



Haidar Technology, LLC.

Industrial Control Innovations Begin Here

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**ModBus Modules
RMC-A200**

**Reference Manual
REV 1.00**

Revision 1.00

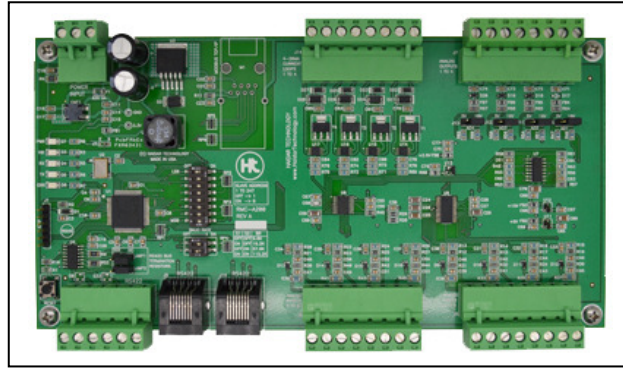
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1. Overview



For more information about RMC Modbus modules, please refer to RMC Series Reference Manual

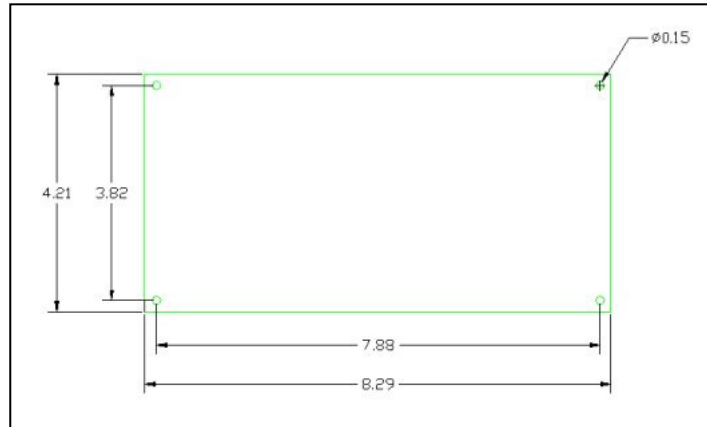
Haidar's RMC-A200 is 8-ch 16-bit analog inputs, 4-ch 12-bit analog outputs and 4-ch 12-bit 4-20mA current loop transmitter ModBus module. Different from other modules, RMC-A200 accepts multiple input voltage ranges, $\pm 10V$, $\pm 5V$, $\pm 2.5V$, $+10V$ and $+5V$, output analog output can be set to 5V or 10V, precision and fully protected current output converter designed to transmit analog 4-20mA signals over industry-standard current loop. Full-Duplex RS485 ModBus RTU or ModBus TCP interface.

2. Features

- Full-Duplex RS485 interface using ModBus slave RTU communication Protocol
- Optional ModBus TCP Protocol
- Powerful 32-bit @ 80MHZ microcontroller on board
- 8-ch 16-bit analog inputs
- 4-ch 12-bit analog outputs
- 4-ch 12-bit 4-20mA current loop transmitter
- Up to 24VDC input voltage
- Programmable analog input range, $\pm 10V$, $\pm 5V$, $\pm 2.5V$, 0 to 10V and 0 to 5V
- 5V or 10V full scale analog output range
- Analog input over voltage protection up to $\pm 20V$
- ESD protected analog input and outputs up to $\pm 4KV$
- 500KSPS sampling frequency
- Input analog filters
- Programmable digital filters, sampling frequency, averaging and range
- LED indicators for Power, RX, TX, HB and Error
- Plug-in terminal blocks
- Dual RJ45 connectors allowing a chain of multiple modules
- Data and Power (optional) over single RJ45 cable up to 1200 meters
- $\pm 80V$ fault and $\pm 8KV$ ESD protection on the RS485 lines
- Communication speed and address are set via on board DIP switches

- Full industrial temperature from -40 to 85°C
- Optional DIN-RAIL mounting plate
- Watchdog system timer
- Communication speed from 9600 bps to 115.2 Kbps
- Free modbus test and simulation software

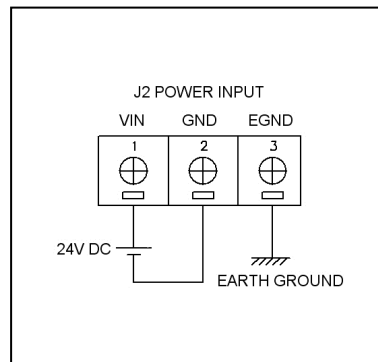
3. Board Dimensions



Width	4.21" (107mm)
Length	8.29" (210mm)
Depth	0.71" (18mm)

