



**24VDC Bipolar Digital In**  
**10-28VDC, 0.5A Sourcing Digital Out**  
**4-20mA Analog In/Out**  
**HE800MIX902 / HE-MIX902\***  
 \* HE- denotes plastic case.



This datasheet also covers products starting with IC300.

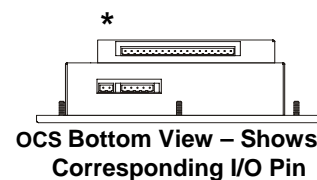
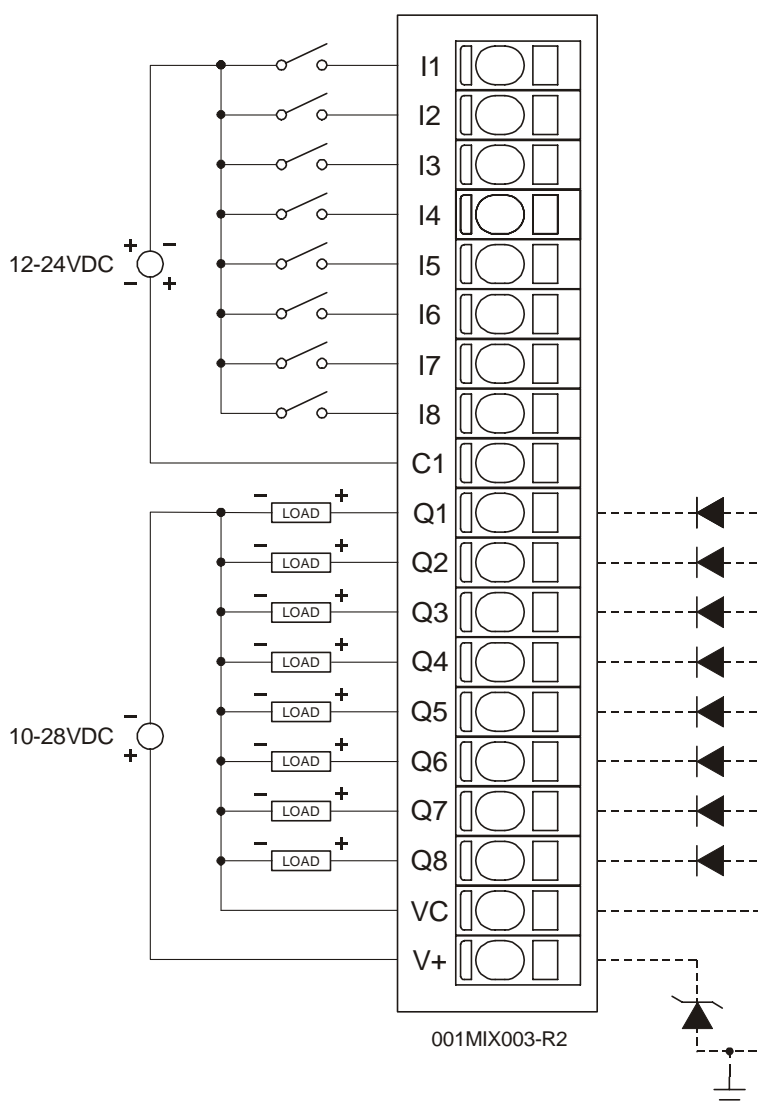
## 1 SPECIFICATIONS

