



**24VDC Bipolar Digital In**  
**10-28VDC, 0.5A Sourcing Digital Out**  
**HE800MIX901 / HE-MIX901\***  
**+/- 10V Analog In/Out**  
 \* HE- denotes plastic case.



This datasheet also covers products starting with IC300.

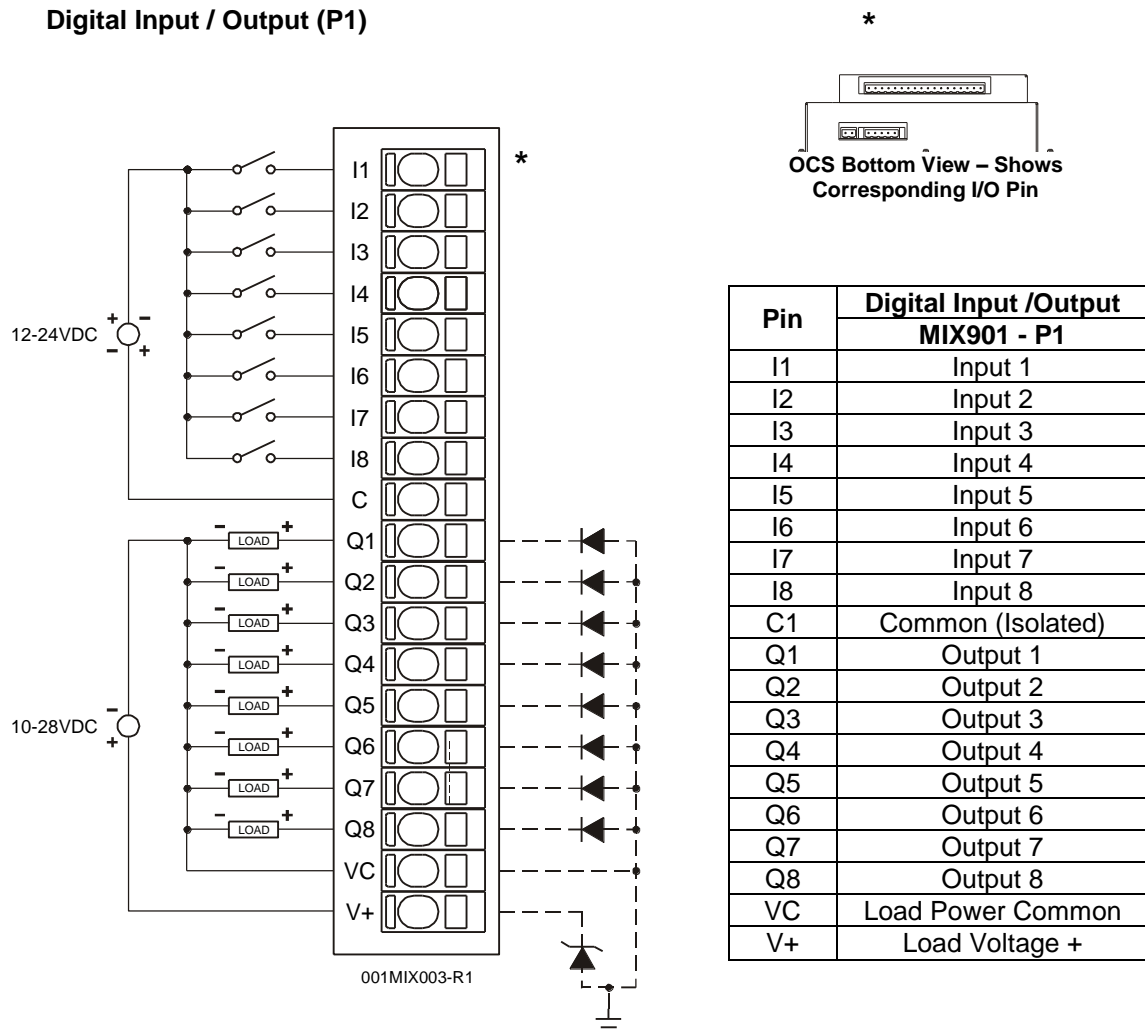
## 1 SPECIFICATIONS

ANALOG INPUT	MIX901		MIX901
Number of Channels	4	Analog Inputs Input Points Required	4
Input Ranges (including over-range)	±10.23VDC	Digital Filtering	Yes
Resolution	12-Bits	Additional error for temperatures other than 25°C	0.01% / °C
Input Impedance	1Meg Ohm <12VDC or clamped @ 12VDC Nom.	Maximum Error at 25°C	0.1%
Maximum Clamp Current	75mA.		
DIGITAL INPUT	MIX901		MIX901
Inputs per Module	8	Input Characteristics	Bidirectional
Commons per Module	1	Input Impedance	10K Ohms
Input Voltage Range	12-24VDC	Minimum ON Current	1mA
Peak Voltage	35VDC Max.	Maximum OFF Current	200µA
Isolation (Channel to Bus)	500VDC	OFF to ON Response	1ms.
ON Voltage Level	9VDC	ON to OFF Response	1ms.
OFF Voltage Level	3VDC		
ANALOG OUTPUT	MIX901		MIX901
Number of Channels	2	Analog Outputs; Output Points Required	2
Output Ranges (including over-range)	± 10.23V	Additional error for temperatures other than 25°C	0.01% / °C
Resolution	12-Bits	PLC Update Rate	Set by PLC Scan Time
