



REGULATEURS EUROPA

Member of the
Heinzmann Group

Instruction Manual



ICENI/MA-01 MODBUS Master Module

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1 FOREWORD

These instructions have been compiled to assist personnel responsible for the operation and maintenance of equipment manufactured by Regulateurs Europa Ltd.

Care has been taken to ensure that the equipment has been accurately represented, but it should be appreciated that, with the continued progress of design and the diversity of application, certain items may differ in detail.

It should be noted that these instructions are issued for general information and do not constitute a specification of the equipment.

Whilst reserving the right to make any alteration in design which they may consider advisable the manufacturers absolve themselves from making any such alteration retrospective.

In addition to the information given herein, practical advice and assistance is always available from the Customer Support Department at Regulateurs Europa Ltd.

2 GENERAL USE

Before carrying out any repairs, adjustments or maintenance to any equipment supplied by Regulateurs Europa Ltd, it is essential the following safety precautions be observed.

2.1 General

The operator should take care to make themselves thoroughly familiar with the operating principles, methods of adjustment and the dismantling and assembly procedures (where applicable) concerning the equipment in his care.

2.2 Product Condition

Before power-up ensure that the product is in a good condition and not damaged, paying particular attention to the ICENIbus connectors on each side of the module and the field wiring connectors at the top of the module. Ensure that any wires are fitted securely into terminals.

2.3 Signal Connection

If the module requires configuration then ensure that any critical signals are disconnected from the module until configuration of the module has been performed. This will prevent unwanted or unexpected changes in signal polarity from affecting other circuitry.

2.4 Module Damage / Repair

The IcenI modules are not repairable. Where damage is found that could compromise the operation of the module, a replacement part should be sourced from Regulateurs Europa Ltd.

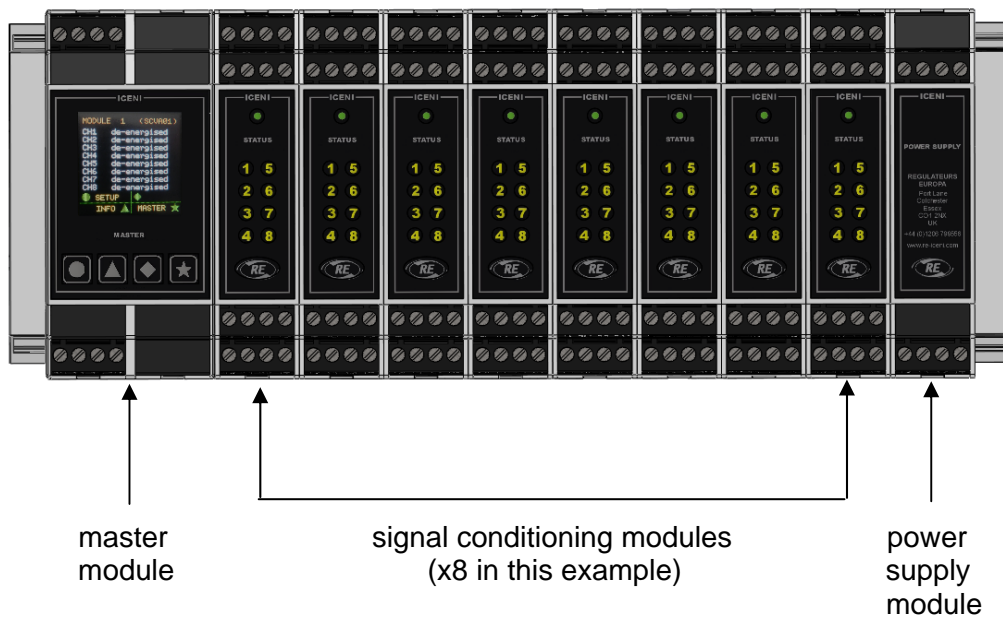
IcenI module should be disposed via an approved disposal scheme suited to electronic products and in accordance with local legislation.

3 PRODUCT OVERVIEW

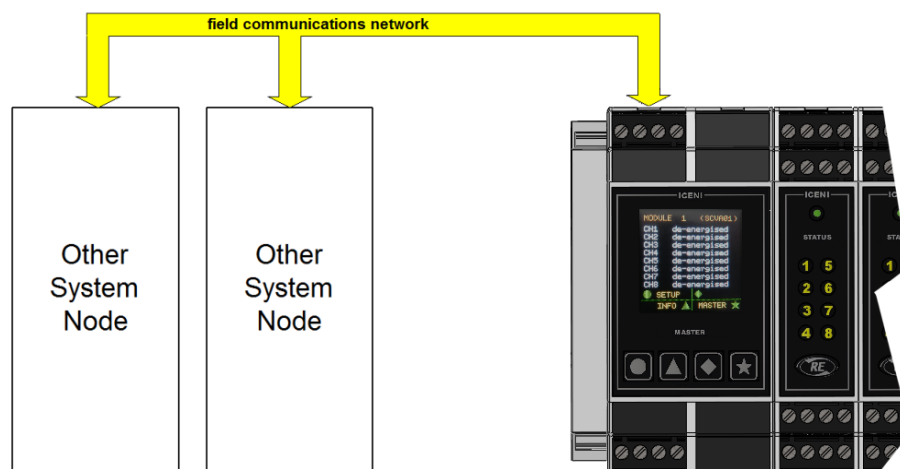
3.1 IcenI Node

An IcenI node comprises of a master module, between one and sixteen signal conditioning modules and at least one power supply module.

A typical IcenI node:

