M-2017 User Manual

Warranty

All products manufactured by ICP DAS are under warranty regarding defective materials for a period of one year from the date of delivery to the original purchaser.

Warning

ICP DAS assumes no liability for damages resulting from the use of this product. ICP DAS reserves the right to change this manual at any time without notification. The information furnished by ICP DAS is believed to be accurate and reliable. However, no responsibility is assumed by ICP DAS for its use, or for any infringements of patents or other rights of third parties resulting from its use.

Copyright

Copyright 1999 - 2015 ICP DAS. All rights reserved.

Trademark

The names used for identification only may be registered trademarks of their respective companies.

Date: 2021/01/14

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Table of Contents

1. Introduction 4
    1.1 More Information 6
    1.2 Terminal Assignment 7
    1.3 Specifications 9
    1.4 Block Diagrams 10
        1.4.1 Block diagram for the M-2017 10
    1.5 Dimensions 11
    1.6 Wiring Diagrams 12
        1.6.1 Wiring diagram for the M-2017 12
        1.6.2 Wiring Recommendations 12
    1.7 Quick Start 13
    1.8 Default Settings 15
    1.9 Calibration 16
    1.10 Configuration Tables 17
    1.11 M-2000 Notes 22
        1.11.1 Protocol Switching 22
        1.11.2 INIT Mode 23
    1.12 Technical Support 24
2. DCON Protocol 25
    2.1 %AANNTTCCFF 29
    2.2 #AA 33
    2.3 #AAN 35
    2.4 $AA0 37
    2.5 $AA1 39
    2.6 $AA2 41
    2.7 $AA5VV 43
    2.8 $AA6 45
    2.9 $AA7CiRrr 47
    2.10 $AA8Ci 49
    2.11 $AAA 51
    2.12 $AAF 53
    2.13 $AAM 54
    2.14 $AAP 56
    2.15 $AAPN 58
    2.16 $AAS1 60
    2.17 ~AACT 62
    2.18 ~AACTVV 64
    2.19 ~AAEV 66
    2.20 ~AAO(Name) 68
    2.21 ~AARD 70

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

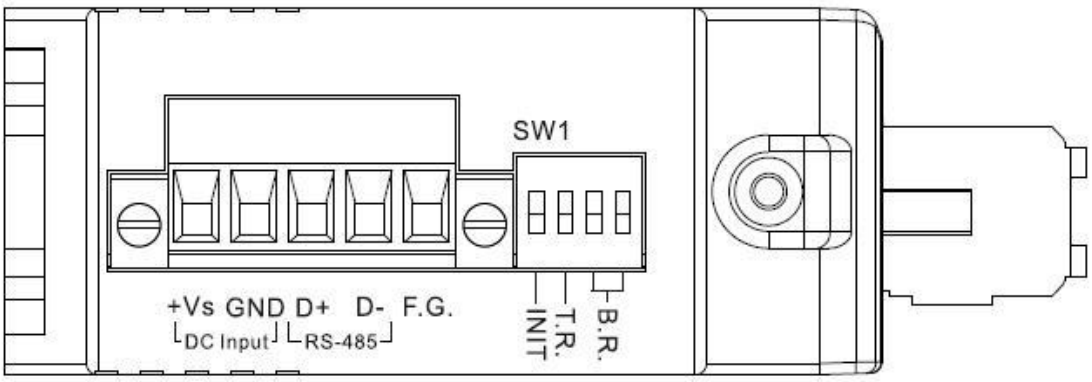
2.22 ~AARDVV 72
2.23 ~** 74
2.24 ~AA0 75
2.25 ~AA1 77
2.26 ~AA2 79
2.27 ~AA3EVV 81
3. Modbus RTU Protocol 83
3.1 02 (0x02) Read Input Status 84
3.2 04 (0x04) Read Input Channels 85
3.3 70 (0x46) Read/Write Module Settings 86
3.3.1 Sub-function 00 (0x00) Read module name 87
3.3.2 Sub-function 04 (0x04) Set module address 88
3.3.3 Sub-function 05 (0x05) Read communication settings 89
3.3.4 Sub-function 06 (0x06) Set communication settings 90
3.3.5 Sub-function 07 (0x07) Read type code 91
3.3.6 Sub-function 08 (0x08) Set type code 92
3.3.7 Sub-function 32 (0x20) Read firmware version 93
3.3.8 Sub-function 37 (0x25) Read channel enabled/disabled status 94
3.3.9 Sub-function 38 (0x26) Set channel enable/disable 95
3.3.10 Sub-function 41 (0x29) Read miscellaneous settings 96
3.3.11 Sub-function 42 (0x2A) Write miscellaneous settings 97
3.4 Address Mappings 98
3.4.1 M-2017 Address Mappings 98
3.5 Engineering Data Format Table 100
4. Troubleshooting 101
4.1 Communicating with the module 102
4.2 Reading Data 103
A. Appendix 104
A.1 INIT Mode 104
A.2 Dual Watchdog Operation 106
A.3 Frame Ground 107
Revision History 108

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1. Introduction

The M-2000 series is a family of network data acquisition and control modules, providing analog-to-digital, digital-to-analog, digital input/output, timer/counter and other functions. The modules can be remotely controlled using a set of commands, which we call the DCON protocol, or the standard Modbus RTU protocol. Communication between the module and the host is via an RS-485 bi-directional serial bus standard. Baud Rates are software programmable and transmission speeds of up to 115.2K baud can be selected.

The M-2000 modules feature a new design for the frame ground and INIT switch as shown in the figure below. The frame ground provides enhanced static protection (ESD) abilities and ensures the module is more reliable. The INIT switch allows INIT mode to be accessed more easily. Refer to Sections A.1 and A.3 for more details.



The M-2017 is an 8-channel voltage and current input module, with the ability to connect various types of inputs to a single module. It supports for fast mode, 60 samples/second. The M-2017 modules are designed for industrial plant environments and have special input

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

circuits to provide 240Vrms continuous overload protection.

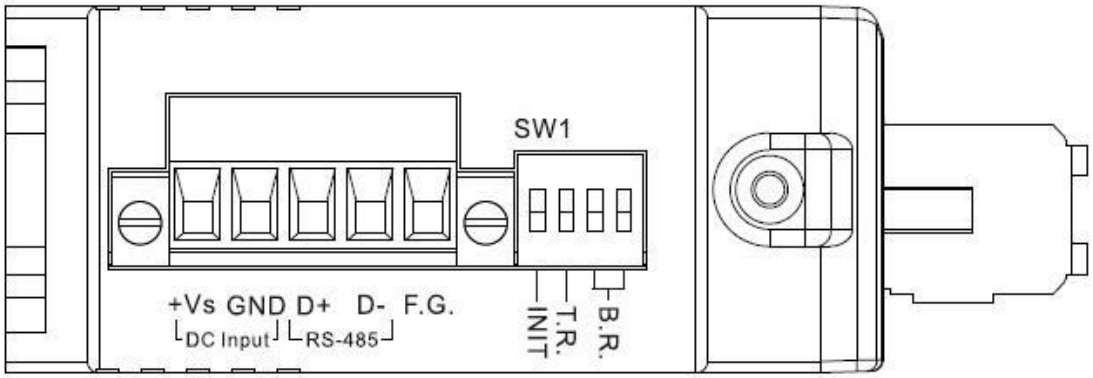
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.1 More Information

Please visit the ICP DAS website http://www.icpdas.com for more information regarding the M-2000 series.

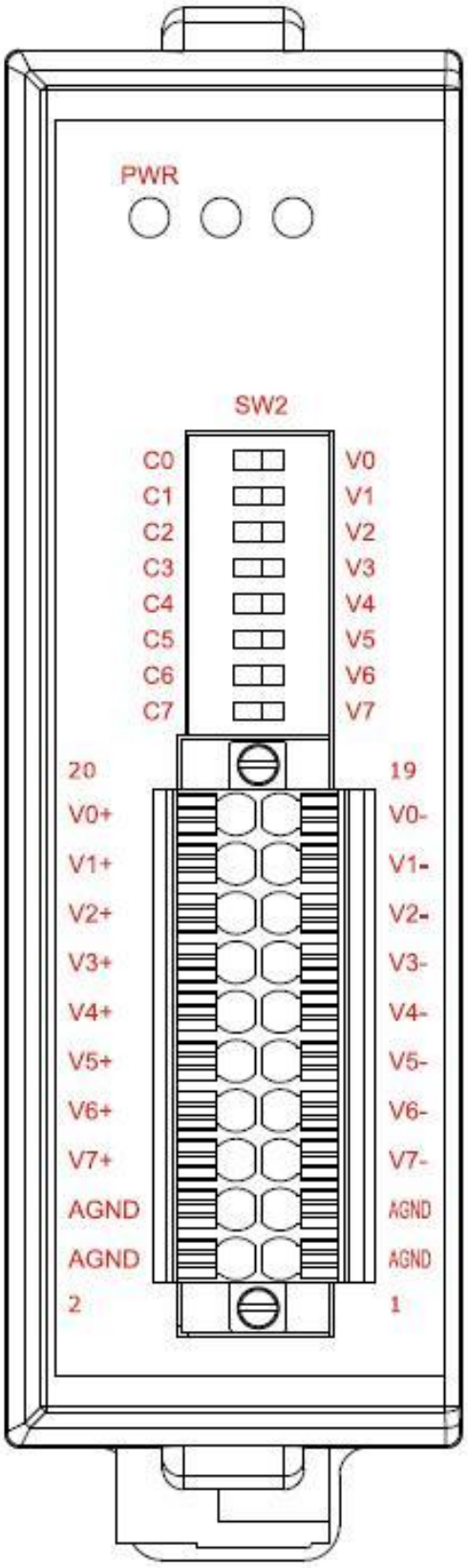
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.2 Terminal Assignment



