
***Manual for***
***MiniOCS and MiniRCS***

# Mini I/O Modules

**24 March 2003** **MAN0581-01**

## PREFACE

This manual explains how to use Mini I/O Modules.



### *For user manual updates, contact* Technical Support at the following locations:

**North America:**
(317) 916-4274
www.heapg.com

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

## LIMITED WARRANTY AND LIMITATION OF LIABILITY

Horner APG, LLC.("HE-APG") warrants to the original purchaser that Mini I/O Modules manufactured by HE-APG are free from defects in material and workmanship under normal use and service. The obligation of HE-APG under this warranty shall be limited to the repair or exchange of any part or parts which may prove defective under normal use and service within two (2) years from the date of manufacture or eighteen (18) months from the date of installation by the original purchaser whichever occurs first, such defect to be disclosed to the satisfaction of HE-APG after examination by HE-APG of the allegedly defective part or parts. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE AND OF ALL OTHER OBLIGATIONS OR LIABILITIES AND HE-APG NEITHER ASSUMES, NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR HE-APG, ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF THIS Mini I/O Module. THIS WARRANTY SHALL NOT APPLY TO THIS Mini I/O Module OR ANY PART THEREOF WHICH HAS BEEN SUBJECT TO ACCIDENT, NEGLIGENCE, ALTERATION, ABUSE, OR MISUSE. HE-APG MAKES NO WARRANTY WHATSOEVER IN RESPECT TO ACCESSORIES OR PARTS NOT SUPPLIED BY HE-APG. THE TERM "ORIGINAL PURCHASER", AS USED IN THIS WARRANTY, SHALL BE DEEMED TO MEAN THAT PERSON FOR WHOM THE Mini I/O Module IS ORIGINALLY INSTALLED. THIS WARRANTY SHALL APPLY ONLY WITHIN THE BOUNDARIES OF THE CONTINENTAL UNITED STATES.

In no event, whether as a result of breach of contract, warranty, tort (including negligence) or otherwise, shall HE-APG or its suppliers be liable of any special, consequential, incidental or penal damages including, but not limited to, loss of profit or revenues, loss of use of the products or any associated equipment, damage to associated equipment, cost of capital, cost of substitute products, facilities, services or replacement power, down time costs, or claims of original purchaser's customers for such damages.

**To obtain warranty service, return the product to your distributor with a description of the problem, proof of purchase, post paid, insured and in a suitable package.**

## ABOUT PROGRAMMING EXAMPLES

Any example programs and program segments in this manual or provided on accompanying diskettes are included solely for illustrative purposes. Due to the many variables and requirements associated with any particular installation, Horner APG cannot assume responsibility or liability for actual use based on the examples and diagrams. It is the sole responsibility of the system designer utilizing the Mini I/O Module to appropriately design the end system, to appropriately integrate the Mini I/O Module and to make safety provisions for the end equipment as is usual and customary in industrial applications as defined in any codes or standards which apply.

**Note: The programming examples shown in this manual are for illustrative purposes only. Proper machine operation is the sole responsibility of the system integrator.**

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* Not available as a MiniRCS model.

# CHAPTER 1: INTRODUCTION

## 1.1 Scope

This manual contains I/O data sheets for MiniOCS and MiniRCS Modules. Module-specific information is provided in the I/O data sheets. To check for updates and new Mini releases, refer to Section 1.3.

**Note:** Effective Spring 2003, Mini I/O data sheets are no longer contained in the *Mini Hardware Manual* (MAN0305). The data sheets are published individually and are published as a group in *the Mini I/O Manual* (MAN0581).

**Table 1.1 – Mini OCS and Mini RCS Modules**

| | | |
|---|---|---|
| **DIGITAL INPUT AND OUTPUT COMBINATION MODULES** | | |
| Mixed DC I/O | 8 Channel, 12/24VDC In, (Isolated) Digital In, Positive/Negative Logic<br>8 Channel, 10-28VDC (Sourcing) Out, Positive Logic (.5A) | HE500OCS031<br>HE500OCS061<br>HE500RCS061 |
| Mixed DC I/O | 8 Channel, 12/24VDC (Isolated) Digital In, Positive/Negative Logic,<br>8 Channel, 24VDC Out, Negative Logic (.5A) | HE500OCS032<br>HE500OCS062<br>HE500RCS062 |
| Mixed I/O | 8 Channel, 12/24VDC (Isolated) Digital In, Positive/Negative Logic,<br>6 Channel, 3A Relay Out | HE500OCS035<br>HE500OCS065<br>HE500RCS065 |
| Mixed I/O | 8 Channel, 120VAC In, Positive Logic<br>8 Channel, 80-240VAC Out, Positive Logic | HE5000CS036<br>HE500OCS066<br>HE500RCS066 |
| Mixed I/O | 8 Channel, 120 VAC In<br>Positive Logic<br>6 Channel, 3A Relay Out | HE500OCS037<br>HE500OCS067<br>HE500RCS067 |
| Mixed I/O Module | 14 Channel, 12/24 Vdc In,<br>Positive/Negative Logic<br>10 Channel, 3A Relay Out | HE500OCS045<br>HE500OCS075<br>HE500RCS075 |
| AC Input /AC Output | 8 Channel, 120 / 240 VAC In, Positive Logic<br>8 Channel, 80-240 VAC Out, Positive Logic | HE5000CS038<br>HE500OCS068 |
| AC Input /AC Output | 14 Channel, 120 VAC In, Positive Logic<br>10 Channel, 3A Relay Out | HE500OCS047<br>HE500OCS077<br>HE500RCS077 |
| Mixed DC I/O | 16 Channel, 12/24VDC In (Isolated) Digital In, Positive/Negative Logic<br>12 Channel, 10-28VDC (Sourcing) Out, Positive Logic | HE500OCS041<br>HE500OCS071<br>HE500RCS071 |
| Mixed DC I/O | 16 Channel, 12/24 VDC In,<br>Positive/Negative Logic<br>12 Channel, 24 VDC Out, Negative Logic | HE500OCS042<br>HE500OCS072<br>HE500RCS072 |
| Temperature I/O | 2 Channel, Relay<br>2 Channel, Analog Output<br>2 Channel,SSR Driver | HE500OCS049<br>HE500OCS079<br>HE500RCS079 |

Table continued on next page

| ANALOG / DIGITAL INPUT AND OUTPUT COMBINATION MODULES | | |
|---|---|---|
| +/-10VDC<br>Analog / Digital I/O | 4 Channel, Analog Input, +/-10VDC In<br>2 Channel Analog Output, +/-10VDC Out<br>8 Channel, 12 Bit Resolution,<br>24VDC Bipolar Digital Input<br>8 Channel, 12 Bit Resolution,<br>10-28VDC, 0.5 Amp Sourcing Digital Output | HE500OCS052<br>HE500OCS082<br>HE500RCS082 |
| 4-20mA<br>Analog / Digital I/O | 4 Channel, Analog Input, 20mA In<br>2 Channel Analog Output, 20mA Out<br>8 Channel, 12 Bit Resolution,<br>24VDC Bipolar Digital Input<br>8 Channel, 12 Bit Resolution,<br>10-28VDC, 0.5 Amp Sourcing Digital Output | HE500OCS053<br>HE500OCS083<br>HE500RCS083 |
| 24VDC Bipolar<br>Analog / Digital I/O | 2 Channel, Analog Input, 20mA In<br>2 Channel Analog Output, 20mA Out<br>8 Channel, 24VDC Bipolar Digital Input<br>8 Channel, 24VDC Sinking Digital Output | HE500OCS055<br>HE500OCS085<br>HE500RCS085 |
| 24VDC Bipolar<br>Analog / Digital I/O | 4 Channel, Isolated Analog Input, 20mA In<br>2 Channel Isolated Analog Output, 20mA Out<br>8 Channel, 10-30VDC Bipolar Digital Input<br>8 Channel, 10-30VDC Sourcing Digital Output | HE500OCS057<br>HE500OCS087<br>HE500RCS087 |

| SPECIALTY MODULES | | |
|---|---|---|
| High Speed Counter<br><br>Product also has a detailed Supplement (SUP0265) which is ordered separately. | High Speed Counter Inputs,<br>Sourcing Pulse Outputs<br>Pulse Width Modulation | HE500OCS033<br>HE500OCS063<br>HE500RCS063 |
| | High Speed Counter Inputs,<br>Sinking Pulse Outputs | HE500OCS034<br>HE500OCS064<br>HE500RCS064 |

### 1.2 Additional References

For further information regarding products covered in this manual, refer to the following references:

a. *Mini Hardware* (MAN305) – Covers hardware topics affecting all Mini modules including wiring diagrams, specifications, installation and configuration procedures.

b. *DeviceNet ä Implementation Using Control Station Modules* (SUP0326) - Covers the implementation of Control Station products in a DeviceNet network.

c. *Cscape Reference Manual* (MAN0313) – Contains topics specifically selected to assist you through the programming process.

d. *Wiring Accessories and Spare Parts* (MAN0347) – Contains a line of wiring accessories available for use with various modules.

### 1.3 Technical Support

For assistance, contact Technical Support at the following locations.
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**North America:**
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www.heapg.com

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# Mixed DC I/O Module

**HE500OCS031 / HE500OCS061**
**HE500RCS061**
**12/24 Vdc In, Positive/Negative Logic**
**24Vdc Out, Positive Logic**

*Mini OCS/RCS*

## 1 SPECIFICATIONS

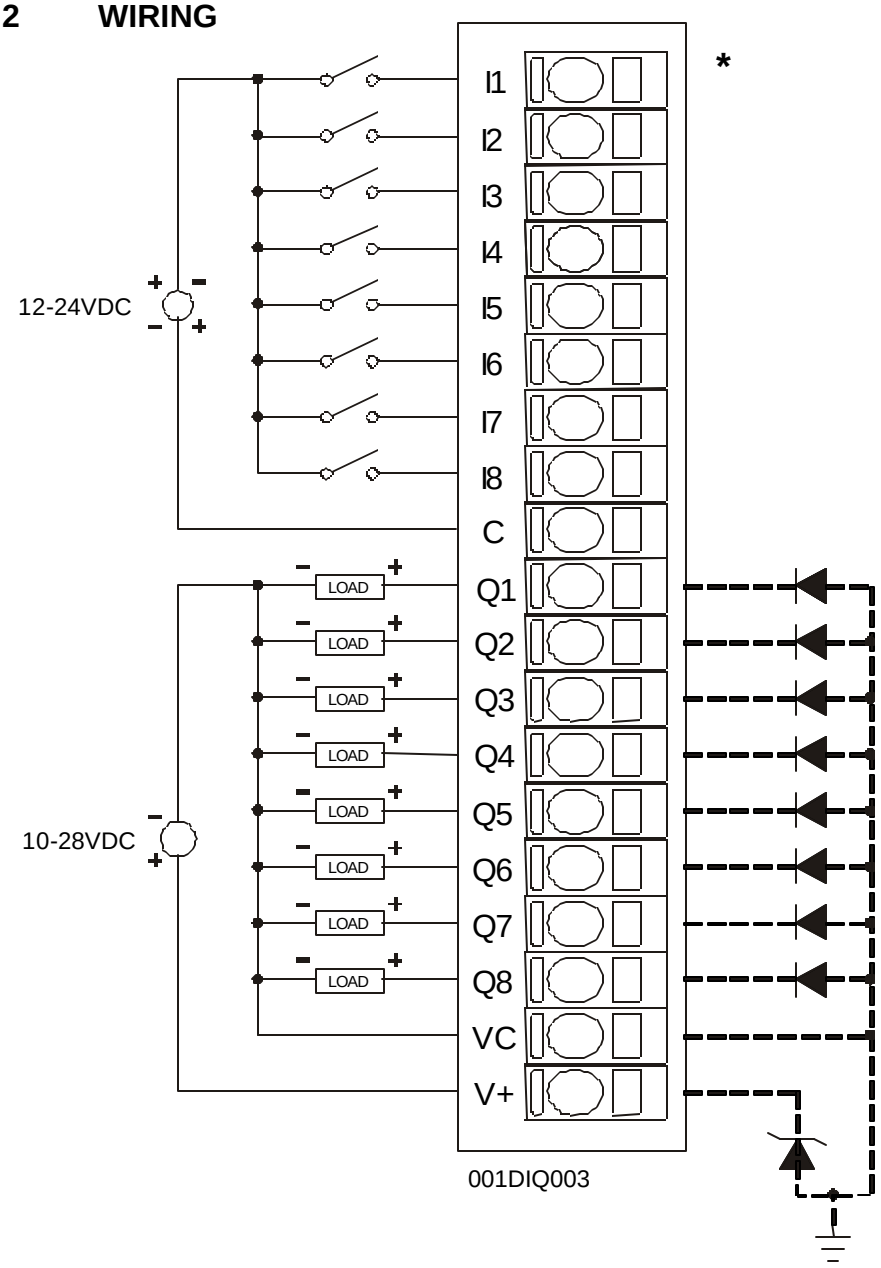
| INPUT | | | |
|---|---|---|---|
| Inputs per Module | 8 | Input Characteristics | Bidirectional |
| Commons per Module | 1 | Input Impedance | 10K Ohms |
| Input Voltage Range | 12-24VDC | Minimum ON Current | 1mA |
| Peak Voltage | 35VDC Max. | Maximum OFF Current | 200µA |
| Isolation (Channel to Bus) | 500VDC | OFF to ON Response | 1ms. |
| ON Voltage Level | 9VDC | ON to OFF Response | 1ms. |
| OFF Voltage Level | 3VDC | Status Indicator | 8 LEDs |

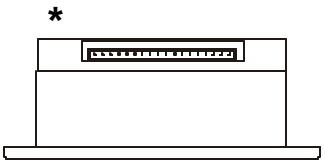
| OUTPUT | | | |
|---|---|---|---|
| Outputs per Module | 8 | Maximum Inrush Current | 650mA per channel |
| Commons per Module | 1 | Minimum Load | None |
| Operating Voltage | 10 - 28VDC | OFF to ON Response | 1ms. |
| Output Type | Sourcing / 10K Pull-Down | ON to OFF Response | 1ms. |
| Peak Voltage | 28VDC Max. | Output Characteristics | Current Sourcing |
| Maximum Load Current per channel | 0.5A Max. | Status Indicator | 8 LEDs |
| Output Protection | Short Circuit | | |

| General Specifications | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA max @ 24VDC) | Terminal Type | Spring Clamp, Removable |
| Required Power (Inrush) | 900mA @ 24VDC for 1mS. | | |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9 oz. (256 g) |
| Operating Temperature | 0° to 50° Celsius | | |
| CE | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |
| UL | | | |

**MAN0295-03**

## 2 WIRING

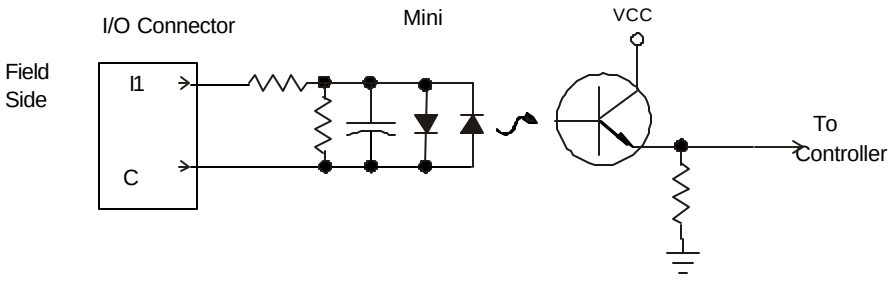


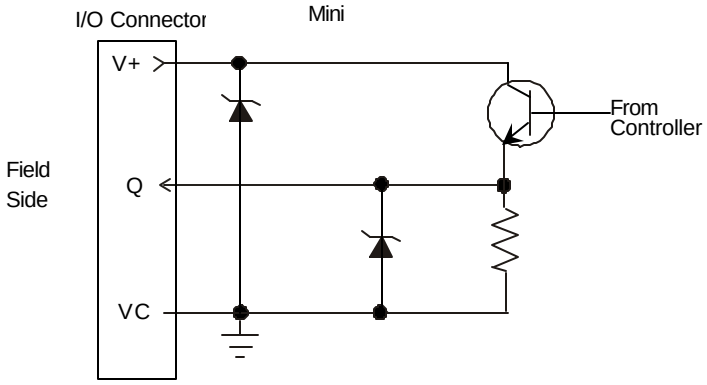

**Mini Bottom View – Shows corresponding I/O pin location**

| Pin | Signal |
|---|---|
| I1 | Input 1 |
| I2 | Input 2 |
| I3 | Input 3 |
| I4 | Input 4 |
| I5 | Input 5 |
| I6 | Input 6 |
| I7 | Input 7 |
| I8 | Input 8 |
| C | Common |
| 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 | Common |
| V+ | Load Voltage + |

## 3 INTERNAL CIRCUIT SCHEMATIC




This Data Sheet is published individually & also as a part of the current version of Mini I/O Manual (MAN0581).
Information is subject to change without notice.




Specification for transient voltage suppressors (transorbs) used on output circuitry is 33VDC, 600 watts.

