to report the following diagnostic information using the “UIM05DIA” board.

The 2 outputs of this board are:

- Missing +24V Flag
- Output short circuit

