HE-RCC972 Compact Controller

8 Digital DC Inputs / 4 Digital Outputs
8 Analog Inputs / 4 Analog Outputs
1 CAN port (CsCAN protocol)
1 Ethernet Port (webserver, Modbus TCP, email)

1 Specifications

Digital DC Inputs	RCC972	
Inputs per Module	8	
Input Voltage Range	12VDC / 24VDC	
Absolute Max. Voltage	35VDC Max.	
Input Impedance	10kΩ	
Input Current	Positive Logic	Negative Logic
Upper Threshold	0.8mA	-1.6mA
Lower Threshold	0.3mA	-2.1mA
Max Upper Threshold	8VDC	
Min Lower Threshold	3VDC	
OFF to ON Response	Scan rate dependent	
ON to OFF Response	Scan rate dependent	

Digital DC Outputs	RCC972
Outputs per Module	4
Output Type	Sourcing / 10kΩ Pull-Down
Absolute Max. Voltage	28VDC Max
Output Protection	Short Circuit
Max. Output Current per point	0.5A
Max. Total Current	2A Continuous
Max. Output Supply Voltage	30VDC
Minimum Output Supply Voltage	10VDC
Max. Voltage Drop at Rated Current	0.25VDC
Max. Inrush Current	650mA per channel
Min. Load	None
OFF to ON Response	Scan rate dependent
ON to OFF Response	Scan rate dependent
Output Characteristics	Current Sourcing (Pos logic)

Analog Inputs	RCC972
Number of Channels	8
Input Range	0 - 20mA
Maximum input resistance	72Ω (Clamped @ -0.5VDC to 6VDC)
Safe input voltage range *	+/- 30VDC
Negative Logic	12 Bits
%AI full scale	0 - 32,000 counts
Max. Over-Current	35mA
Accuracy (% of full scale)	1.00%
Max. Error at 25°C (excluding zero)	1.5% of full scale.
Conversion rate	All channels converted once per ladder scan
Filtering	160Hz hash (noise) filter 1-128 scan digital running average filter

Analog Outputs	RCC972
Outputs per Module	4
Output Ranges	0- 20mA.
Minimum Current load	500Ω
Galvanic Isolation	None
Nominal Resolution	12 Bits
%AQ full scale	0 - 32,000 counts
Response Time	One update per ladder scan
Accuracy (% of full scale)	0.5%
Max. Error at 25°C (excluding zero)	0.25% of full scale.
Conversion rate	All channels converted once per ladder scan