## 4 CONFIGURATION

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

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

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

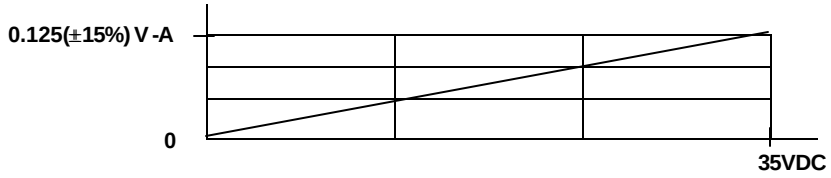
## 5 INSTALLATION / SAFETY

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

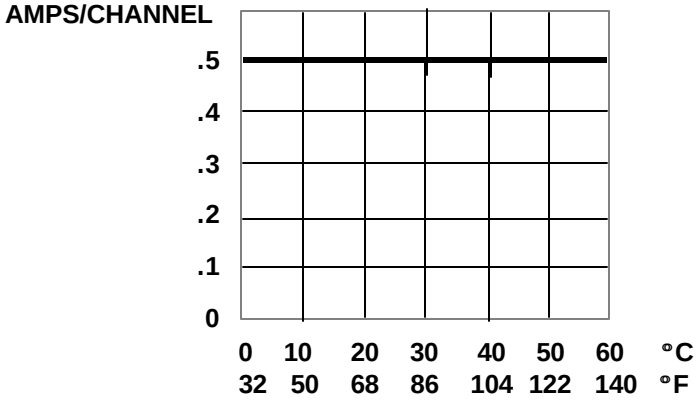
## 6 INPUT CHARACTERISTICS

**Digital Input Chart**




## 7 OUTPUT CHARACTERISTICS

**Derating Chart**




## 8 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations.
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# Mixed DC I/O Module

**HE500OCS032 / OCS062**
**HE500RCS062**
**12/24 Vdc In, Positive/Negative Logic**
**24Vdc Out, Negative Logic**

*Mini OCS/RCS*

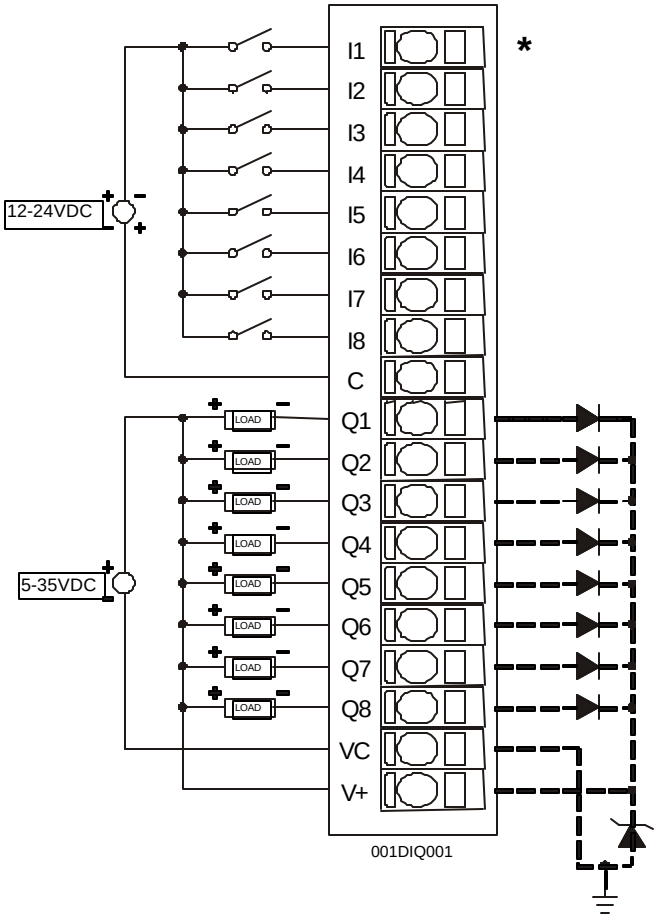
## 1 SPECIFICATIONS

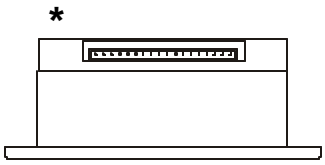
| INPUT | | | |
|---|---|---|---|
| Inputs per Module | 8 | Input Characteristics | Bidirectional |
| Commons per Module | 1 | Input Impedance | 10K Ohms |
| Input Voltage Range | 12-24VDC | Minimum ON Current | 1mA |
| Peak Voltage | 35VDC Max. | Maximum OFF Current | 200µA |
| Isolation (Channel to Common) | 500VDC | OFF to ON Response | 1ms. |
| ON Voltage Level | 9VDC | ON to OFF Response | 1ms. |
| OFF Voltage Level | 3VDC | Status Indicator | 8 LEDs |

| OUTPUT | | | |
|---|---|---|---|
| Outputs per Module | 8 | Output Protection | Short Circuit |
| Commons per Module | 1 | Maximum Leakage Current | 100µA |
| Operating Voltage | 5 - 35VDC | Maximum Inrush Current | 600mA. per channel |
| Output Type | Sinking / 10K Pull-Up | Minimum Load | None |
| Peak Voltage | 35VDC Max. | OFF to ON Response | 1ms. |
| Output Characteristics | Current Sinking | ON to OFF Response | 1ms. |
| ON Voltage Level | 1.5VDC Max. | Status Indicator | 8 LEDs |
| Maximum Load Current per channel | 0.5A Max. | | |

| General Specifications | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9 oz. (256 g) |
| | | | |
| CE | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |
| UL | | | |

## 2 WIRING



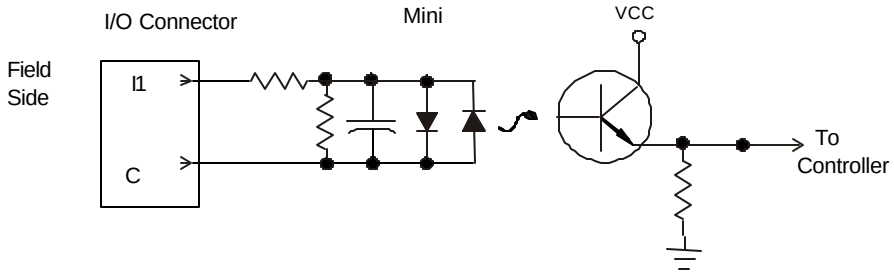



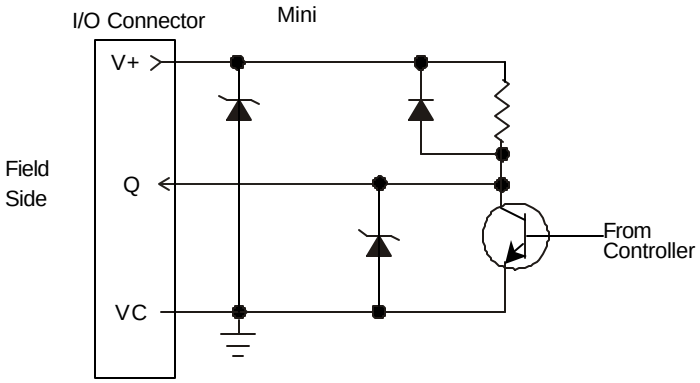

**Mini Bottom View – Shows corresponding I/O pin location**

| | |
|---|---|
| I1 | Input 1 |
| I2 | Input 2 |
| I3 | Input 3 |
| I4 | Input 4 |
| I5 | Input 5 |
| I6 | Input 6 |
| I7 | Input 7 |
| I8 | Input 8 |
| C | Common |
| 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 | Common |
| V+ | Load Voltage + |

**Warning:** Wiring the positive side of the DC source to loads connected to outputs 1 through 8 and the negative side of the DC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice under CE directives.

## 3 INTERNAL CIRCUIT SCHEMATIC






Specification for transient voltage suppressors (transorbs) used on output circuitry is 36VDC, 300 watts.

## 4 CONFIGURATION

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

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

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

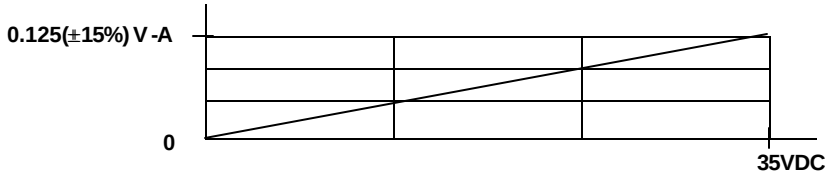
## 5 INSTALLATION / SAFETY

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

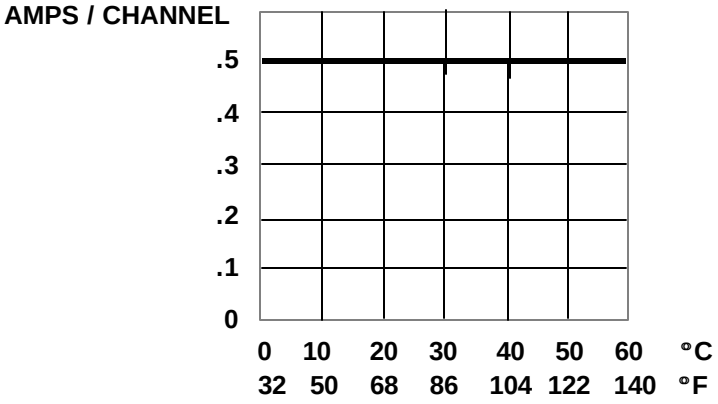
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

## 6 INPUT / OUTPUT CHARACTERISTICS

**Digital Input Chart**



**Derating Output Chart**




## 7 TECHNICAL ASSISTANCE

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# High Speed Counter

## HE500OCS033 / HE500OCS063
## HE500RCS063
## High Speed Counter Inputs
## Sourcing Pulse Outputs

*MINI OCS/RCS*

This product also has a detailed supplement (SUP0265) available.

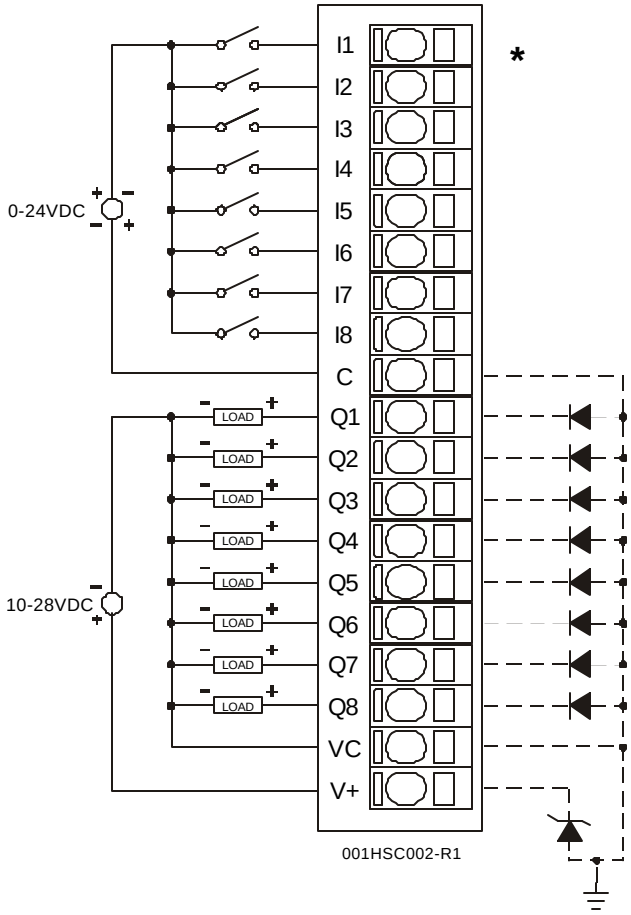
## 1 SPECIFICATIONS

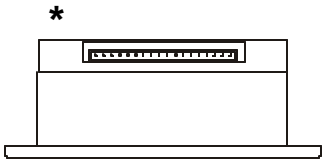
| INPUT | | | | | | |
|---|---|---|---|---|---|---|
| Inputs per Module | 8 | | | | Commons per Module | 1 |
| Programmable Input Voltage Ranges | Zero Crossing | TTL / 5 VDC | 12 VDC | 24 VDC | Input Type | Positive Logic |
| | | | | | Peak Voltage | 35 VDC Max. |
| ON Voltage Level | + 0.1 | + 2 | + 8 | + 16 | Input Impedance | 10K Ohms |
| OFF Voltage Level | - 0.1 | + 0.8 | + 4 | + 8 | Input Filter | 500KHz, 50KHz, 5KHz |

| OUTPUT | | | |
|---|---|---|---|
| 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 | 10µs. |
| Output Type | Sourcing / 10K Pull-Down Positive Logic | ON to OFF Response | 10µs. |
| Peak Voltage | 28VDC Max. | Output Characteristics | Current Sourcing |
| Maximum Load Current Per Output | 0.5A Max. | Output Protection | Short Circuit |

| General Specifications | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA @ 24VDC for 1 ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9.5 oz. (270 g) |
| CE | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |
| UL | Operating Temperature Code T4A; See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |

## 2 WIRING

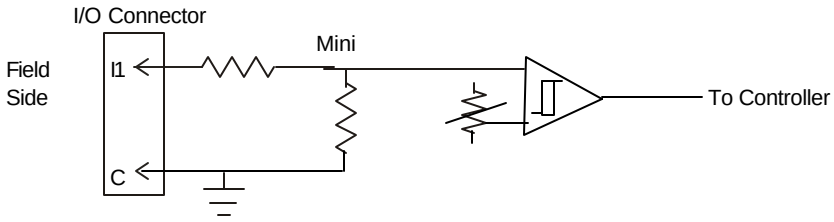


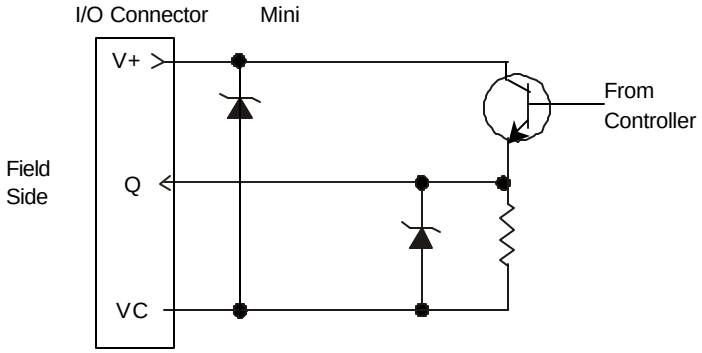




**Mini Bottom View – Shows corresponding I/O pin location**

| Pin | Signal |
|---|---|
| I1 | Input 1 |
| I2 | Input 2 |
| I3 | Input 3 |
| I4 | Input 4 |
| I5 | Input 5 |
| I6 | Input 6 |
| I7 | Input 7 |
| I8 | Input 8 |
| C | Common |
| 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 | Common |
| V+ | Load Voltage + |

## 3 INTERNAL CIRCUIT SCHEMATIC






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

## 4 CONFIGURATION AND INPUT/OUTPUT MODES

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

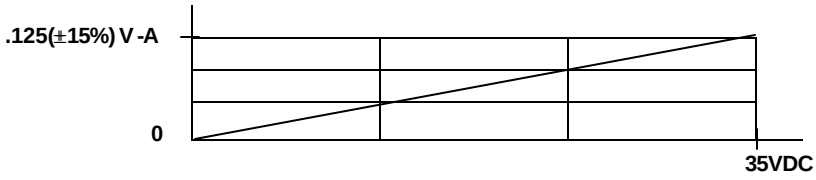
1. Preliminary Configuration procedures that are applicable to **all** Mini OCS Modules are located in the Mini Hardware Manual (MAN0305.)

   There are two screen tabs for this model – the **I/O Map** tab and the **Module Setup** tab. The I/O Map is not edited by the user. The I/O Map describes which I/O registers are assigned to a specific Mini OCS model. The I/O Map is determined by the model number.

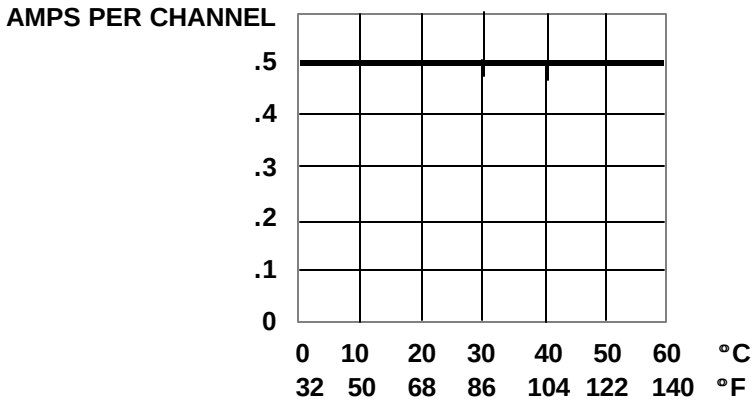
2. Consult the **SmartStack High Speed Counter Manual** (SUP0265) to continue the rest of the configuration process after pressing the **Module Setup** tab and selecting an option.

## 5 INPUT / OUTPUT CHARACTERISTICS

**Digital Input Chart**



**Derating Chart**




## 6 INSTALLATION / SAFETY

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

## 7 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations.
Please visit our website for manual updates.

**North America:**
(317) 916-4274
www.heapg.com

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

# High Speed Counter

## HE500OCS034 / HE500OCS064
## HE500RCS064
## High Speed Counter Inputs
## Sinking Pulse Outputs

*MINI OCS/RCS*

This product also has a detailed supplement (SUP0265) available.

## 1 SPECIFICATIONS

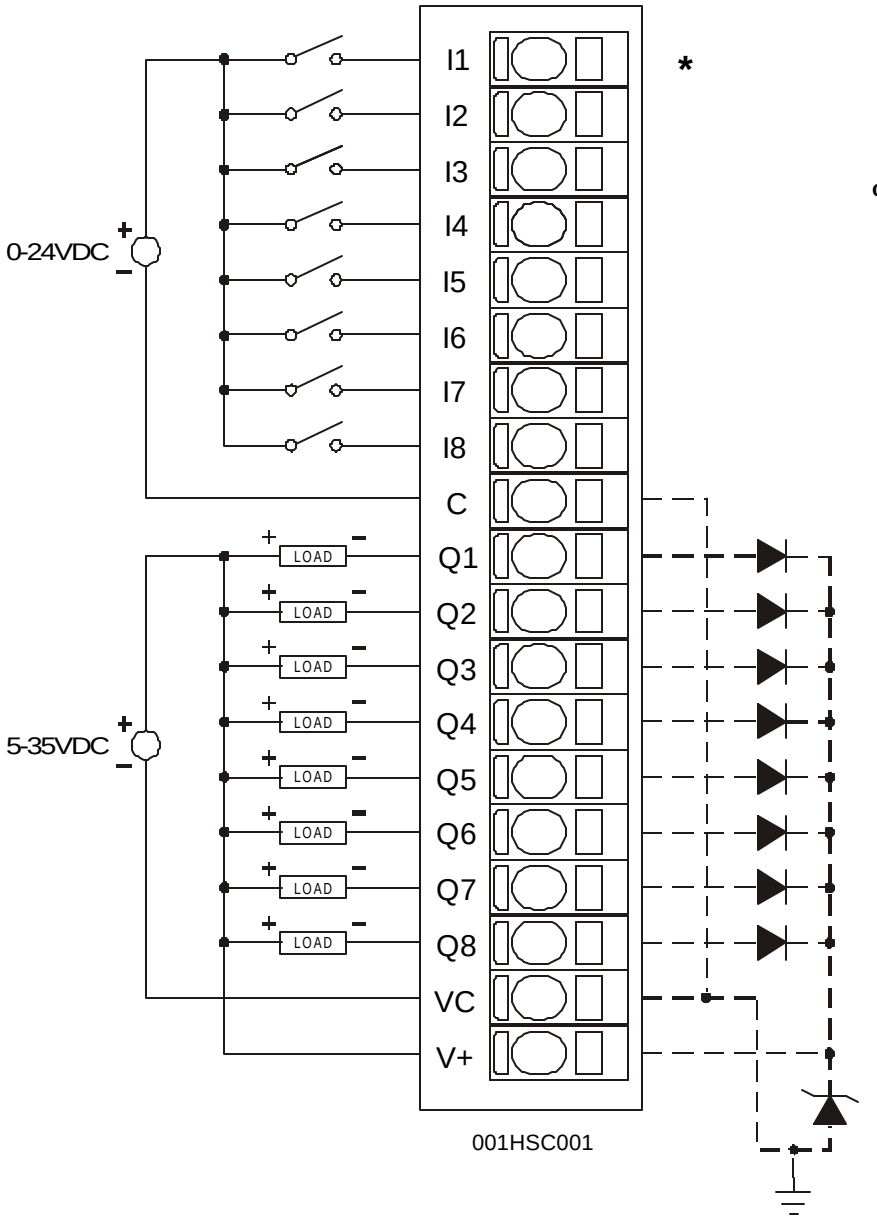
| INPUT | | | | | | |
|---|---|---|---|---|---|---|
| Inputs per Module | 8 | | | | Commons per Module | 1 |
| Programmable Input Voltage Ranges | Zero Crossing | TTL / 5 VDC | 12 VDC | 24 VDC | Input Type | Positive Logic |
| | | | | | Peak Voltage | 35VDC Max. |
| ON Voltage Level | + 0.1 | + 2 | + 8 | + 16 | Input Impedance | 10K Ohms |
| OFF Voltage Level | - 0.1 | + 0.8 | + 4 | + 8 | Input Filter | 500KHz, 50KHz, 5KHz |

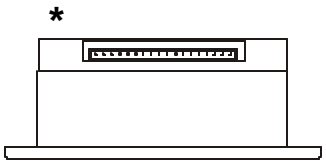
| OUTPUT | | | |
|---|---|---|---|
| Outputs per Module | 8 | Output Protection | Short Circuit |
| Commons per Module | 1 | Maximum Leakage Current | 100µA |
| Operating Voltage | 5 - 35VDC | Maximum Inrush Current | 600mA. per channel |
| Output Type | Sinking / 10K Pull-Up Negative Logic | Minimum Load | None |
| Peak Voltage | 35VDC Max. | OFF to ON Response | 0.3µS. |
| Output Characteristics | Current Sinking | ON to OFF Response | 2µS. |
| ON Voltage Level | 1.5VDC Max. @ 500mA<br>0.7 VDC Max. @ 250mA | Maximum Load Current per Output | 0.5A |

| General Specifications | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9.5 oz. (270 g) |
| CE | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |
| UL | Operating Temperature Code T4A;<br>See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |

**MAN0298-03**

## 2 WIRING



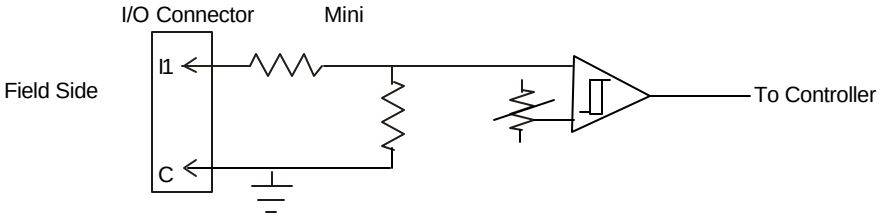

**Mini Bottom View – Shows corresponding I/O pin location**

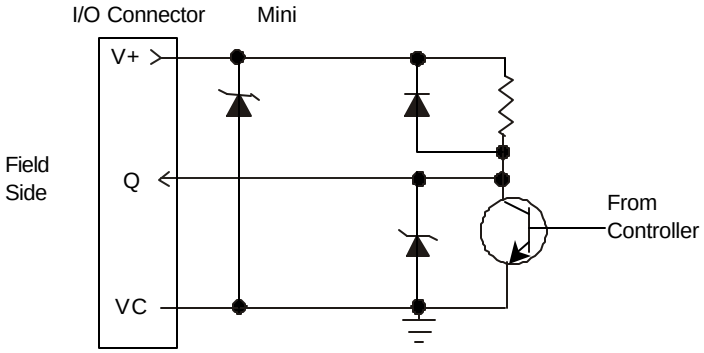
| Pin | Signal |
|---|---|
| I1 | Input 1 |
| I2 | Input 2 |
| I3 | Input 3 |
| I4 | Input 4 |
| I5 | Input 5 |
| I6 | Input 6 |
| I7 | Input 7 |
| I8 | Input 8 |
| **C** | **Common[1]** |
| Q1 | Output 1 |
| Q2 | Output 2 |
| Q3 | Output 3 |
| Q4 | Output 4 |
| Q5 | Output 5 |
| Q6 | Output 6 |
| Q7 | Output 7 |
| Q8 | Output 8 |
| **VC** | **Common[1]** |
| V+ | Load Voltage + |

[1] **Internally Connected**

**Warning:** Wiring the positive side of the DC source to loads connected to outputs 1 through 8 and the negative side of the DC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice under CE directives.