4. Supply Voltage (Vin)

Typical Supply Voltage (Vin)	24V DC
Supply Current	TBD



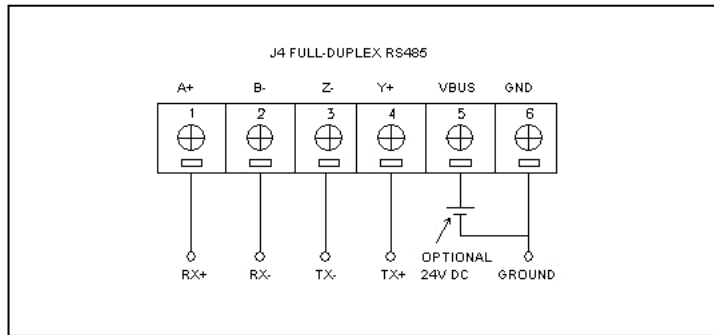
J3 Pin Number	Description
1	Supply Voltage Input (VIN)
2	Power Ground
3	Earth Ground

5. Full-Duplex RS485 (RS422) Connectors

- Specifications

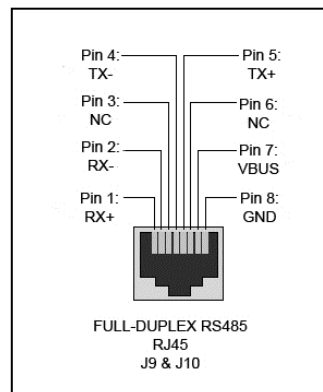
Driver	MAX13448E
Isolation	None
Fault Protection	±80V on the RS485 I/O Ports
ESD Protection	±8KV ESD Protection
Common Mode	-7V to +12V common-mode input voltage range
Data Rate	Max 250Kbps
Hot Swap	Yes
Slew Rate Limiting	Yes
True Fail-Safe	Yes
Bus Transceivers	Up to 256

- J4 (6-pole screw terminal block)



J4 Pin Number	Description
1	Receiver + (RX+ Or A+)
2	Receiver - (RX- Or B-)
3	Transmitter - (TX- Or Z-)
4	Transmitter + (TX+ Or Y+)
5	Optional Bus Voltage (Typical 24V DC). Not required for normal operation.
6	Common Ground

- J9 and J10 (RJ45)



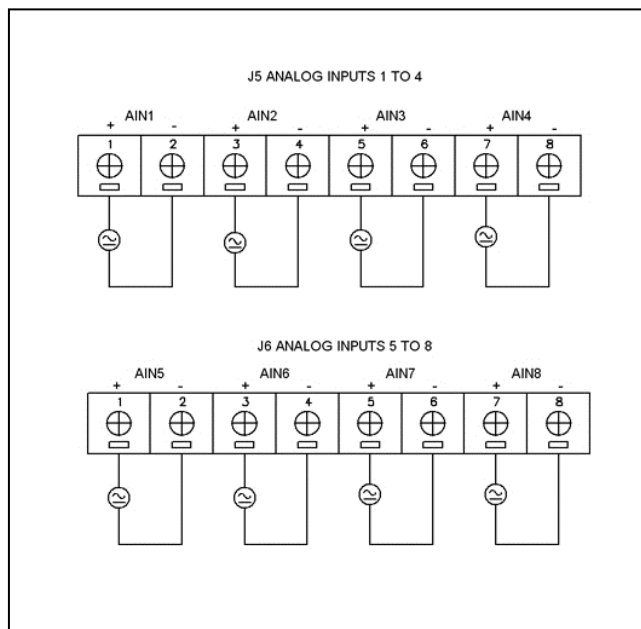
J4 Pin Number	Description
1	Receiver + (RX+ Or A+)
2	Receiver - (RX- Or B-)
3	Not Connected
4	Transmitter - (TX- Or Z-)
5	Transmitter + (TX+ Or Y+)
6	Not Connected
7	Optional Bus Voltage (Typical 24V DC). Not required for normal operation.
8	Common Ground