SW1	
INIT	On for INIT mode
T.R.	On to provide 120 ohm terminal resistance on the RS-485 bus
B.R.	On to provide 1k ohm bias resistance on the RS-485 bus. If the RS-485 converter does not provide the bias, then both of the B.R. switches should be turned on.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.3 Specifications

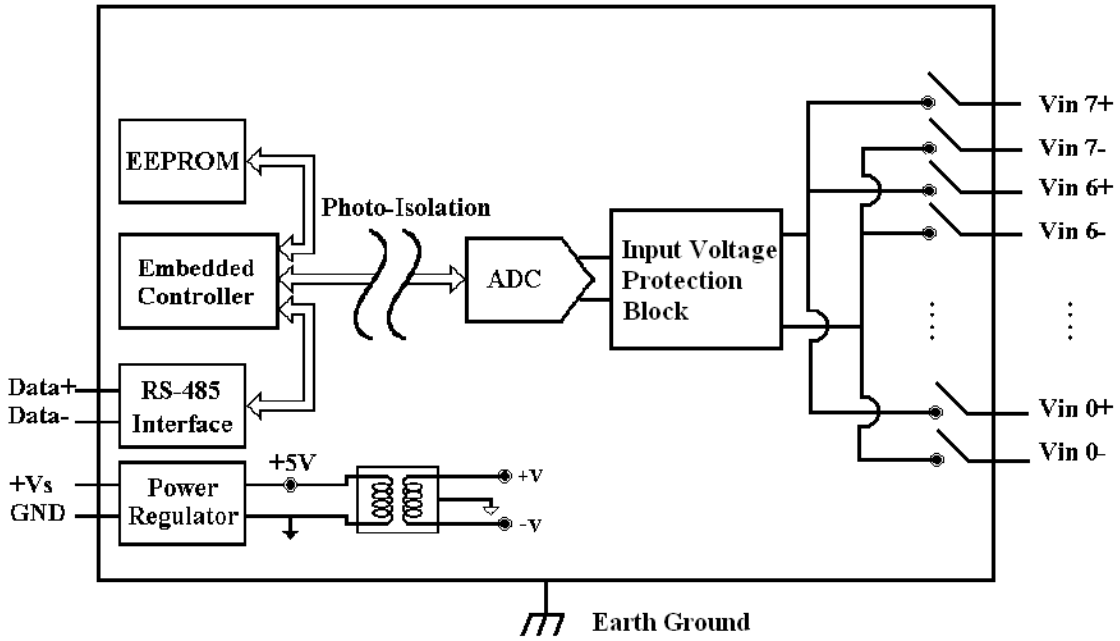
	M-2017
Analog Input	
Input Channels	8 differential
Input Type	mV, V, mA (switch selectable)
Sampling Rate	10 samples/sec (normal) 60 samples/sec (fast)
Bandwidth	15.7Hz (normal) 78.7Hz (fast)
Accuracy	±0.1% (normal) ±0.5% (fast)
Zero Drift	20μV/℃
Span Drift	25ppm/℃
CMR@50/60Hz	86dB min
NMR@50/60Hz	100dB min
Input Impedance	1MΩ
Current Impedance	125Ω, 1/4W
Voltage overload Protection	±240V
Isolation	3000V DC
Individual Channel Configurable	Yes
Modbus RTU	Yes
Power	
Requirement	+10 to +48V DC
Consumption	0.6W
Temperature Range	
Operating	-25℃ to +75℃
Storage	-30℃ to +75℃

Note: A warm up period of 30 minutes is recommended in order to achieve the complete performance results described in the specifications.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.4 Block Diagrams

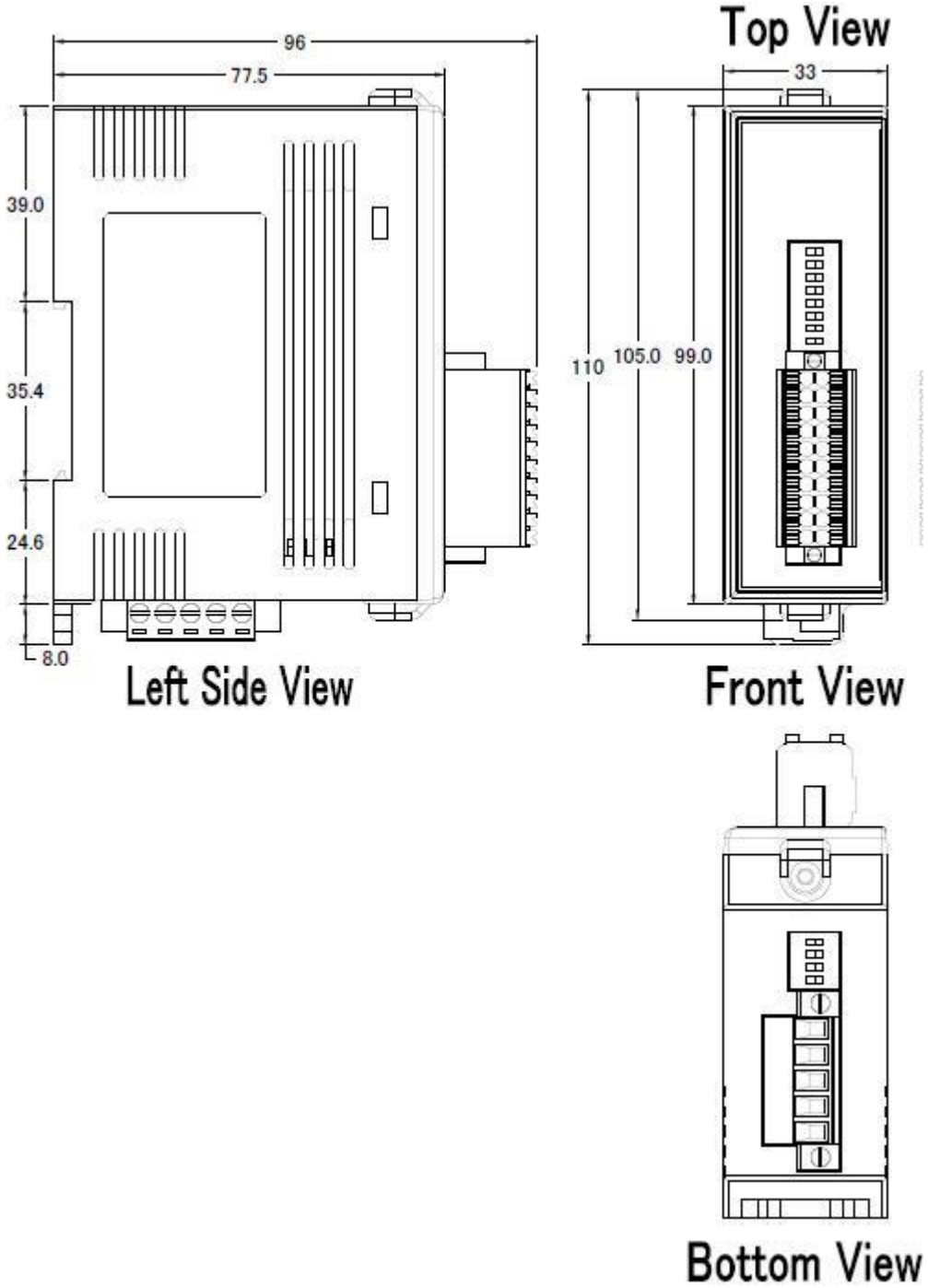
1.4.1 Block diagram for the M-2017



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.5 Dimensions

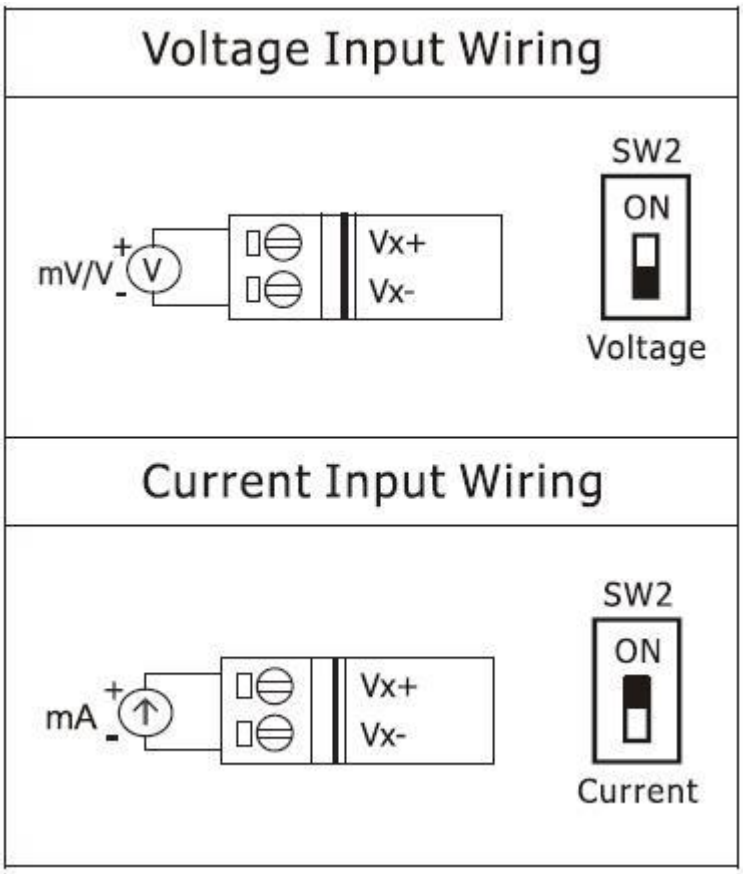
The dimensions of the M-2017 are as shown below.