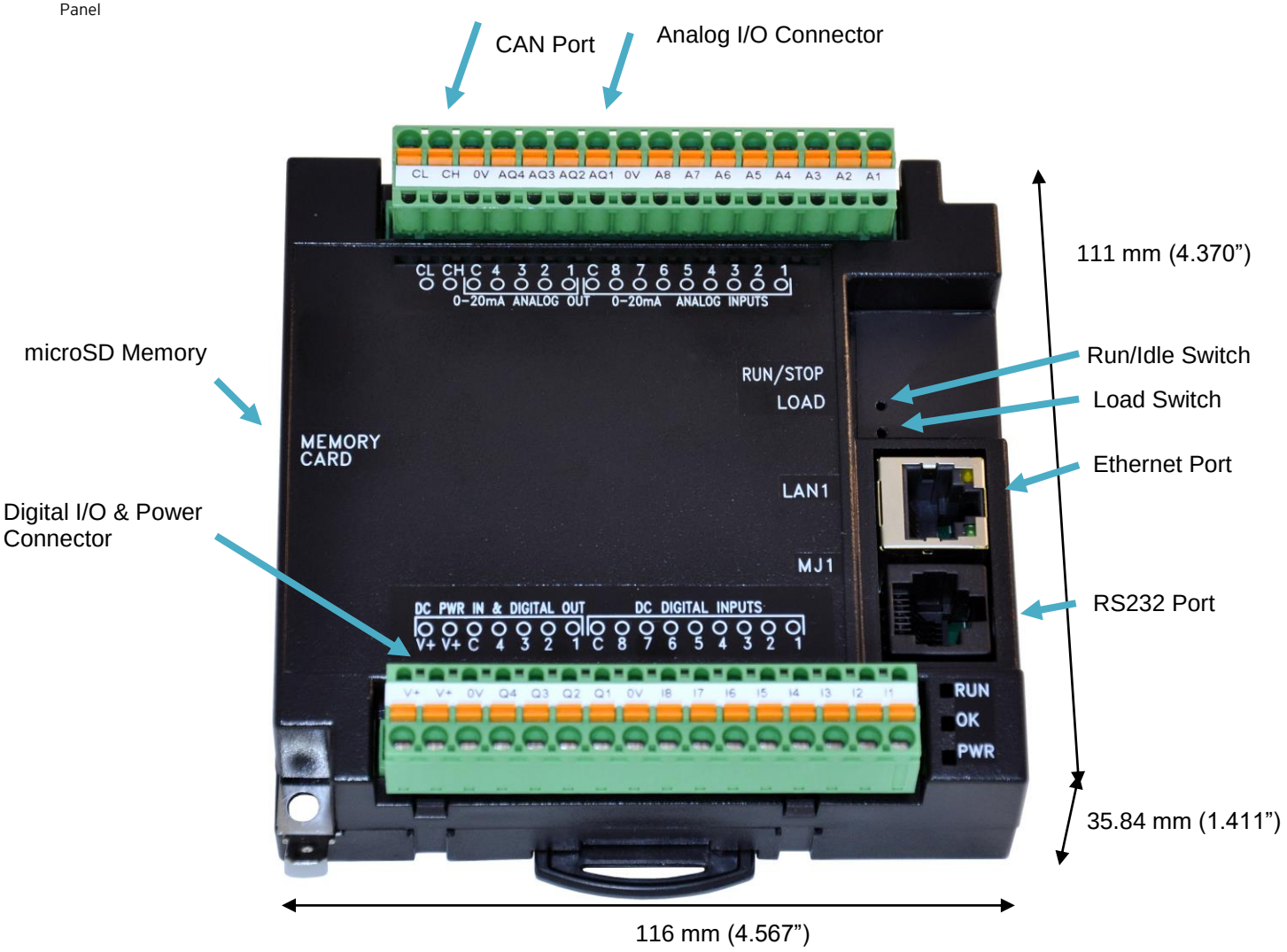
Register type	No. of Registers	Register type	No. of Registers
%R	4096	%I, %Q	2048
%T, %M	2048	%AI, %AQ	512
%S	13	Network Digital In/Out	64 per ID
%SR	1-192, 200-205	Network Analog In/Out	32 per ID

Fieldbus		Ethernet	
CAN Hardware	Version 2.0	Ethernet Connector	RJ45, Auto MDIX
Protocols	CsCAN	Protocols	See Ethernet manual ETN200 / ETN300
Baud rate	125kBd, 250kBd, 500kBd,1MBd	Baud rate	10/100Mb

General Specification			
Operating Voltage Range	10 - 32VDC	Serial Port	1 x RS232 port, RJ45
Required Power (Steady State)	130mA @ 24VDC	Program Memory Size	128kB
		Removable Memory Type	microSD, 32GB
Required Power (Inrush)	30A for 1ms @ 24VDC	Housing Type	Plastic (UL 50 rated, flame retardant, UV resistant.)
Operating Temperature	-10° to 60°C	Mounting	DIN Rail / Panel mounting
Storage Temperature	-10° to 70°C	Terminal Type	Spring clamp 0.2" / 5.08mm Removable
Relative Humidity	5 to 95% Non-condensing	Battery backed	No
Weight	10 oz. (325.0 g)	Switches	1-Run/Idle, 2-Load
		LED's	1-Power, 2- OK, 3- Run
CE	USA: https://hornerautomation.com/certifications/ Europe: http://www.horner-apg.com/en/support/certification.aspx		

- Do not apply external voltage without a load.