## 3 INTERNAL CIRCUIT SCHEMATIC




Specification for transient voltage suppressors (transorbs) used on output circuitry is 36VDC, 300 watts.

## 4 CONFIGURATION AND MODES

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

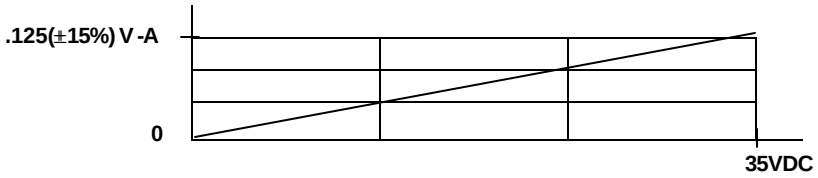
1. Preliminary Configuration procedures that are applicable to **all** Mini OCS Modules are located in the Mini Hardware Manual (MAN0305.)

   There are two screen tabs for this model – the **I/O Map** tab and the **Module Setup** tab. The I/O Map is not edited by the user. The I/O Map describes which I/O registers are assigned to a specific Mini OCS model. The I/O Map is determined by the model number.

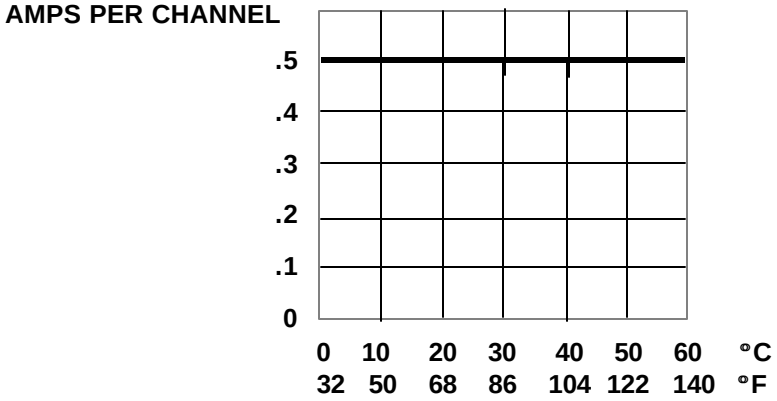
2. Consult the **SmartStack High Speed Counter Manual** (SUP0265) to continue the rest of the configuration process after pressing the **Module Setup** tab and selecting an option.

## 5 INPUT / OUTPUT CHARACTERISTICS

**Digital Input Chart**



**Derating Chart**




## 6 INSTALLATION / SAFETY

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

## 7 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations.
Please visit our website for manual updates.

**North America:**
(317) 916-4274
www.heapg.com

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

# Mixed I/O Module

**HE500OCS035 / HE500OCS065**
**HE500RCS065**
**12/24 Vdc In, Positive/Negative Logic**
**3A Relay Out**

*Mini OCS/RCS*

## 1 SPECIFICATIONS

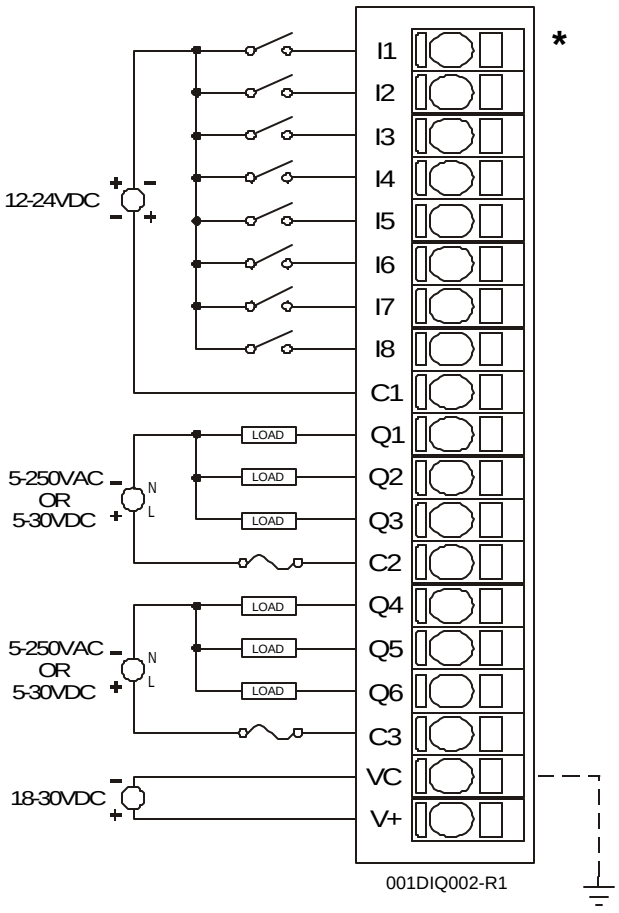
| INPUT | | | |
|---|---|---|---|
| Inputs per Module | 8 isolated | Input Impedance | > 10K Ohms |
| Commons per Module | 1 | Minimum ON Current | 1mA |
| Input Voltage Range | 12/24VDC | Maximum OFF Current | 200µA |
| Peak Voltage | 35VDC Max. | OFF to ON Response | 1ms. |
| ON Voltage level | Min. 9VDC | ON to OFF Response | 1ms. |
| OFF Voltage level | Max. 3VDC | Status Indicator | 8 |
| Isolation (Common to Common and Channel to Common) | 500VDC | | |

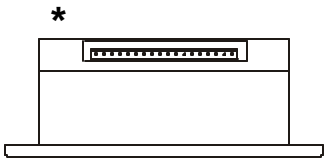
| OUTPUT | | | |
|---|---|---|---|
| Outputs per Module | 6 relay | Maximum Leakage Current | 5µA |
| Commons per Module | 2 | Maximum Inrush Current | 3A per channel |
| Output Type | Relay | Minimum Load | None |
| Coil Voltage | 18-30VDC | OFF to ON Response | 6ms. Typical |
| Contact Voltage | 250VAC / 30VDC Max. | ON to OFF Response | .3ms. Typical |
| ON Voltage drop | 0.2V Max. | Status Indicator | 6 |
| Fuses | 10A common | Isolation (Common to Common and Channel to Common) | 500VDC |
| Maximum Load current (resistive) per channel | 3A | | |

| General Specifications | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9 oz. (256 g) |
| CE<br>UL | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |

**MAN0299-03**

## 2 WIRING




**Mini Bottom V iew – Shows corresponding I/O pin location**

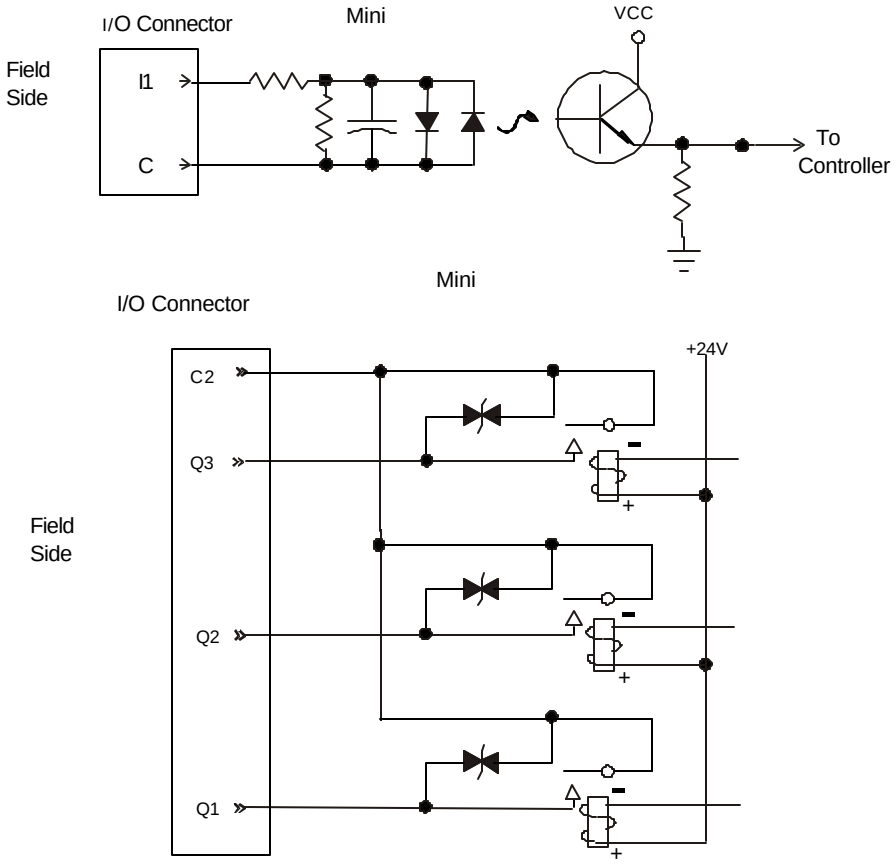
| Pin | Signal |
|---|---|
| I1 | Input 1 |
| I2 | Input 2 |
| I3 | Input 3 |
| I4 | Input 4 |
| I5 | Input 5 |
| I6 | Input 6 |
| I7 | Input 7 |
| I8 | Input 8 |
| C1 | Common 1 |
| Q1 | Output 1 |
| Q2 | Output 2 |
| Q3 | Output 3 |
| C2 | Common 2 |
| Q4 | Output 4 |
| Q5 | Output 5 |
| Q6 | Output 6 |
| C3 | Common 3 |
| VC | Relay Coil Voltage Common |
| V+ | Relay Coil Voltage + |

**Warning:** To protect the module and associated wiring from load faults, use external fuses **(10 A)** as shown. **This warning affects Mini OCS035 / OCS065, Revisions E or higher and all versions of the Mini RCS065.**

**Warning**: Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

**Warning:** Wiring the line side of the AC source to loads connected to outputs 1 through 6 and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

# 3 INTERNAL CIRCUIT SCHEMATIC




Specification for transient voltage suppressors (transorbs) used on output circuitry is 400VDC, bi-directional 400 watts.

Electro-mechanical relays comply with IEC1131-2.

# 4 CONFIGURATION

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

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

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

## 5 INSTALLATION / SAFETY

**Warning:** Previous versions of this product provided internal fuses on the output circuits (relay contacts). Due to CE Low Voltage Directive (LVD) marking requirements, these fuses have been removed and replaced with solid wire. Therefore, it is now the responsibility of the user of this equipment to ensure that adequate fusing is installed *externally* on each relay output circuit.

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

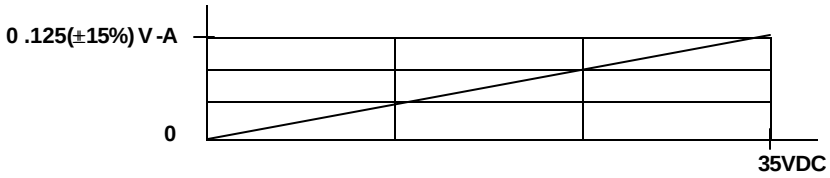
When found on the product, the following symbols specify:

**Warning:** Consult user documentation.

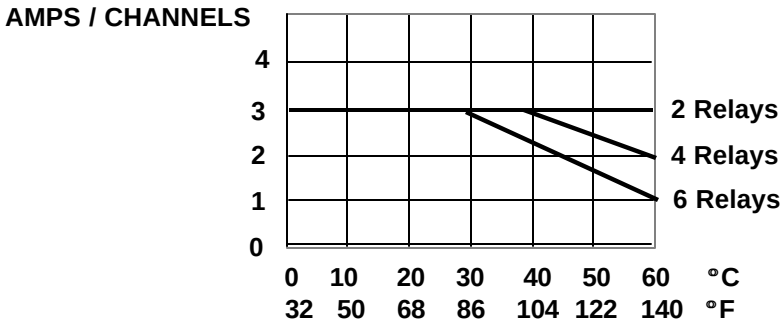
**Warning:** Electrical Shock Hazard.

## 6 INPUT / OUTPUT CHARACTERISTICS

**Digital Input Chart**



**Derating Output Chart**




| Typical Relay Life | | | |
|---|---|---|---|
| **Voltage (Resistive)** | **Load Current** | | |
| | **1 Amp** | **2 Amp** | **3 Amp** |
| 30VDC | 600K | 250K | 125K |
| 125VAC | 750K | 300K | 150K |
| 250VAC | 500K | 200K | 100K |

## 7 TECHNICAL SUPPORT

For assistance, contact Technical Support at the following locations.
Please visit our website for manual updates.

**North America:**
(317) 916-4274
www.heapg.com

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

**NOTES**

# AC Input /AC Output Module

**HE500OCS036 / HE500OCS066**
**HE500RCS066**
**120 VAC In, Positive Logic**
**80-260 VAC Out, Positive Logic**

***Mini OCS/RCS***

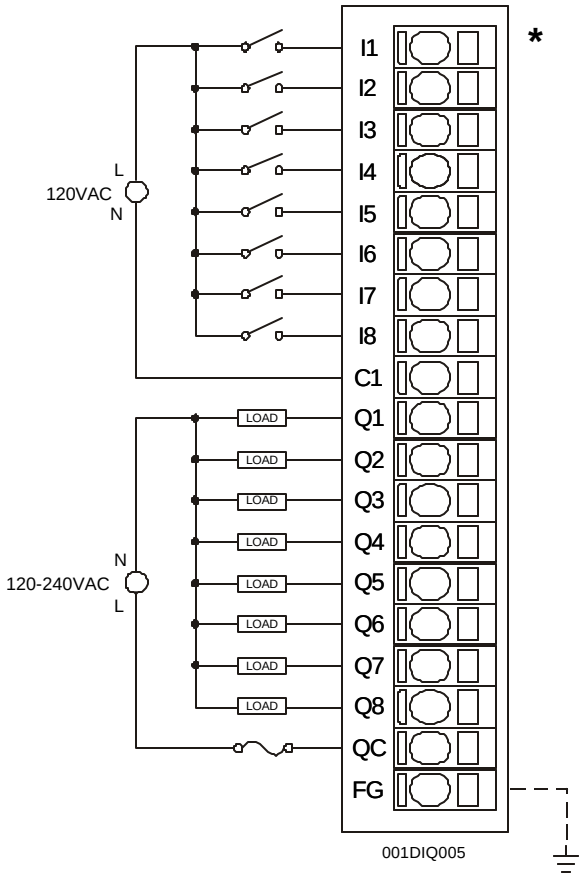
## 1 SPECIFICATIONS

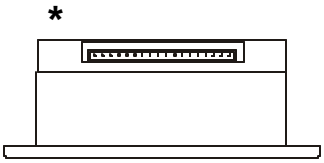
| INPUT | | | |
|---|---|---|---|
| Inputs per Module | 8 | Input Impedance | 0.01µF +10K |
| Commons per Module | 1 | Isolation (Channel to Common) | 500VDC |
| Input Voltage Range | 120 – 160 VAC | Minimum ON Current | 1mA. |
| Peak Voltage | 160VAC | Maximum OFF Current | 200µA. |
| AC Frequency | 60Hz | OFF to ON Response | 50ms. |
| ON Voltage Level | 70VAC Min. | ON to OFF Response | 50ms. |
| OFF Voltage level | 30VAC Max. | Status Indicator | 8 |

| OUTPUT | | | |
|---|---|---|---|
| Outputs per Module | 8 | Maximum Load Current per output | .3A Max. |
| Commons per Module | 1 | Maximum Leakage Current | 15µA Max. |
| Operating voltage | 260VAC Max. | Maximum Inrush Current | 500mA |
| Output Type | MOSFET | OFF to ON Response | 10ms. Max. |
| Contact Voltage | 260VAC Max. | ON to OFF Response | 3ms. Max. |
| ON Voltage level | 1V Max. | Status Indicator | 8 |
| Isolation (Channel to Channel and Channel to Common) | 500VDC | | |

| General Specifications | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9.5 oz. (256 g) |
| CE | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |
| UL | | | |

## 2 WIRING




**Mini Bottom View – Shows corresponding I/O pin location**

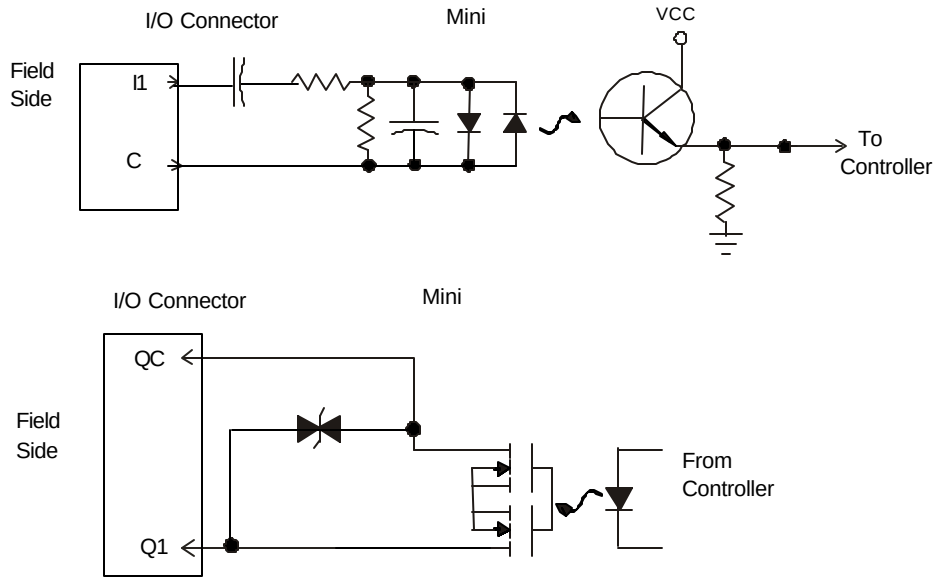
| Pins | Signal |
|---|---|
| I1 | Input 1 |
| I2 | Input 2 |
| I3 | Input 3 |
| I4 | Input 4 |
| I5 | Input 5 |
| I6 | Input 6 |
| I7 | Input 7 |
| I8 | Input 8 |
| IC | Input Common |
| Q1 | Output 1 |
| Q2 | Output 2 |
| Q3 | Output 3 |
| Q4 | Output 4 |
| Q5 | Output 5 |
| Q6 | Output 6 |
| Q7 | Output 7 |
| Q8 | Output 8 |
| QC | Output Common |
| FG | Frame Ground |

**Warning:** To protect the module and associated wiring from load faults, use external fuse **(2.5A)** as shown. **This warning affects OCS036 / 066, Revisions E or higher and all versions of the Mini RCS066.**

**Warning**: Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

**Warning:** Wiring the line side of the AC source to loads connected to outputs 1 through 8 and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

# 3 INTERNAL CIRCUIT SCHEMATICS




Specification for transient voltage suppressors (transorbs) used on output circuitry is 400VDC, bi-directional 400 watts.