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.6 Wiring Diagrams

1.6.1 Wiring diagram for the M-2017



1.6.2 Wiring Recommendations

- Use 26-12 AWG wire for signal connections.
- Strip the wire to a length of 7±0.5mm.
- Use a crimp terminal for wiring.
- Avoid high-voltage cables and power equipment as much as possible.
- For RS-485 communication, use insulated and twisted pair 24 AWG wire, e.g. Belden 9841.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.7 Quick Start

To install the module, follow the steps below:

1. Connect the analog input. See Section 1.2 for the terminal assignment and Section 1.6 for the wiring diagram.
2. Connect the module to the RS-485 network using the DATA+ and DATA- terminals. See Section 1.2 for the terminal assignment. If the host is only equipped with an RS-232 interface, then an RS-232 to RS-485 converter will be required. Refer to the "**I-7000 Bus Converter User's Manual**" for more information.
3. Connect the module to the power supply using the +Vs and GND terminals. See Section 1.2 for the terminal assignment. Note that the voltage supplied should be in the range of +10 to +48V DC.
4. For DCON protocol, configure the module by sending the %AANNTTCCFF and $AA7CiRrr commands. See Section 2.1 and 2.9 for details. For Modbus RTU protocol, configure the module using the following Modbus registers: 40257, 40485 and 40486. See Section 3.4.1 for details.
   The default settings for the module can be found in Section 1.8.
5. For DCON protocol, in order to read data from the input channels, send either the #AA or #AAN command to the module. See Sections 2.2 and 2.3 for details. For the Modbus RTU protocol, use Function 04h to read the data from the input channels. See Section 3.2 for details.
6. If the host is a PC with a Windows operating system installed, the DCON Utility can be used to allow easy configuration and reading of data. The DCON Utility

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

can be downloaded from the ICP DAS website (http://www.icpdas.com). The documentation for the DCON Utility can be found in the ”**Getting Started For I-7000 Series Modules**” manual.

Refer to the “**I-7000 Bus Converter User’s Manual**” and ”**Getting Started For I-7000 Series Modules**” manuals for more details. The “**Getting Started For I-7000 Series Modules**” manual can be downloaded from the ICP DAS website (http://www.icpdas.com).

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.8 Default Settings

Default settings for the M-2017 are:

- Protocol: Modbus RTU
- Module address: 01
- Analog input type: Type 08, -10V to 10V
- Baud Rate: 9600 bps
- Filter set at 60Hz rejection
- Normal mode

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.9 Calibration

Warning: *It is not recommended that calibration be performed until the process is fully understood.*

The calibration procedure is as follows:

1. Warm up the module for 30 minutes.
2. Set the type code of channel 0 to the type you want to calibrate. Refer to Sections 2.9 for details.
3. Enable calibration. Refer to Section 2.17 for details.
4. Apply the zero calibration voltage/current to channel 0.
5. Send the zero calibration command. Refer to Sections 2.5 for details.
6. Apply the span calibration voltage/current to channel 0.
7. Send the span calibration command. Refer to Sections 2.4 for details.
8. Repeat steps 3 to 7 three times.

Notes:

1. When calibrating type 0D for the M-2017, the SW2 switch of channel 0 should be set to the ON position.
2. Calibration voltages and currents are shown below.
3. The M-2000 series modules must be switched to the DCON protocol mode before calibrating. Refer to Section 1.11.1 for details of the switching protocol.

Calibration voltages/current used by the M-2017:

Type Code	08	09	0A	0B	0C	0D
Zero Input	0V	0V	0V	0mV	0mV	0mA
Span Input	+10V	+5V	+1V	+500mV	+150mV	+20mA

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.10 Configuration Tables

Baud Rate Setting (CC)

7	6	5	4	3	2	1	0
Data		Baud					

Key	Description
Baud	Baud Rate 03: 1200 04: 2400 05: 4800 06: 9600 07: 19200 08: 38400 09: 57600 0A: 115200
Data	Data Format 0: N81 1: N82 2: E81 3: O81

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Analog Input Type Setting (TT)

Type Code	Analog Input Type	Range
07	+4 to +20mA	4mA ~ 20mA
08	+/-10V	-10V ~ 10V
09	+/-5V	-5V ~ 5V
0A	+/-1V	-1V ~ 1V
0B	+/-500mV	-500mV ~ 500mV
0C	+/-150mV	-150mV ~ 150mV
0D	+/-20mA	-20mA ~ 20mA
1A	0 to +20mA	0 ~ 20mA
1D	+4 to +20mA	4mA ~ 20mA

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Data Format Setting (FF)

7	6	5	4	3	2	1	0
FS	CS	MS	Reserved			DF	

Key	Description
DF	Data format 00: Engineering unit 01: % of FSR (full scale range) 10: 2’s complement hexadecimal
MS	Mode settings 0: Normal mode (16 bits) 1: Fast mode (12 bits)
CS	Checksum settings 0: Disabled 1: Enabled
FS	Filter settings 0: 60Hz rejection 1: 50Hz rejection

Note: The reserved bits should be zero.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Analog Input Type and Data Format Table

Type code	Input Type	Data Format	+F.S	-F.S.
07	+4 to +20 mA	Engineering unit	+20.000	+04.000
		% of FSR	+100.00	+000.00
		2's comp HEX	FFFF	0000
08	-10 to +10 V	Engineering unit	+10.000	-10.000
		% of FSR	+100.00	-100.00
		2's comp HEX	7FFF	8000
09	-5 to +5 V	Engineering unit	+5.0000	-5.0000
		% of FSR	+100.00	-100.00
		2's comp HEX	7FFF	8000
0A	-1 to +1 V	Engineering unit	+1.0000	-1.0000
		% of FSR	+100.00	-100.00
		2's comp HEX	7FFF	8000
0B	-500 to +500 mV	Engineering unit	+500.00	-500.00
		% of FSR	+100.00	-100.00
		2's comp HEX	7FFF	8000
0C	-150 to +150 mV	Engineering unit	+150.00	-150.00
		% of FSR	+100.00	-100.00
		2's comp HEX	7FFF	8000
0D	-20 to +20 mA	Engineering unit	+20.000	-20.000
		% of FSR	+100.00	-100.00
		2's comp HEX	7FFF	8000
1A	0 to +20 mA	Engineering unit	+20.000	+00.000
		% of FSR	+100.00	+000.00
		2's comp HEX	FFFF	0000
1D	4 to +20 mA	Engineering unit	+20.000	+04.000
		% of FSR	+100.00	+020.00
		2's comp HEX	FFFF	1999

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4 ~ 20 mA, type code 07, and 0 ~ 20 mA under range reading with DCON protocol

	Under Range
Engineering Unit	-9999.9
% of FSR	-999.99
2’s Complement HEX	0000

4 ~ 20 mA, type code 1D, under range reading with DCON protocol

	Under Range
Engineering Unit	-00.000
% of FSR	-000.00
2’s Complement HEX	0000

4 ~ 20 mA, type code 07, and 0 ~ 20 mA under range reading with Modbus protocol

	Under Range
Engineering Unit	-32768
2’s Complement HEX	0000

4 ~ 20 mA, type code 1D, under range reading with Modbus protocol

	Under Range
Engineering Unit	0
2’s Complement HEX	0000

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.11 M-2000 Notes

The M-2000 series support for the Modbus RTU communication protocol, which is the default protocol of the M-2000 series. The communication Baud Rates for the Modbus RTU protocol can be in the range of 1200 bps to 115200 bps.

Modbus functions supported by the module are described in Chapter 3.

1.11.1 Protocol Switching

To switch to the DCON protocol:

1. Set the Modbus register 00257 to 0. See Section 3.4.1 for details.
2. After a power-on reset, the communication protocol will be changed to DCON.

To switch to the Modbus RTU protocol:

1. Sends the $AAPN command and set N to a value of 1. Note that the SW1 INIT switch on the bottom side of the module should be set to the ON position, see the figure on the next page. See Section 2.15 for details.
2. After a power-on reset, the communication protocol will be changed to the Modbus RTU protocol.

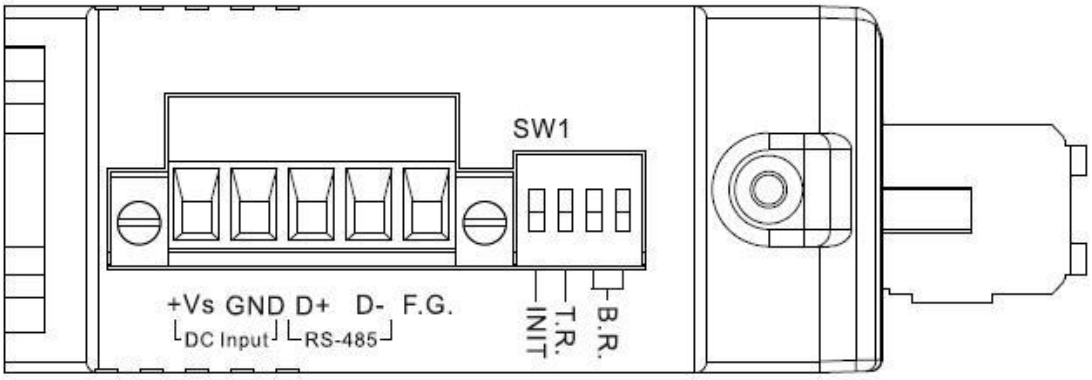
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.11.2 INIT Mode

When the module is powered on, with the SW1 INIT switch set to the ON position as shown in the figure below, the module is in INIT mode, (see Section A.1 for details), and the communication settings are as follows:

1. Address: 00
2. Baud Rate: 9600 bps
3. No checksum
4. Protocol: DCON

If communication with the module is not possible, set the module to the INIT mode and use the above settings to communicate with the module. To read the current settings, send the commands $AA2, (see Section 2.6), and $AAP, (see Section 2.14). To set new settings, send the commands %AANNTTCCFF, (see Section 2.1) and $AAPN, (see Section 2.15). The new communication settings will be effective after the next power-on reset.



