+/- 10 V Analog Input / Output Module
HE800MIX011/ HE-MIX111*
HE800MIX011/ HE-MIX111*
12-Bit Resolution
* HE- denotes plastic case.
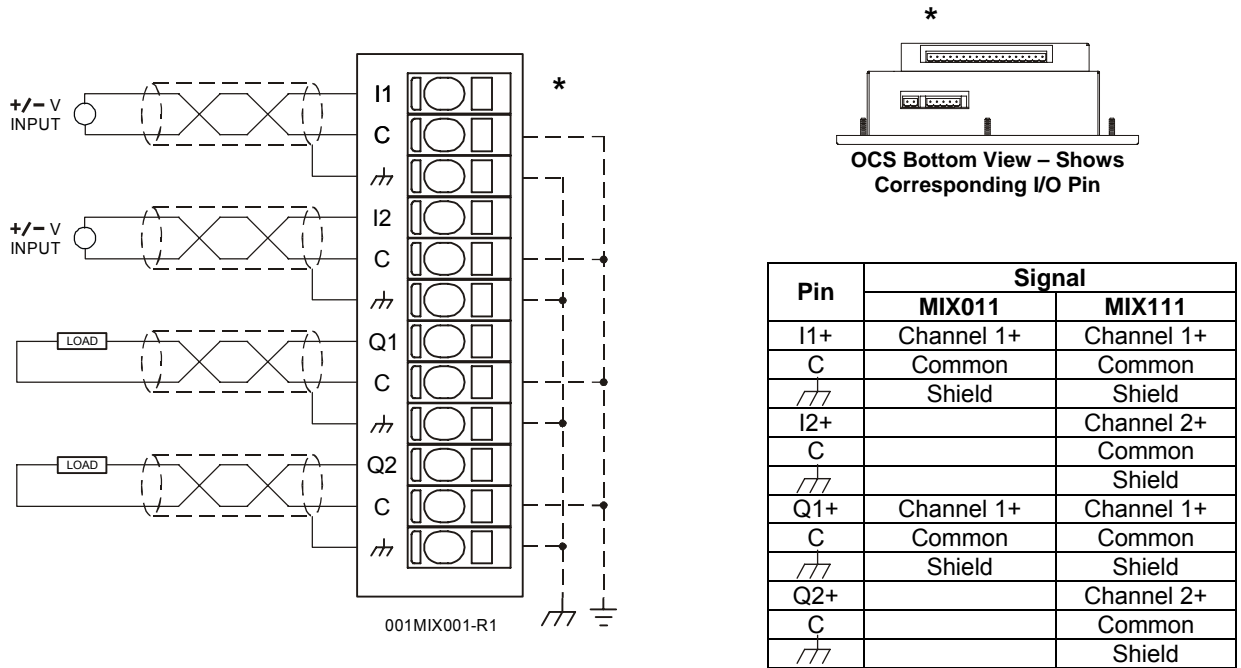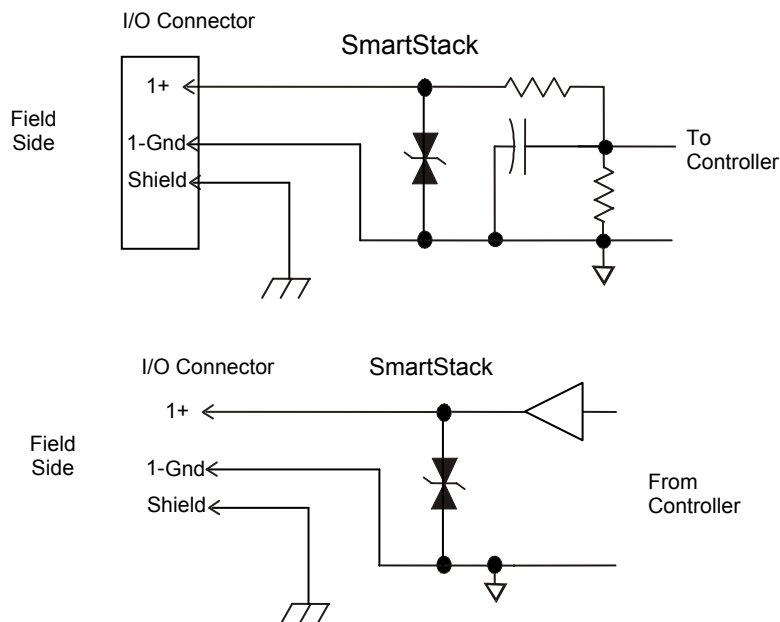
This datasheet also covers products starting with IC300.

1   SPECIFICATIONS

INPUT	MIX011	MIX111			MIX011	MIX111
Number of Channels	1	2		Analog Inputs Input Points Required	1	2
Input Ranges (including over-range)	±10.23 VDC; ±5.11, 0- +10.23, 0-5.11			Maximum Over-Voltage	350 VDC Max.	
Resolution	12-Bit			Additional error for temperatures other than 25°C	0.01% / °C	
Input Impedance	10 Meg Ω <12 VDC or 6 Meg Ω >12 VDC Nom.			External Power Supply	None	
Usable Resolution	12- Bits			Converter Type	Successive Approximation	
Maximum Error at 25°C	0.1%					
OUTPUT	**MIX011**	**MIX111**			**MIX011**	**MIX111**
Number of Channels	1	2		Analog Outputs; Output Points Required	1	2
Output Ranges (including over-range)	± 10.23 V			Additional error for temperatures other than 25°C	0.01% / °C	
Resolution	12-Bits			Power Budget Requirement	150 mA Max.	
Peak Output Voltage	10.23 V			Conversion Settling Time	1 ms.	
Load Impedance	2 KΩ Min.			Digital Filtering	Yes	
Load Capacitance	.01 μF Max.			External Power Supply	None	
PLC Update Rate	Set by PLC Scan Time			Maximum Error at 25°C	0.1%	
				Voltage Output Resolution	12 Bits	