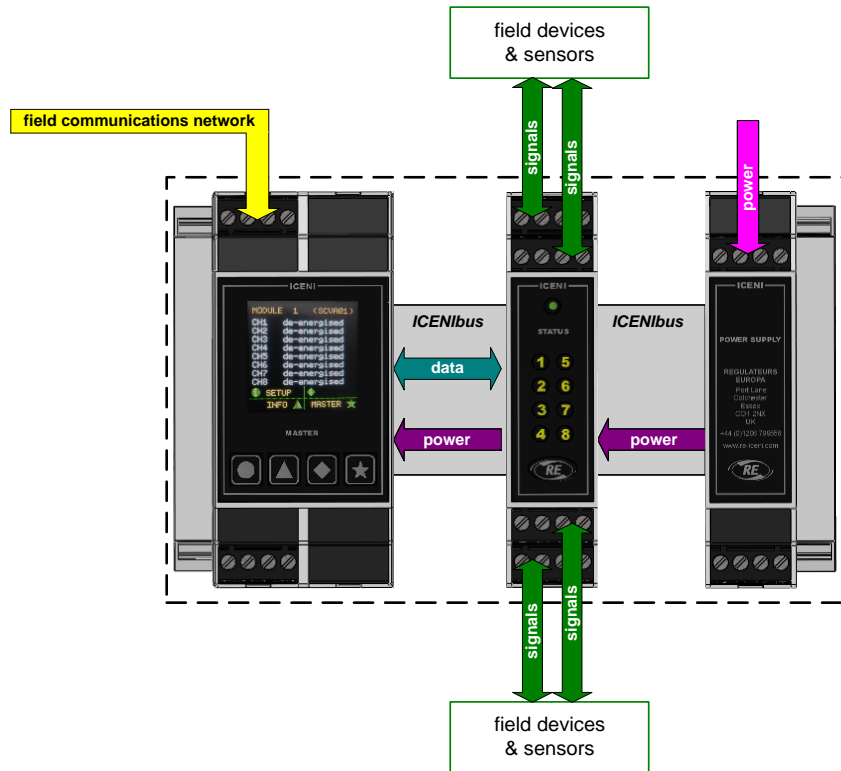


According to the mix of signal conditioning modules, the IcenI node manages the measurement and generation of electrical signals to/from sensors and field devices. Information is exchanged with other nodes in a system via a field communications network connected to the IcenI master module.

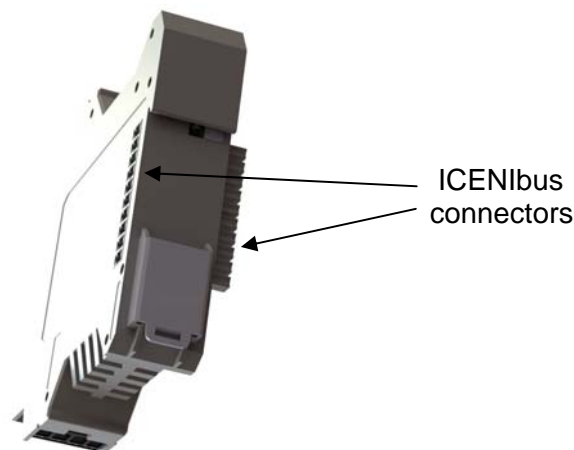


3.2 ICENibus Interface

Iceni modules are designed to plug together to form a node. The connection system used to join one module to another is called ICENibus and is used to transfer both data and power supply between modules.



All modules have a 10-way ICENibus connector on both sides of the lower housing, although for end modules (master and main power supply) one side connector will be supplied fitted with a protective cover.



3.3 Field Wiring Interface

As standard, IcenI modules are supplied with screw-clamp field wiring connectors, although cage-clamp variants are available as an option.

For ICENI/MA-01 there are two connectors marked 1-4 and 13-16 to match the numbers marked on the IcenI housing. This arrangement identifies the connector to its location on the module.

When fitted properly, the field wiring connectors are held securely in the module housing. In order to remove a terminal, a small flat bladed screwdriver should be inserted between the top of the connector and the module housing to enable the connector to be carefully levered free. This will release the connector without damage.

4 ICENI/MA-01 KEY FEATURES

The ICENI/MA-01 module is a component of an IcenI node and provides a slave interface to a MODBUS field communications network and coordinates data flow between IcenI modules within a node.

The ICENI/MA-01 module also provides an access point for configuration and status display via the in-built User Interface

The ICENI/MA-01 module provides the following key features:

- Data access to/from up to sixteen signal conditioning modules, each with a maximum of eight I/O channels.
- MODBUS RTU RS485 (slave) field communications interface for communication of data to a remote station.
- Node health status indication via changeover relay contacts.
- Colour graphic display and keypad for IcenI node and signal channel configuration and access to channel measured, driven and status information.
- Self-configuration of IcenI node at power up.

5 PRODUCT SPECIFICATION

5.1 Electrical Properties

5.1.1 Power Supply Input

Maximum ICENIbus consumption: 200mA

5.1.2 Field Communications Network

MODBUS: slave
RTU
RS485

Supported standards: MODBUS Application Protocol
Specification V 1.1b3

Network termination: external to IcenI module

5.1.3 Fault Status Indication

Output type: relay clean contact (changeover)

Fault sensing: failure of signal conditioning module/s
failure of master module
failure of MODBUS network

Series resistance (on): < 50mOhm

Switching current (maximum): 1A @ 24Vdc

Switching voltage (maximum): 125Vdc / 150Vac

Switching capacity (maximum): 30W / 60VA

5.1.4 Signal Isolation

MODBUS interface to ICENIbus : 1kV

MODBUS interface to fault status output: 1kV

Fault status output to ICENIbus: 1kV

5.1.5 Field Wiring Termination

2 x 4-way free part sockets with screw terminals. (Cage-clamp option available)

Wiring cross section / strip length 0.14 to 0.5mm² / 7mm

5.2 Mechanical Properties

5.2.1 Temperature Range

Operating: -20°C to +70°C (-4°F to +158°F)

Storage: -40°C to +85°C (-40°F to +185°F)

5.2.2 Material

Enclosure: Polyamide

Labels: Polyester

Membrane overlay: Polyester

5.2.3 Weight

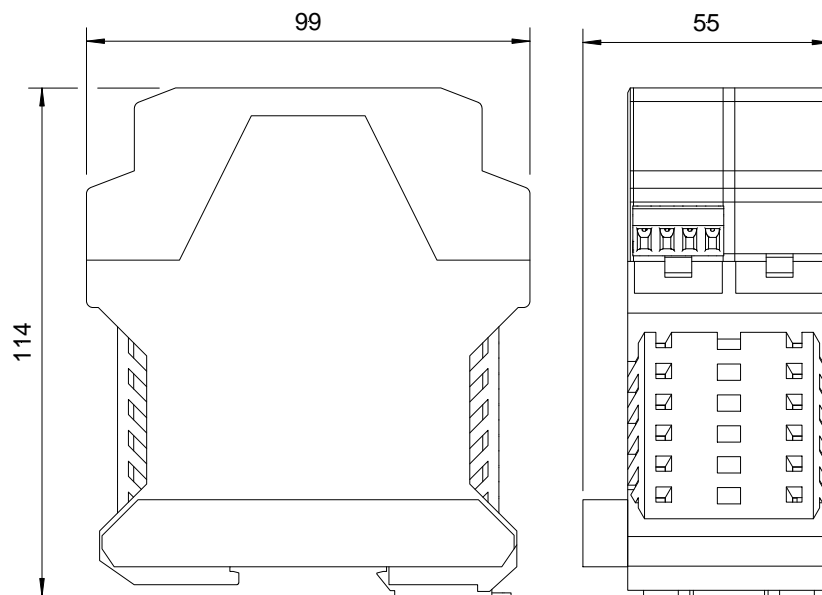
Module weight
(including free part screw terminals): 170g (approx.)