| ANALOG INPUT  |  | MIX902  |   |  | MIX902  |
|---|--|---|---|--|---|
| Number of Channels  |  | 4   | Analog Inputs<br>Input Points Required                  |  | 4   |
| Input Ranges<br>(including over-range)                        |  | Nominal: 0-20.47mA  | Conversion Time<br>(PLC Update Rate)                    |  | Set by PLC Scan Time                                |
| Resolution  |  | 12-Bits   | Converter Type  |  | Successive Approximation                            |
| Input Impedance   |  | 200 Ohms < 12VDC,<br>Clamped @ 12VDC,<br>35mA Max. Continuous | Additional error for<br>temperatures other than<br>25°C |  | 0.01% / °C  |
| Maximum Error at<br>25°C                                      |  | 0.1%  | Maximum Over-Current                                    |  | 35mA  |
| DIGITAL INPUT   |  |   |   |  |   |
| Inputs per Module   |  | 8   | Input Characteristics                                   |  | Bidirectional                                       |
| Commons per<br>Module   |  | 1   | Input Impedance   |  | 10K Ohms  |
| Input Voltage Range   |  | 12-24VDC  | Minimum ON Current                                      |  | 1mA   |
| Peak Voltage  |  | 35VDC Max.  | Maximum OFF Current                                     |  | 200µA   |
| Isolation<br>(Channel to Channel<br>and Channel to<br>Common) |  | 500VDC  | OFF to ON Response                                      |  | 1ms.  |
| ON Voltage Level  |  | 9VDC  | ON to OFF Response                                      |  | 1ms.  |
| OFF Voltage Level   |  | 3VDC  |   |  |   |
| ANALOG OUTPUT   |  |   |   |  |   |
| Number of Channels  |  | 2   | Analog Outputs;<br>Output Points Required               |  | 2   |
| Output Ranges<br>(including over-<br>range)                   |  | 20.47mA;<br>Clamped @-0.5 - +33VDC<br>Nominal                 | Additional error for<br>temperatures other than<br>25°C |  | 0.01% / °C  |
| Resolution  |  | 12 Bits   | Maximum Error at 25°C                                   |  | 0.1%<br>(Note: Used 2% error<br>under EMC testing.) |
| Output Voltage  |  | 4 - 30VDC   |   |  |   |
| DIGITAL OUTPUT  |  | MIX902  |   |  | MIX902  |
| Outputs per Module  |  | 8   | Maximum Inrush Current                                  |  | 650mA   |
| Commons per<br>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           |
| <b>General Specifications</b>   |   |                       |                         |
| Required Power (Steady State)   | 0.03W (1.65MA @ 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                              |   |                       |                         |

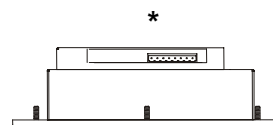
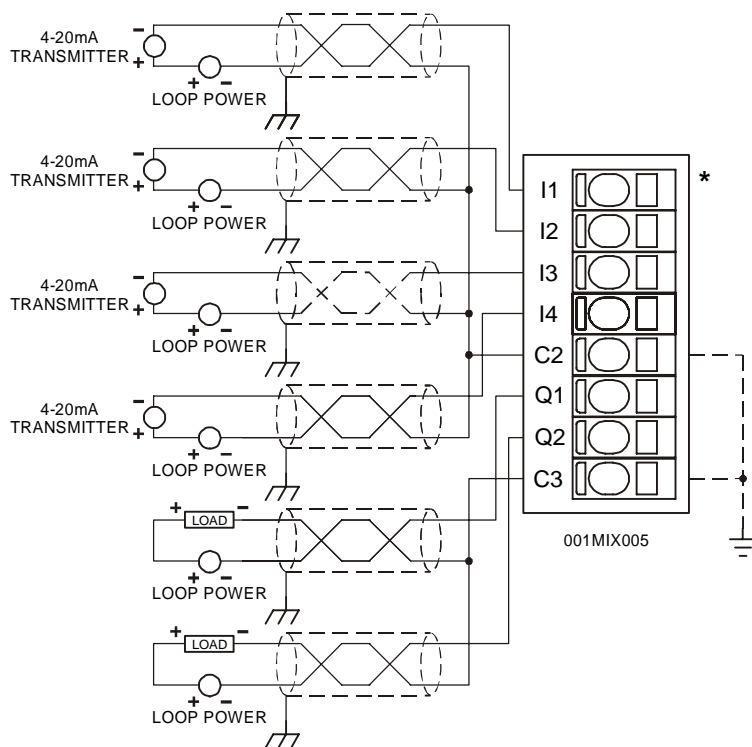
## 2 WIRING