Peak Output Voltage	10.23V	Conversion Settling Time	1ms.
Load Impedance	2K Ohms Min.	Voltage Output Resolution	12 Bits
Load Capacitance	.01µF MAX	Maximum Error at 25°C	0.1%
DIGITAL OUTPUT	MIX901		MIX901
Outputs per Module	8	Maximum Inrush Current	650mA per channel
Commons per Module	1	Minimum Load	None
Operating Voltage	10 - 28VDC	OFF to ON Response	1ms.
Output Type	Sourcing / 10K Pull-Down	ON to OFF Response	1ms.
Peak Voltage	28VDC Max.	Output Characteristics	Current Sourcing
Maximum Load Current per Output	0.5A Max.	Output Protection	Short Circuit

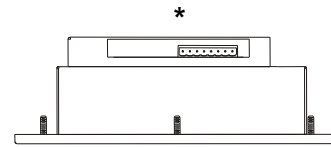
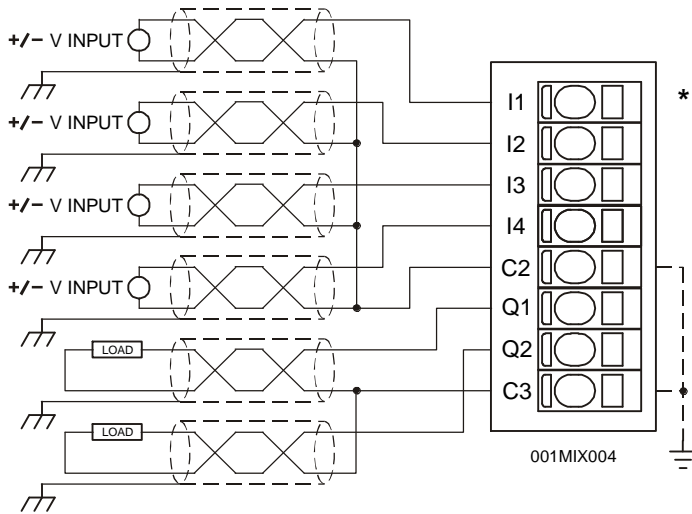
General Specifications			
	MIX901		MIX901
Required Power (Steady State)	0.33W (13.75mA @ 24VDC)	Operating Temperature	0° to 60° Celsius
Required Power (Inrush)	Negligible	Terminal Type	Spring Clamp, Removable
Relative Humidity	5 to 95% Non-condensing	Weight	9.5 oz. (270 g)
CE	See Compliance Table at <a href="http://www.heapg.com/Support/compliance.htm">http://www.heapg.com/Support/compliance.htm</a>		
UL	Operating Temperature Code T4A; See Compliance Table at <a href="http://www.heapg.com/Support/compliance.htm">http://www.heapg.com/Support/compliance.htm</a>		