5.2.4 Ingress Protection

Assembled node: IP20

5.2.5 Dimensions

(Dimensions shown in mm)



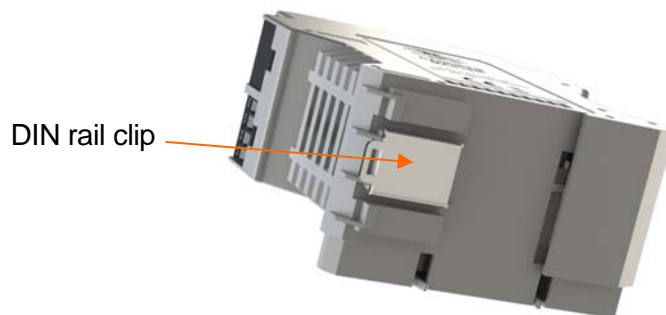
6 UNPACKING & INITIAL PREPARATION FOR USE

6.1 Unpacking

The module should be removed from the sealed bag inside the protective cardboard carton. All packaging should be disposed of in an appropriate way.

6.2 Node Assembly

The module is designed to clip and fit onto TS 35 DIN terminal rail (both standard and deep types) with other IcenI modules to form a node. A metal clip is provided on the base of each module for this purpose.



An IcenI node can be mounted in both vertical and horizontal orientations according to terminal rail layout. Assembly of the IcenI System can be achieved in one of two ways:

- The IcenI node (including the ICENI/MA-01 module) can be assembled on a bench and then fitted into place on the DIN rail with a slight tilting action. It is important that the metal DIN rail latch on the underside of each module engages properly with the rail to retain the modules in place.
- The ICENI/MA-01 module can be fitted with other modules one at a time on the DIN rail with a slight tilting action. It is important that the metal DIN rail latch on the underside of each module engages properly with the rail to retain the module in place. The modules can then be pressed together tightly to ensure that each module plugs into its neighbour to form the node.

6.3 Node Disassembly

Disassembly of the IcenI node is essentially the reverse of the procedure above and can be achieved in one of two ways:

- Each module can be separated from the next on the rail. The metal DIN rail latch can then be operated with a small screwdriver and the modules removed with a tilting action, one by one.
- The metal DIN rail latches for all modules can be released in turn with a small screwdriver until the IcenI node is free to be removed with a tilting action. The modules can then be separated from each other.

6.4 Module Positioning Within a Node

The ICENI/MA-01 module should be fitted in the yellow location shown in the diagram below.



7 FIELD WIRING TERMINATION

7.1 Terminal & Connector Layout

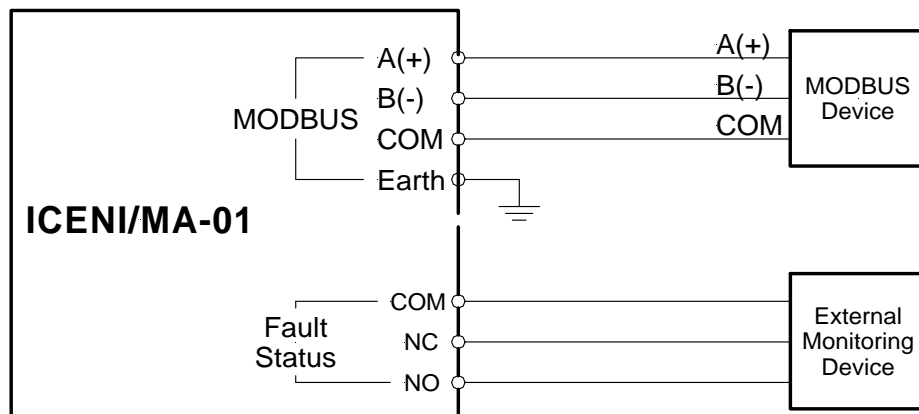
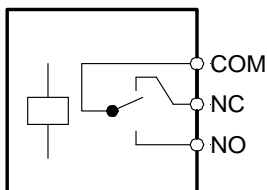


CHANNEL	TERMINAL	DESCRIPTION
MODBUS Network	1	A(+)
	2	B(-)
	3	COM
	4	Earth

NAME	TERMINAL	DESCRIPTION
Fault Status	13	common
	14	normally closed contact
	15	normally open contact
	16	-

(- : not connected)

7.2 Wiring Schematic



7.3 Earthing / Grounding

The metal terminal rail to which the IcenI node is attached and the 'Earth' terminal should be connected to a 'clean' earth / ground point. In many applications this would be the chassis of the product.

It is recommended that screened MODBUS network cables are used, with the screen connected to a 'clean' earth / ground point at the IcenI node end only. This might be via the terminal rail, for example.

7.4 MODBUS Network Termination

If the IcenI node is at one end of a MODBUS network, a 120R termination resistor should be fitted directly across the MODBUS A(+) and B(-) terminals at the ICENI/MA-01 module.

8 MODULE OPERATION

8.1 Module Configuration

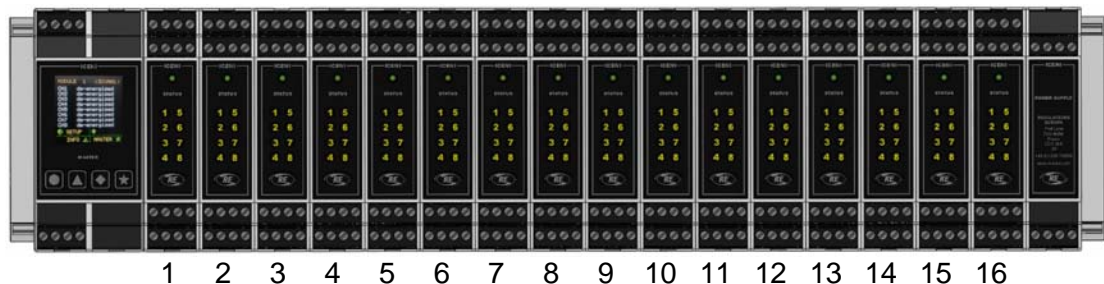
When the ICENI/MA-01 module receives power via the ICENIbus connector, it will automatically power up and commence an IcenI node configuration process.

8.2 IcenI Node Configuration

The ICENI/MA-01 will self configure the IcenI node.

During this process the master module will communicate with all signal conditioning modules fitted in the IcenI node to establish not only what modules are fitted, but where they are fitted in relation to the master and each other.

As the ICENI/MA-01 locates each signal conditioning module it allocates a unique module number to it. Each signal conditioning module will receive a module number between one and sixteen according to its position within the node (shown below):



The sequence of module numbers will be continuous i.e. if four modules are fitted then they will always take the module numbers 1, 2, 3, and 4, etc.

A healthy node will have at least one signal conditioning module fitted.

At the end of the IcenI node configuration process, the ICENI/MA-01 will show a sequence of numbers on the display representing the signal conditioning modules detected in the IcenI node.