### 2.1 Digital Input / Output (P1)



| Pin | Digital Input / Output |
|-----|------------------------|
|     | MIX902 - P1            |
| I1  | Input 1                |
| I2  | Input 2                |
| I3  | Input 3                |
| I4  | Input 4                |
| I5  | Input 5                |
| I6  | Input 6                |
| I7  | Input 7                |
| I8  | Input 8                |
| C1  | Common (Isolated)      |
| Q1  | Output 1               |
| Q2  | Output 2               |
| Q3  | Output 3               |
| Q4  | Output 4               |
| Q5  | Output 5               |
| Q6  | Output 6               |
| Q7  | Output 7               |
| Q8  | Output 8               |
| VC  | Load Power Common      |
| V+  | Load Voltage +         |

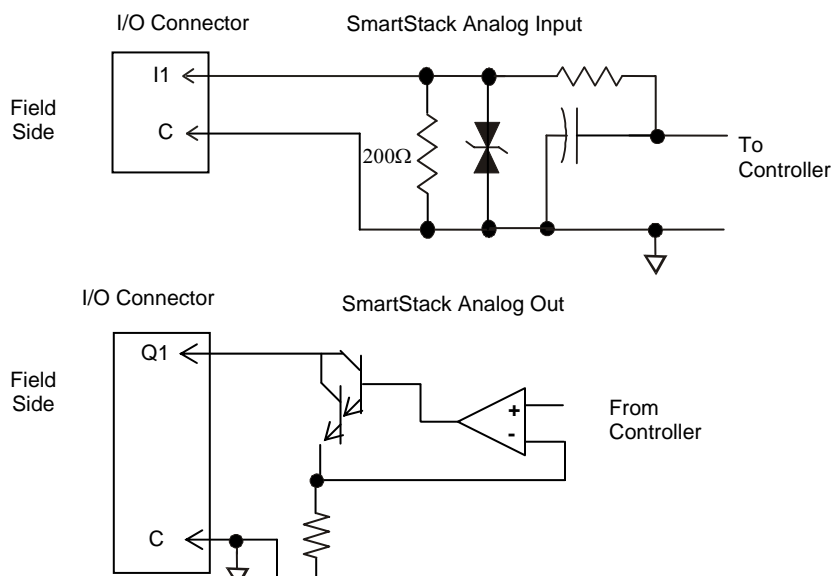
## 2.2 Analog Input / Output (P2)



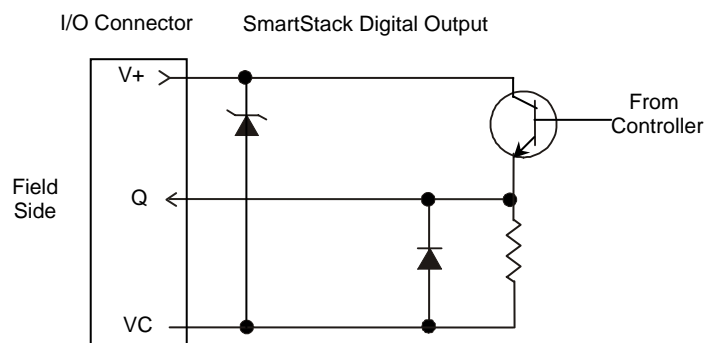
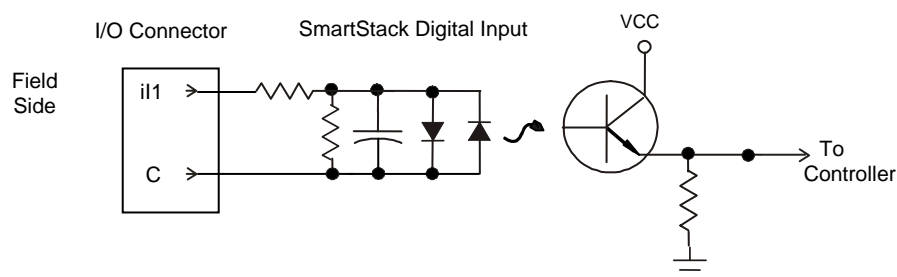
OCS Top View – Shows Corresponding I/O Pin

| Pin | Analog In and Out |
|-----|-------------------|
|     | MIX902 P2         |
| I1  | Input 1           |
| 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 30V, 300W.