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.12 Technical Support

Should you encounter problems while using the M-2000 module, and are unable to find the help you need in this manual or on our website, please contact ICP DAS Product Support.

Email: service@icpdas.com
Website: http://www.icpdas.com.tw/contact_us/contact_us.html

When requesting technical support, be prepared to provide the following information about your system:

1. Module name and serial number: The serial number can be found printed on the barcode label attached to the cover of the module.
2. Firmware version: See Section 2.12 and 3.4, Modbus registers 40481 and 40482, for information regarding the command used to identify the firmware version.
3. Host configuration (type and operating system)
4. If the problem is reproducible, please give full details describing the procedure used to reproduce the problem.
5. Specific error messages displayed. If a dialog box with an error message is displayed, please include the full text of the dialog box, including the text in the title bar.
6. If the problem involves other programs or hardware devices, please describe the details of the problem in full.
7. Any comments and suggestions related to the problem are welcome.

ICP DAS will reply to your request by email within three business days.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2. DCON Protocol

All communication with M-2000 modules consists of commands generated by the host and responses transmitted by the M-2000 modules. Each module has a unique ID number that is used for addressing purposes and is stored in non-volatile memory. The ID is 01 by default and can be changed using a user command. All commands to the modules contain the ID address, meaning that only the addressed module will respond. The only exception to this is command ~** (Section 2.23), which are sent to all modules, but in these cases, the modules do not reply to the command.

Command Format:

Leading Character	Module Address	Command	[CHKSUM]	CR

Response Format:

Leading Character	Module Address	Data	[CHKSUM]	CR

CHKSUM A 2-character checksum that is present when the checksum setting is enabled. See Section 1.10 and 2.1 for details.

CR End of command character, carriage return (0x0D)

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Checksum Calculation:

1. Calculate the ASCII code sum of all the characters in the command/response string except for the carriage return character (CR).
2. The checksum is equal to the sum masked by 0ffh.

Example:

Command string: $012(CR)

1. Sum of the string = “$”+”0”+”1”+”2” = 24h+30h+31h+32h = B7h
2. Therefore the checksum is B7h, and so CHKSUM = “B7”
3. The command string with the checksum = $012B7(CR)

Response string: !01200600(CR)

1. Sum of the string = “!”+”0”+”1”+”2”+”0”+”0”+”6”+”0”+”0” = 21h+30h+31h+32h+30h+30h+36h+30h+30h = 1AAh
2. Therefore the checksum is AAh, and so CHKSUM = “AA”
3. The response string with the checksum = !01200600AA(CR)

Note:

All characters should be in upper case.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

General Command Sets			
Command	**Response**	**Description**	**Section**
%AANNTTCCFF	!AA	Set Module Configuration	2.1
#AA	>(Data)	Reads the Analog Inputs of All Channels	2.2
#AAN	>(Data)	Reads the Analog Input of the Specified Channel	2.3
$AA0	!AA	Performs a Span Calibration	2.4
$AA1	!AA	Performs a Zero Calibration	2.5
$AA2	!AANNTTCCFF	Reads the Module Configuration	2.6
$AA5VV	!AA	Enables/Disables the Channel	2.7
$AA6	!AAVV	Reads the Channel Enable/Disable Status	2.8
$AA7CiRrr	!AA	Sets the Single Channel Range Configuration	2.9
$AA8Ci	!AACiRrr	Reads the Single Channel Range Configuration	2.10
$AAA	>(data)	Reads the Analog Inputs of All Channels in Hex Format	2.11
$AAF	!AA(Data)	Reads the Firmware Version	2.12
$AAM	!AA(Data)	Reads the Module Name	2.13
$AAP	!AASC	Reads the Protocol	2.14
$AAPN	!AA	Sets the Protocol	2.15
$AAS1	!AA	Reloads the Default Calibration Parameters	2.16
~AACT	!AAVV	Reads the 4mA under range threshold	2.17
~AACTVV	!AA	Sets the 4mA under range threshold	2.18
~AAEV	!AA	Enables/Disables the Calibration	2.19
~AAO(Name)	!AA	Sets the Module Name	2.20
~AARD	!AAVV	Reads the response delay setting	2.21
~AARDVV	!AA	Sets the response delay setting	2.22

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Host Watchdog Command Sets			
Command	**Response**	**Description**	**Section**
~**	No Response	Host OK	2.23
~AA0	!AASS	Reads the Host Watchdog Status	2.24
~AA1	!AA	Resets the Host Watchdog Status	2.25
~AA2	!AAETT	Reads the Host Watchdog Timeout Settings	2.26
~AA3ETT	!AA	Sets the Host Watchdog Timeout Settings	2.27

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.1 %AANNTTCCFF

Description:

Sets the configuration of an analog input module.

Syntax:

%AANNTTCCFF[CHKSUM](CR)

% Delimiter character

AA Address of the module to be configured in hexadecimal format (00 to FF)

NN New address of the module in hexadecimal format (00 to FF)

TT New type code, see Section 1.11 for details. Not used by the M-2017. For the M-2017, use the $AA7CiRrr command to set the type of each channel, see Section 2.9 for details.

CC New Baud Rate code, see Section 1.10 for details. To change the Baud Rate, the INIT switch must be switched to the ON position. See Section A.1 for details.

FF Used to set the data format, checksum, and filter settings (Section 1.10). To change the checksum setting, the INIT switch must be switched to the ON position. See Section A.1 for details.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Response:

Valid Response: **!AA[CHKSUM](CR)**
Invalid Response: **?AA[CHKSUM](CR)**

! Delimiter character for a valid response

? Delimiter character for an invalid response. If changing the **Baud Rate** or **checksum** settings without switching the INIT switch to the ON position, the module will return an invalid command.

AA Address of the module in hexadecimal format (00 to FF)

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: %0102000600 Response: !02

Change the address of module 01 to 02. The module returns a valid response.

Command: %0202000602 Response: !02

Set the data format of module 02 to be 2 (2's complement hexadecimal). The module returns a valid response.

Command: %0101000A00 Response: ?01

Change the Baud Rate of module 01 to 115200bps. The module returns an invalid command, because it is not in INIT* mode.

Command: %0101000A00 Response: !01

Change the Baud Rate of module 01 to 115200bps and the module is in INIT* mode. The module returns a valid response.

Related Commands:

Section 2.6 $AA2

Related Topics:

Section 1.10 Configuration Tables, Section A.1 INIT Mode

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Notes:

1. Changes to the address, type code, data format and filter settings take effect immediately after a valid command is received. Changes to the Baud Rate and checksum settings take effect on the next power on reset.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.2 #AA

Description:
Reads the data from every analog input channel.

Syntax:
#AA[CHKSUM](CR)

#	Delimiter character
AA	Address of the module to be read (00 to FF)

Response:
Valid Response: **>(Data)[CHKSUM](CR)**
Invalid Response: **?AA[CHKSUM](CR)**

>	Delimiter character for a valid response
?	Delimiter character for an invalid response
(Data)	Data from every analog input channels, see Section 1.10 for the details of data format.

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: #01 Response:
>+025.12+020.45+012.78+018.97+003.24+015.35+008.07+014.79

Reads module 01 and receives the data in engineering format.

Command: #02 Response:
>4C532628E2D683A20F2ADBA16284BA71

Reads module 02 and receives the data in hexadecimal format.

Command: #03 Response:
>-9999.9-9999.9-9999.9-9999.9-9999.9-9999.9-9999.9-9999.9

Reads module 03 and the data is under range.

Related Commands:

Section 2.1 %AANNTTCCFF, Section 2.6 $AA2

Related Topics:

Section 1.10 Configuration Tables

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.3 #AAN

Description:
Reads the analog input of channel N.

Syntax:
#AAN[CHKSUM](CR)

#	Delimiter character
AA	Address of the module to be read (00 to FF)
N	The channel to be read, zero based.

Response:
Valid Response: **>(Data)[CHKSUM](CR)**
Invalid Response: **?AA[CHKSUM](CR)**

>	Delimiter character for a valid response
?	Delimiter character for an invalid response. An invalid command is returned if the specified channel is incorrect.
(Data)	Analog input data of the specified channel, see Section 1.10 for details of the data format.
AA	Address of the responding module (00 to FF)

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: #032 Response: >+025.13

Reads data from channel 2 of module 03.

Command: #029 Response: ?02

Reads data from channel 9 of module 02. An error is returned because channel 9 is invalid.

Related Commands:

Section 2.1 %AANNTTCCFF, Section 2.6 $AA2

Related Topics:

Section 1.10 Configuration Tables

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.4 $AA0

Description:
Performs a span calibration.

Syntax:
$AA0[CHKSUM](CR)

$	Delimiter character
AA	Address of the module to be calibrated (00 to FF)
0	Command for the span calibration

Response:
Valid Response: **!AA[CHKSUM](CR)**
Invalid Response: **?AA[CHKSUM](CR)**

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: $010 Response: !01

Performs a span calibration on module 01 and returns a valid response.

Command: $020 Response: ?02

Performs a span calibration on module 02. An invalid command is returned because the "enable calibration" command was not sent in advance.