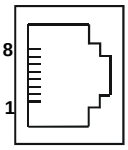
2 Panel



3 Ports / Connectors / Cables

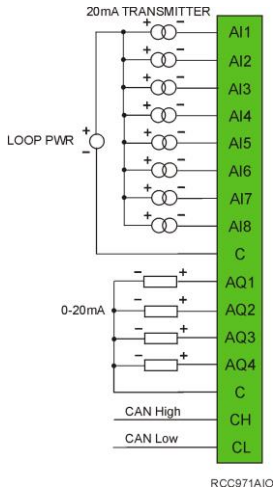
Memory Slot:
Uses **µSD Removable Memory** for data logging, screen captures, program loading and recipes.
Horner Part No.: HE-MC1

Serial Communications:
MJ1: (RS-232) Use for Cscape programming and Application-Defined Communications.



Pin	MJ1 Pins	
8	TXD	OUT
7	RXD	IN
6	0 V	Ground
5	+5V (60mA Max)	OUT
4	RTS	OUT
3	CTS	IN
2	N/C	
1	N/C	

Analog	RCC972
1	Analog In1
2	Analog In2
3	Analog In3
4	Analog In4
5	Analog In5
6	Analog In6
7	Analog In7
8	Analog In8
C	0V
1	Analog Out1
2	Analog Out2
3	Analog Out3
4	Analog Out4
0V	0V
CH	CAN High
CL	CAN Low



Note: The wiring examples show **Positive Logic** input wiring.
Do not apply external Power to the Analog inputs without a load.

Ethernet Port:
The Ethernet port is a standard RJ45 port supporting: Webserver, various Ethernet protocols and Cscape programming. See: http://heapg.com
Manual: SUP0740-07.pdf

Wiring Specifications
- For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG (0.8mm^2) or larger.
- For shielded Analog I/O wiring, use the following wire type or equivalent: Belden 8441, 18 AWG (0.8mm^2) or larger.

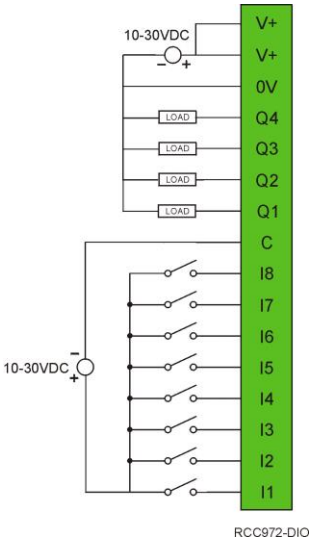
Power Up: Connect to Earth Ground.
Apply 10 – 30VDC.
Torque rating 4.5 – 7 in-lbs (0.50 – 0.78 N-m)

For CAN wiring, use the following wire type or equivalent: Belden 3084, 24 AWG (0.2mm^2) or larger.

4 Wiring

Wire according to the type of inputs / outputs used.
Use Copper Conductors in Field Wiring Only, 60/75°C

Digital	RCC972
V+	DC Power In
V+	24V DC Out
C	0V
Q4	Digital Ou4
Q3	Digital Ou3
Q2	Digital Out2
Q1	Digital Out1
C	0V
I8	Digital In8
I7	Digital In7
I6	Digital In6
I5	Digital In5
I4	Digital In4
I3	Digital In3
I2	Digital In2
I1	Digital In1



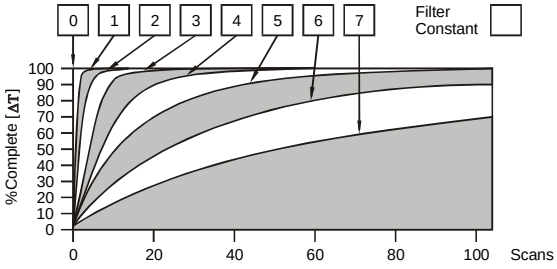
RCC972-DIO

Register Map

Registers	Description
%I1 to %I8	Digital Inputs
%I9 to %I15	Reserved
%I16	%Q Fault Status
%Q1 to %Q4	Digital outputs
%AI1 to %AI8	Analog inputs
%AQ1 to %AQ4	Analog outputs