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

## 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.

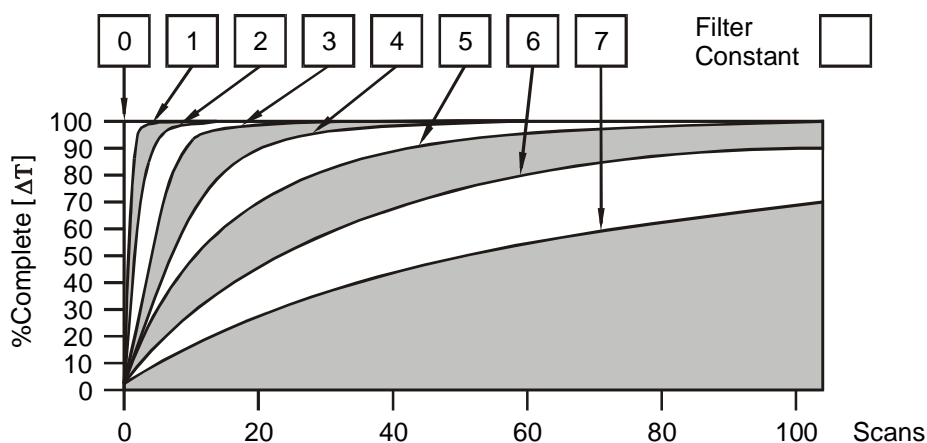
**Warning:** The default sets the output values to zero when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

### 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 CONVERSION FACTOR

The following table describes how real-world inputs are scaled into the controller. Given a known input current, the data value is configured by using the conversion factor from the table. The following formula is used: **Data = Input Current (mA) / Conversion Factor**

**Example:** The user selects a current range of 0 to +20mA:

- 1) The known input current is 14mA.
- 2) Using the table, the conversion factor for the current range of 0 to +20mA is .000625.
- 3) To determine the data value, the formula is used:  

$$\text{Data} = \text{Input Current (mA)} / \text{Conversion Factor}$$

$$22400 = 14\text{mA} / 0.000625$$

| Conversion of Real-World Inputs into Controller |                    |       |                   |
|---|--------------------|-------|-------------------|
| Selected Current Range                          | Input Current (mA) | Data  | Conversion Factor |
| 0 to +20mA                                      | +20.47             | 32752 | 0.000625          |
|   | +20.00             | 32000 |                   |
|   | 0                  | 0     |                   |

## 6 ANALOG CONVERSION OUTPUT FACTOR

The following table describes how program data values are scaled to real-world analog voltage outputs by the module. Given a desired output current, the data value is converted by using the conversion factor from the table. The following formula is used: **Data = Output Current (mA) / Conversion Factor**

**Example:** The user selects a current range of +20mA:

- 1) The desired output current is 12mA.
- 2) Using the table, the conversion factor for the current range of +20 mA is 0.000625.
- 3) To determine the data value, the formula is used:  

$$\text{Data} = \text{Output Current (mA)} / \text{Conversion Factor}$$

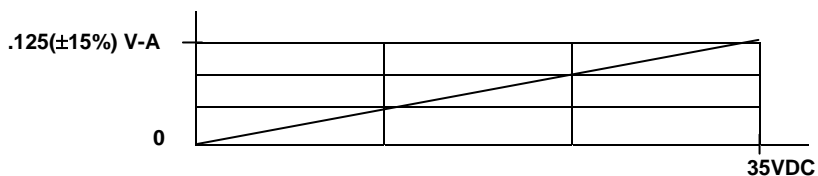
$$19200 = 12\text{mA} / 0.000625$$

| Conversion of Real-World Outputs into Controller |                     |       |                   |
|--|---------------------|-------|-------------------|
| Selected Current Range                           | Output Current (mA) | Data  | Conversion Factor |
| 0 to +20mA                                       | +20.47              | 32752 | 0.000625          |
|  | +20.00              | 32000 |                   |
|  | 0                   | 0     |                   |