## 2 WIRING

### 2.1 Digital Input / Output (P1)



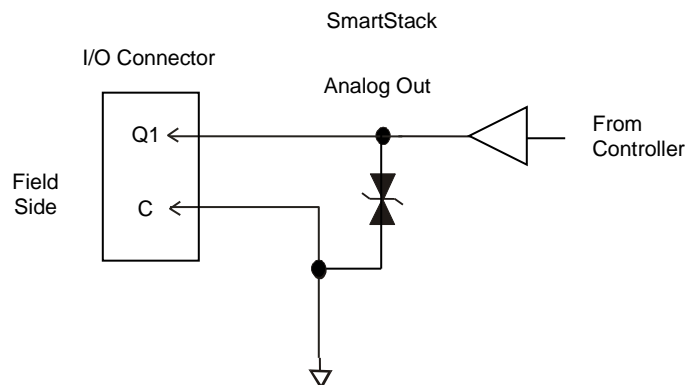
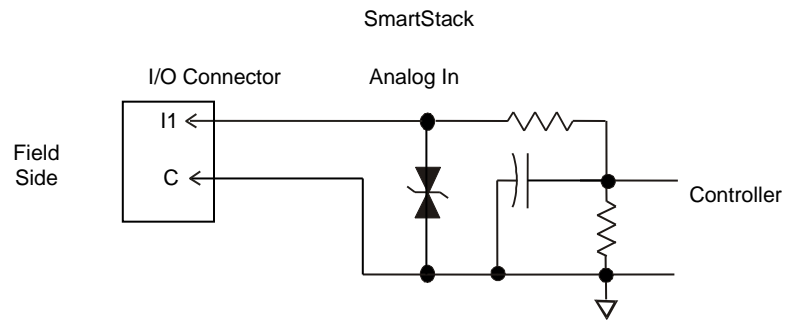
### 2.2 Analog Input / Output (P2)



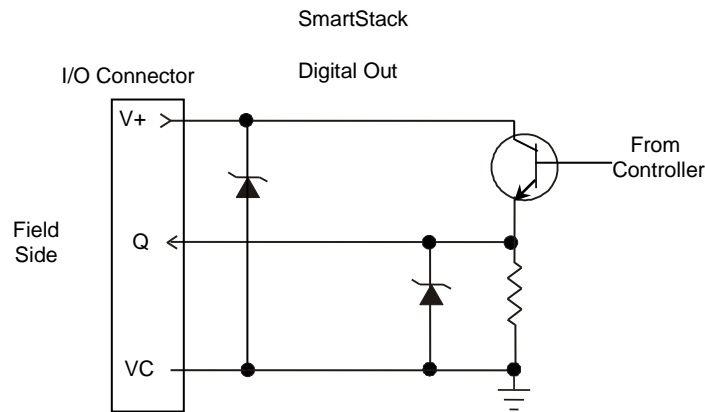
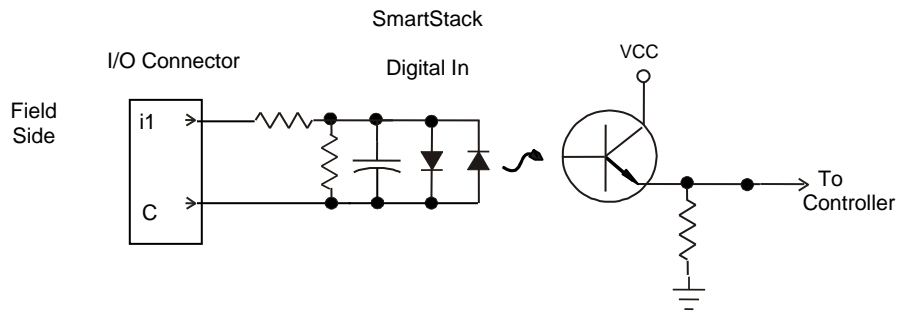
OCS Top View – Shows Corresponding I/O Pin

Pin	Analog In and Out MIX901 P2
	I1
I2	Input 2
I3	Input 3
I4	Input 4
C2	Input Common
Q1	Output 1
Q2	Output 2
C3	Output Common

### 3 INTERNAL CIRCUIT SCHEMATIC



Specification for transient voltage suppressors (transorbs) used on output circuitry is 12VDC, 600 watts.



Specification for transient voltage suppressors (transorbs) used on output circuitry is 33VDC, 300 watts.

Note: Electro-mechanical relays comply with IEC1131-2.

## 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.

### 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 Digital Outputs:** The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