Related Commands:

Section 2.5 $AA1, Section 2.19 ~AAEV

Related Topics:

Section 1.9 Calibration

Notes:

1. This command is only applicable to M-2017 modules.
2. The "enable calibration" command, ~AAEV, must be sent before this command is used, see Section 1.9 for details.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.5 $AA1

Description:
Performs a zero calibration.

Syntax:
$AA1[CHKSUM](CR)

$	Delimiter character
AA	Address of the module to be set (00 to FF)
1	Command for the zero calibration

Response:
Valid Response: **!AA[CHKSUM](CR)**
Invalid Response: **?AA[CHKSUM](CR)**

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: $011 Response: !01

Performs a zero calibration on module 01 and returns a valid response.

Command: $021 Response: ?02

Performs a zero calibration on module 02. An invalid command is returned because the “enable calibration” command was not sent in advance.

Related Commands:

Section 2.4 $AA0, Section 2.19 ~AAEV

Related Topics:

Section 1.9 Calibration

Notes:

1. This command is only applicable to M-2017 modules.
2. The “enable calibration” command, ~AAEV, must be sent before this command is used, see Section 1.9 for details.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.6 $AA2

Description:
Reads the module configuration.

Syntax:
$AA2[CHKSUM](CR)

$	Delimiter character
AA	Address of the module to be read (00 to FF)
2	Command to read the module configuration

Response:
Valid Response: !AATTCCFF[CHKSUM](CR)
Invalid Response: ?AA[CHKSUM](CR)

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)
TT	Type code of the module, see Section 1.10 for details. It is 00 for M-2017.
CC	Baud Rate code of the module, see Section 1.10 for details.
FF	Data format, checksum settings and filter settings of the module, see Section 1.10 for details.

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: $012 Response: !01050600

Reads the configuration of module 01.

Command: $022 Response: !02030602

Reads the configuration of module 02.

Related Commands:

Section 2.1 %AANNTTCCFF

Related Topics:

Section 1.10 Configuration Tables, Section A.1 INIT Mode

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.7 $AA5VV

Description:

Specifies the channel(s) to be enabled.

Syntax:

$AA5VV[CHKSUM](CR)

$	Delimiter character
AA	Address of the module to be set (00 to FF)
5	Command to set the channel(s) to enabled
VV	A two-digit hexadecimal value, where bit 0 corresponds to channel 0, bit 1 corresponds to channel 1, etc. When the bit is 1 it means that the channel is enabled and 0 means that the channel is disabled.

Response:

Valid Response: **!AA[CHKSUM](CR)**

Invalid Response: **?AA[CHKSUM](CR)**

!	Delimiter character for a valid response
?	Delimiter character for an invalid response. An invalid command is returned if an attempt is made to enable a channel that is not present.
AA	Address of the responding module (00 to FF)

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Examples:

Command: $0153A Response: !01

Enables channels 1, 3, 4, and 5 and disables all other channels of module 01. The module returns a valid response.

Command: $016 Response: !013A

Reads the channel status of module 01 and returns a response of 3A, meaning that channels 1, 3, 4, and 5 are enabled and all other channels are disabled.

Related Commands:

Section 2.8 $AA6

Note:

1. It is recommended that only the channels that will be used are enabled.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.8 $AA6

Description:
Reads the enabled/disabled status of each channel.

Syntax:
$AA6[CHKSUM](CR)

$	Delimiter character
AA	Address of the module to be read (00 to FF)
6	Command to read the channel status

Response:
Valid Response: **!AAVV[CHKSUM](CR)**
Invalid Response: **?AA[CHKSUM](CR)**

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)
VV	A two-digit hexadecimal value, where bit 0 corresponds to channel 0, bit 1 corresponds to channel 1, etc. When the bit is 1 it means that the channel is enabled and 0 means that the channel is disabled.

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: $0153A Response: !01

Enables channels 1, 3, 4, and 5 and disables all other channels of module 01. The module returns a valid response.

Command: $016 Response: !013A

Reads the channel status of module 01 and returns a response of 3A, meaning that channels 1, 3, 4, and 5 are enabled and all other channels are disabled.

Related Commands:

Section 2.7 $AA5VV

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.9 $AA7CiRrr

Description:

Sets the type code of a channel.

Syntax:

$AA7CiRrr[CHKSUM](CR)

$	Delimiter character
AA	Address of the module to be set (00 to FF)
7	Command to set the channel range code
Ci	i specifies the input channel to be set (0-7 for M-2017).
Rrr	rr represents the type code of the channel to be set. Refer to the Analog Input Type Setting table in Section 1.10 for details.

Response:

Valid Response: !AA [CHKSUM](CR)

Invalid Response: ?AA[CHKSUM](CR)

!	Delimiter character for a valid response
?	Delimiter character for an invalid response or invalid type code

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Examples:

Command: $017C0R0B Response: !01

Sets the type code for channel 0 of module 01 to be 0B (-500~+500mV) and the module returns a valid response.

Command: $027C5R1A Response: !02

Sets the type code for channel 5 of module 02 to be 1A (+0~+20mA) and the module returns a valid response.

Command: $037C1R30 Response: ?03

Sets the type code for channel 1 of module 03 to be 30. The module returns an invalid response because the type code is invalid.

Related Commands:

Section 2.10 $AA8Ci

Related Topics:

Section 1.10 Configuration Tables

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.10 $AA8Ci

Description:
Reads the type code information of a channel.

Syntax:
$AA8Ci[CHKSUM](CR)

$	Delimiter character
AA	Address of the module to be read (00 to FF)
8	Command to read the type code of a channel
Ci	Specifies which channel to access for the type code information (i=0-7 for M-2017).

Response:
Valid Response: !AACiRrr[CHKSUM](CR)
Invalid Response: ?AA[CHKSUM](CR)

!	Delimiter character for a valid response
?	Delimiter character for an invalid response or invalid channel
AA	Address of the responding module (00 to FF)
Ci	Specifies which input channel to access to retrieve the type code information.
Rrr	Represents the type code of the specified input channel. Refer to the Analog Input Type Setting table in Section 1.10 for details.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Examples:

Command: $018C0 Response: !01C0R0C

Reads the channel 0 input range of module 01 and returns 0C (-150~+150mV).

Related Commands:

Section 2.9 $AA7CiRrr

Related Topics:

Section 1.10 Configuration Tables

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.11 $AAA

Description:

Reads the data from every analog input channel in hex format.

Syntax:

$AAA[CHKSUM](CR)

$	Delimiter character
AA	Address of the module to be read (00 to FF)
A	Command to read every analog input

Response:

Valid Response: **>(Data)[CHKSUM](CR)**

Invalid Response: **?AA[CHKSUM](CR)**

>	Delimiter character for a valid response
?	Delimiter character for an invalid response
(Data)	Data from every analog input channels in hex format.

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: $01A

Response: >0000012301257FFF1802744F98238124

Reads module 01 and receives the data in hex format.

Related Commands:

Section 2.2 #AA

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.12 $AAF

Description:
Reads the firmware version of a module.

Syntax:
$AAF[CHKSUM](CR)

$	Delimiter character
AA	Address of the module to be read (00 to FF)
F	Command to read the firmware version

Response:
Valid Response: **!AA(Data)[CHKSUM](CR)**
Invalid Response: **?AA[CHKSUM](CR)**

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)
(Data)	A string indicating the firmware version of the module

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Examples:
Command: $01F Response: !01A2.0

Reads the firmware version of module 01, and shows that it is version A2.0.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.13 $AAM

Description:
Reads the name of a module.

Syntax:
$AAM[CHKSUM](CR)

$	Delimiter character
AA	Address of the module to be read (00 to FF)
M	Command to read the module name

Response:
Valid Response: !AA(Name)[CHKSUM](CR)
Invalid Response: ?AA[CHKSUM](CR)

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)
(Name)	A string showing the name of the module

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: $01M Response: !012017

Reads the module name of module 01 and returns the name “2017”.

Related Commands:

Section 2.20 ~AAO(Name)

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.14 $AAP

Description:

Reads the communication protocol information.

Syntax:

$AAP[CHKSUM](CR)

$	Delimiter character
AA	Address of the module to be read (00 to FF)
P	Command to read the communication protocol

Response:

Valid Response: !AASC[CHKSUM](CR)

Invalid Response: ?AA[CHKSUM](CR)

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)
S	The protocols supported by the module 0: only DCON protocol is supported 1: both the DCON and Modbus RTU protocols are supported
C	Current protocol saved in EEPROM that will be used at the next power on reset 0: the protocol set in EEPROM is DCON 1: the protocol set in EEPROM is Modbus RTU

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: $01P Response: !0110

Reads the communication protocol of module 01 and returns a response of 10 meaning that it supports both the DCON and Modbus RTU protocols and the protocol that will be used at the next power on reset is DCON.

Related Commands:

Section 2.15 $AAPN

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.15 $AAPN

Description:

Sets the communication protocol.

Syntax:

$AAPN[CHKSUM](CR)

$	Delimiter character
AA	Address of the module to be read (00 to FF)
P	Command to set the communication protocol
N	0: DCON protocol 1: Modbus RTU protocol Before using this command, the SW1 INIT switch must be in the ON position, see Section A.1 for details. The new protocol is saved in the EEPROM and will be effective after the next power on reset.

Response:

Valid Response: !AA[CHKSUM](CR)

Invalid Response: ?AA[CHKSUM](CR)

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: $01P1 Response: ?01

Sets the communication protocol of module 01 to Modbus RTU and returns an invalid response because the module is not in INIT mode.

Command: $01P1 Response: !01

Sets the communication protocol of module 01 to Modbus RTU and returns a valid response.