8.3 IcenI Node Fault Status Output

The fault status output will de-energise (unhealthy condition) under any of the following conditions:

- Power loss to IcenI node
- Node configuration in progress
- Failure of any IcenI signal conditioning module

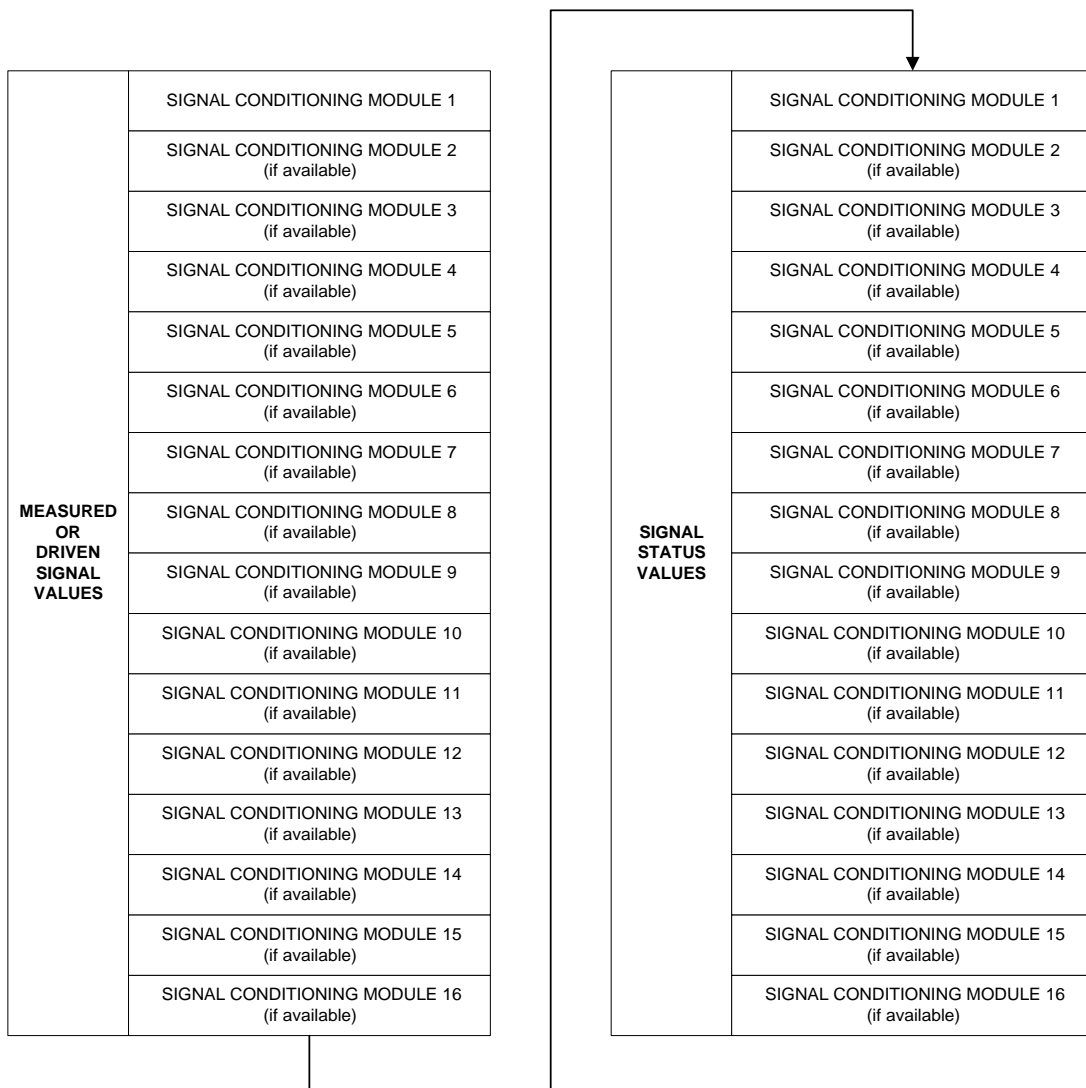
9 MASTER TO SIGNAL CONDITIONING MODULE DATA EXCHANGE

9.1 Process Image

9.1.1 Node Process Image

The ICENI/MA-01 module communicates node data to field equipment via the CANopen field communication network. The MODBUS protocol within the ICENI/MA-01 exchanges data with signal conditioning modules via a node process image.

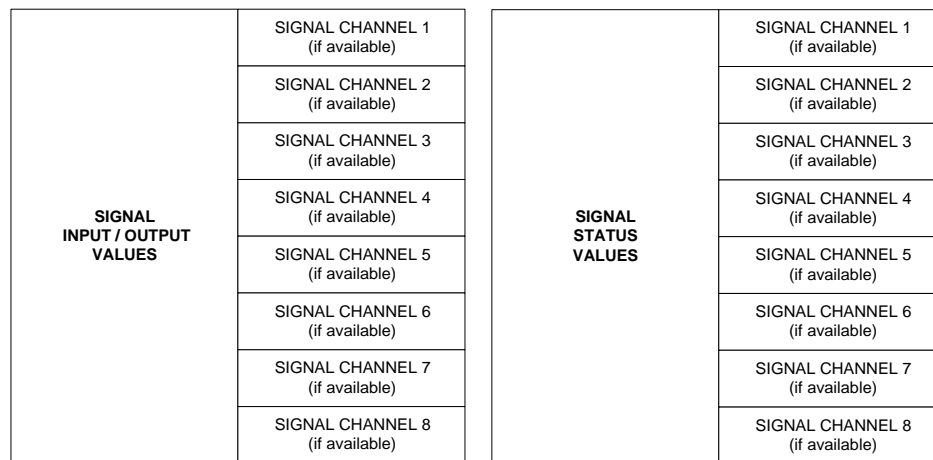
The diagram below shows how the node process image is constructed.



9.1.2 Signal Conditioning Module Process Image

Following configuration of the IcenI node, the ICENI/MA-01 communicates with each signal conditioning module via the ICENIbus to transfer data to / from the field communications network. The data is exchanged between ICENI/MA-01 and signal conditioning module via a signal conditioning module process image.

The diagram below shows how the signal conditioning module process image is constructed.



9.2 **Data Format**

9.2.1 Signal Inputs

Analogue Values

Analogue signal input values are presented on the field network in 'real world' format, i.e. a temperature measurement will be presented as a temperature value; a voltage measurement will be presented as a voltage value, etc.

The format for each type of signal will vary – refer to the specific signal conditioning module instruction manual for details.

Digital Values

Digital signal input values are presented on the field network as both analogue and digital values (see section 'MODBUS Field Communications Network').

