



Thermistor / Current / Voltage Analog Input Module



HE800ADC920 / HE-ADC920*

12-Bit Resolution

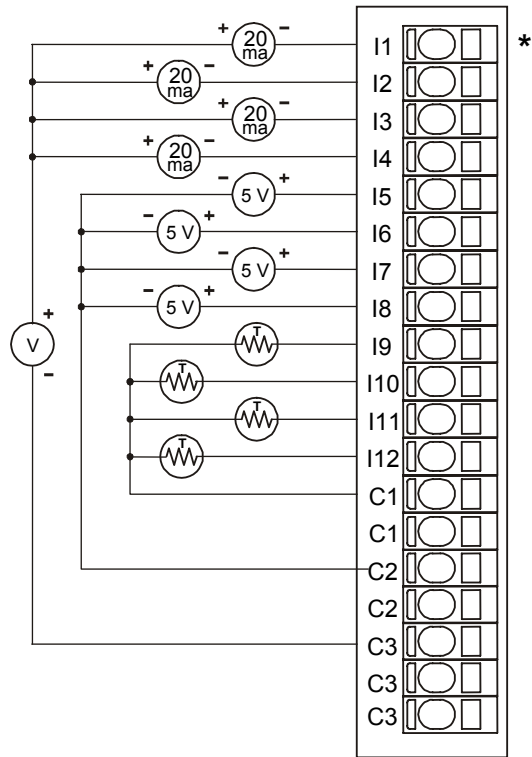
* HE- denotes plastic case.

This datasheet also covers products starting with IC300.

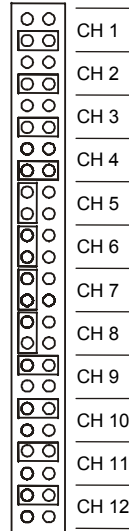
1 SPECIFICATIONS

ADC920		ADC920	
Number of Channels	12	Converter Type	Successive Approximation
Input Ranges (including over-range)		Input Impedance	< 12 VDC, Clamped @ 12 VDC, 35 mA Max. Continuous
<i>Thermistor</i> (1/10° resolution)	-37–115°C -35–240°F	<i>Thermistor</i>	10 KΩ
<i>Current</i>	0–20.47 mA	<i>Current</i>	250 Ω
<i>Voltage</i>	0–5.11 VDC	<i>Voltage</i>	1 Mega Ω
Resolution	12-Bit	Terminal Type	Spring Clamp, Removable
Maximum Error at 25°C	0.1% Full Scale	Operating Temperature	0° – 60° Celsius
Conversion Time (PLC Update Rate)	Set by PLC Scan Time	Analog Inputs Input Points Required	12
Additional error for temperatures other than 25°C	0.01% / C°	Relative Humidity	5–95% Non-condensing
Required Power (Steady State)	0.19 W (8 mA @ 24 VDC)	Weight	9 oz. (256 g)
Required Power (Inrush)	Negligible		
Maximum Over-Current	35 mA		
External Power Supply	None		
CE	See Compliance Table at http://www.heapg.com/Support/compliance.htm		
UL			

2 WIRING

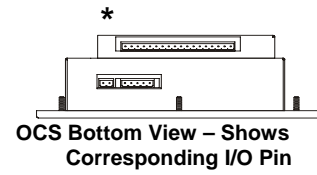


001ADC003-R2



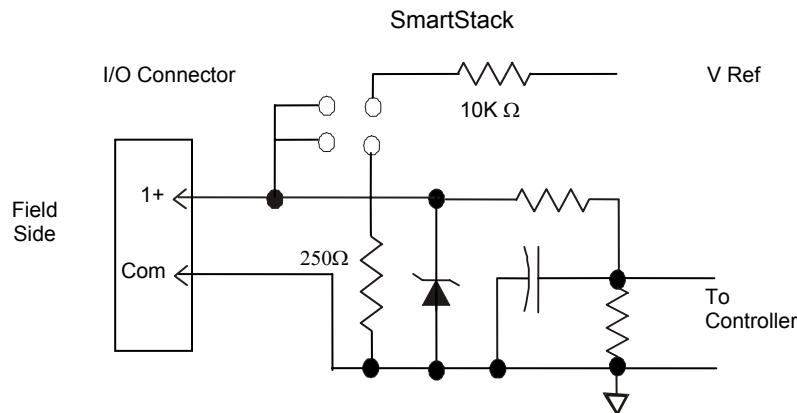
The jumper block indicates the correct jumper positions for the wiring shown.