5 Filter

Filter Constant sets the level of digital filtering according to the following chart



Digital Filtering module response to a temperature change. The illustration above demonstrates the effect of digital filtering (set with Filter Constant) on

6 Safety

When found on the product, the following symbols specify:

Warning: Electrical Shock Hazard.

Warning: Consult user documentation.

WARNING: To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.

WARNING: To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse the voltage measurement inputs. Be sure to locate fuses as close to the source as possible.

WARNING: Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.

WARNING: In the event of repeated failure, do not replace the fuse again as a repeated failure indicates a defective condition that will not clear by replacing the fuse.

WARNING: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

- All applicable codes and standards need to be followed in the installation of this product.

- Adhere to the following safety precautions whenever any type of connection is made to the module:
  - Connect the safety (earth) ground on the power connector first before making any other connections.
  - When connecting to electric circuits or pulse-initiating equipment, open their related breakers.
  - Do not make connections to live power lines.
  - Make connections to the module first; then connect to the circuit to be monitored.
  - Route power wires in a safe manner in accordance with good practice and local codes.
  - Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.
  - Ensure hands, shoes, and floor are dry before making any connection to a power line.
  - Make sure the unit is turned OFF before making connection to terminals.
  - Make sure all circuits are de-energized before making connections.
  - Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.
- Use Copper Conductors in Field Wiring Only, 60/75°C

7 Technical Support

For assistance and manual updates, contact Technical Support at the following locations:

North America:
+1 (317) 916-4274
www.hornerautomation.com
email: techsppt@heapg.com

Europe:
(+) 353-21-4321-266
www.horner-apg.com
email: techsupport@hornerirl.ie

8 Diagnostics

LED - Normal Functionality

LED	Off	ON	Flash (1Hz)
PWR	No power applied	10-30 VDC applied	
OK	Self test fail	Self test pass	I/O forcing enabled.
RUN	Stop mode	Run Mode	Do I/O Mode.

LED Load Program/Firmware Functionality

LED OK & RUN	Flashing Alternately	Flashing Together	Flashing Stops
Load program or firmware	Download in Progress	Download fails, number of flashes indicates the error.	Download Complete, unit reboots (allow 30 seconds).

Switch - Normal Functionality

Load switch

1. Pressing the **LOAD** switch during power-up boots from the Micro SD card. This starts a Firmware Load if the Micro SD is bootable and valid firmware files are found on it.
2. After boot-up, pressing the **LOAD** switch for 3 seconds either starts a Firmware Load or an Application Load depending upon what files are found on the Micro SD. If firmware files are found, a Firmware Load is performed. If firmware files are not found and the DEFAULT.PGM file is found, an Application Load is performed.

Run/Stop switch

1. After boot-up, pressing the **RUN/STOP** switch for 3 seconds toggles the RCC between RUN and STOP modes.

Switch – Erase Program Function

LOAD and RUN/STOP

1. After boot-up, pressing both Load and RUN/Stop switches for 3 seconds performs an "Erase All" function, which deletes all application programs.

LED – Diagnostic Functionality

The LEDs are also used to indicate some fault conditions in the unit. The two LEDs, OK and RUN, will flash a number of times depending upon the fault. There will be a two second gap and the pattern will be repeated. The number of flashes and the associated error are as follows:

No. of flashes	Fault Meaning
2	The MAC ID is empty.
3	The internal MAC file is corrupt.
4	The MAC ID TXT file is invalid.
5	The MAC ID file is not found or the microSD card is empty or missing system files.

Diagnostic Led flashing table.