9.2.2 Signal Output Values

Analogue Values

Analogue signal output values are written to the IcenI node in 'real world' format, i.e. a voltage output will be written as a voltage value; a current signal will be written as a current value, etc.

The format for each type of signal will vary – refer to the specific signal conditioning module instruction manual for details.

Digital Values

Digital signal output values are presented on the field network as both analogue and digital values (see section 'MODBUS Field Communications Network').

9.2.3 Signal Status Values

Each signal channel has a status value associated with it representing the operating condition of the channel. Typically this could be operating states such as 'healthy', 'open circuit' or 'short circuit'.

For normal healthy operation, the signal channel status will hold a value of 0x00.

If a signal channel is not present (e.g. channel 8 of a four channel module) then the signal channel status will hold a value of 0x07.

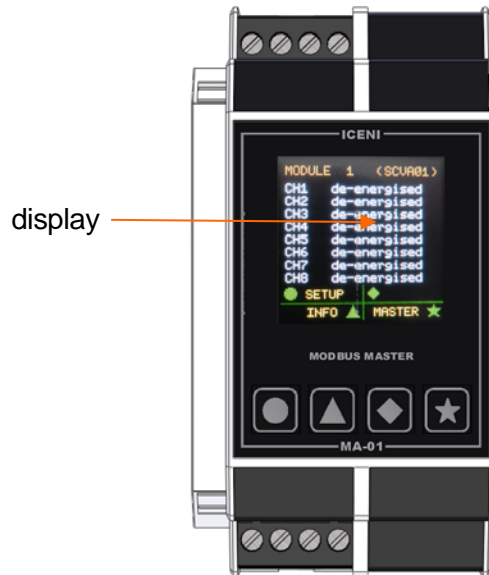
If the ICENI/MA-01 cannot successfully communicate with a signal conditioning module (e.g. the signal conditioning module has failed) then the signal channel status will hold a value of 0x08.

Other signal channel status values are described in detail in the specific signal conditioning module instruction manual.

10 MODULE USER INTERFACE

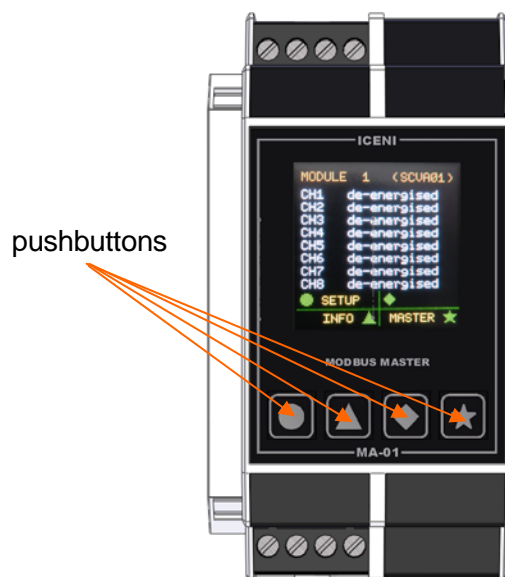
10.1 Physical Interface

The ICENI/MA-01 provides a colour dot matrix display to allow status information to be viewed, and configuration of module parameters.



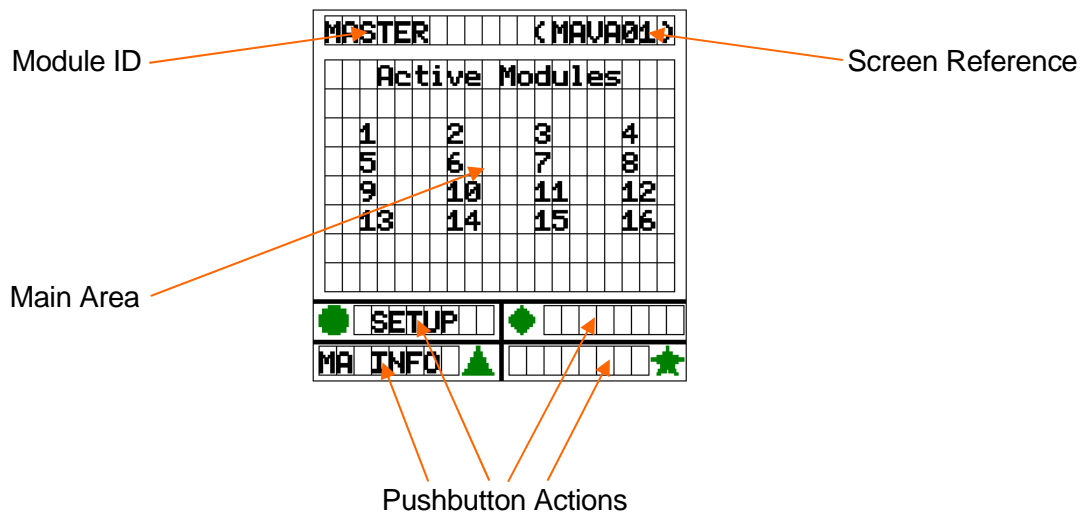
10.2 Keypad

The ICENI/MA-01 also provides a four button keypad to allow display screen navigation and configuration of module parameters.



10.3 Display Screen Format

There are a number of different display screens presented to the user, but they share a common format described below.



10.3.1 Module ID

This is the description of the module for which data is displayed on the display.

10.3.2 Screen Reference

Each screen layout has a unique reference shown in the top right hand corner.

10.3.3 Main Area

The central part of the screen is dedicated to status and parameter display. The screen layout in this area varies according to what is being presented.

10.3.4 Pushbutton Actions

The functions of the four pushbuttons dynamically change according to the screen layout presented on the display. The button action areas describe the function of each button should it be pressed.

10.4 Screensaver

Following initial power up, the ICENI/MA-01 has a built in screensaver function that is activated when no pushbutton activity has been sensed for five minutes. When this happens, the power to the display is automatically removed.

Any push button can be pressed to cancel the screen saver function and reset the screensaver inactivity timer back to zero. At this point power will be restored to the display.

10.5 User Interface Navigation

The four push buttons are used to navigate around the user interface. Each screen layout describes the action of each of the four push buttons and it is by following these actions that the user interface is navigated.

In addition to the four push buttons on the ICENI/MA-01, each signal conditioning module presents its own pushbutton on the top of its module enclosure. Pressing the button on a signal conditioning module provides a shortcut to the display of that module's signal values / status. However, the shortcut button is only active if the user is not already in the process of configuring parameters.