6. Analog Inputs

- Specifications

Channel	8
Isolation	None
Resolution	16-bit
Range	Bipolar: $\pm 2.5V$, $\pm 5V$, $\pm 10V$ Unipolar: $0V$ to $10V$, $0V$ to $5V$ User Defined Per Channel
DNL/INL	$\pm 0.5LSB/\pm 0.75LSB$
Input Impedance	1M
Analog Filter	2-Poles LPF; $F_c = 60KHZ$
Overvoltage Protection	$\pm 20V$
ESD Protection	Up to $\pm 4KV$ air discharge
Sampling Mode	User Defined Auto Or Manual
Sampling Interval	User Defined from 1 To 255msec
Moving Window Average	User Defined 1, 2, 4, or 8 Samples

- J5&J6 (8-pole screw terminal block)



J5 Pin Number	Description
1	Analog Input 1 Positive (AIN1+)
2	Analog Input 1 Negative (AIN1-)
3	Analog Input 2 Positive (AIN2+)
4	Analog Input 2 Negative (AIN2-)
5	Analog Input 3 Positive (AIN3+)
6	Analog Input 3 Negative (AIN3-)
7	Analog Input 4 Positive (AIN4+)
8	Analog Input 4 Negative (AIN4-)

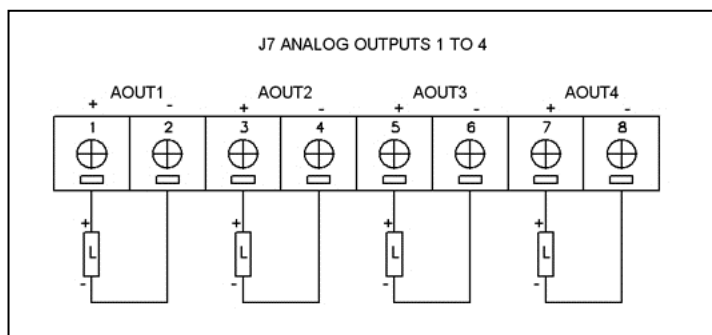
J6 Pin Number	Description
1	Analog Input 5 Positive (AIN5+)
2	Analog Input 5 Negative (AIN5-)
3	Analog Input 6 Positive (AIN6+)
4	Analog Input 6 Negative (AIN6-)
5	Analog Input 7 Positive (AIN7+)
6	Analog Input 7 Negative (AIN7-)
7	Analog Input 8 Positive (AIN8+)
8	Analog Input 8 Negative (AIN8-)

7. Analog Outputs

- Specifications

Channel	4
Isolation	None
Resolution	12-bit
Range	Unipolar: 0V to 10V OR 0V to 5V On board Jumper Select
INL/DNL	±1LSB
Output Impedance	1K
Output Capacitance	0.01uF
Overvoltage Protection	±20V
ESD Protection	Up to ±4KV air discharge
Load Current	5V Output: 2.5ma @ 1K Load 10V Output: 5ma @ 1K Load
Max Load Current	10ma

- J7 (8-pole screw terminal block)



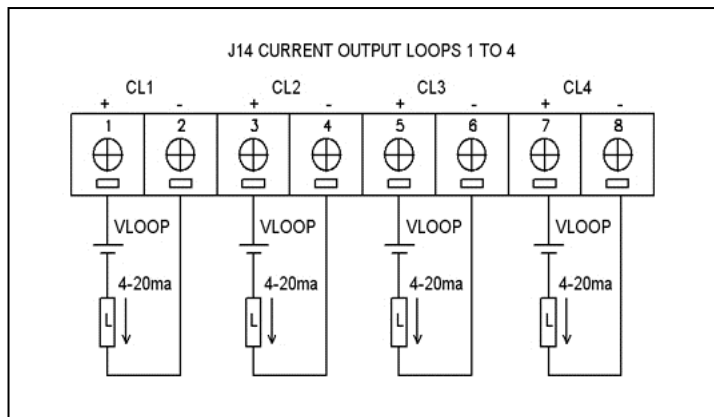
J7 Pin Number	Description
1	Analog Output 1 Positive (AOUT1+)
2	Analog Output 1 Negative (AOUT1-)
3	Analog Output 2 Positive (AOUT2+)
4	Analog Output 2 Negative (AOUT2-)
5	Analog Output 3 Positive (AOUT3+)
6	Analog Output 3 Negative (AOUT3-)
7	Analog Output 4 Positive (AOUT4+)
8	Analog Output 4 Negative (AOUT4-)