For more information, refer to Section 4.2 (b), Hardware Configuration in this document.



Pin	ADC920
I1*	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
I9	Input 9
I10	Input 10
I11	Input 11
I12	Input 12
C1	Thermistor Common
C2	0 – 5VDC Common
C3	20mA Common
C3	
C3	

3 INTERNAL CIRCUIT SCHEMATIC



4 CONFIGURATION

Note: The status of the I/O can be monitored in Cscape Software.

4.1 Software Configuration

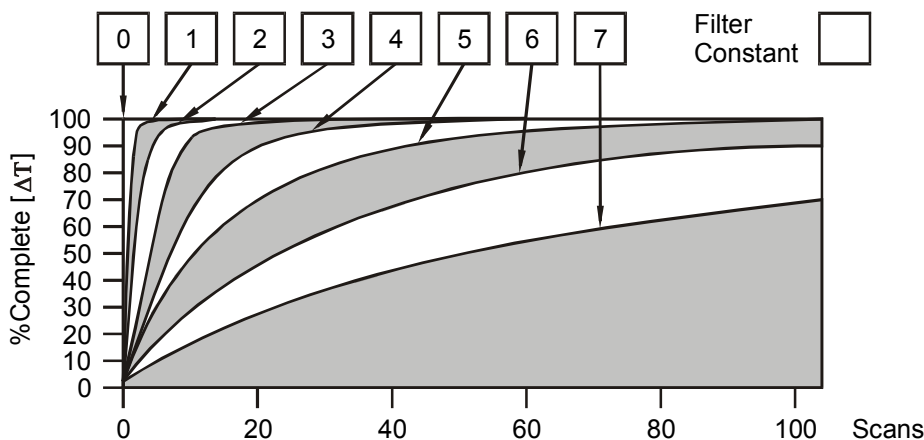
Preliminary configuration procedures that apply to SmartStack™ Modules are contained in the hardware manual of the controller you are using. Refer to the **Additional References** section in this data sheet for a listing of hardware manuals.

I/O Map Tab

The I/O Map describes which I/O registers are assigned to a specific SmartStack™ Module and where the module is located in the point map. The I/O Map is determined by the model number and location within the SmartStack™. The I/O Map is not edited by the user.

Module Setup Tab

- a) Input range for each channel may be selected independently.
- b) Filter Constant sets the level of digital filtering according to the following chart.
- c) In addition to configuring the module setup, the hardware must be jumpered to select the appropriate range for each channel.



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

4.2 Hardware Configuration

The inputs are referenced to the bus common. Each of the inputs can be jumper-selected for one of the three input types. Behind each of the input pins is a corresponding group of four jumper pins with a programming plug.

- a) To select 5V input: Connect the two pins nearest the connector.
- b) To select thermistor input: Connect the two pins nearest input 1.
- c) To select 20mA input: Connect the two pins nearest input 12.

Note: It is also necessary to specify the input channel type in Cscape along with the temperature format.

The ADC920 supports Kele Engineering Precon Type III, 10 K Ω thermistors. It also directly supports the following 10 K Ω (Beta=3574) thermistors from Yellow Springs Instruments (YSI).

44006	46006
44106	46031
44406	46041
44031	44907
45006	44908

Thermistor Curve for PreCon TYPE III (Model 3)					
Temperature	Resistance	Temperature	Resistance	Temperature	Resistance
°F		°F		°F	
-35	203.6 K	60	14.78 K	155	2.098 K
-30	173.6 K	65	13.15 K	160	1.920 K
-25	148.3 K	70	11.72 K	165	1.759 K
-20	127.1 K	75	10.46 K	170	1.614 K
-15	109.2 K	80	9.354 K	175	1.482 K
-10	94.07 K	85	8.378 K	180	1.362 K
-5	81.23 K	90	7.516 K	185	1.254 K
0	70.32 K	95	6.754 K	190	1.156 K
5	61.02 K	100	6.078 K	195	1.066 K
10	53.07 K	105	5.479 K	200	984.0
15	46.27 K	110	4.947 K	205	909.8
20	40.42 K	115	4.472 K	210	841.9
25	35.39 K	120	4.049 K	215	779.8
30	31.06 K	125	3.671 K	220	723.0
35	27.31 K	130	3.333 K	225	671.0
40	24.06 K	135	3.031 K	230	623.3
45	21.24 K	140	2.759 K	235	579.5
50	18.79 K	145	2.515 K	240	539.4
55	16.65 K	150	2.296 K		