10.6 Changing the Configuration of Parameters

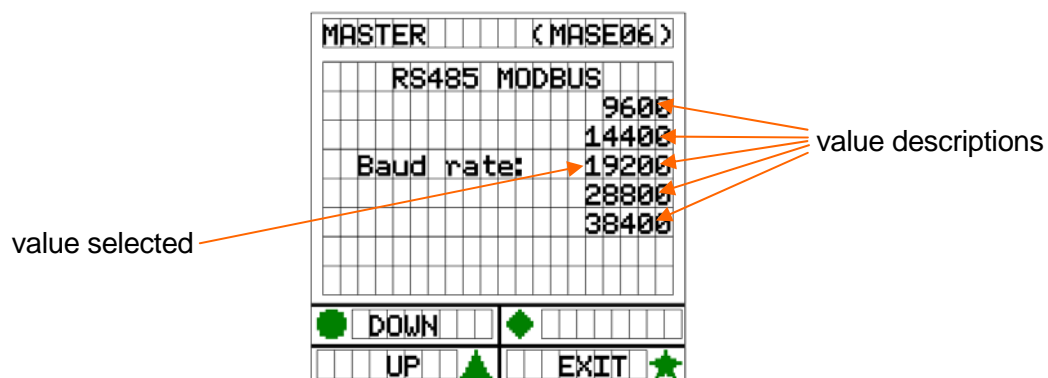
Using the four pushbuttons it is possible to change the value of certain parameters as part of the configuration progress.

Typically there are two types of edit function associated with parameters:-

- Selection from a list
- Numerical edit

10.6.1 Selection From a List

This method of editing is used when a parameter value is selected from a list of value descriptions, or when a continuous range of numerical values cannot be supported (e.g. 1 to 5 and 7 to 10, but not 6).



The selected value description is the one in line with the 'Baud Rate' text and is highlighted the same colour. All other value options are highlighted in yellow.

The 'down' and 'up' pushbuttons can be used to scroll through the list of value options.

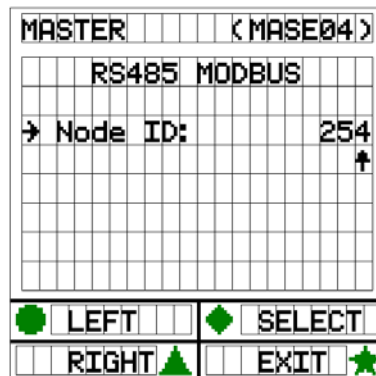
The 'exit' pushbutton should be pressed to complete the list edit.

10.6.2 Numerical Edit

This method of editing is used where the value can be presented in numerical format and a continuous range of numerical values can be supported.

This method of editing is done in multiple stages - character position selection followed by numerical value change.

Character Position Selection

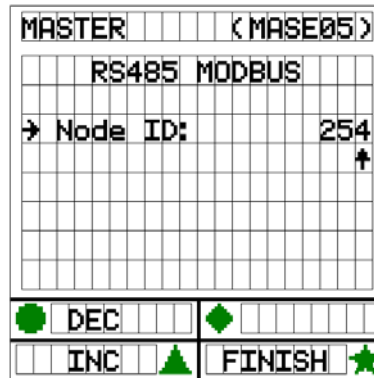


The numerical parameter will have a number of characters making up the value, i.e. if the maximum value held is 254 then there will be three characters for the parameter.

Using the 'left' or 'right' pushbuttons, the character to be changed can be selected. The character position is indicated by the selection cursor on the screen.

When the cursor is in the correct position, the 'select' pushbutton should be pressed.

Numerical Value Change



Using the 'dec' or 'inc' pushbuttons, the character numerical value can be nudged down or up one increment where the increment is equal to the character position. i.e. if the selection cursor is in the 'tens' column then when 'inc' pushbutton is pressed, the value will be increased by 10.

The numerical value can be nudged up or down within the boundaries of the maximum and minimum values for the parameter.

When the correct value is chosen, the 'finish' pushbutton should be pressed.

The 'exit' pushbutton should be pressed to complete the numerical edit.

11 PARAMETER STATUS DISPLAY

The user interface in the ICENI/MA-01 provides the following screens to display signal values and status:

11.1 Display of Signal Conditioning Module Status Information

11.1.1 (Master) Active Modules Screen [MAVA01]

Access: at power up or on return to master

Following power up of the ICENI/MA-01 and node configuration, the display automatically defaults to a screen showing the status of each of the signal conditioning modules within the node. For each module that has been successfully discovered and configured, the ICENI/MA-01 will display the module number on the screen in up to four rows of four numbers.

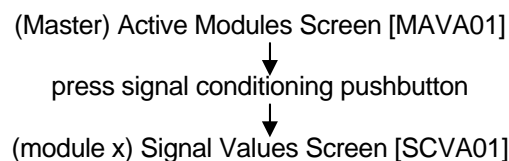
If a module has not been discovered during the configuration process, no number will be shown for that module number.

If a module has been discovered and it remains healthy, the module number will be shown in solid white characters.

If a module has been discovered but then becomes unhealthy, the module number will be shown in flashing red characters.

11.2 Display of Signal Value Information

The parameters can be located in the user interface via the following navigation:



The ICENI/MA-01 will display channel values for each of the module channels that are provided.

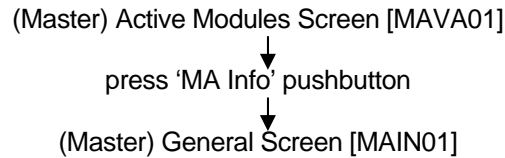
If a channel is healthy then the 'real world' value will be displayed.

If a channel is not healthy then a fault or alarm status will be displayed in place of the 'real world' value.

11.3 Display of Other Status Information

11.3.1 (Master) General Information

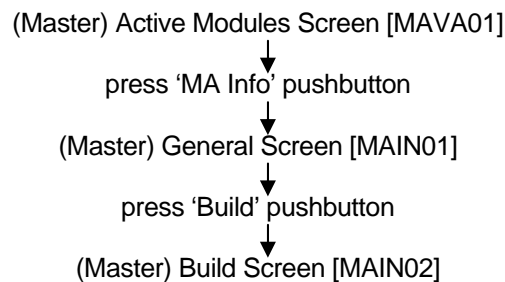
The parameters can be located in the user interface via the following navigation:



- 'Alarm O/P': if a signal conditioning module has failed, or no modules have been discovered during configuration then this parameter will show 'fault' otherwise the system is healthy and will show 'healthy'

11.3.2 (Master) Build Information

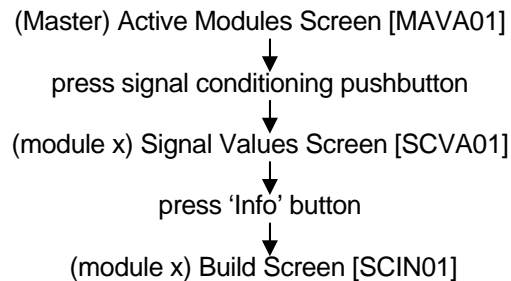
The parameters can be located in the user interface via the following navigation:



- Screen title description of the master module
- 'Part No': the part number of the master module
- 'S/W version': the version of software running in the master module
- 'S/W issue': the issue of software running in the master module

11.3.3 (Signal Conditioning) Build Information

The parameters can be located in the user interface via the following navigation:



- Screen title a description of the signal conditioning module
- 'Part No': the part number of the signal conditioning module
- 'S/W version': the version of software running in the signal conditioning module
- 'S/W issue': the issue of software running in the signal conditioning module

12 PARAMETER CONFIGURATION

The user interface in the ICENI/MA-01 provides the functionality to adjust and configure parameters.

