



High Resolution
20 mA Analog Input Module
HE800ADC140 / HE-ADC140*
16-Bit



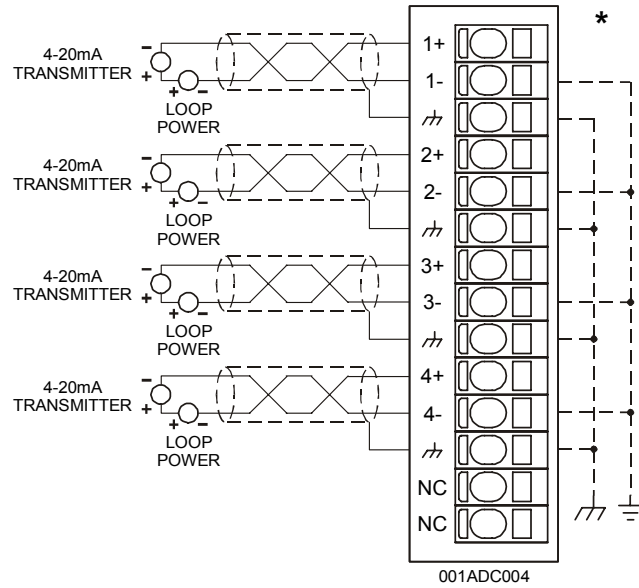
* HE- denotes plastic case

This datasheet also covers products starting with IC300.

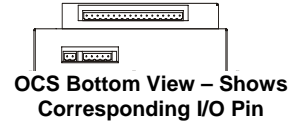
1 SPECIFICATIONS

	ADC140		ADC140
Number of Channels	4	Analog Input Points Required	4
Input Ranges (including over-range)	±20.47 mA, ±0 to 20.47 mA, ±4 to 20.47 mA	Conversion Time (PLC Update Rate)	313 ms for all 4 channels
Resolution	16-Bit	Terminal Type	Spring Clamp, Removable
Maximum error @ 25°C	0.05% Full Scale	Additional error for temperatures other than 25°C	0.01% / °C
Input Impedance	5 Ω	Common Mode Range	± 12 VDC
Required Power (Steady State)	0.62 W (26 mA @ 24 VDC)	PLC Update Rate	Set by PLC Scan Rate
Required Power (Inrush)	Negligible	Operating Temperature	0°–60° Celsius
Maximum Over-Current	100 mA	Relative Humidity	5–95% Non-condensing
External Power Supply	None	Weight	9.5 oz. (270 g)
CE	See Compliance Table at http://www.heapg.com/Support/compliance.htm		
UL	See Compliance Table at http://www.heapg.com/Support/compliance.htm		

2 WIRING



* Pin 1



ADC140 Pinout		
Name	Pin	Signal
1+	1 *	20ma 1 +
1-	2	20ma 1 -
⌘	3	Shield
2+	4	20ma 2 +
2-	5	20ma 2 -
⌘	6	Shield
3+	7	20ma 3 +
3-	8	20ma 3 -
⌘	9	Shield
4+	10	20ma 4 +
4-	11	20ma 4 -
⌘	12	Shield
	13	No Connection
	14	No Connection

For installation, use twisted pairs (shielded preferred).

The differential inputs must be maintained within the specified common mode range for proper operation. One way to ensure this is to connect one side of each input to the OCS power supply common potential.

Exceeding the common mode range on an input channel results in erroneous readings on that channel. Failure to connect one side of a differential input results in an effective zero reading. A reversed connection of a differential input pair results in sign reversed digital data into the PLC for that channel.

3 CONFIGURATION

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

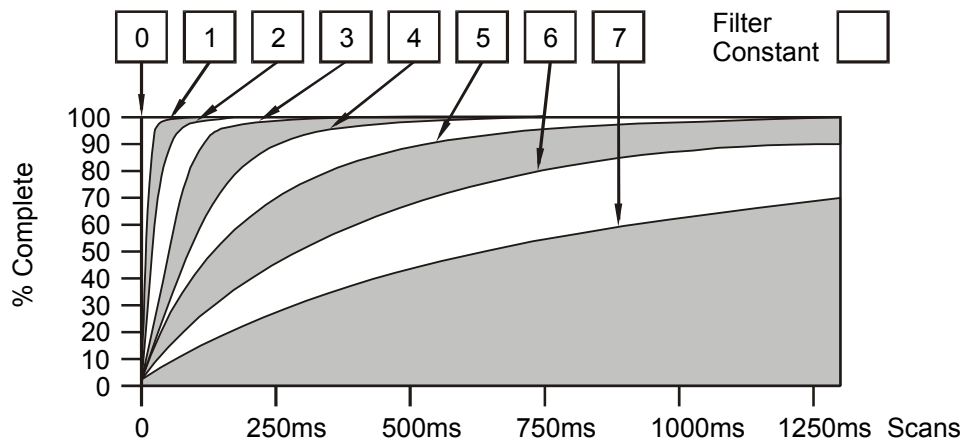
Preliminary configuration procedures that apply to SmartStack™ Modules are contained in the hardware manual of the controller you are using. Refer to the [Additional References](#) section in this data sheet for a listing of hardware manuals.

Module Setup Tab

- a) Input range may be set for each channel as +/-20 mA, 0–20 mA, 4–20 mA.
- b) Filter Constant sets the level of digital filtering according to the chart below.
- c) Reject Rates sets the frequency level for noise rejection at 50 or 60 Hz.

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.



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

4 INPUT CONVERSIONS

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. **Data = (Current In (ma) - Offset) / Conversion Factor**

Example: The user selects a range of 4–20 mA:

- 1) The known input current is 12 mA.
- 2) Using the table, the conversion factor for the range of 4–20 mA is 0.0005 with an offset of 4 mA.
- 3) To determine the data value, the formula is used:

$$\text{Data} = (\text{ma} - \text{Offset}) / \text{Conversion Factor}$$

$$16000 = (12 \text{ mA} - 4 \text{ mA}) / 0.0005$$

Conversion of Real-World Inputs to the Controller					
	%AI Value				
Selected Range	Current In mA DC	Data Out	LSB	Conversion Factor	Offset
± 20 mA	<-20.48 mA	-32768 *	625 μA	0.000625	0 mA
	-20 mA	-32000			
	0	0			
	+20 mA	+32000			
	>+20.48 mA	+32767 *			
0–20 mA	<-20.48 mA	0 *	625 μA	0.000625	0 mA
	-20 mA	0			
	0	0			
	+20 mA	+32000			
	>+20.48 mA	+32767 *			
4–20 mA	<-20.48 mA	0 *	500 μA	0.0005	4 mA
	-20 mA	0			
	4 mA	0			
	+20 mA	+32000			
	>+20.48 mA	+32767 *			

* Digital output reading under overload condition.

5 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) Shielded, twisted-pair wiring should be used for best performance.
- b) Shields may be terminated at the module terminal strip.
- c) In severe applications, shields should be tied directly to the ground block within the panel.
- d) Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

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.

6 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

7 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

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