5 INPUT CONVERSION FACTOR

The following table describes how real-world inputs are scaled into the controller. Given a known input voltage, the data value is configured by using the conversion factor from the table. The following formula is used:

$$\text{Data} = \text{Voltage In (Vin)} / \text{Conversion Factor}$$

Example: The user selects a voltage range of 0 to +5 VDC:

- 1) The known input voltage is 3 VDC.
- 2) Using the table, the conversion factor for the voltage range of 0 to +5 VDC is 0.00015625.
- 3) To determine the data value, the formula is used:

$$\text{Data} = \text{Vin} / \text{Conversion Factor}$$

$$19200 = 3 \text{ VDC} / 0.00015625$$

Conversion of Real-World Inputs into Controller			
Selected Voltage Range	Voltage In (Vin) VDC	Data Out	Conversion Factor
0 to +5.00 VDC	+5.11	32704	0.00015625
	+5.00	32000	
	0	0	
	NA	NA	
	NA	NA	
0 to +20 mA	+20.47	32736	0.000625
	+20.00	32000	
	0	0	
	NA	NA	
	NA	NA	
°C	+115	1150	0.1
	0	0	
	-37	-370	
°F	+240	2400	0.1
	0	0	
	-35	-350	

6 INSTALLATION / SAFETY

Warning: Remove power from the OCS controller, CAN port, and any peripheral equipment connected to this local system before adding or replacing this or any module.

- a) All applicable codes and standards should be followed in the installation of this product.
- b) Shielded, twisted-pair wiring should be used for best performance.
- c) Shields should be tied directly to the ground block within the panel.
- d) Use the following wire type or equivalent:
Belden 8441

For detailed installation and a handy checklist that covers panel box layout requirements and minimum clearances, refer to the hardware manual of the controller you are using. (See the [Additional References](#) section in this document.)

When found on the product, the following symbols specify:



Warning: Consult user documentation.



Warning: Electrical Shock Hazard.

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.

For detailed installation and a handy checklist that covers panel box layout requirements and minimum clearances, refer to the hardware manual of the controller you are using. (See the [Additional References](#) section in this document.):

- All applicable codes and standards need to be followed in the installation of this product.
- For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG or larger.

Adhere to the following safety precautions whenever any type of connection is made to the module.

- Connect the green safety (earth) ground 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.

7 ADDITIONAL REFERENCES

The following information serves as a *general* listing of Horner controller products and other references of interest and their corresponding manual numbers. Visit our website listed in the [Technical Support](#) section to obtain user documentation and updates.

Note: This list is <u>not</u> intended for users to determine which products are appropriate for their application; controller products differ in the features that they support. If assistance is required, see the Technical Support section in this document.	
Controller	Manual Number
XLE Series (e.g., HE-XExxx)	MAN0805
QX Series (e.g., HE-QXxxx)	MAN0798
NX Series (e.g., HE-NXxxx)	MAN0781
LX Series (e.g., LX-xxx; also covers RCS116)	MAN0755
Color Touch OCS (e.g., OCSxxx)	MAN0465
OCS (Operator Control Station) (e.g., OCS1xx / 2xx; Graphic OCS250)	MAN0227
Remote Control Station (e.g., RCS2x0)	
MiniOCS (e.g., HE500OCSxxx, HE500RCSxxx)	MAN0305
Other Useful References	
CAN Networks	MAN0799
Cscape Programming and Reference	MAN0313
Wiring Accessories and Spare Parts Manual	MAN0347
DeviceNet™ Implementation	SUP0326
Wiring Accessories and Spare Parts Manual	MAN0347

8 TECHNICAL SUPPORT

For assistance and manual up-dates, contact Technical Support at the following locations:

North America:+

(317) 916-4274

www.heapg.com

Europe:

(+) 353-21-4321-266

www.horner-apg.com