General Specifications						
	MIX011	**MIX111**			**MIX011**	**MIX111**
Required Power (Steady State)	1.32 W (55 mA @ 24 VDC)		Operating Temperature	0°–60° Celsius		
Required Power (Inrush)	Negligible		Terminal Type	Spring Clamp, Removable		
Relative Humidity	5–95% Non-condensing		Weight	9.5 oz. (270 g)		
CE	See Compliance Table at http://www.heapg.com/Support/compliance.htm					
UL						

2   WIRING

OCS Bottom View – Shows Corresponding I/O Pin

Pin	Signal	
	MIX011	**MIX111**
I1+	Channel 1+	Channel 1+
C	Common	Common
⏚	Shield	Shield
I2+		Channel 2+
C		Common
⏚		Shield
Q1+	Channel 1+	Channel 1+
C	Common	Common
⏚	Shield	Shield
Q2+		Channel 2+
C		Common
⏚		Shield

3   INTERNAL CIRCUIT SCHEMATIC

Specification for transient voltage suppressors (transorbs) used on output circuitry is 11 VDC, bi-directional 500 W.

4   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.

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

The **Module Setup** is used in applications where it is necessary to change the default states or values of the outputs when the controller (e.g., OCS100) enters idle/stop mode.

1. For Analog Outputs: The default sets the output values to zero when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to a specific value or hold the last value. Generally, most applications use the default settings.

> **Warning:** The default sets the output values to zero when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

2. Analog Inputs

   a) Input range for each channel can be selected independently.
   b) Filter Constant sets the level of digital filtering according to the following chart.
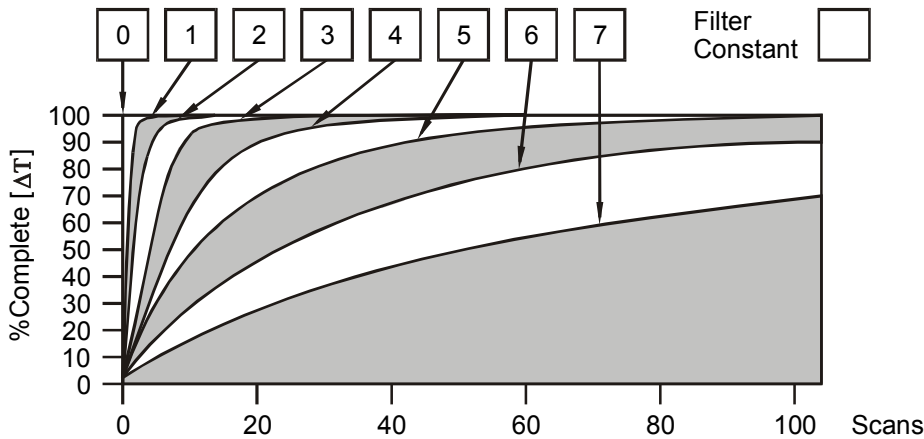
Digital Filtering. The illustration above demonstrates the effect of digital filtering (set with Fillter Constant) on module response to a temperature change.

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:

Data = Voltage In (Vin) / 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:
    Data = Vin / Conversion Factor
    19200 = 3 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	.00015625
	+5.00	32000	
	0.00	0	
	NA	NA	
	NA	NA	
0 to +10.00 VDC	+10.23	32736	.0003125
	+10.00	32000	
	0.00	0	
	NA	NA	
	NA	NA	
+/-5.00 VDC	+5.11	32704	.00015625
	+5.00	32000	
	0	0	
	-5.00	-32000	
	-5.11	-32704	
+/-10.00 VDC	+10.23	32736	.0003125
	+10.00	32000	
	0	0	
	-10.00	-32000	
	-10.23	-32736	

6   OUTPUT CONVERSION FACTOR

The following table describes how program data values are scaled to real-world analog voltage outputs by the module. Given a desired output voltage, the data value is converted by using the conversion factor from the table. The following formula is used:

Data = Voltage Out (V out) / Conversion Factor

Example: The user selects $\pm$ 10 VDC output range:

1) The desired voltage is 3 VDC.
2) Using the table, the conversion factor for the voltage range of 0 to +10 VDC is 0.0003125.
3) To determine the data value, the formula is used:
   Data = V out / Conversion Factor
   9600 = 3 VDC / 0.0003125

Conversion of Real-World Outputs into Controller			
Selected Voltage Output Range	**Data**	**Voltage Out (V out) VDC**	**Conversion Factor**
$\pm$ 10 VDC Analog Out	+ 32736	+10.23	0.0003125
	+ 32000	+10.00	
	0	0.00	
	- 32000	-10.00	
	- 32736	-10.23	

7   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.

- Use the following wire type or equivalent: Belden 8441.
- Shielded, twisted-pair wiring should be used for best performance.
- Shields may be terminated at the module terminal strip.
- In severe applications, shields should be tied directly to the ground block within the panel.
- All applicable codes and standards are to be followed in the installation of this product

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 <u>handy checklist</u> that covers panel box layout requirements and minimum clearances, refer to the hardware manual of the controller you are using. (See the <u>Additional References</u> 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 <u>not</u> 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.

8   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

9   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