# 4 CONFIGURATION

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

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

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

# 5 INSTALLATION / SAFETY

**Warning:** Previous versions of this product provided internal fuses on the output circuits (relay contacts). Due to CE Low Voltage Directive (LVD) marking requirements, these fuses have been removed and replaced with solid wire. Therefore, it is now the responsibility of the user of this equipment to ensure that adequate fusing is installed *externally* on each relay output circuit.

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

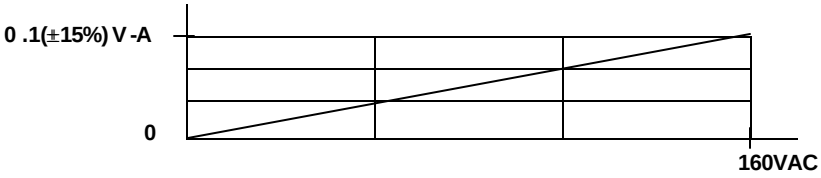
When found on the product, the following symbols specify:

**Warning:** Consult user documentation.

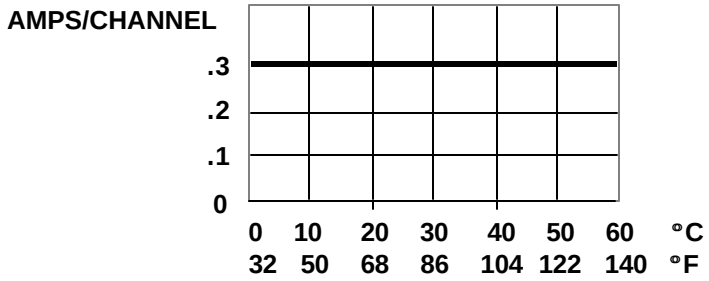
**Warning:** Electrical Shock Hazard.

# 6 INPUT / OUTPUT CHARACTERISTICS

**Digital Input Chart**

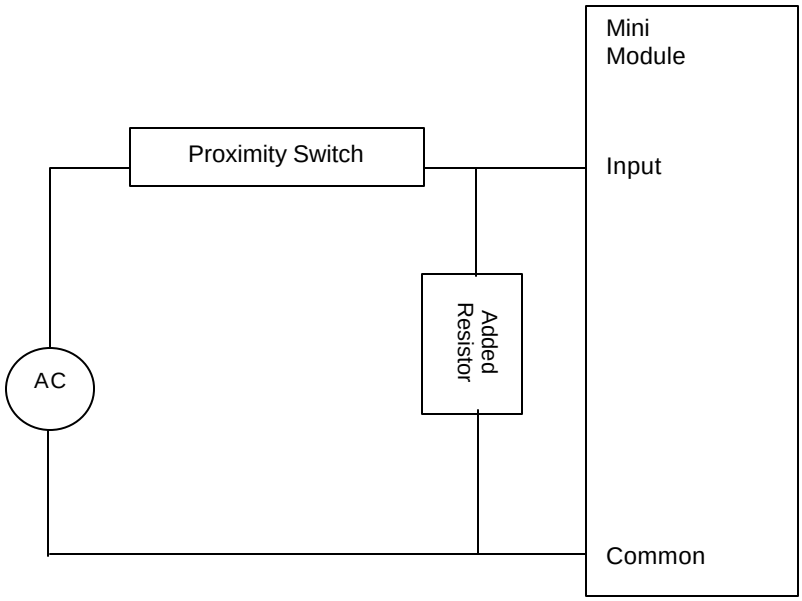



**Derating Output Chart**



The following applies to applications in which two-wire proximity switches are used as sensors for discreet AC inputs. For these applications, an external resistor *or* resistor/capacitor combination must be added to each input as shown below. The resistor provides a small current to power the proximity switch. The resistor is not required for other types of proximity switches.

120VAC: 15K ohm, 2W resistor *or* 0.22µF metallized film capacitor rated for 120VAC service in series with 470 ohm, 0.5W resistor




## 7 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations.
Please visit our website for manual updates.

**North America:**
(317) 916-4274
www.heapg.com

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

**NOTES**

# AC Input /AC Output Module

**HE500OCS037 / HE500OCS067**
**HE500RCS067**
**120 VAC In, Positive Logic**
**3A Relay Out**

***Mini OCS/RCS***

## 1 SPECIFICATIONS

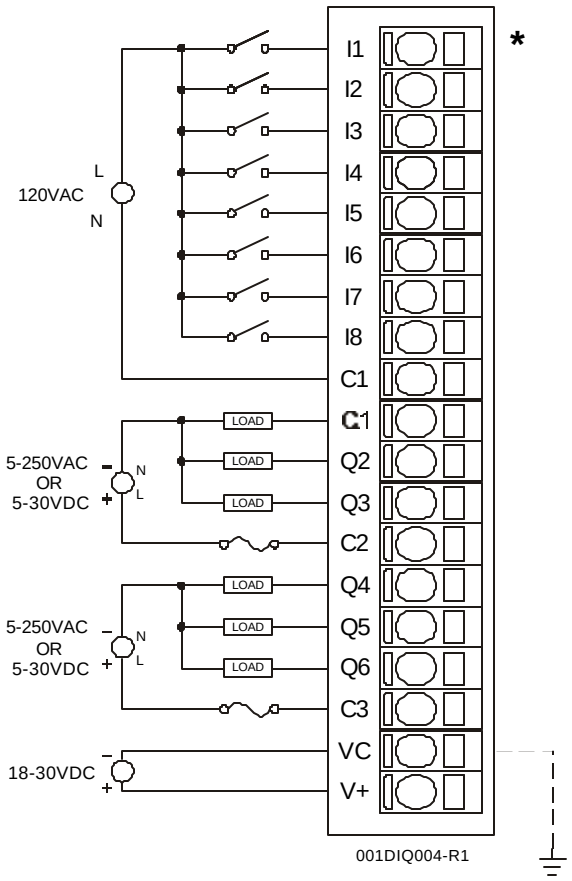
| INPUT | | | |
|---|---|---|---|
| Inputs per Module | 8 | Input Impedance | 0.01µF +10K |
| Commons per Module | 1 | Isolation ( Channel to Bus) | 500VDC |
| Input Voltage Range | 120 – 160 VAC | Minimum ON Current | 1mA. |
| Peak Voltage | 160VAC | Maximum OFF Current | 200µA. |
| AC Frequency | 50 / 60Hz | OFF to ON Response | 50ms. |
| ON Voltage Level | 70VAC Min. | ON to OFF Response | 50ms. |
| OFF Voltage level | 30VAC Max. | Status Indicator | 8 |

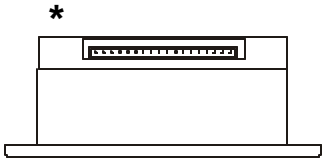
| OUTPUT | | | |
|---|---|---|---|
| Outputs per Module | 6 relay | Maximum Leakage Current | 5µA |
| Commons per Module | 2 | Maximum Inrush Current | 3A per channel |
| Output Type | Relay | Minimum Load | None |
| Coil Voltage | 18-30VDC | OFF to ON Response | 6ms. Typical |
| Contact Voltage | 250VAC / 30VDC Max. | ON to OFF Response | 0.3ms. Typical |
| ON Voltage drop | .1V Max. | Status Indicator | 6 |
| Fuses | 10A common | Isolation (Channel to Channel and Channel to Common) | 500VDC |
| Maximum Load current (resistive) per channel | 3A | | |

| General Specifications | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9oz. (256 g) |
| CE<br>UL | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |

**MAN0301-03**

## 2 WIRING




**Mini Bottom View – Shows corresponding I/O pin location**

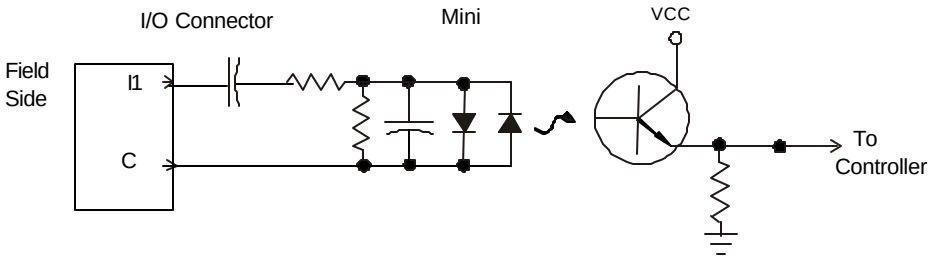
| Pin | Signal |
|---|---|
| I1 | Input 1 |
| I2 | Input 2 |
| I3 | Input 3 |
| I4 | Input 4 |
| I5 | Input 5 |
| I6 | Input 6 |
| I7 | Input 7 |
| I8 | Input 8 |
| C1 | Common 1 |
| Q1 | Output 1 |
| Q2 | Output 2 |
| Q3 | Output 3 |
| C2 | Common 2 |
| Q4 | Output 4 |
| Q5 | Output 5 |
| Q6 | Output 6 |
| C3 | Common 3 |
| VC | Relay Coil Voltage Common |
| V+ | Relay Coil Voltage + |

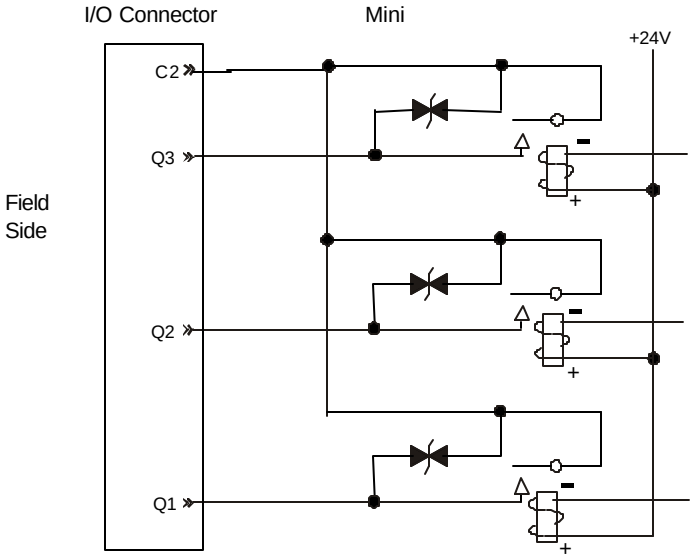
**Warning:** To protect the module and associated wiring from load faults, use external fuse **(10 A)** as shown. **This warning affects OCS037 / OCS067, Revisions E or higher and all versions of the Mini RCS067.**

**Warning**: Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

**Warning:** Wiring the line side of the AC source to loads connected to outputs 1 through 6 and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

# 3 INTERNAL CIRCUIT SCHEMATICS




Specification for transient voltage suppressors (transorbs) used on output circuitry is 400VDC, bi-directional 400 watts.

Electro-mechanical relays comply with IEC1131-2.

# 4 CONFIGURATION

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

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

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

## 5 INSTALLATION / SAFETY

**Warning:** Previous versions of this product provided internal fuses on the output circuits (relay contacts). Due to CE Low Voltage Directive (LVD) marking requirements, these fuses have been removed and replaced with solid wire. Therefore, it is now the responsibility of the user of this equipment to ensure that adequate fusing is installed *externally* on each relay output circuit.

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

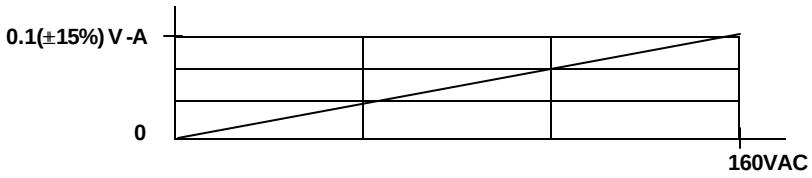
When found on the product, the following symbols specify:

**Warning:** Consult user documentation.

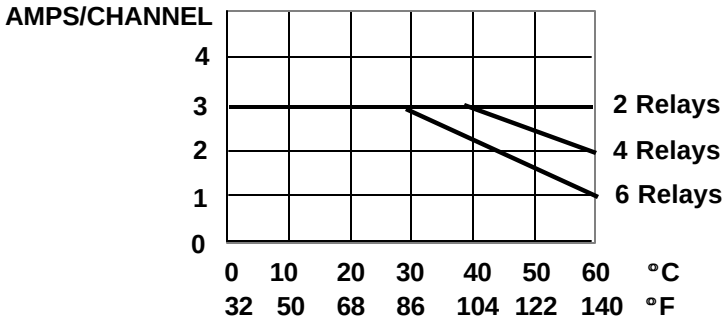
**Warning:** Electrical Shock Hazard.

## 6 INPUT / OUTPUT CHARACTERISTICS

**Digital Input Chart**



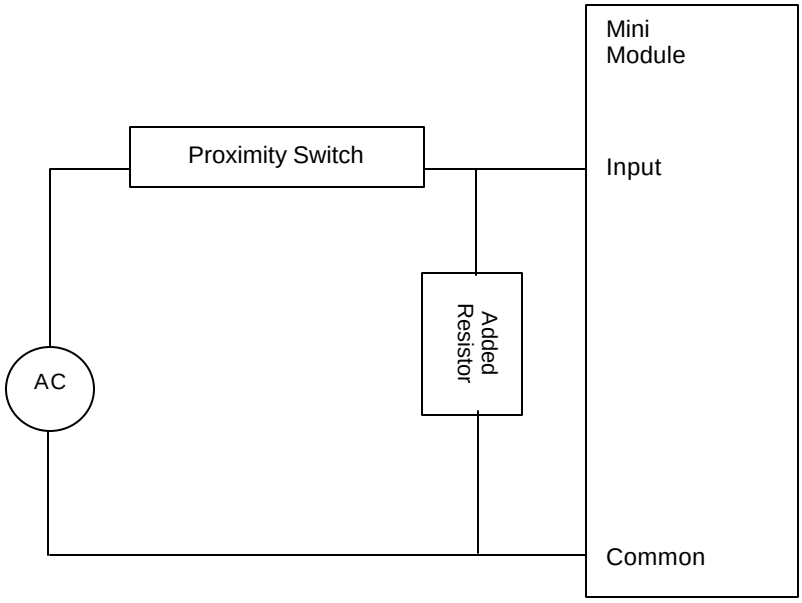
**Derating Output Chart**




| Typical Relay Life | | | |
|---|---|---|---|
| **Voltage (Resistive)** | **Load Current** | | |
| | **1 Amp** | **2 Amp** | **3 Amp** |
| 30VDC | 600K | 250K | 125K |
| 125VAC | 750K | 300K | 150K |
| 250VAC | 500K | 200K | 100K |

The following applies to applications in which two-wire proximity switches are used as sensors for discreet AC inputs. For these applications, an external resistor *or* resistor/capacitor combination must be added to each input as shown below. The resistor provides a small current to power the proximity switch. The resistor is not required for other types of proximity switches.

120VAC: 15K ohm, 2W resistor *or* 0.22µF metallized film capacitor rated for 120VAC service in series with 470 ohm, 0.5W resistor



# 7 TECHNICAL SUPPORT

For assistance, contact Technical Support at the following locations.
Please visit our website for manual updates.

**North America:**
(317) 916-4274
www.heapg.com

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

# AC Input /AC Output Module

**HE500OCS038 / HE500OCS068**
**120 / 240 VAC In, Positive Logic**
**80-250 VAC Out, Positive Logic**

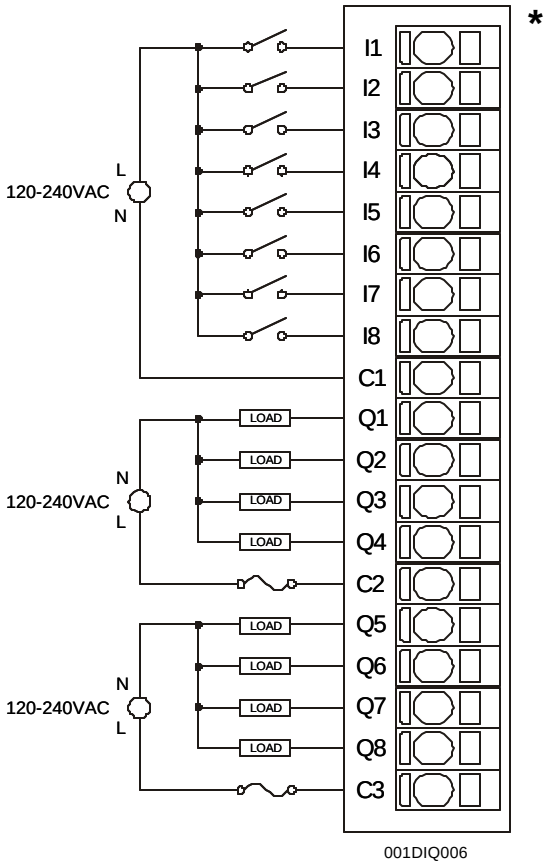
***Mini OCS/RCS***

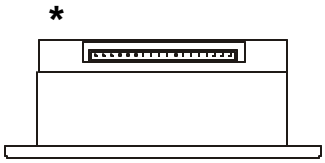
## 1 SPECIFICATIONS

| **INPUT** | | | |
|---|---|---|---|
| Inputs per Module | 8 | Input Impedance | 0.01µF +10K |
| Commons per Module | 1 | Isolation (Channel to Common) | 1500VDC |
| Input Voltage Range | 120 – 240 VAC | Minimum ON Current | 1ms. |
| Peak Voltage | 275 VAC | Maximum OFF Current | 1ms. |
| AC Frequency | 60Hz | OFF to ON Response | 50ms. |
| ON Voltage Level | 70VAC Min. | ON to OFF Response | 50ms. |
| OFF Voltage level | 30VAC Max. | Status Indicator | 8 LEDs |
| **OUTPUT** | | | |
| Outputs per Module | 8 | Maximum Load Current per output | 2A Max. |
| Commons per Module | 2 | Maximum Leakage Current | 600µA Max. |
| Operating voltage | 250VAC Max. | Maximum Inrush Current | 4A |
| Output Type | Triac | OFF to ON Response | 10ms. Max. |
| ON Voltage level | 1.6V Max. | ON to OFF Response | 10ms. Max. |
| Isolation (Channel to Common) | 1500VDC | Status Indicator | 8 |

| **General Specifications** | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9.5 oz. (256 g) |
| CE<br>UL | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |

## 2 WIRING




**Mini Bottom View – Shows corresponding I/O pin location**

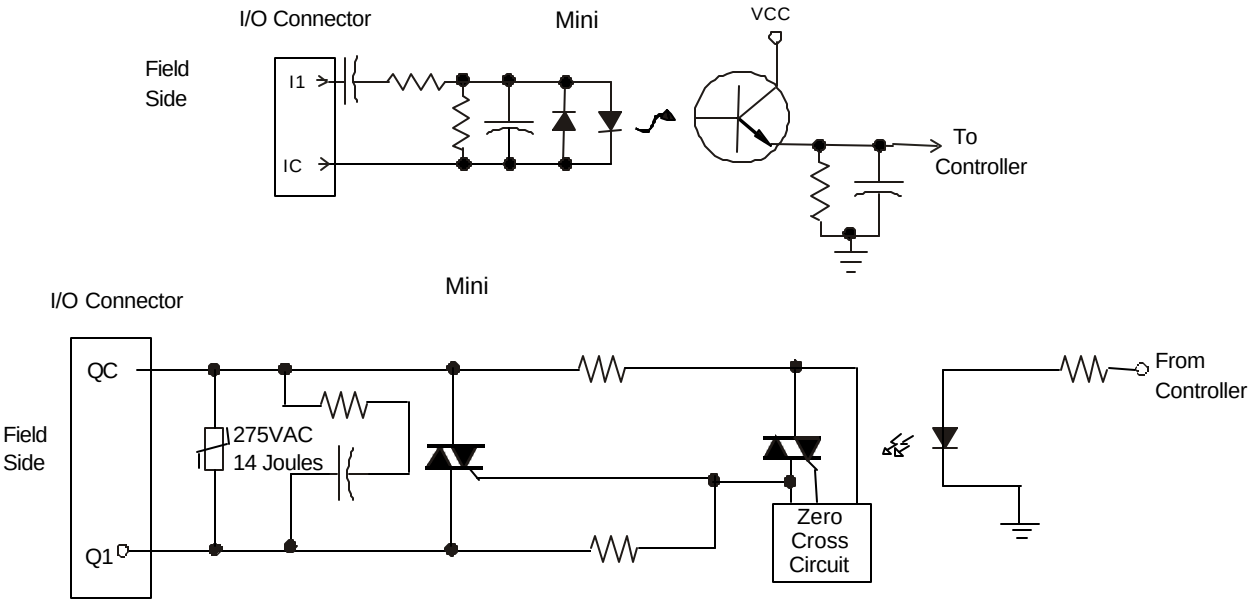
| Pins | Signal |
|---|---|
| I1 | Input 1 |
| I2 | Input 2 |
| I3 | Input 3 |
| I4 | Input 4 |
| I5 | Input 5 |
| I6 | Input 6 |
| I7 | Input 7 |
| I8 | Input 8 |
| IC | Input Common Isolated |
| Q1 | Output 1 |
| Q2 | Output 2 |
| Q3 | Output 3 |
| Q4 | Output 4 |
| C2 | Output Common 2 Isolated |
| Q5 | Output 5 |
| Q6 | Output 6 |
| Q7 | Output 7 |
| Q8 | Output 8 |
| C3 | Output Common 3 Isolated |

**Warning**: To protect the module and associated wiring from load faults, use external fuse **(5 A)** as shown. **This warning affects OCS038 / OCS068, Revisions E or higher.**

**Warning**: Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

**Warning:** Wiring the line side of the AC source to loads connected to outputs 1 through 8 and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

## 3 INTERNAL CIRCUIT SCHEMATICS




Specification for transient voltage suppressors (MOVs) used on output circuitry is 275VAC, 14 Joules.

## 4 CONFIGURATION

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

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is <u>not</u> edited by the user.

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

## 5 INSTALLATION / SAFETY

**Warning:** Previous versions of this product provided internal fuses on the output circuits (relay contacts). Due to CE Low Voltage Directive (LVD) marking requirements, these fuses have been removed and replaced with solid wire. Therefore, it is now the responsibility of the user of this equipment to ensure that adequate fusing is installed *externally* on each relay output circuit.

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

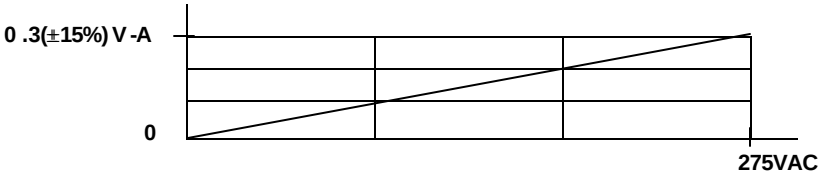
When found on the product, the following symbols specify:

**Warning:** Consult user documentation.

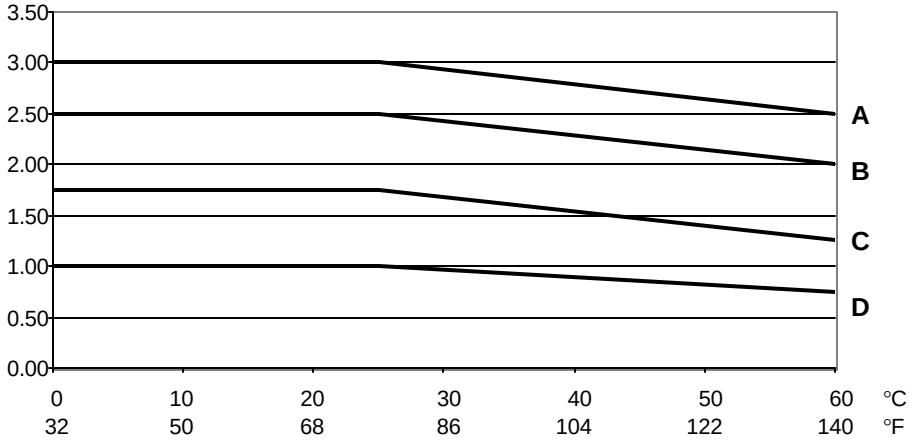
**Warning:** Electrical Shock Hazard.

## 6 INPUT / OUTPUT CHARACTERISTICS

**Digital Input Chart**



**Derating Chart**



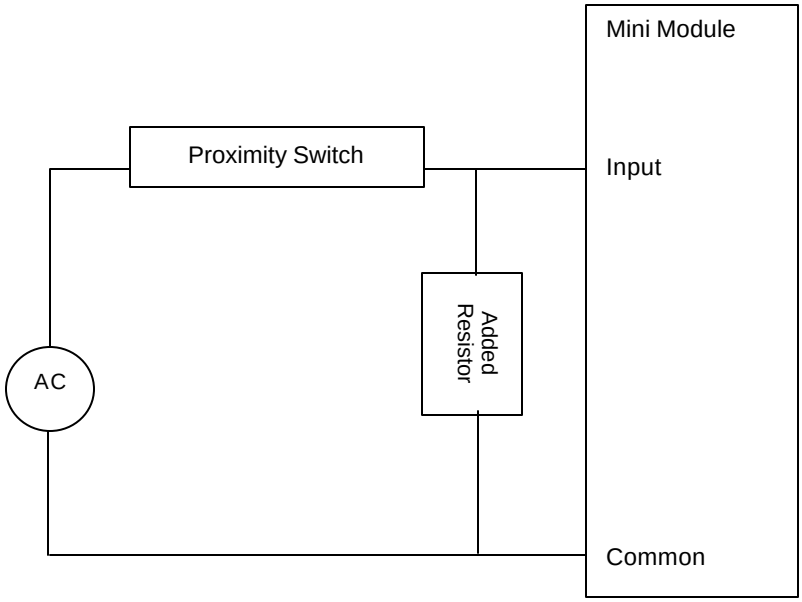

| Derating Legend | |
|---|---|
| **A** | 1 Channel ON |
| **B** | 2 Channels ON<br>▪ One even channel and one odd channel or<br>▪ One low channel (1-4) and one high channel (5-8). |
| **C** | 4 Channels ON<br>▪ One channel (1 or 3)<br>▪ One channel (2 or 4)<br>▪ One channel (5 or 7)<br>▪ One channel (6 or 8) |
| **D** | 8 Channels ON |

For maximum output power, loads are to be distributed between even and odd channels, and also, between low (1-4) and high (5-8) channels. Allow for ample air circulation around the module. Current levels typically need to be reduced by 0.5 amp for restricted air flow.

The following applies to applications in which two-wire proximity switches are used as sensors for discreet AC inputs. For these applications, an external resistor *or* resistor/capacitor combination must be added to each input as shown below. The resistor provides a small current to power the proximity switch. The resistor is not required for other types of proximity switches.

120VAC: 15K ohm, 2W resistor *or* 0.22µF metallized film capacitor rated for 120VAC service in series with 470 ohm, 0.5W resistor

240VAC: 15K ohm, 10W resistor *or* 0.22µF metallized film capacitor rated for 240VAC service in series with 470 ohm, 0.5W resistor




## 7 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations.
Please visit our website for manual updates.

**North America:**
(317) 916-4274
www.heapg.com

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

# Mixed DC I/O Module

**HE500OCS041 / HE500OCS071**
**HE500RCS071**
**12/24 Vdc In, Positive/Negative Logic**
**(16 Input Channels)**
**10-28Vdc Out, Positive Logic**
**(12 Output Channels)**

***Mini OCS/RCS***

## 1 SPECIFICATIONS

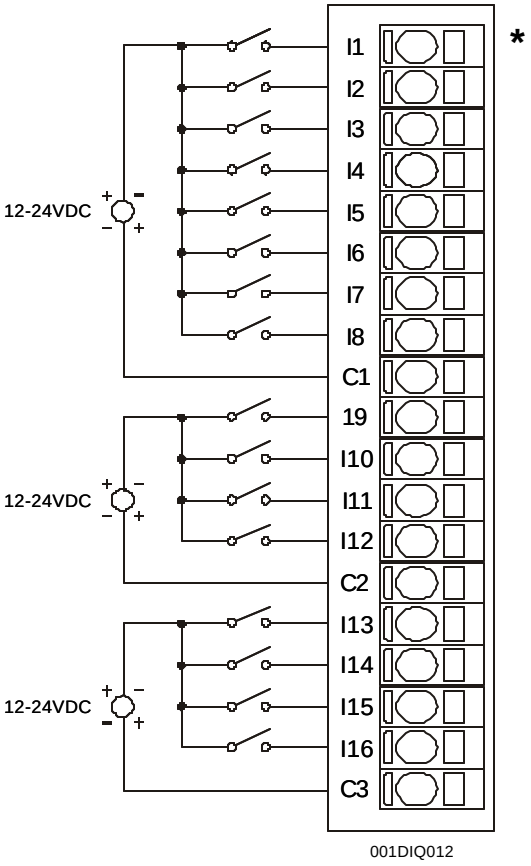
| INPUT | | | |
|---|---|---|---|
| Inputs per Module | 16 | Input Characteristics | Bidirectional |
| Commons per Module | 3 | Input Impedance | 10K Ohms |
| Input Voltage Range | 12-24VDC | Minimum ON Current | 1mA |
| Peak Voltage | 35VDC Max. | Maximum OFF Current | 200µA |
| Isolation (Channel to Channel) | 500VDC | OFF to ON Response | 1ms. |
| ON Voltage Level | 9VDC /1mA minimum | ON to OFF Response | 1ms. |
| OFF Voltage Level | 3VDC | | |

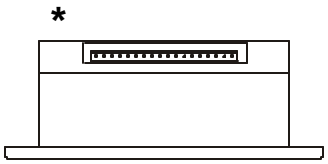
| OUTPUT | | | |
|---|---|---|---|
| Outputs per Module | 12 | Maximum Inrush Current | 650mA |
| Commons per Module | 1 | Minimum Load | None |
| Operating Voltage | 10 - 28VDC | OFF to ON Response | 1ms. |
| Output Type | Sourcing / 10K Pull-Down | ON to OFF Response | 1ms. |
| Peak Voltage | 28VDC Max. | Output Characteristics | Current Sourcing |
| Maximum Load Current per channel | 0.5A Max. | Output Protection | Short Circuit |

| General Specifications | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9.5 oz. (270 g) |
| CE | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |
| UL | Operating Temperature Code T4A; See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |

# 2 WIRING

## *2.1 Input Wiring*

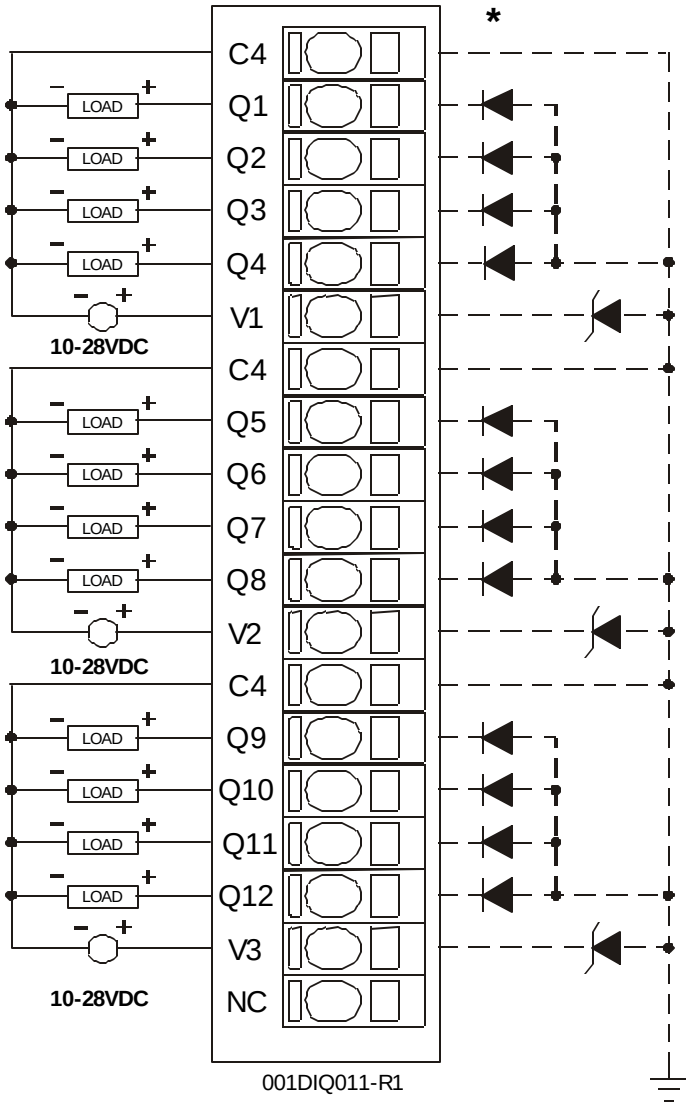


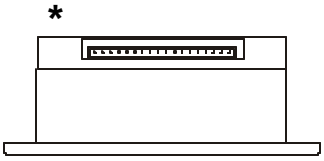




**Mini Top View – Shows corresponding I/O pin location**

| Pin | Signal |
|---|---|
| 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 1 (Isolated) |
| I9 | Input 9 |
| I10 | Input 10 |
| I11 | Input 11 |
| I12 | Input 12 |
| C2 | Common 2 (Isolated) |
| I13 | Input 13 |
| I14 | Input 14 |
| I15 | Input 15 |
| I16 | Input 16 |
| C3 | Common 3 (Isolated) |

*2.2 Output Wiring*

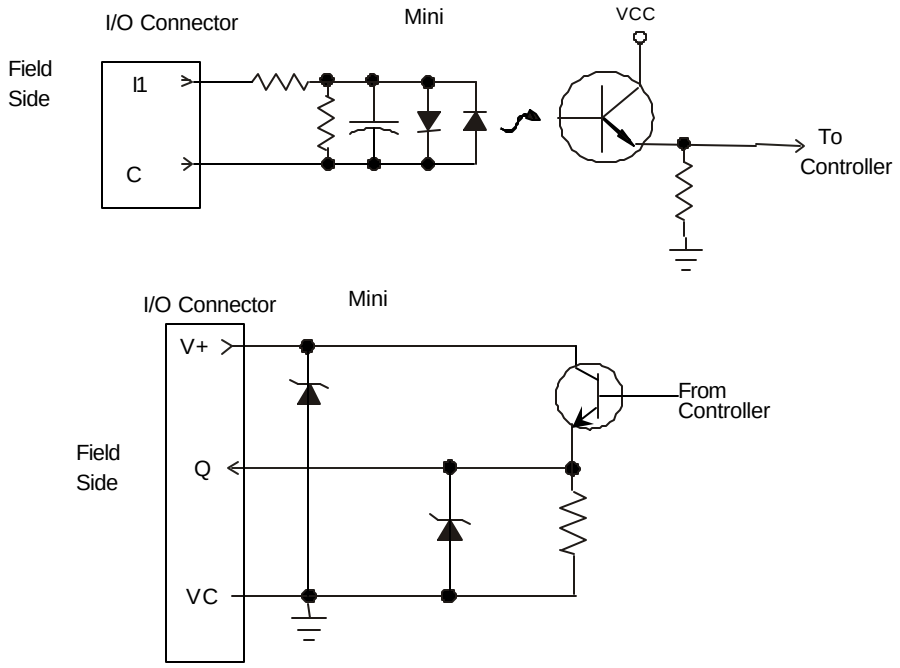



**Mini Bottom View – Shows corresponding I/O pin location**

| Pin | Signal |
|---|---|
| C4 | Common |
| Q1 | Output 1 |
| Q2 | Output 2 |
| Q3 | Output 3 |
| Q4 | Output 4 |
| V1 | Load Power 1 |
| C4 | Common |
| Q5 | Output 5 |
| Q6 | Output 6 |
| Q7 | Output 7 |
| Q8 | Output 8 |
| V2 | Load Power 2 |
| C4 | Common |
| Q9 | Output 9 |
| Q10 | Output 10 |
| Q11 | Output 11 |
| Q12 | Output 12 |
| V3 | Load Power |
| NC | No Connection |

## 3 INTERNAL SCHEMATIC DRAWING




Specification for transient voltage suppressors (transorbs) used on output circuitry is 33VDC, 600 watts.