8. Current-Loop Transmitter Outputs

- Specifications

Channel	4
Isolation	None
Resolution	12-bit
Range	4-20ma
INL/DNL	±1LSB
Loop Voltage	Typical 12-24VDC (Max 30V)
Overvoltage Protection	30V
Span Error	0.05%
Nonlinearity Error	0.03%
Reverse Voltage Protection	Diode Protected

- J14 (8-pole screw terminal block)



J14 Pin Number	Description
1	Current Loop Output 1 Positive (CL1+)
2	Current Loop Output 1 Negative (CL1-)
3	Current Loop Output 2 Positive (CL2+)
4	Current Loop Output 2 Negative (CL2-)
5	Current Loop Output 3 Positive (CL3+)
6	Current Loop Output 3 Negative (CL3-)
7	Current Loop Output 4 Positive (CL4+)
8	Current Loop Output 4 Negative (CL4-)

9. ModBus Registers & Operation

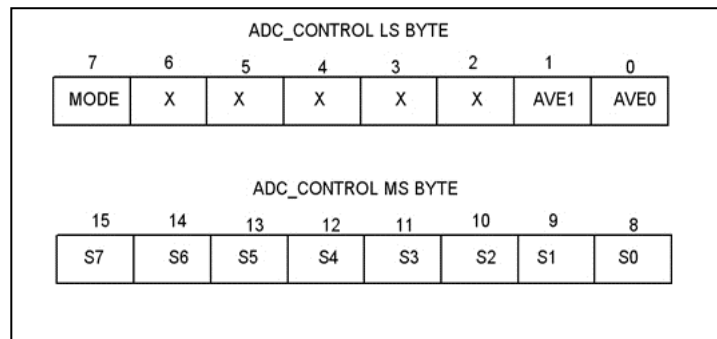
- **Input Registers (8 Registers)**

Address	Name	Value Type	Description
0	AIN1	Count	Analog Input 1 Value
1	AIN2	Count	Analog Input 2 Value
2	AIN3	Count	Analog Input 3 Value
3	AIN4	Count	Analog Input 4 Value
4	AIN5	Count	Analog Input 5 Value
5	AIN6	Count	Analog Input 6 Value
6	AIN7	Count	Analog Input 7 Value
7	AIN8	Count	Analog Input 8 Value

- **Holding (Output) Registers (16 Registers)**

Address	Name	Value Type	Description
0	AOUT1	Count (0-4095)	Analog Output 1 Value
1	AOUT2	Count (0-4095)	Analog Output 2 Value
2	AOUT3	Count (0-4095)	Analog Output 3 Value
3	AOUT4	Count (0-4095)	Analog Output 4 Value
4	CLT1	Count (0-4095)	Current Loop Transmitter 1 Value
5	CLT2	Count (0-4095)	Current Loop Transmitter 2 Value
6	CLT3	Count (0-4095)	Current Loop Transmitter 3 Value
7	CLT4	Count (0-4095)	Current Loop Transmitter 4 Value
8	ADC_CONTROL	Unsigned 16-bit	Analog To Digital Conversion Control Register
9	ADC_RANGE 0	Unsigned 16-bit	Analog Input Range Word 0
10	ADC_RANGE 1	Unsigned 16-bit	Analog Input Range Word 1
11	Reserved		
12	Reserved		
13	Reserved		
14	Reserved		
15	Reserved		

- **ADC_CONTROL:** This register is used to set the Sampling mode, Sampling interval and Average.



Moving Window Average

AVE1	AVE0	
0	0	No Average
0	1	2 Samples Moving Window Average
1	0	4 Samples Moving Window Average
1	1	8 Samples Moving Window Average (Default)