Related Commands:

Section 2.14 $AAP

Related Topics:

Section A.1 INIT Mode

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.16 $AAS1

Description:

Reloads the factory default calibration parameters, including the internal calibration parameters.

Syntax:

$AAS1[CHKSUM](CR)

$	Delimiter character
AA	Address of the module to be reloaded (00 to FF)
S1	Command to reload the factory default calibration parameters

Response:

Valid Response: **!AA[CHKSUM](CR)**

Invalid Response: **?AA[CHKSUM](CR)**

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Examples:

Command: $01S1 Response: !01

Sends the command to reload the factory default calibration parameters and returns a valid response.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Related Topics:

Section 1.9 Calibration

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.17 ~AACT

Description:

Reads the under range threshold of the range with type code 1D, 4mA ~ 20mA.

Syntax:

~AACT[CHKSUM](CR)

~	Delimiter character
AA	Address of the module to be read (00 to FF)
CT	Command to read the under range threshold of the range with type code 1D

Response:

Valid Response: **!AAVV[CHKSUM](CR)**

Invalid Response: **?AA[CHKSUM](CR)**

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)
VV	Two hexadecimal digits to represent the under range threshold value in 0.1 mA, for example, 01 denotes 0.1mA and 1E denotes 3mA. The max allowable value is 40 (28h).

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: ~01CT Response: !011E

Sends a command to read the under range threshold of module 01 and shows that it is 3.0mA.

Related Commands:

Section 2.18 ~AACTVV

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.18 ~AACTVV

Description:

Sets the under range threshold value for the range with type code 1D, 4 ~ 20mA.

Syntax:

~AACTVV[CHKSUM](CR)

~	Delimiter character
AA	Address of the module to be read (00 to FF)
CT	Command to set the under range threshold for the range with type code 1D
VV	Two hexadecimal digits to represent the under range threshold value in 0.1 mA, for example, 01 denotes 0.1mA and 1E denotes 3mA. The max allowable value is 40 (28h).

Response:

Valid Response: **!AA[CHKSUM](CR)**

Invalid Response: **?AA[CHKSUM](CR)**

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: ~01CT14 Response: !01

Sends a command to set the under range threshold of the range with type code 1D of module 01 to 2.0mA and returns a valid response.

Related Commands:

Section 2.17 ~AACT

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.19 ~AAEV

Description:
Enable/Disable module calibration.

Syntax:
~AAEV[CHKSUM](CR)

~	Delimiter character
AA	Address of the module to be set (00 to FF)
E	Command to enable/disable calibration
V	1: enable calibration 0: disable calibration

Response:
Valid Response: **!AA[CHKSUM](CR)**
Invalid Response: **?AA[CHKSUM](CR)**

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: $010 Response: ?01

Sends the command to perform a span calibration on module 01. It returns an invalid response because the "enable calibration" command was not sent in advance.

Command: ~01E1 Response: !01

Enables calibration on module 01 and returns a valid response.

Command: $010 Response: !01

Sends the command to perform a span calibration on module 01 and returns a valid response.

Related Commands:

Section 2.4 $AA0, Section 2.5 $AA1

Related Topics:

Section 1.9 Calibration

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.20 ~AAO(Name)

Description:
Sets the name of a module.

Syntax:
~AAO(Name)[CHKSUM](CR)

~	Delimiter character
AA	Address of the module to be set (00 to FF)
O	Command to set the module name
(Name)	New name of the module (max. 6 characters).

Response:
Valid Response: **!AA[CHKSUM](CR)**
Invalid Response: **?AA[CHKSUM](CR)**

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: ~01O2017A Response: !01

Sets the name of module 01 to be “2017A” and returns a valid response.

Command: $01M Response: !012017A

Reads the name of module 01 and returns “2017A”.

Related Commands:

Section 2.13 $AAM

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.21 ~AARD

Description:

Reads the response delay time value of a module.

Syntax:

~AARD[CHKSUM](CR)

~	Delimiter character
AA	Address of the module to be read (00 to FF)
RD	Command to read the response delay time value

Response:

Valid Response: !AAVV[CHKSUM](CR)

Invalid Response: ?AA[CHKSUM](CR)

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)
VV	Two hexadecimal digits to represent the response delay time value in milli-second, for example, 01 denotes 1ms and 1E denotes 30ms. The max allowable value is 30 (1Eh).

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: ~01RD Response: !0102

Reads the response delay time value of module 01 and returns 02, which denotes that the response delay time value is 2ms.

Related Commands:

Section 2.22 ~AARDVV

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.22 ~AARDVV

Description:

Sets the response delay time value of a module.

Syntax:

~AARDVV[CHKSUM](CR)

~	Delimiter character
AA	Address of the module to be read (00 to FF)
RD	Command to set the communication protocol
VV	Two hexadecimal digits to represent the response delay time value in milli-second, for example, 01 denotes 1ms and 1E denotes 30s. The max allowable value is 30 (1Eh).

Response:

Valid Response: !AA[CHKSUM](CR)

Invalid Response: ?AA[CHKSUM](CR)

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: ~01RD06 Response: !01

Sets the response delay time value to 6ms. The module returns a valid response.

Command: ~01RD Response: !0106

Reads the response delay time value of module 01. The module returns 06, which denotes that the response delay time value is 6ms.

Related Commands:

Section 2.21 ~AARD

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.23 ~**

Description:
Informs all modules that the host is OK.

Syntax:
~[CHKSUM](CR)**
~ Delimiter character
** Host OK command

Response:
No response.

Examples:
Command: ~** No response
Sends a “Host OK” command to all modules.

Related Commands:
Section 2.24 ~AA0, Section 2.25 ~AA1, Section 2.26 ~AA2, Section 2.27 ~AA3EVV

Related Topics:
Section A.2 Dual Watchdog Operation

Note:
After sending this command, there must be a 2ms delay before the next command can be sent.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.24 ~AA0

Description:

Reads the host watchdog status of a module.

Syntax:

~AA0[CHKSUM](CR)

~	Delimiter character
AA	Address of the module to be read (00 to FF)
0	Command to read the module status

Response:

Valid Response: **!AASS[CHKSUM](CR)**

Invalid Response: **?AA[CHKSUM](CR)**

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)
SS	Two hexadecimal digits that represent the host watchdog status, where: Bit 7: 0 indicates that the host watchdog is disabled and 1 indicates the host watchdog is enabled, Bit 2: 1 indicates that a host watchdog time out has occurred and 0 indicates that no host watchdog time out has occurred. The host watchdog status is stored in EEPROM and can only be reset using the ~AA1 command.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Examples:

Command: ~010 Response: !0100

Reads the host watchdog status of module 01 and returns 00, meaning that the host watchdog is disabled and no host watchdog time out has occurred.

Command: ~020 Response: !0204

Reads the host watchdog status of module 02 and returns 04, meaning that a host watchdog timeout has occurred.

Related Commands:

Section 2.23 ~**, Section 2.25 ~AA1, Section 2.26 ~AA2, Section 2.27 ~AA3EVV

Related Topics:

Section A.2 Dual Watchdog Operation

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.25 ~AA1

Description:
Resets the host watchdog time out status of a module.

Syntax:
~AA1[CHKSUM](CR)

~	Delimiter character
AA	Address of the module to be set (00 to FF)
1	Command to reset the host watchdog time out status

Response:
Valid Response: **!AA[CHKSUM](CR)**
Invalid Response: **?AA[CHKSUM](CR)**

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: ~010 Response: !0104

Reads the host watchdog status of module 01 and shows that a host watchdog time out has occurred.

Command: ~011 Response: !01

Resets the host watchdog time out status of module 01 and returns a valid response.

Command: ~010 Response: !0100

Reads the host watchdog status of module 01 and shows that no host watchdog time out has occurred.

Related Commands:

Section 2.23 ~**, Section 2.24 ~AA0, Section 2.26 ~AA2, Section 2.27 ~AA3EVV

Related Topics:

Section A.2 Dual Watchdog Operation

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.26 ~AA2

Description:

Reads the host watchdog time out value of a module.

Syntax:

~AA2[CHKSUM](CR)

~	Delimiter character
AA	Address of the module to be read (00 to FF)
2	Command to read the host watchdog time out value

Response:

Valid Response: **!AAEVV[CHKSUM](CR)**

Invalid Response: **?AA[CHKSUM](CR)**

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)
E	1: the host watchdog is enabled 0: the host watchdog is disabled
VV	Two hexadecimal digits to represent the time out value in tenths of a second, for example, 01 means 0.1 seconds and FF means 25.5 seconds.

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: ~012 Response: !011FF

Reads the host watchdog time out value of module 01 and returns FF, meaning that the host watchdog is enabled and the host watchdog time out value is 25.5 seconds.

Related Commands:

Section 2.23 ~**, Section 2.24 ~AA0, Section 2.25 ~AA1, Section 2.27 ~AA3EVV

Related Topics:

Section A.2 Dual Watchdog Operation

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.27 ~AA3EVV

Description:

Enables/disables the host watchdog and set the host watchdog time out value of a module.

Syntax:

~AA3EVV[CHKSUM](CR)

~	Delimiter character
AA	Address of the module to be set (00 to FF)
3	Command to set the host watchdog
E	1: enable the host watchdog 0: disable the host watchdog
VV	Two hexadecimal digits to represent the time out value in tenths of a second, for example, 01 means 0.1 seconds and FF means 25.5 seconds.