## 4 CONFIGURATION

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

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

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

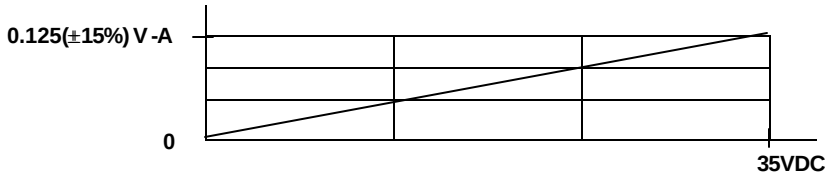
# 5 INSTALLATION / SAFETY

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

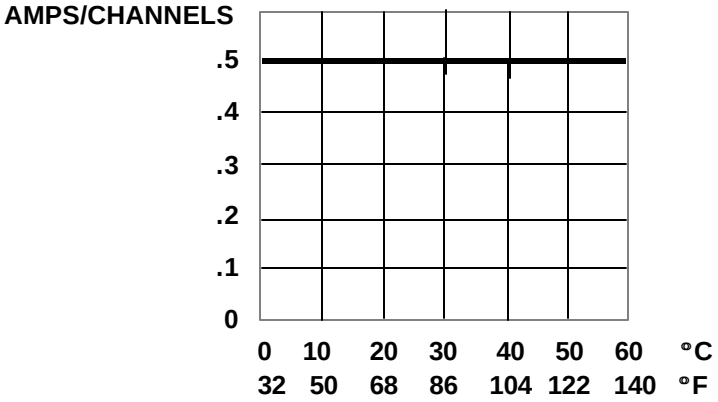
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

# 6 INPUT / OUTPUT CHARACTERISTICS

**Digital Input Chart**




## Derating Chart




# 7 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations.
Please visit our website for manual updates.

**North America:**
(317) 916-4274
www.heapg.com

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

**NOTES**

# Mixed DC I/O Module

**HE500OCS042 / HE500OCS072**
**HE500RCS072**
**(16 Input Channels)**
**12/24 Vdc In, Positive/Negative Logic**
**24Vdc Out, Negative Logic**
**(12 Output Channels)**

***Mini OCS/RCS***

## 1 SPECIFICATIONS

| INPUT | | | |
|---|---|---|---|
| Inputs per Module | 16 | Input Characteristics | Bidirectional |
| Commons per Module | 3 | 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 | | |

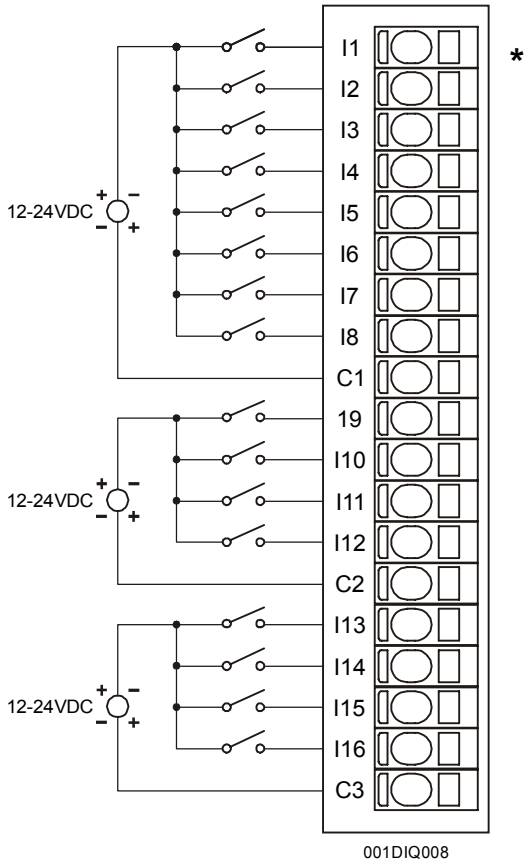
| OUTPUT | | | |
|---|---|---|---|
| Outputs per Module | 12 | Output Protection | Short Circuit |
| Commons per Module | 1 | Maximum Leakage Current | 100μA |
| Operating Voltage | 5 - 35VDC | Maximum Inrush Current | 600mA. per channel |
| Output Type | Sinking / 10K Pull-Up | Minimum Load | None |
| Peak Voltage | 35VDC Max. | OFF to ON Response | 1ms. |
| Output Characteristics | Current Sinking | ON to OFF Response | 1ms. |
| ON Voltage Level | 1.5VDC Max. | | |
| Maximum Load Current per channel | 0.5A Max. | | |

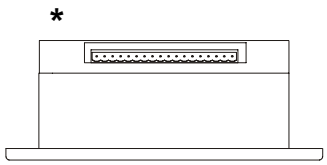
| General Specifications | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9.5 oz. (270 g) |
| CE | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |
| UL | Operating Temperature Code T4A; See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |

**MAN0303-03**

# 2 WIRING

## *2.1 Input Wiring*

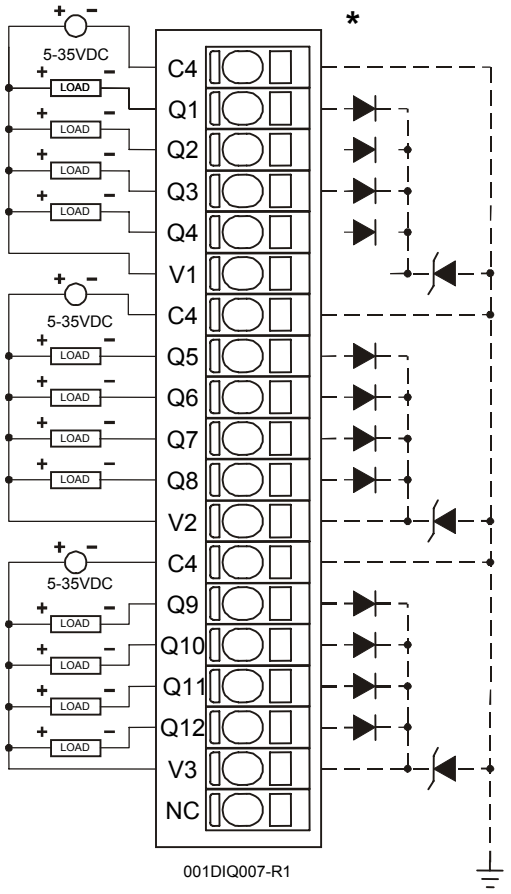


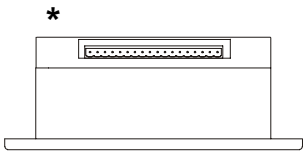




**Mini Top View – Shows corresponding I/O pin location**

| Pin | Signal |
|---|---|
| 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 1 |
| I9 | Input 9 |
| I10 | Input 10 |
| I11 | Input 11 |
| I12 | Input 12 |
| C2 | Common 2 |
| I13 | Input 13 |
| I14 | Input 14 |
| I15 | Input 15 |
| I16 | Input 16 |
| C3 | Common 3 |

*2.2 Output Wiring*



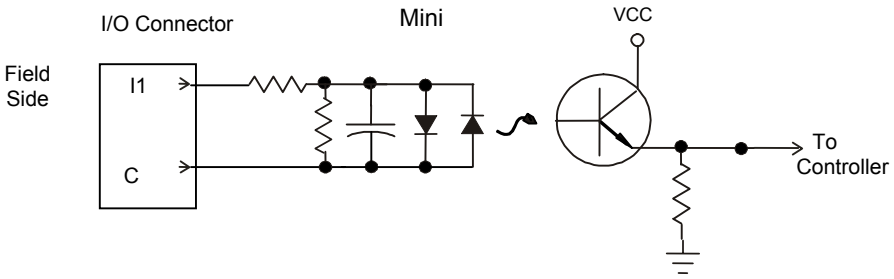



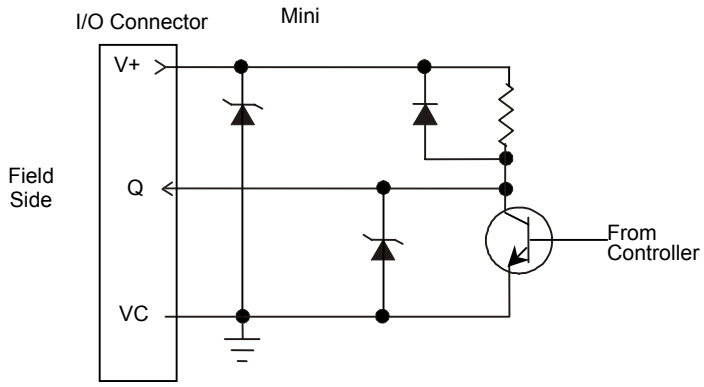

**Mini Bottom View – Shows corresponding I/O pin location**

| Pin | Signal |
|---|---|
| C4 | Common 4 |
| Q1 | Output 1 |
| Q2 | Output 2 |
| Q3 | Output 3 |
| Q4 | Output 4 |
| V1 | Load Power 1 |
| C4 | Common 4 |
| Q5 | Output 5 |
| Q6 | Output 6 |
| Q7 | Output 7 |
| Q8 | Output 8 |
| V2 | Load Power 2 |
| C4 | Common 4 |
| Q9 | Output 9 |
| Q10 | Output 10 |
| Q11 | Output 11 |
| Q12 | Output 12 |
| V3 | Load Power 3 |
| NC | No Connection |

**Warning:** This is a negative logic device. Use of it may be considered an unsafe practice under CE directives.

## 3 INTERNAL CIRCUIT SCHEMATIC






Specification for transient voltage suppressors (transorbs) used on output circuitry is 36VDC, 300 watts.

## 4 CONFIGURATION

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

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

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

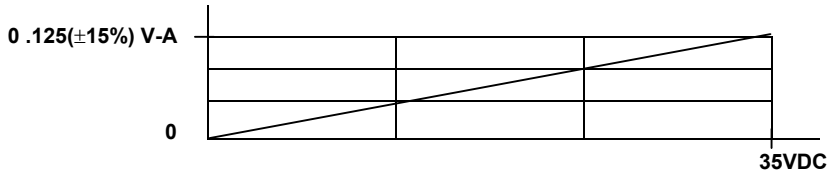
## 5 INSTALLATION / SAFETY

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

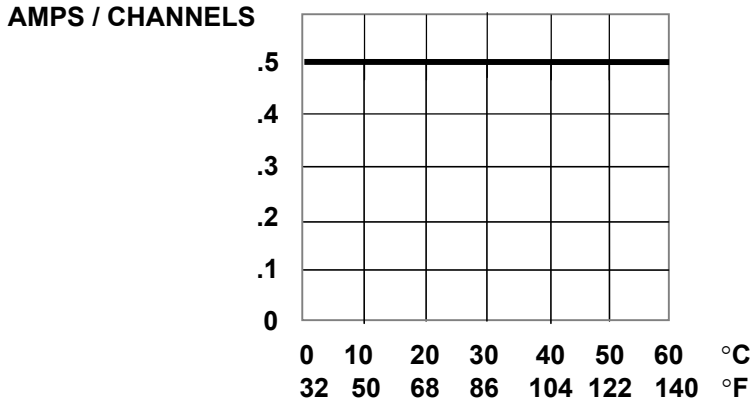
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

## 6 INPUT / OUTPUT CHARACTERISTICS

**Digital Input Chart**



**Derating Output Chart**




## 7 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations.
Please visit our website for manual updates.

**North America:**
(317) 916-4274
www.heapg.com

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

**NOTES**

# Mixed I/O Module

## HE500OCS045 / HE500OCS075
## HE500RCS075
## 12/24 Vdc In, Positive/Negative Logic
## 3A Relay Out

***Mini OCS/RCS***

## 1 SPECIFICATIONS

| INPUT | | | |
|---|---|---|---|
| Inputs per Module | 14 isolated | Minimum ON Current | 1mA |
| Commons per Module | 3 | Maximum OFF Current | 200µA |
| Input Voltage Range | 12/24VDC | OFF to ON Response | 1ms. |
| Peak Voltage | 35VDC Max. | ON to OFF Response | 1ms. |
| ON Voltage level | Min. 9VDC | Isolation (Channel to Common) | 500VDC |
| OFF Voltage level | Max. 3VDC | | |
| Input Impedance | > 10K Ohms | | |

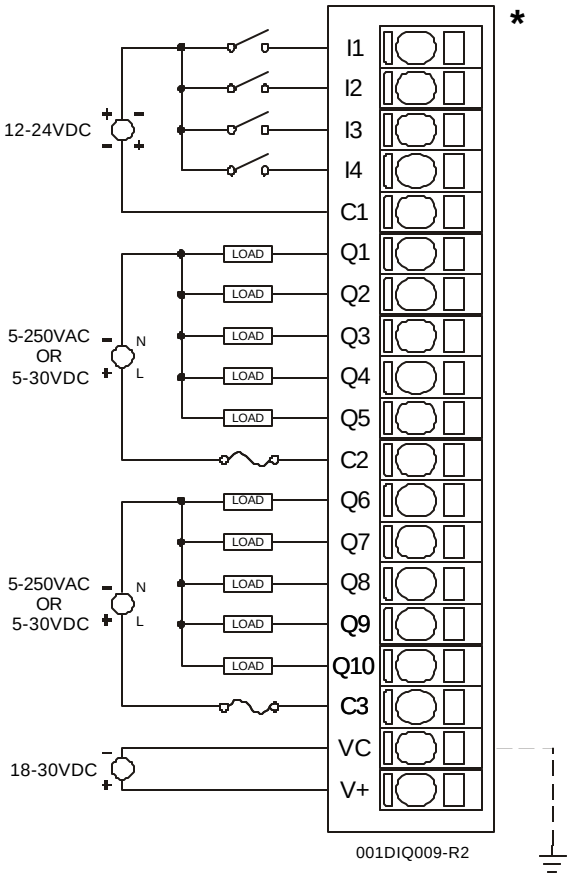
| OUTPUT | | | |
|---|---|---|---|
| Outputs per Module | 10 relay | Maximum Inrush Current | 3A |
| Commons per Module | 2 | Minimum Load | None |
| Output Type | Relay | OFF to ON Response | 6ms. Typical |
| Coil Voltage | 18-30VDC | ON to OFF Response | 0.3ms. Typical |
| Contact Voltage | 250VAC / 30VDC Max. | Isolation (Channel to Channel and Channel to Common) | 2500VDC |
| ON Voltage drop | 0.2V Max. | Maximum Leakage Current | 5µA |
| Maximum Load current (resistive) per output | 3A | | |

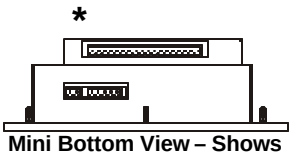
| General Specifications | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9.5 oz. (270 g) |
| CE | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |
| UL | | | |

**MAN0319-03**

# 2 WIRING

## 2.1 Input / Output Connector Wiring




**Mini Bottom View – Shows Corresponding I/O Pin**

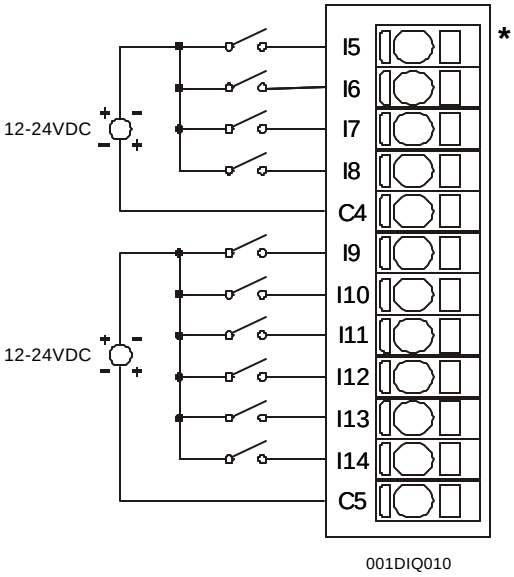
| Pin | Signal |
|---|---|
| I1 | Input 1 |
| I2 | Input 2 |
| I3 | Input 3 |
| I4 | Input 4 |
| C1 | Common for Inputs1,2,3,4 |
| Q1 | Output 1 |
| Q2 | Output 2 |
| Q3 | Output 3 |
| Q4 | Output 4 |
| Q5 | Output 5 |
| C2 | Common for Outputs 1,2,3,4,5 |
| Q6 | Output 6 |
| Q7 | Output 7 |
| Q8 | Output 8 |
| Q9 | Output 9 |
| Q10 | Output 10 |
| C3 | Common for Outputs 6,7,8,9,10 |
| VC | Relay Coil power common, connected to bus common internally. |
| V+ | Relay Coil Power, +18 to +30VDC, 90mA max. |

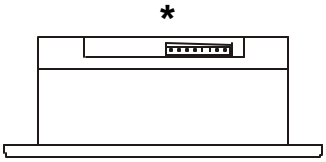
**Warning:** To protect the module and associated wiring from load faults, use external fuse (**10 A**) as shown. **This warning affects OCS045 / OCS075, Revisions E or higher and all versions of the Mini RCS075.**

**Warning**: Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

**Warning:** Wiring the line side of the AC source to loads connected to outputs 1 through 10 and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

## 2.2 Input Connector Wiring

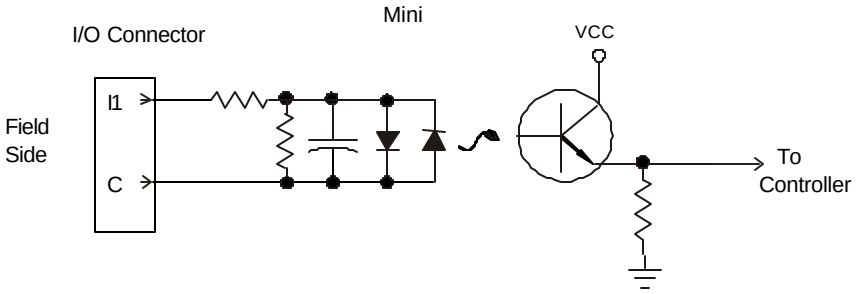


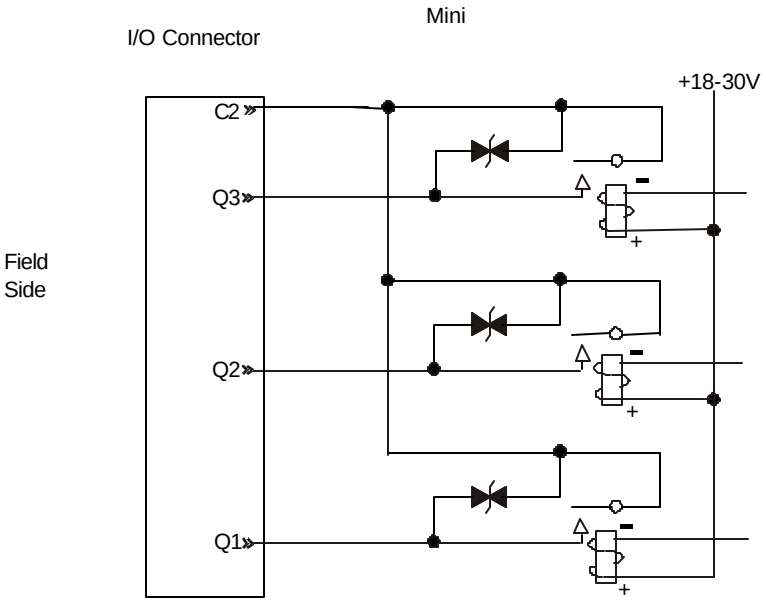




**Mini Top View – Shows corresponding I/O pin location**

| Pin | Signal |
|---|---|
| I5 | Input 5 |
| I6 | Input 6 |
| I7 | Input 7 |
| I8 | Input 8 |
| C4 | Common for Inputs 5,6,7,8 |
| I9 | Input 9 |
| I10 | Input 10 |
| I11 | Input 11 |
| I12 | Input 12 |
| I13 | Input 13 |
| I14 | Input 14 |
| C5 | Common for Inputs 9,10,11,12,13,14 |

# 3 INTERNAL CIRCUIT SCHEMATIC






Specification for transient voltage suppressors (transorbs) used on output circuitry is 400VDC bi-directional 400 watts.

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

## 4 CONFIGURATION

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

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

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

# 5 INSTALLATION / SAFETY

**Warning:** Previous versions of this product provided internal fuses on the output circuits (relay contacts). Due to CE Low Voltage Directive (LVD) marking requirements, these fuses have been removed and replaced with solid wire. Therefore, it is now the responsibility of the user of this equipment to ensure that adequate fusing is installed *externally* on each relay output circuit.