12.1 ICENI/MA-01 Isolation During Configuration

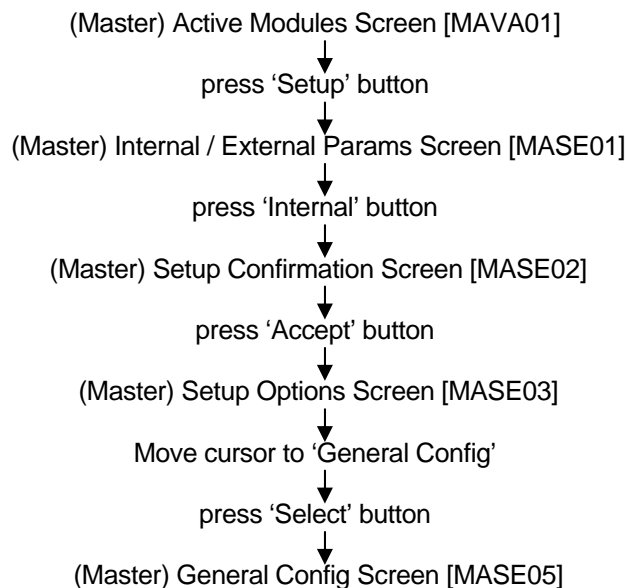
During configuration and storage of any parameters, the ICENI/MA-01 module will isolate itself from both the field communications network, and from communications with signal conditioning modules (any outputs will revert to their failsafe conditions and the module healthy light will flash). This ensures a safe and stable environment within which to configure parameters.

Communications will commence again once the ICENI/MA-01 has completed setup mode. The MODBUS network interface will be reset before communications begin.

12.2 Configuration of General Operating Parameters

A number of general operating parameters are configurable via the user interface.

The parameters can be located in the user interface via the following navigation:



12.2.1 Temperature Unit (°C / °F) Configuration

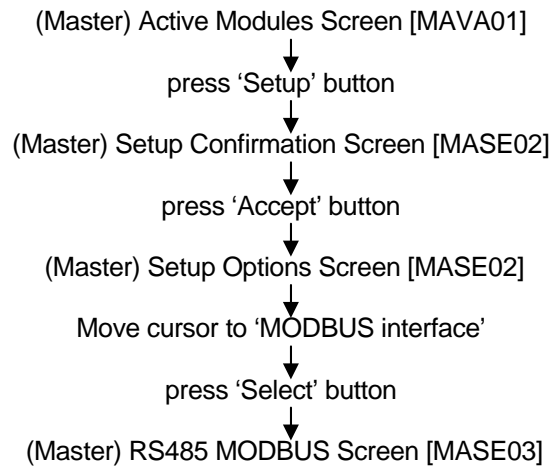
The parameter 'Temperature as' selects the type of temperature unit to be used (Celcius or Fahrenheit) and can be configured as °C or °F. (Edit is by selection from a list.)

Any 'real world' temperature values will be calculated according to the temperature unit in use.

12.3 Configuration of MODBUS Interface General Parameters

A number of CANopen interface general parameters are configurable via the user interface.

The parameters can be located in the user interface via the following navigation:



12.3.1 Node ID Configuration

The MODBUS node identity can be configured using the parameter 'Node ID'. (Edit is numerical).

The Node ID value can be edited from 1 to 247.

12.3.2 Baudrate Configuration

The MODBUS baud rate can be configured using the parameter 'Baud rate'. (Edit is by selection from a list.)

The ICENI/MA-01 master module supports the following baud rates:

1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, and 115200 baud

12.3.3 Parity Configuration

The MODBUS parity type function can be configured using the parameter 'Parity'. (Edit is by selection from a list.)

The ICENI/MA-01 master module supports 'even', 'odd' and 'none' (no parity) configurations.

12.3.4 Stop Bits Configuration

The MODBUS stop bits can be configured using the parameter 'Stop Bits'. (Edit is by selection from a list.)

The ICENI/MA-01 master module supports '1' or '2' stop bits.

12.3.5 Alarm Configuration

The MODBUS alarm can be configured using the parameter 'Alarm' and 'Alarm Time'.

The ICENI/MA-01 master module can be configured to monitor the health status of the MODBUS field network and de-activate its fault status output should no healthy message be received from a MODBUS master within 'Alarm Time' of the last healthy MODBUS master message.

To enable this functionality the 'Alarm' parameter must not be set to 'enabled'.

If the 'Alarm' parameter is not set to 'enabled' and no healthy MODBUS master message has been received within the given timescale, the fault status output will de-energise and any signal conditioning module outputs will be controlled according to the 'Alarm' setting:

'frozen': signal conditioning outputs remain at their last driven values;

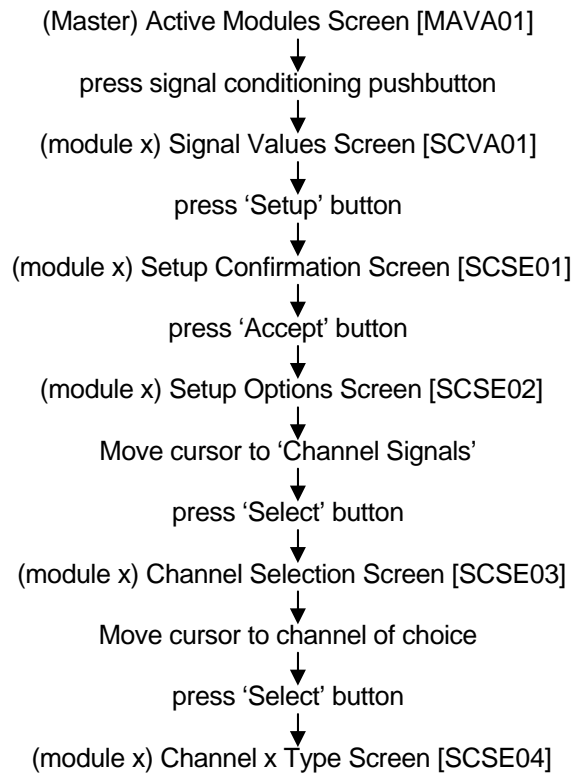
'failsafe': signal conditioning outputs are driven to their failsafe (power down) values

The MODBUS alarm function self-resets when healthy communications with a MODBUS master module resumes.