**Warning:** The default turns the digital outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default settings.

**2. 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.

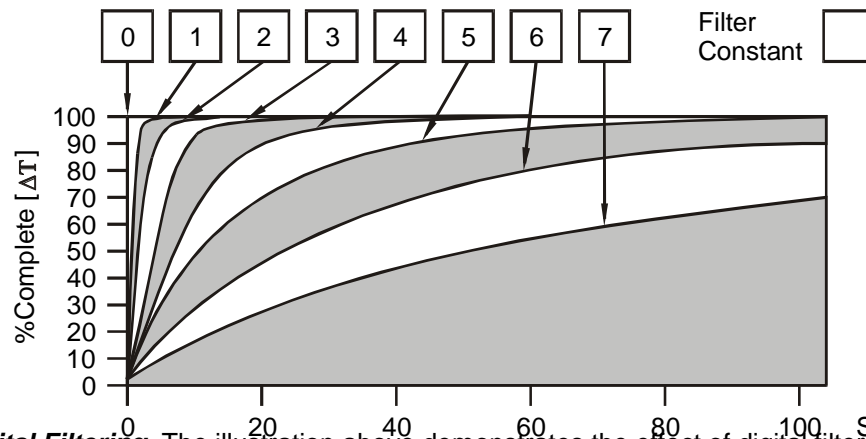
**Warning:** The default sets the output values to zero when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

### 3. For Analog Inputs:

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

#### 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 a temperature change.

## 5 ANALOG INPUT and OUTPUT CONVERSIONS

### 5.1 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 voltage range is +/-10VDC:

- 1) The known input voltage is 3 VDC.
- 2) Using the table, the conversion factor for the voltage range of +/-10VDC is 0.0003125.
- 3) To determine the data value, the formula is used:  

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

$$9600 = 3 \text{ VDC} / 0.0003125$$

Conversion of Real-World Inputs into Controller			
Selected Voltage Range	Voltage In (Vin) VDC	Data Out	Conversion Factor
+/-10.00 VDC	+10.23	32736	0.0003125
	+10.00	32000	
	0	0	
	-10.00	-32000	
	-10.23	-32736	

### 5.2 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 ± 10 VDC output range:

- 1) The desired voltage is 3 VDC.
- 2) Using the table, the conversion factor for the voltage range of +/-10 VDC is 0.0003125
- 3) To determine the data value, the formula is used:  

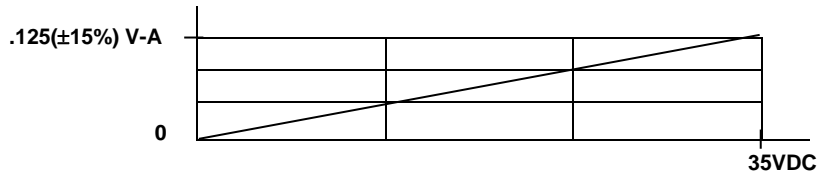
$$\text{Data} = \text{V out} / \text{Conversion Factor}$$

$$9600 = 3 \text{ VDC} / 0.0003125$$

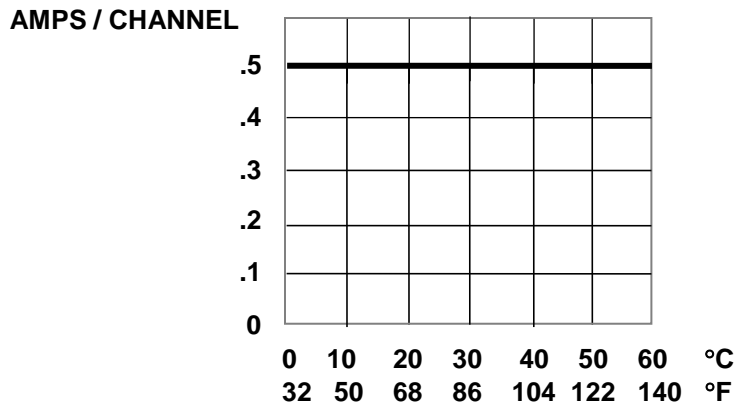
Conversion of Real-World Outputs into Controller			
Selected Voltage Output Range	Data	Voltage Out (V out) VDC	Conversion Factor
± 10 VDC Analog Out	+ 32736	+10.23	0.0003125
	+ 32000	+10.00	
	0	0.00	
	- 32000	-10.00	
	- 32736	-10.23	

## 6 DIGITAL INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Chart



## 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.

- All applicable codes and standards should be followed in the installation of this product.
- Shielded, twisted-pair wiring should be used for best performance (analog I/O).
- Shields may be terminated at the module terminal strip.
- In severe applications, shields should be tied directly to the ground block within the panel.
- Use the following wire type or equivalent: Belden 8917, 16 AWG or larger for digital I/O; Belden 8441 for analog I/O.

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.

## 8 ADDITIONAL REFERENCES

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

<b>Note:</b> 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 <b>Technical Support</b> 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](http://www.heapg.com)

**Europe:**  
(+) 353-21-4321-266  
[www.horner-apg.com](http://www.horner-apg.com)

## NOTES