Response:

Valid Response: **!AA[CHKSUM](CR)**

Invalid Response: **?AA[CHKSUM](CR)**

!	Delimiter character for a valid response
?	Delimiter character for an invalid response
AA	Address of the responding module (00 to FF)

There will be no response if the command syntax is incorrect, there is a communication error, or there is no module with the specified address.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Examples:

Command: ~013164 Response: !01

Enables the host watchdog of module 01 and sets the host watchdog time out value to 10.0 seconds. The module returns a valid response.

Command: ~012 Response: !01164

Reads the host watchdog time out value of module 01. The module returns 164, meaning that the host watchdog is enabled and the host watchdog time out value is 10.0 seconds.

Related Commands:

Section 2.23 ~**, Section 2.24 ~AA0, Section 2.25 ~AA1, Section 2.26 ~AA2

Related Topics:

Section A.2 Dual Watchdog Operation

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3. Modbus RTU Protocol

The Modbus protocol is developed by Modicon Inc., originally developed for Modicon controllers. Detailed information can be found at http://www.modicon.com/techpubs/toc7.html. You can also visit http://www.modbus.org to find more valuable information.

M-2000 series modules support the Modbus RTU protocol. The communication Baud Rates range from 1200bps to 115200bps. The following Modbus functions are supported.

Function Code	Description	Section
02 (0x02)	Read input status	3.1
04 (0x04)	Read input channels	3.2
70 (0x46)	Read/write module settings	3.3

If the function specified in the message is not supported, then the module responds as follows.

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	Function code | 0x80
02	Exception code	1 Byte	01

If a CRC mismatch occurs, the module will not respond.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.1 02 (0x02) Read Input Status

This function code is used to read the under range status of a module.

Request

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x02
02 ~ 03	Starting channel	2 Bytes	0x80 to 0x87, where 0x80 corresponds to channel 0, 0x81 corresponds to channel 1, etc
04 ~ 05	Number of input channels	2 Bytes	N, 1 to 8; (Starting channel + N) should be less than or equal to 0x88

Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x02
02	Byte count	1 Byte	1
03	Data of input channels	1 Byte	A bit corresponds to a channel. When the bit is 1 it denotes that the channel is enabled and is either over-range, under-range or wire opening. If the bit is 0 it denotes that the channel is disabled or normal.

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x82
02	Exception code	1 Byte	02: starting channel out of range 03: (starting channel + number of input channels) out of range, incorrect number of bytes received

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.2 04 (0x04) Read Input Channels

This function code is used to read from contiguous analog input channels.

Request

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x04
02 ~ 03	Starting channel	2 Bytes	0 to 7 for reading analog inputs
04 ~ 05	Number of input channels (N)	2 Bytes	1 to 8; (Starting channel + N) <= 8 for reading analog inputs.

Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x04
02	Byte count	1 Byte	2 x N
03 ~	Data of input channels	2 x N Bytes	

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x84
02	Exception code	1 Byte	02: starting channel out of range 03: (starting channel + number of input channels) out of range, incorrect number of bytes received

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.3 70 (0x46) Read/Write Module Settings

This function code is used to read the settings of the module or change the settings of the module. The following sub-function codes are supported.

Sub-function Code	Description	Section
00 (0x00)	Read the module name	3.3.1
04 (0x04)	Set the module address	3.3.2
05 (0x05)	Read the communication settings	3.3.3
06 (0x06)	Set the communication settings	3.3.4
07 (0x07)	Read the type code	3.3.5
08 (0x08)	Set the type code	3.3.6
32 (0x20)	Read the firmware version	3.3.7
37 (0x25)	Read the channel enable/disable status	3.3.8
38 (0x26)	Set the channel enable/disable	3.3.9
41 (0x29)	Read the miscellaneous settings	3.3.10
42 (0x2A)	Write the miscellaneous settings	3.3.11

If the module does not support the sub-function code specified in the message, then it responds as follows.

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0xC6
02	Exception code	1 Byte	02: invalid sub-function code

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.3.1 Sub-function 00 (0x00) Read module name

This sub-function code is used to read the name of a module.

Request

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x00

Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x00
03 ~ 06	Module name	4 Bytes	0x4D 0x20 0x17 0x00 for M-2017

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0xC6
02	Exception code	1 Byte	03: incorrect number of bytes received

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.3.2 Sub-function 04 (0x04) Set module address

This sub-function code is used to set the address of a module.

Request

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x04
03	New address	1 Byte	1 to 247
04 ~ 06	Reserved	3 Bytes	0x00 0x00 0x00

Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x04
03	Set address result	1 Byte	0: OK, others: error
04 ~ 06	Reserved	3 Bytes	0x00 0x00 0x00

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0xC6
02	Exception code	1 Byte	03: new address out of range, reserved bytes should be filled with zero, incorrect number of bytes received

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.3.3 Sub-function 05 (0x05) Read communication settings

This sub-function code is used to read the communication protocol settings of a module.

Request

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x05
03	Reserved	1 Byte	0x00

Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x05
03	Reserved	1 Byte	0x00
04	Baud Rate	1 Byte	Baud Rate code, see Section 1.10 for details.
05 ~ 07	Reserved	3 Bytes	0x00 0x00 0x00
08	Mode	1 Byte	0: DCON protocol 1: Modubs RTU protocol
09 ~ 10	Reserved	2 Bytes	0x00 0x00

Note: This information is the data saved in the EEPROM and will be used for the next power-on reset. It is not the currently used settings.

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0xC6
02	Exception code	1 Byte	03: reserved byte should be filled with zero, incorrect number of bytes received

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.3.4 Sub-function 06 (0x06) Set communication settings

This sub-function code is used to set the communication protocol of a module.

Request

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x06
03	Reserved	1 Byte	0x00
04	Baud Rate	1 Byte	Baud Rate code, see Section 1.10 for details.
05 ~ 07	Reserved	3 Bytes	0x00 0x00 0x00
08	Mode	1 Byte	0: DCON protocol 1: Modubs RTU protocol
09 ~ 10	Reserved	2 Bytes	0x00 0x00

Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x06
03	Reserved	1 Byte	0x00
04	Baud Rate	1 Byte	0: OK, others: error
05 ~ 07	Reserved	3 Bytes	0x00 0x00 0x00
08	Mode	1 Byte	0: OK, others: error
09 ~ 10	Reserved	2 Bytes	0x00 0x00

Note: The new Baud Rate and protocol will be effective after the next power-on reset.

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0xC6
02	Exception code	1 Byte	03: Baud Rate or mode out of range, reserved bytes should be filled with zero, incorrect number of bytes received

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.3.5 Sub-function 07 (0x07) Read type code

This sub-function code is used to read the type code information of a module.

Request

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x07
03	Reserved	1 Bytes	0x00
04	Channel	1 Byte	0x00 ~ 0x07 for M-2017

Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x07
03	Type code	1 Byte	Type code, see Section 1.10 for details.

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0xC6
02	Exception code	1 Byte	03: reserved bytes should be filled with zero, channel out of range for M-2017 modules, incorrect number of bytes received

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.3.6 Sub-function 08 (0x08) Set type code

This sub-function code is used to set the type code of a module.

Request

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x08
03	Reserved	1 Byte	0x00
04	Channel	1 Byte	0x00 ~ 0x07 for M-2017
05	Type code	1 Byte	Type code, see Section 1.10 for details.

Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x08
03	Type code	1 Byte	0: OK others: error

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0xC6
02	Exception code	1 Byte	03: type code out of range, channel out of range for M-2017 modules, reserved bytes should be filled with zero, incorrect number of bytes received

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.3.7 Sub-function 32 (0x20) Read firmware version

This sub-function code is used to read the firmware version information of a module.

Request

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x20

Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x20
03	Major version	1 Byte	0x00 ~ 0xFF
04	Minor version	1 Byte	0x00 ~ 0xFF
05	Build version	1 Byte	0x00 ~ 0xFF

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0xC6
02	Exception code	1 Byte	03: incorrect number of bytes received

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.3.8 Sub-function 37 (0x25) Read channel enabled/disabled status

This sub-function code is used to read the enabled/disabled status of each channel in a module.

Request

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x25

Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x25
03	Enabled/disabled status	1 Byte/2 Byte/3 Byte	0x00 ~ 0xFF, enabled/disabled status of each channel, where bit 0 corresponds to channel 0, bit 1 corresponds to channel 1, etc. When the bit is 1 it denotes that the channel is enabled and 0 denotes that the channel is disabled.

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0xC6
02	Exception code	1 Byte	03: incorrect number of bytes received

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.3.9 Sub-function 38 (0x26) Set channel enable/disable

This sub-function code is used to specify the channels to be enabled in a module.

Request

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x26
03	Enable/disable setting	1 Byte/ 2 Byte/3 Byte	0x00 ~ 0xFF, enable/disable setting of each channel, where bit 0 corresponds to channel 0, bit 1 corresponds to channel 1, etc. When the bit is 1 it denotes that the channel is enabled and 0 denotes that the channel is disabled.

Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x26
03	Enable/disable setting	1 Byte	0: OK others: error.

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0xC6
02	Exception code	1 Byte	03: enable/disable setting out of range, incorrect number of bytes received

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.3.10 Sub-function 41 (0x29) Read miscellaneous settings

This sub-function code is used to read the miscellaneous settings of a module.

Request

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x29

Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x29
03	Miscellaneous settings	1 Byte	Bit 7: filter setting 0: 60Hz rejection 1: 50Hz rejection Bit 6: reserved Bit 5: for M-2017 0: normal mode 1: fast mode Bit 4~0: reserved

Note: The reserved fields are filled with zeros.

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0xC6
02	Exception code	1 Byte	03: incorrect number of bytes received

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.3.11 Sub-function 42 (0x2A) Write miscellaneous settings

This sub-function code is used to set the miscellaneous settings of a module.