## 7 DIGITAL INPUT / OUTPUT CHARACTERISTICS

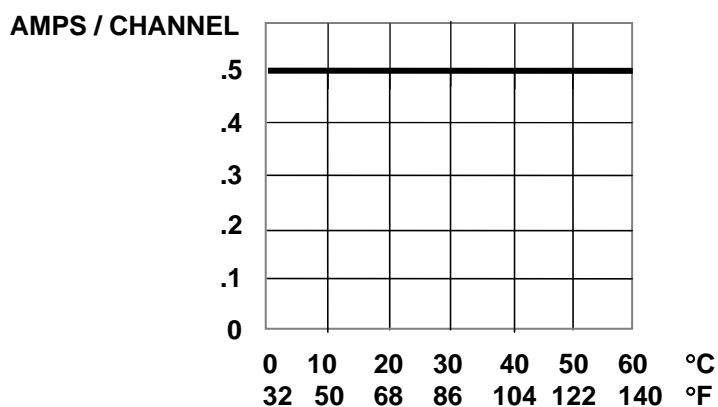
### 7.1 Digital Input

Digital Input Chart

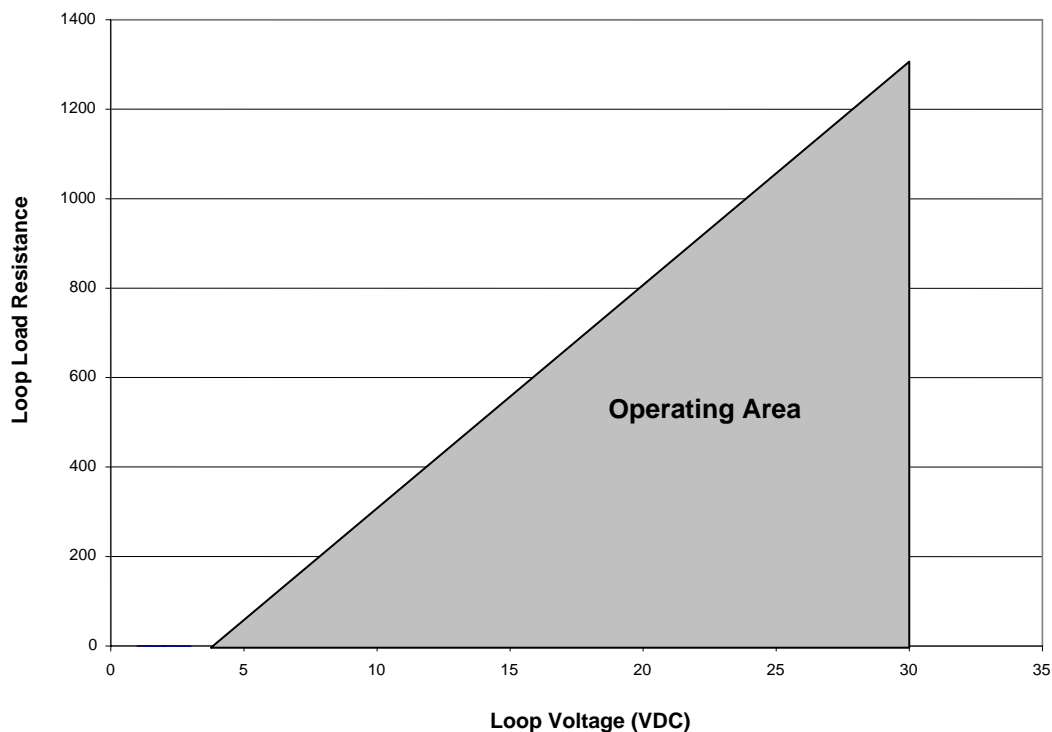


### 7.2 Digital Output

Derating Chart for MIX902



### 6.3 Operating Area



## 8 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 (Analog I/O).
- 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 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.

## 9 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       |

## 10 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)