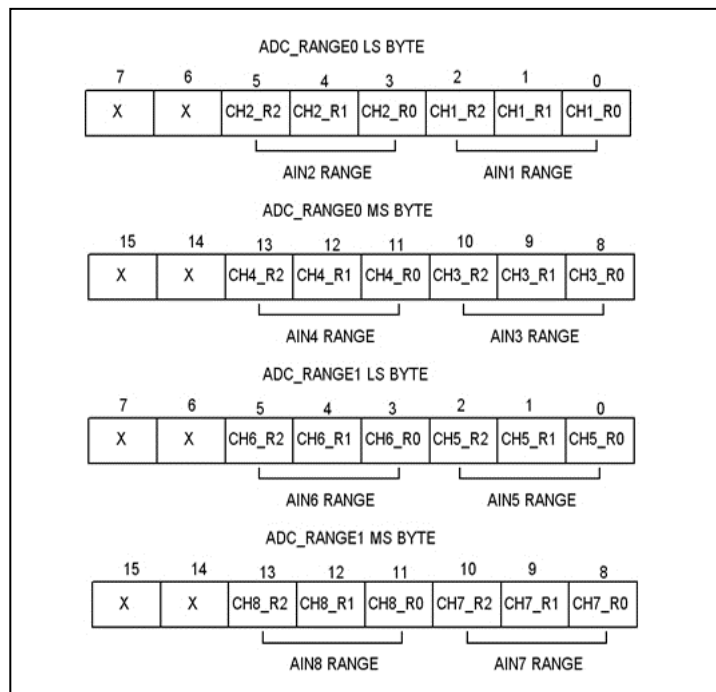
Sampling Mode

Mode	Sampling Mode
0	Auto Sampling Mode (Default): In this mode, all analog inputs are sampled and averaged at the specified sampling rate and average.
1	Manual Sampling Mode: In this mode, all analog inputs are sampled and averaged at the time of receiving a command to read the input registers.

Sampling Interval in msec

S7-S0	Sampling Interval	Sampling Frequency
1	1 msec	1KHZ
2	2 msec	500HZ
10	10 msec	100HZ (Default)
255	255 msec	3.92HZ

- **ADC_RANGE 0 & 1:** These two registers are used to set the range of each analog input.



Analog Input Range

R2	R1	R0	Range
0	0	0	Bipolar $\pm 10V$
0	0	1	Bipolar $\pm 5V$
0	1	0	Bipolar $\pm 2.5V$
0	1	1	Unipolar 0 to 10V (Default)
1	0	0	Unipolar 0 to 5V

- **Power Up/ Reset Default Settings**

Mode	Auto Sampling
Average	8 Samples
Sampling Interval	10msec
Range	Unipolar 0 to 10V For all analog inputs

10. Manual Change History

Date	Revision	Change
7/9/2015	REV1.00	Initial version of this manual

11. Hardware Limited Warrnty

Haidar Technology, LLC. Warrants its hardware products to be free from manufacturing defects in materials and workmanship under normal use for a period of one (1) year from the date of purchase from H AidAR. This warranty extends to products purchased directly from H AidAR or an authorized H AidAR distributor. Purchasers should inquire of the distributor regarding the nature and extent of the distributor's warranty, if any. H AidAR shall not be liable to honor the terms of this warranty if the product has been used in any application other than that for which it was intended, or if it has been subjected to misuse, accidental damage, modification, or improper installation procedures. Furthermore, this warranty does not cover any product that has had the serial number altered, defaced, or removed. This warranty shall be the sole and exclusive remedy to the original purchaser. In no event shall H AidAR be liable for incidental or consequential damages of any kind (property or economic damages inclusive) arising from the sale or use of this equipment. H AidAR is not liable for any claim made by a third party or made by the purchaser for a third party. H AidAR shall, at its option, repair or replace any product found defective, without charge for parts or labor. Repaired or replaced equipment and parts supplied under this warranty shall be covered only by the unexpired portion of the warranty. Except as expressly set forth in this warranty, H AidAR makes no other warranties, expressed or implied, nor authorizes any other party to offer any warranty, including any implied warranties of merchantability or fitness for a particular purpose. Any implied warranties that may be imposed by law are limited to the terms of this limited warranty. This warranty statement supercedes all previous warranties, and covers only the H AidAR hardware.

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No merchandise may be returned for credit, exchange, or service without prior authorization from. To obtain warranty service, contact the factory and request an RMA (Return Merchandise Authorization) number. Enclose a note specifying the nature of the problem, name and phone number of contact person, RMA number, and return address. Authorized returns must be shipped freight prepaid to H AidAR Technology with the RMA number clearly marked on the outside of all cartons. Shipments arriving freight collect or without an RMA number shall be subject to refusal. H AidAR reserves the right in its sole and absolute discretion to charge a 15% restocking fee, plus shipping costs, on any products returned with an RMA.

Return freight charges following repair of items under warranty shall be paid by H AidAR, shipping by standard ground carrier. In the event repairs are found to be non-warranty, return freight costs shall be paid by the purchaser.