Request

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x2A
03	Miscellaneous settings	1 Byte	Bit 7: filter setting 0: 60Hz rejection 1: 50Hz rejection Bit 6: reserved Bit 5: for M-2017 0: normal mode 1: fast mode Bit 4~0: reserved

Note: The reserved fields are filled with zeros.

Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0x46
02	Sub function code	1 Byte	0x2A
03	Miscellaneous settings	1 Byte	0: OK others: error

Error Response

00	Address	1 Byte	1 to 247
01	Function code	1 Byte	0xC6
02	Exception code	1 Byte	03: reserved bits should be filled with zero, incorrect number of bytes received

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.4 Address Mappings

3.4.1 M-2017 Address Mappings

<table>
<tr><th>Address</th><th>Description</th><th>Attribute</th></tr>
<tr><td>10129 ~ 10136
00129 ~ 00136</td><td>Over/under range status of channel 0 to 7 for 4 ~ 20mA or 0 ~ 20mA ranges</td><td>R</td></tr>
<tr><td>30001 ~ 30008
40001 ~ 40008</td><td>Analog input value of channel 0 to 7</td><td>R</td></tr>
<tr><td>40257 ~ 40264</td><td>Type code of channel 0 to 7</td><td>R/W</td></tr>
<tr><td>40481</td><td>Firmware version (low word)</td><td>R</td></tr>
<tr><td>40482</td><td>Firmware version (high word)</td><td>R</td></tr>
<tr><td>40483</td><td>Module name (low word)</td><td>R</td></tr>
<tr><td>40484</td><td>Module name (high word)</td><td>R</td></tr>
<tr><td>40485</td><td>Module address, valid range: 1 ~ 247</td><td>R/W</td></tr>
<tr><td>40486</td><td>Bits 5:0
Baud rate, 0x03 ~ 0x0A
<table>
<tr><td>Code</td><td>0x03</td><td>0x04</td><td>0x05</td><td>0x06</td></tr>
<tr><td>Baud</td><td>1200</td><td>2400</td><td>4800</td><td>9600</td></tr>
<tr><td>Code</td><td>0x07</td><td>0x08</td><td>0x09</td><td>0x0A</td></tr>
<tr><td>Baud</td><td>19200</td><td>38400</td><td>57600</td><td>115200</td></tr>
</table>
Bits 7:6
00: no parity, 1 stop bit
01: no parity, 2 stop bits
10: even parity, 1 stop bit
11: odd parity, 1 stop bit</td><td>R/W</td></tr>
<tr><td>40488</td><td>Modbus response delay time in ms, valid range: 0 ~ 30</td><td>R/W</td></tr>
<tr><td>40489</td><td>Host watchdog timeout value, 0 ~ 255, in 0.1s</td><td>R/W</td></tr>
</table>

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Address	Description	Attribute
40490	Channel enable/disable, low word	R/W
40492	Host watchdog timeout count, write 0 to clear	R/W
40494	4mA under range threshold for type code 1D in 0.1mA, valid range: 0 ~ 40	R/W
00257	Protocol, 0: DCON, 1: Modbus RTU	R/W
00259	Filter setting, 0: 60Hz rejection, 1: 50Hz rejection	R/W
00261	1: enable, 0: disable host watchdog	R/W
00269	Modbus data format, 0: hex, 1: engineering	R/W
00270	Host watch dog timeout status, write 1 to clear host watch dog timeout status	R/W
00271	1: enable, 0: disable fast mode	R/W
00272	Write 1 to load factory calibration parameters	W
00273	Reset status, 1: first read after powered on, 0: not the first read after powered on	R

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.5 Engineering Data Format Table

Type Code	Input Type	Min.	Max.
07	+4 mA ~ +20 mA	4000	20000
08	-10 V ~ +10 V	-10000	10000
09	-5 V ~ +5 V	-5000	5000
0A	-1 V ~ +1 V	-10000	10000
0B	-500 mV ~ +500 mV	-5000	5000
0C	-150 mV ~ +150 mV	-15000	15000
0D	-20 mA ~ +20 mA	-20000	20000
1A	0 ~ +20 mA	0	20000
1D	+4 mA ~ +20 mA	4000	20000

The under range value is –32768 for type code 07 and 1A, and 0 for type code 1D. For the hex data format, please refer to Section 1.10.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4. Troubleshooting

If you are having difficulty using the M-2000 module, here are some suggestions that may help. If you cannot find the answers you need in these guides, contact ICP DAS Product Support. Contact information is located in Section 1.12.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4.1 Communicating with the module

If you attempt to communicate with the module and receive no response, first check the following:

- Make sure the supplied power is within the range of +10 to +48 V DC. If the supplied power is OK, then the power LED should be on.
- When the module receives a command, the power LED is set to “off”. The power LED is shown as “on” after the module responds. This method can be used to check whether the module has received a command sent from the host.
- If possible, use another device to check whether the host can communicate with the device through the same RS-485 network.
- If the host is a PC installed with a Windows operating system, then execute the DCON Utility to determine whether the module can be found. The DCON Utility can be downloaded from the ICP DAS website http://www.icpdas.com. The DCON Utility documentation can be found in the “**Getting Started For I-7000 Series Modules**” manual.
- Set the module to “INIT mode” and communicate with the module using the following settings: address 00, Baud Rate 9600bps, no checksum and DCON protocol. See Section A.1 for details.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4.2 Reading Data

If the data read from the input channel is not correct, first check the following:

- Make sure the type code and data format settings are correct. The type code is set by using the $AA7CiRrr command, see Section 2.9 for details. The data format is set by using the %AANNTTCCFF command. For the Modbus RTU protocol, the type code is set by Modbus registers 40257 ~ 40264.
- If the voltage read by the module is incorrect, then it may be because the calibration parameters stored in the non-volatile memory are corrupted. You can calibrate the module by yourself. Be sure to read Section 1.9 in detail before doing any calibration. Or, use the $AAS1 command to reload the factory calibration parameters, see Section 2.16 for details.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

A. Appendix

A.1 INIT Mode

Each M-2000 module has a built-in EEPROM to store configuration information such as module address, type code, Baud Rate, etc. Occasionally, the configuration of a module may be forgotten and there are no visual indications of the configuration of the module. It is difficult to communicate with the module when the configuration of the module is unknown. To help avoid this problem, the M-2000 series has a special mode called **"INIT mode"**. When the module is powered on in **"INIT mode"** the configuration of the module is reset as follows, allowing it to be operated as normal.

1. Address: 00
2. Baud Rate: 9600 bps
3. No checksum
4. Protocol: DCON

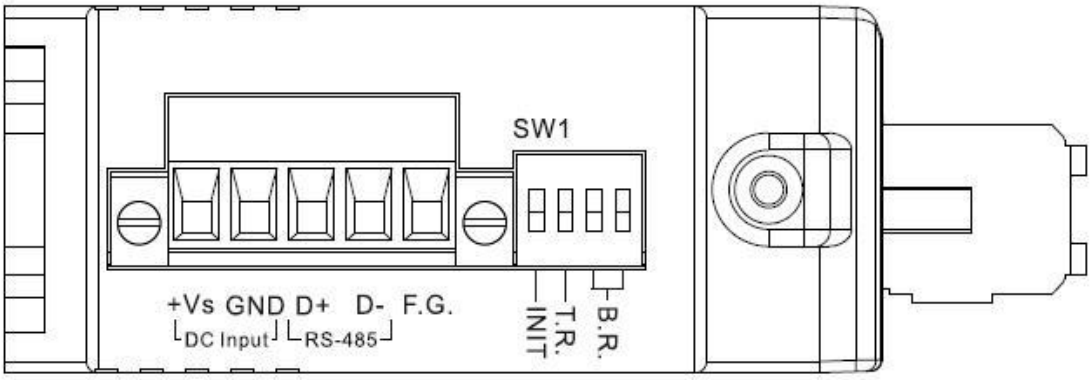
The configuration information stored in the EEPROM is not changed and they can be read by sending the $002(CR) command at 9600bps.

There are commands that require the module to be in INIT mode. They are:

1. %AANNTTCCFF when changing Baud Rate and checksum settings. See Section 2.1 for details.
2. $AAPN, see Section 2.15 for details.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

The M-2000 modules have the INIT switch located on the bottom side of the module allow easier access to INIT mode. For these modules, INIT mode is accessed by sliding the INIT switch to the ON position as shown below.



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

A.2 Dual Watchdog Operation

Dual Watchdog = Module Watchdog + Host Watchdog

The Module Watchdog is a hardware reset circuit that monitors the operating status of the module. While working in harsh or noisy environments, the module may be shut down by external signals. The circuit allows the module to work continuously without disruption.

The Host Watchdog is a software function that monitors the operating status of the host. Its purpose is to prevent problems due to network/communication errors or host malfunctions. When a host watchdog time out occurs, the module will reset all outputs to a safe state in order to prevent any erroneous operations of the controlled target.

M-2000 series modules include an internal Dual Watchdog, making the control system more reliable and stable.

For more information regarding the Dual Watchdog, please refer to Chapter 5 of the "**Getting Started For I-7000 Series Modules**" manual that can be downloaded from the ICP DAS website http://www.icpdas.com.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

A.3 Frame Ground

Electronic circuits are constantly vulnerable to ESD which become worse in a continental climate area. The M-2000 modules feature a new design for the frame ground. The frame ground provides a path for bypassing ESD, which provides enhanced static protection (ESD) abilities and ensures the module is more reliable.

Connect the frame ground terminal to a wire/DIN rail and connect the wire/DIN rail to the earth ground will provide a better protection for the module.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Revision History

Revision	Date	Changes Made
B2.5	2021/01/14	Add Modbus register 00272

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000