12.4 Configuration of Signal Channel Types

The selection of a particular signal type (e.g., a thermocouple module may support a number of different sensor types for each signal channel) is configurable via the user interface.

The parameters can be located in the user interface via the following navigation:



The screen will present the various signal type options for the specific signal channel to be configured. (Edit is by selection from a list.)

13 MODBUS FIELD COMMUNICATIONS NETWORK

The ICENI/MA-01 master module supports RS485 MODBUS RTU communications as a slave node.

As described previously, a generic IcenI signal conditioning module process image takes the format shown in the diagram on the left below, where sixteen data slots are filled with up to eight measured or driven signal values and up to eight signal status values.

MEASURED / DRIVEN SIGNAL VALUES	CHANNEL 1 MEASURED / DRIVEN VALUE (if available)
	CHANNEL 2 MEASURED / DRIVEN VALUE (if available)
	CHANNEL 3 MEASURED / DRIVEN VALUE (if available)
	CHANNEL 4 MEASURED / DRIVEN VALUE (if available)
	CHANNEL 5 MEASURED / DRIVEN VALUE (if available)
	CHANNEL 6 MEASURED / DRIVEN VALUE (if available)
	CHANNEL 7 MEASURED / DRIVEN VALUE (if available)
	CHANNEL 8 MEASURED / DRIVEN VALUE (if available)
SIGNAL STATUS VALUES	CHANNEL 1 STATUS VALUE (if available)
	CHANNEL 2 STATUS VALUE (if available)
	CHANNEL 3 STATUS VALUE (if available)
	CHANNEL 4 STATUS VALUE (if available)
	CHANNEL 5 STATUS VALUE (if available)
	CHANNEL 6 STATUS VALUE (if available)
	CHANNEL 7 STATUS VALUE (if available)
	CHANNEL 8 STATUS VALUE (if available)

Generic IcenI Signal Conditioning
Module Process Image

13.1 MODBUS Addressing

13.1.1 Channel Values

MODBUS addressing is as follows:

CHANNEL VALUE			CHANNEL VALUE		
ADDRESS	MODULE	CHANNEL	ADDRESS	MODULE	CHANNEL
0	1	1	32	5	1
1		2	33		2
2		3	34		3
3		4	35		4
4		5	36		5
5		6	37		6
6		7	38		7
7		8	39		8
8	2	1	40	6	1
9		2	41		2
10		3	42		3
11		4	43		4
12		5	44		5
13		6	45		6
14		7	46		7
15		8	47		8
16	3	1	48	7	1
17		2	49		2
18		3	50		3
19		4	51		4
20		5	52		5
21		6	53		6
22		7	54		7
23		8	55		8
24	4	1	56	8	1
25		2	57		2
26		3	58		3
27		4	59		4
28		5	60		5
29		6	61		6
30		7	62		7
31		8	63		8

CHANNEL VALUE		
ADDRESS	MODULE	CHANNEL
64	9	1
65		2
66		3
67		4
68		5
69		6
70		7
71		8
72	10	1
73		2
74		3
75		4
76		5
77		6
78		7
79		8
80	11	1
81		2
82		3
83		4
84		5
85		6
86		7
87		8
88	12	1
89		2
90		3
91		4
92		5
93		6
94		7
95		8

CHANNEL VALUE		
ADDRESS	MODULE	CHANNEL
96	13	1
97		2
98		3
99		4
100		5
101		6
102		7
103		8
104	14	1
105		2
106		3
107		4
108		5
109		6
110		7
111		8
112	15	1
113		2
114		3
115		4
116		5
117		6
118		7
119		8
120	16	1
121		2
122		3
123		4
124		5
125		6
126		7
127		8

13.1.2 Channel Status

MODBUS addressing is as follows:

CHANNEL STATUS			CHANNEL STATUS		
ADDRESS	MODULE	CHANNEL	ADDRESS	MODULE	CHANNEL
0	1	1	32	5	1
1		2	33		2
2		3	34		3
3		4	35		4
4		5	36		5
5		6	37		6
6		7	38		7
7		8	39		8
8	2	1	40	6	1
9		2	41		2
10		3	42		3
11		4	43		4
12		5	44		5
13		6	45		6
14		7	46		7
15		8	47		8
16	3	1	48	7	1
17		2	49		2
18		3	50		3
19		4	51		4
20		5	52		5
21		6	53		6
22		7	54		7
23		8	55		8
24	4	1	56	8	1
25		2	57		2
26		3	58		3
27		4	59		4
28		5	60		5
29		6	61		6
30		7	62		7
31		8	63		8

CHANNEL STATUS		
ADDRESS	MODULE	CHANNEL
64	9	1
65		2
66		3
67		4
68		5
69		6
70		7
71		8
72	10	1
73		2
74		3
75		4
76		5
77		6
78		7
79		8
80	11	1
81		2
82		3
83		4
84		5
85		6
86		7
87		8
88	12	1
89		2
90		3
91		4
92		5
93		6
94		7
95		8

CHANNEL STATUS		
ADDRESS	MODULE	CHANNEL
96	13	1
97		2
98		3
99		4
100		5
101		6
102		7
103		8
104	14	1
105		2
106		3
107		4
108		5
109		6
110		7
111		8
112	15	1
113		2
114		3
115		4
116		5
117		6
118		7
119		8
120	16	1
121		2
122		3
123		4
124		5
125		6
126		7
127		8

13.2 MODBUS Supported Functions

In general, the ICENI/MA-01 supports the following MODBUS functions:

- 1 read coils
- 2 read discrete inputs
- 3 read holding registers
- 4 read input registers
- 5 write single coil
- 6 write single register
- 15 write multiple coils
- 16 write multiple registers

However, the use of these functions to access channel values is restricted according to channel / module type. The table below shows the supported function calls according to channel / module type.

MODBUS FUNCTION	CHANNEL TYPE			
	DIGITAL INPUT	DIGITAL OUTPUT	ANALOGUE INPUT	ANALOGUE OUTPUT
1	✓	✓*	✓	✓*
2	✓	✓*	✓	✓*
3	✓	✓	✓	✓
4	✓	✓	✓	✓
5	x	✓	x	x
6	x	✓	x	✓
15	✓*	✓	✓*	✓*
16	✓*	✓	✓*	✓

* If this function call is used then no exception will be returned.

Additionally, if for example a four channel module was positioned between two eight channel modules, the ICENI/MA-01 master permits a function read / write of twelve inputs or outputs without returning an exception for the four missing channels.

14 CONTACT

For sales or support enquiries, the following contact details should be used. The product part number and serial number (where available) should be referenced.

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15 REVISION HISTORY

REVISION	DATE	AUTHOR	CHANGES
1	22.04.14	MMB	Original



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