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

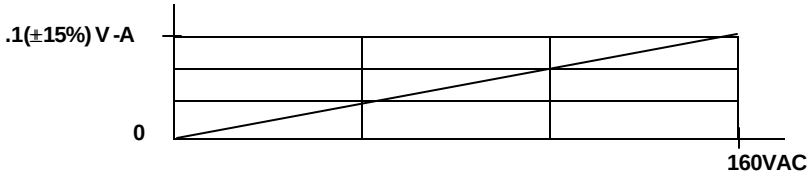
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

**Warning:** Consult user documentation.

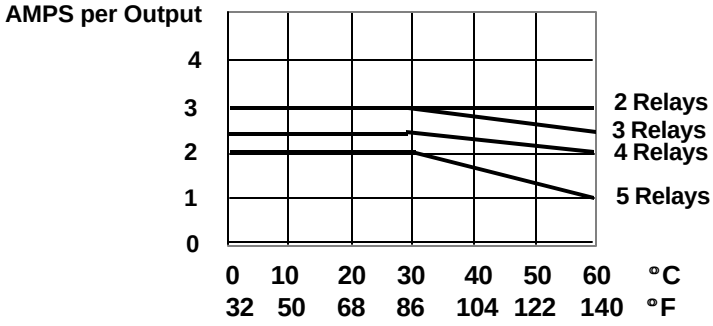
**Warning:** Electrical Shock Hazard.

# 6 INPUT / OUTPUT CHARACTERISTICS

**Digital Input Chart**




**Derating Output Chart**
**(Each group of 5)**



| Typical Relay Life | | | | |
|---|---|---|---|---|
| Voltage (Resistive) | No Load | Load Current | | |
| | | 1 Amp | 2 Amp | 3 Amp |
| 30VDC | 20 Million | 600K | 250K | 125K |
| 125VAC | | 750K | 300K | 150K |
| 250VAC | | 500K | 200K | 100K |

# 7 TECHNICAL SUPPORT

For assistance, contact Technical Support at the following locations.
Please visit our website for manual updates.

**North America:**
(317) 916-4274
www.heapg.com

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

# AC Input /AC Output Module

## Mini OCS/RCS

**HE500OCS047 / HE500OCS077**
**HE500RCS077**
**120 VAC In, Positive Logic**
**3A Relay Out**

## 1 SPECIFICATIONS

| INPUT | | | |
|---|---|---|---|
| Inputs per Module | 14 | Input Impedance | 0.01µF +10K |
| Commons per Module | 3 | Isolation (Channel to Common) | 1500VDC |
| Input Voltage Range | 120 – 160 VAC | Minimum ON Current | 1mA. |
| Peak Voltage | 160VAC | Maximum OFF Current | 200µA. |
| AC Frequency | 50 / 60Hz | OFF to ON Response | 50ms. |
| ON Voltage Level | 70VAC Min. | ON to OFF Response | 50ms. |
| OFF Voltage level | 30VAC Max. | | |

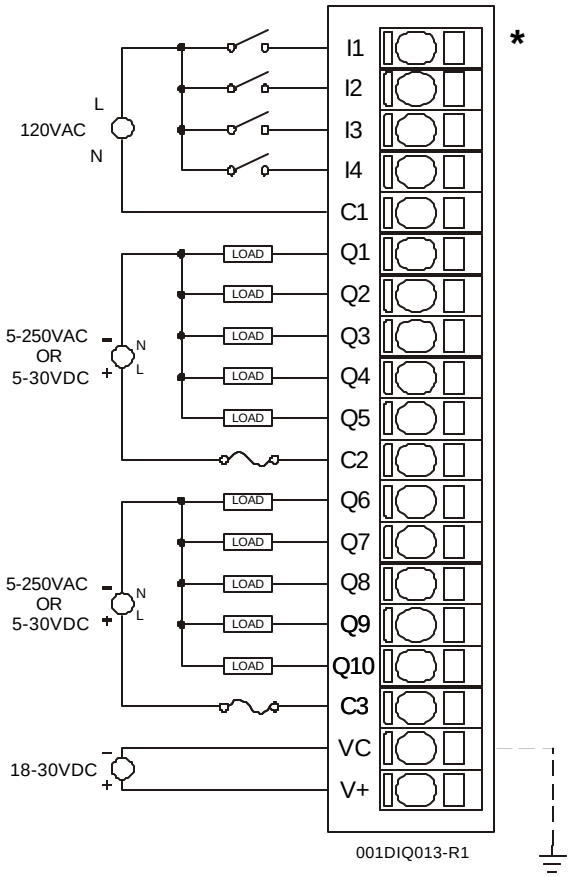
| OUTPUT | | | |
|---|---|---|---|
| Outputs per Module | 10 relay | Maximum Leakage Current | 5µA |
| Commons per Module | 2 | Maximum Inrush Current | 3A |
| Output Type | Relay | Minimum Load | None |
| Coil Voltage | 18-30VDC | OFF to ON Response | 6ms. Typical |
| Contact Voltage | 250VAC / 30VDC Max. | ON to OFF Response | 0.3ms. Typical |
| ON Voltage drop | 0.2VDC max. | Isolation (Channel to Channel and Channel to Common) | 2500VDC |
| Maximum Load current (resistive) per channel | 3A | | |

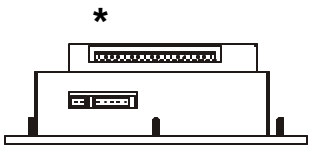
| General Specifications | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9.5 oz. (270 g) |
| CE | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |
| UL | | | |

**MAN0318-02**

# 2 WIRING

## 2.1 Input / Output Connector Wiring




**Mini Bottom View – Shows Corresponding I/O Pin**

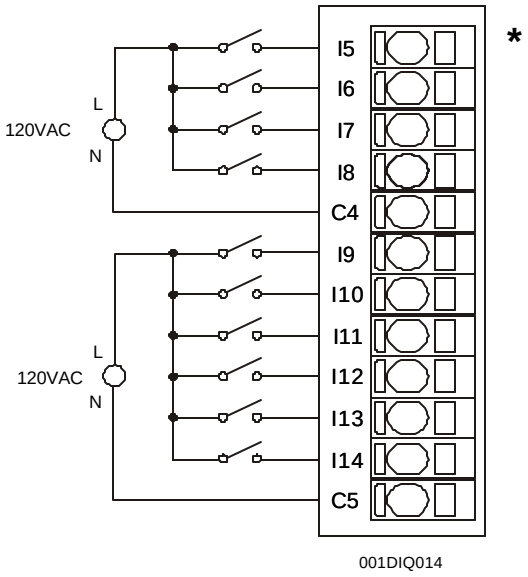
| Pin | Signal |
|---|---|
| I1 | Input 1 |
| I2 | Input 2 |
| I3 | Input 3 |
| I4 | Input 4 |
| C1 | Common for Inputs 1,2,3,4 |
| Q1 | Output 1 |
| Q2 | Output 2 |
| Q3 | Output 3 |
| Q4 | Output 4 |
| Q5 | Output 5 |
| C2 | Common for Outputs 1,2,3,4,5 |
| Q6 | Output 6 |
| Q7 | Output 7 |
| Q8 | Output 8 |
| Q9 | Output 9 |
| Q10 | Output 10 |
| C3 | Common for Outputs 6,7,8,9,10 |
| VC | Relay Coil power common, connected to bus common internally. |
| V+ | Relay Coil power + 18 to +30VDC, 90mA max. |

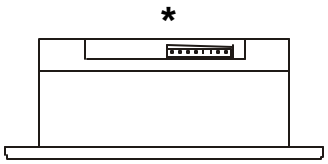
**Warning:** To protect the module and associated wiring from load faults, use external **(10 A)** fuse(s) as shown. **This warning affects OCS047 / OCS077, Revisions E or higher and all versions of the Mini RCS077.**

**Warning:** Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

**Warning:** Wiring the line side of the AC source to loads connected to outputs 1 through 10 and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

2.2 Input Connector Wiring

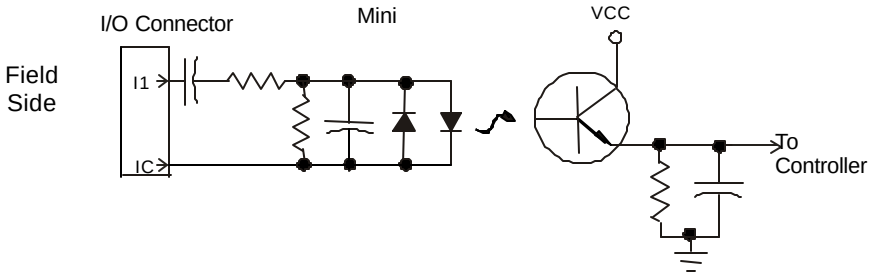


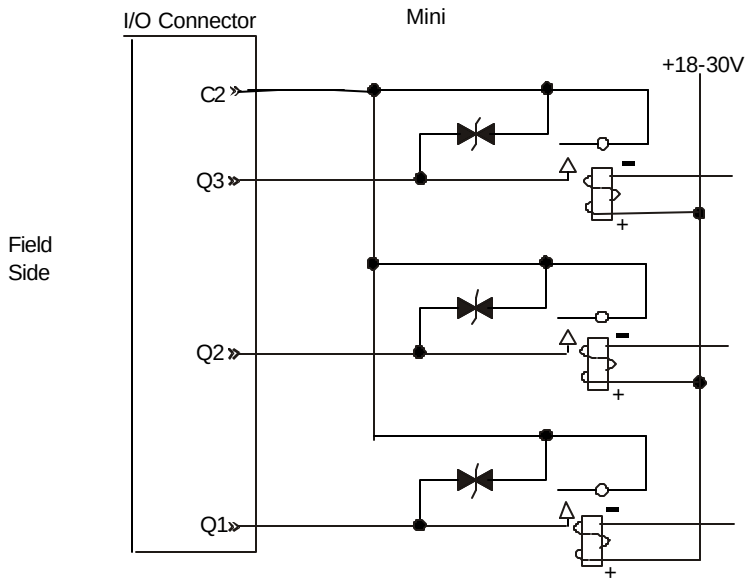




**Mini Top View – Shows corresponding I/O pin location**

| Pin | Signal |
|---|---|
| I5 | Input 5 |
| I6 | Input 6 |
| I7 | Input 7 |
| I8 | Input 8 |
| C4 | Common for Inputs 5,6,7,8 |
| I9 | Input 9 |
| I10 | Input 10 |
| I11 | Input 11 |
| I12 | Input 12 |
| I13 | Input 13 |
| I14 | Input 14 |
| C5 | Common for Inputs 9,10,11,12,13,14 |

# 3 INTERNAL SCHEMATIC DRAWINGS






Specification for transient voltage suppressors (transorbs) used on output circuitry is 400V bi-directional 400W.

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

## 4 CONFIGURATION

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

Selecting the **I/O Map** tab provides information about the I/O registers. The I/O Map is not edited by the user.

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

## 5 INSTALLATION / SAFETY

**Warning:** Previous versions of this product provided internal fuses on the output circuits (relay contacts). Due to CE Low Voltage Directive (LVD) marking requirements, these fuses have been removed and replaced with solid wire. Therefore, it is now the responsibility of the user of this equipment to ensure that adequate fusing is installed *externally* on each relay output circuit.

a. All applicable codes and standards are to be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

When found on the product, the following symbols specify:

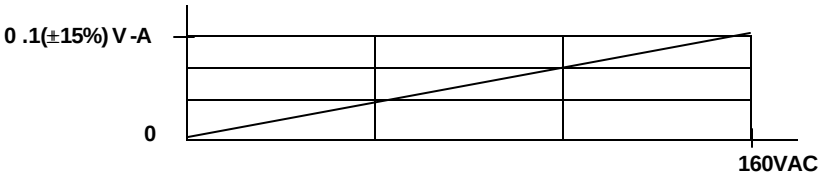
**Warning:** Consult user documentation.

**Warning:** Electrical Shock Hazard.

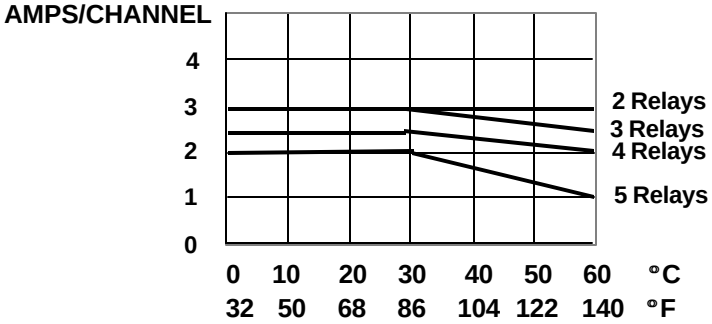
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

## 6 INPUT / OUTPUT CHARACTERISTICS

**Digital Input Chart**



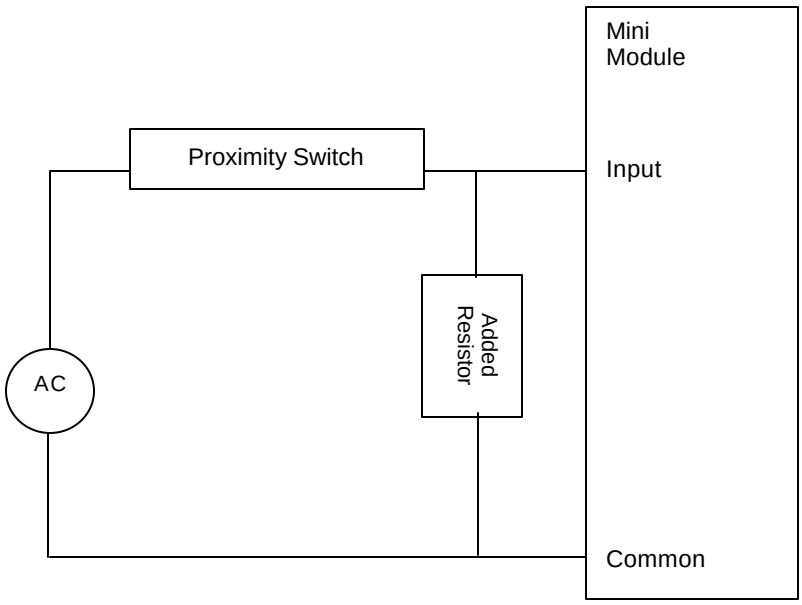

**Derating Chart**
**(Each group of 5)**



| Typical Relay Life | | | | |
|---|---|---|---|---|
| Voltage (Resistive) | No Load | Load Current 1 Amp | 2 Amp | 3 Amp |
| 30VDC | 20 Million | 600K | 250K | 125K |
| 125VAC | | 750K | 300K | 150K |
| 250VAC | | 500K | 200K | 100K |

The following applies to applications in which two-wire proximity switches are used as sensors for discreet AC inputs. For these applications, an external resistor *or* resistor/capacitor combination must be added to each input as shown below. The resistor provides a small current to power the proximity switch. The resistor is not required for other types of proximity switches.

120VAC: 15K ohm, 2W resistor *or* 0.22µF metallized film capacitor rated for 120VAC service in series with 470 ohm, 0.5W resistor




## 7 TECHNICAL SUPPORT

For assistance, contact Technical Support at the following locations.
Please visit our website for manual updates.

**North America:**
(317) 916-4274
www.heapg.com

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

# Temperature I/O Module

**HE500OCS049 / HE500OCS079**
**HE500RCS079**

***Mini OCS/RCS***

## 1 SPECIFICATIONS

| **Relay Outputs** | | | | |
|---|---|---|---|---|
| Number of Channels | 2 N.O. Relays | | Maximum Load Current (resistive) per channel | 10A Max. |
| Commons per Module | 2 | | Maximum Leakage Current | 5µA |
| Digital Output Registers Consumed by Cscape (%Q) | 1,2 of 8 | | ON Voltage Level | 0.15V |
| Isolation (Channel to Channel) (Channel to Common) | 500VDC 400VDC | | OFF to ON Response | 10ms Max. |
| Output Type | N.O. | | ON to OFF Response | 5ms. Max. |
| Maximum Load Voltage | 250VAC or 30VDC Max. | | Protection | Transient voltage suppressor across contacts. |
| **Analog Outpus** | | | | |
| Number of Channels | 2 | | Analog Output Registers Consumed by Cscape (%AQ) | 2 |
| Commons per Module | 1 | | | |
| Output Ranges (including over-range) | 20.47mA; Clamped @-0.5 - +33VDC Nominal | | Additional error for temperatures other than 25°C | 0.01% / °C |
| Resolution | 12 Bits | | Maximum Error at 25°C | 0.1% |
| Output Voltage | 4 - 30VDC | | Load Impedance | ≤ 1.1kΩ @ 24VDC Loop Voltage |
| **SSR Driver** | | | | |
| Number of Channels | 2 | | Minimum Load | None |
| Commons per Module | 1 | | OFF to ON Response | 1ms. |
| Digital Output Registers Consumed by Cscape (%Q) | 3,4 of 8 | | ON to OFF Response | 1ms. |
| Output Type | Sourcing | | Output Characteristics | Current Sourcing |
| Output Voltage | 12VDC Min. | | Output Protection | Transient voltage suppressors |
| Maximum Load Current per Output | 15mA internally limited | | | |

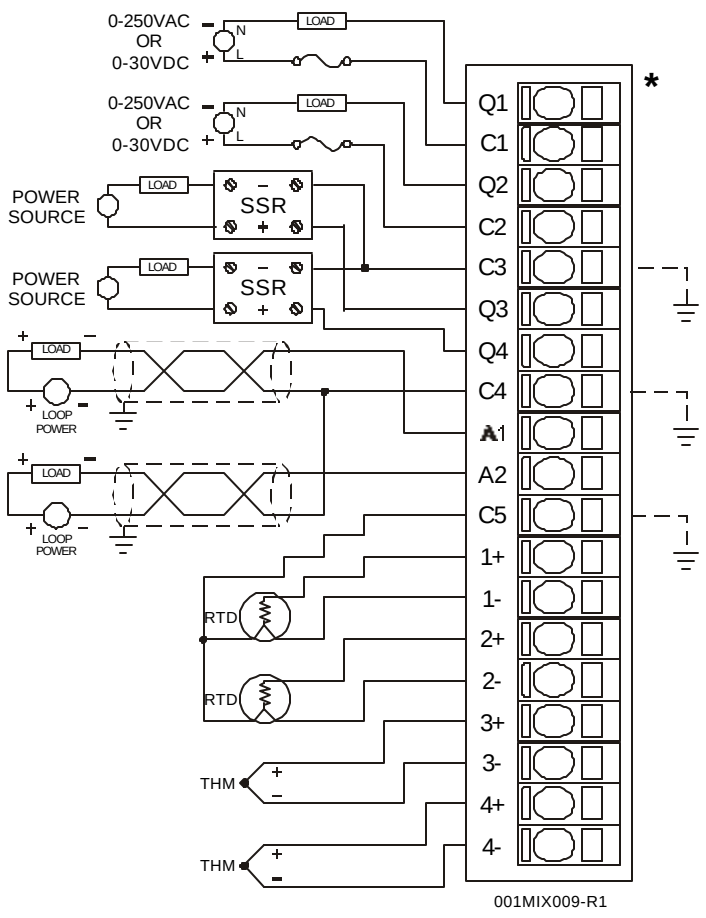
**MAN0359-01**

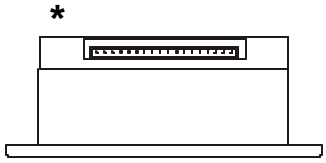
| **Thermocouple Inputs** | | | | | |
|---|---|---|---|---|---|
| Number of Channels | 4 | | A/D Conversion Time | 16 channels/second | |
| Commons per Module | 1 (for grounding shielded T/Cs only) | | Analog Input Registers Consumed by Cscape (%AI) | 4 | |
| Input Impedance | 20Meg Ohm clamped @ ±24VDC | | PLC Update Rate | Set by PLC Scan Rate | |
| A/D Conversion Type | Integrating | | Cold Junction | Internal | |
| Types Supported | J, K, T, & E | | | | |
| Open Thermocouple Response | High Temperature | | Maximum Sustained Differential O/L | ±15VDC | |
| Thermocouple Common Mode Range | -10.5VDC to + 12VDC | | Resolution | 0.05°C | |
| **Thermocouple Type** | **J** | **K** | | **T** | |
| Input Range Temperature | -210°C to 770°C (-346°F to 1418°F) | -270°C to 1380°C (-454°F to 2516°F) | | -270°C to 410°C (-454°F to 770°F) | |
| | **E** | | | | |
| | -270°C to 1010°C (-454°F to 1850°F) | | | | |
| **Accuracy of:** Types J, K, T, & E | **Typical:** 25°C | ±1°C | **Under Extremes:** 0°C, 50°C, or full load | **J:** ±5°C **K:** ±3°C | **E:** ±1°C **T:** ±4°C |
| **Note:** Accuracy Specifications not guaranteed below -100°C for Thermocouple. | | | | | |

| **RTD Inputs** | | | |
|---|---|---|---|
| Number of Channels | 4 | Input Transient Protection | Zener/Capacitor |
| Commons per Module | 1 | Resolution | 0.05°C |
| Analog Input Registers Consumed by Cscape (%AI) | 4 | RTD Types Supported | PT100 (100 Ohms at 0°C, Platinum, Alpha 0.00385, DIN43760) |
| RTD Excitation Current | 200µA, 25% duty cycle | Input Impedance | 10Meg Ohm clamped @ ±24VDC |
| RTD Short | Indefinite | Input Range | -206.2°C to +856.8°C |
| Notch Filter | 50-60 Hz. Software Selectable | PLC Update Rate | Set by PLC Scan Rate |
| A/D Conversion Time | 8 channels/second | Accuracy | ± 1°C |
| A/D Conversion Type | Integrating | Channel-to-Channel Tracking | 0.1°C |

| **General Specifications** | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9.5 oz. (270 g) |
| UL | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |

## 2 WIRING




**Mini Bottom View – Shows corresponding I/O pin location**

| Pin | Signal |
|---|---|
| **Q1** | Relay 1 NO Contact |
| **C1** | Relay 1 NO Contact |
| **Q2** | Relay 2 NO Contact |
| **C2** | Relay 2 NO Contact |
| **C3** | SSR Common |
| **Q3** | SSR Source 1 |
| **Q4** | SSR Source 2 |
| **C4** | 20mA Analog Output Common |
| **A1** | 20mA Analog Output 1 |
| **A2** | 20mA Analog Output 2 |
| **C5** | THM Shield or RTD Common |
| **1+** | THM/RTD Channel 1+ |
| **1-** | THM/RTD Channel 1- |
| **2+** | THM/RTD Channel 2+ |
| **2-** | THM/RTD Channel 2- |
| **3+** | THM/RTD Channel 3+ |
| **3-** | THM/RTD Channel 3- |
| **4+** | THM/RTD Channel 4+ |
| **4-** | THM/RTD Channel 4- |

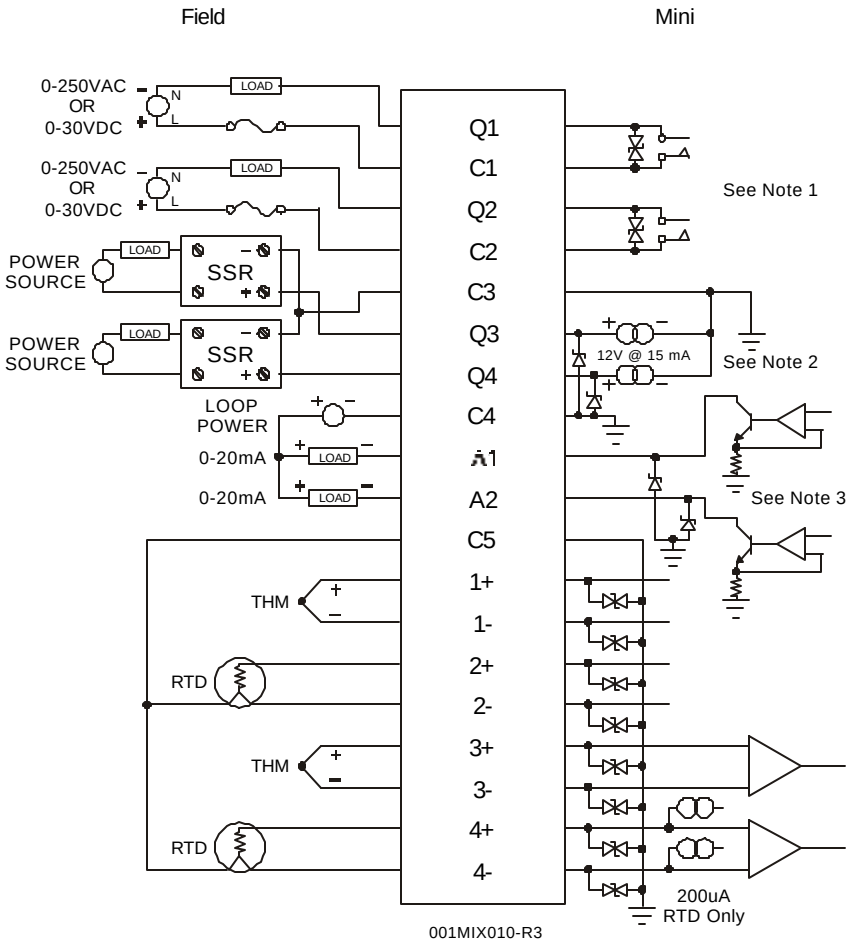
**Note regarding Pin C5:** The pin is not a THM common but is a thermocouple shielding termination point.

**Note:** All temperature inputs can be either Thermocouple or RTD inputs.

**Warning:** Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

**Warning:** Wiring the line side of the AC source to loads connected to outputs Q1 through Q2 and the neutral side of the AC source to the output common(s) create a Negative Logic condition, which may be considered an unsafe practice.

# 3 INTERNAL CIRCUIT SCHEMATIC




**Note 1:** Specification for transient voltage suppressors (transorbs) used on output circuitry is 400VDC bi-directional 400 watts.

**Note 2:** Specification for transient voltage suppressors (transorbs) used on output circuitry is 15VDC, 300 watts.

**Note 3:** Specification for transient voltage suppressors (transorbs) used on output circuitry is 30VDC, 500 watts.

Electro-mechanical relays comply with IEC1131-2.

# 4 CONFIGURATION

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

**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.

The HE800MIX693 digital outputs are assigned as follows assuming a start at %Q1:

%Q1 Relay 1
%Q2 Relay 2
%Q3 SSR Drive 1
%Q4 SSR Drive 2

**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 Temperature Setup**
a. Sensor Type for each channel must match what is physically attached.

b. Temperature format may be set for various C° or F° ranges.

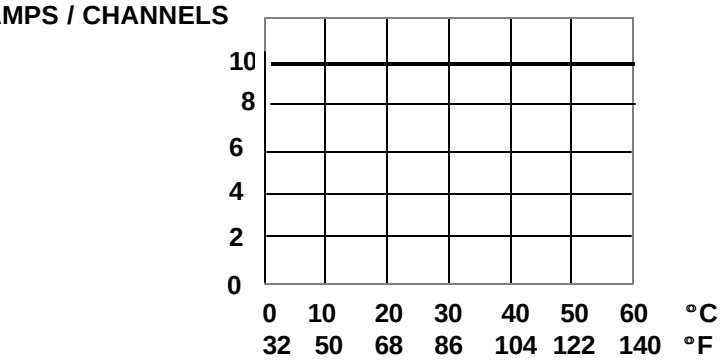
c. Filter Constant sets the level of digital filtering according to the chart below.

d. Reject Rates sets the frequency level for noise rejection at 50 or 60HZ.

**I/O Map Tab**
The I/O Map describes I/O registers. The I/O Map is not edited by the user.

# 5 RELAY OUTPUT CHARACTERISTICS

## Derating Chart for Relay Outputs




| Typical Relay Life (Number of Cycles) | | | |
|---|---|---|---|
| **Voltage and Load Type** | **Load Current** | | |
| | **1 Amp** | **5 Amp** | **10 Amp** |
| 30VDC Resistive | 800K | 180K | 100K |
| 30VDC Inductive | 500K | 100K | Not Rated |
| 250VAC Resistive | 800K | 180K | 100K |
| 250VAC Inductive | 500K | 100K | Not Rated |

# 6 ANALOG OUTPUTS

### 6.1 Conversion Factor

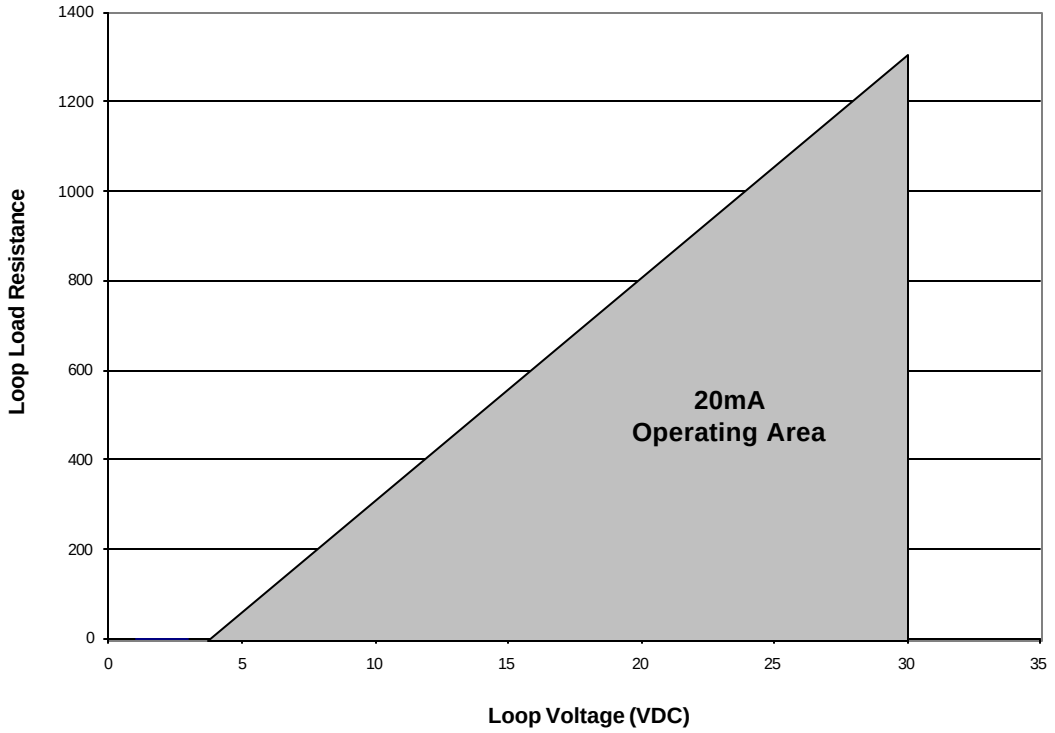
The following table describes how program data values are scaled to real-world analog voltage outputs by the module. Given a desired output current, the data value is converted by using the conversion factor from the table. The following formula is used: **Data = Output Current (mA) / Conversion Factor**

**Example:**

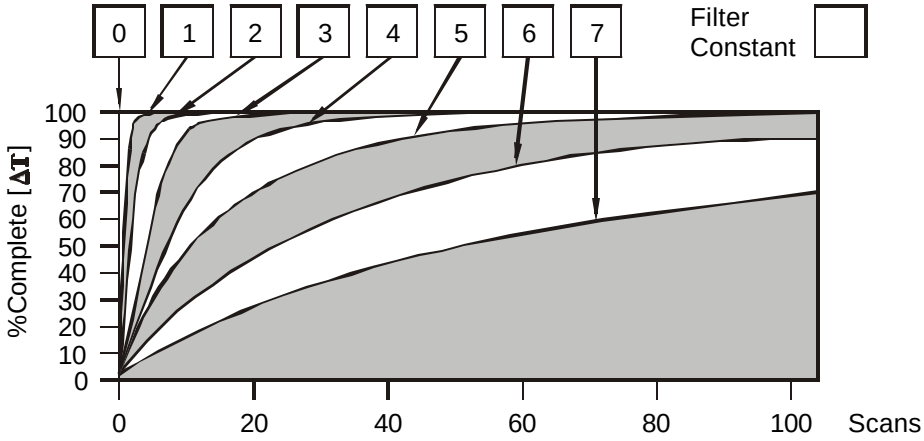
1. The desired output current is 12mA.
2. Using the table, the conversion factor for the current range of +20 mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Output Current (mA) / Conversion Factor
   19200 = 12mA / 0.000625

| 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 | |

### 6.2 Operating Area




## 7 THERMOCOUPLE / RTD SCALING & CONVERSION FACTOR




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

For a given module configuration, use the appropriate formula in the table to obtain the actual temperature (°C or °F) that is represented by the value in the %AI register.

| Thermocouple or RTD Configuration | Temperature Conversion | |
|---|---|---|
| | Celsius | Fahrenheit |
| 0.05° | °C = %AI / 20 * | °F = %AI / 20 * |
| 0.1° | °C = %AI / 10 | °F = %AI / 10 |
| 0.5° | °C = %AI / 2 | °F = %AI / 2 |
| * Maximum reading in 0.05°F or 0.05°C format is limited to 1638.3 because of %AI resolution. | | |

## 8 INSTALLATION / SAFETY

a. All applicable codes and standards should be followed in the installation of this product.
b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger for digital I/O; Belden 8441 for analog I/O; Omega TT-J-20-TWSH for thermocouple inputs; and Omega EXTT-3CU-26S for RTD inputs.
c. Shielded, twisted-pair wiring should be used for best performance (analog I/O).
d. Shields may be terminated at the module terminal strip.
e. In severe applications, shields should be tied directly to the ground block within the panel.
f. Interposing electrical devices (such as relays) in the analog signal path (RTD, Thermocouple) can cause errors due to resistive imbalance.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

When found on a product, the following symbols specify:

**Warning:** Consult user documentation.

**Warning:** Electrical Shock Hazard.

## 9 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations.
Please visit our website for manual updates.

**North America:**
(317) 916-4274
www.heapg.com

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

# 24VDC Bipolar Digital In
# 10-28VDC, 0.5A Sourcing Digital Out
# HE500OCS052 / HE500OCS082 / HE500RCS082
# +/- 10V Analog In/Out

**Mini OCS/RCS**

## 1 SPECIFICATIONS

| | | | |
|---|---|---|---|
| **ANALOG INPUT** | | | |
| Number of Channels | 4 | Analog Inputs Input Points Required | 4 |
| Input Ranges (including over-range) | ±10.23VDC | Usable Resolution | 12- Bits |
| Resolution | 12-Bit | Digital Filtering | Yes |
| Input Impedance | 1Meg Ohm <12VDC or clamped @ 12VDC Nom. | Additional error for temperatures other than 25°C | 0.01% / °C |
| Maximum Clamp Current | 75mA. | Maximum Error at 25°C | 0.1% |
| **DIGITAL INPUT** | | | |
| 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** | | | |
| 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** | | | |
| Outputs per Module | 8 | Maximum Inrush Current | 650m A 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 |

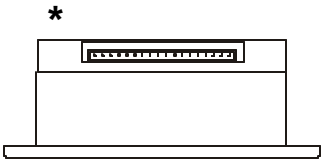
| **General Specifications** | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9.5 oz. (270 g) |
| CE | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |
| UL | Operating Temperature Code T4A; See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |

**MAN0307-03**

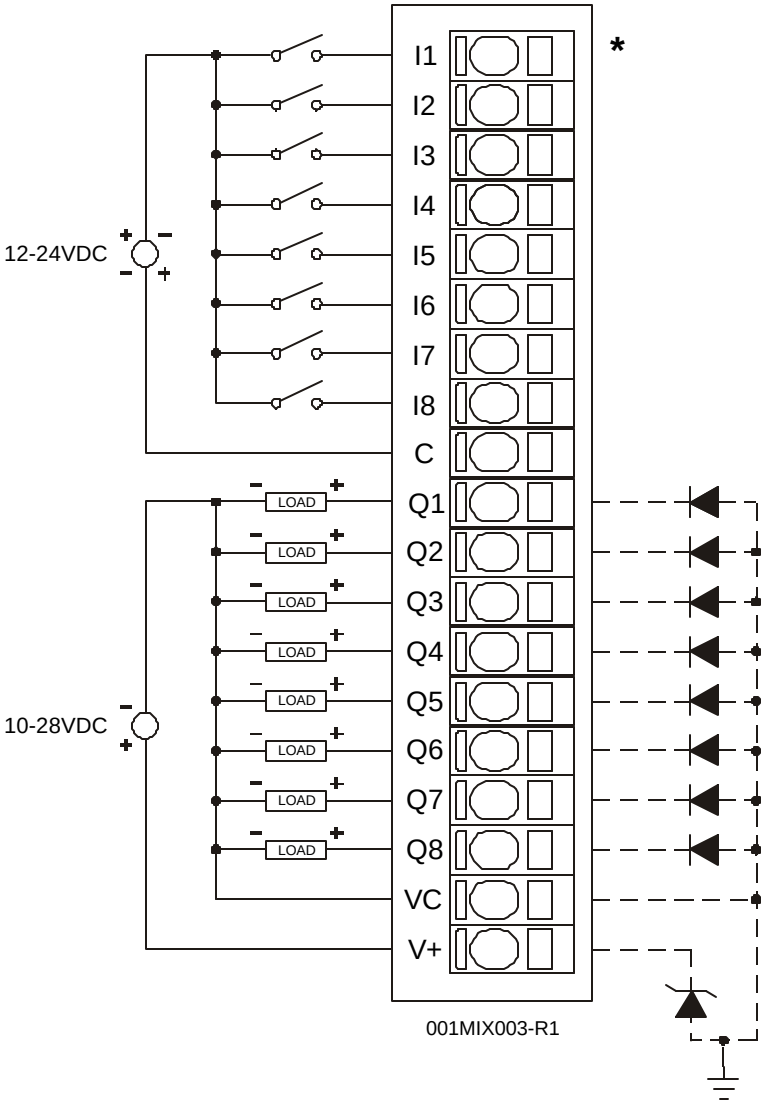
This Data Sheet is published individually & also as a part of the current version of Mini I/O Manual (MAN0581).
Information is subject to change without notice.

# 2 WIRING

## 2.1 Digital Input / Output (P1)

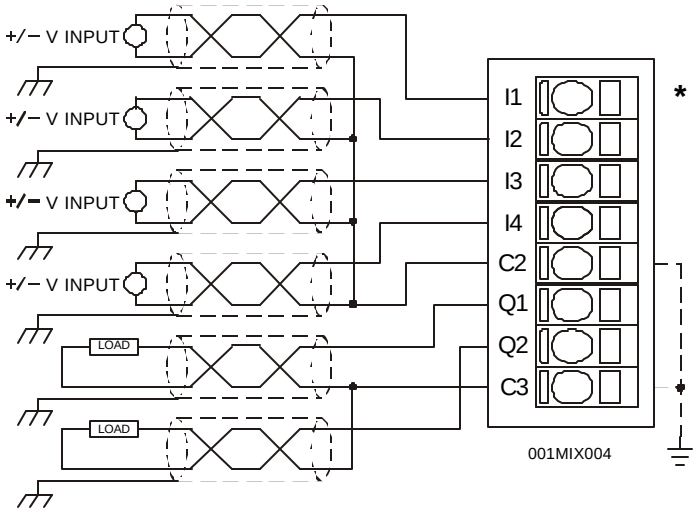


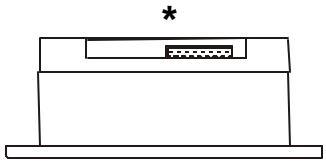

**Mini Bottom View – Shows corresponding I/O pin location**




| Pin | Digital Input /Output |
|---|---|
| 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)

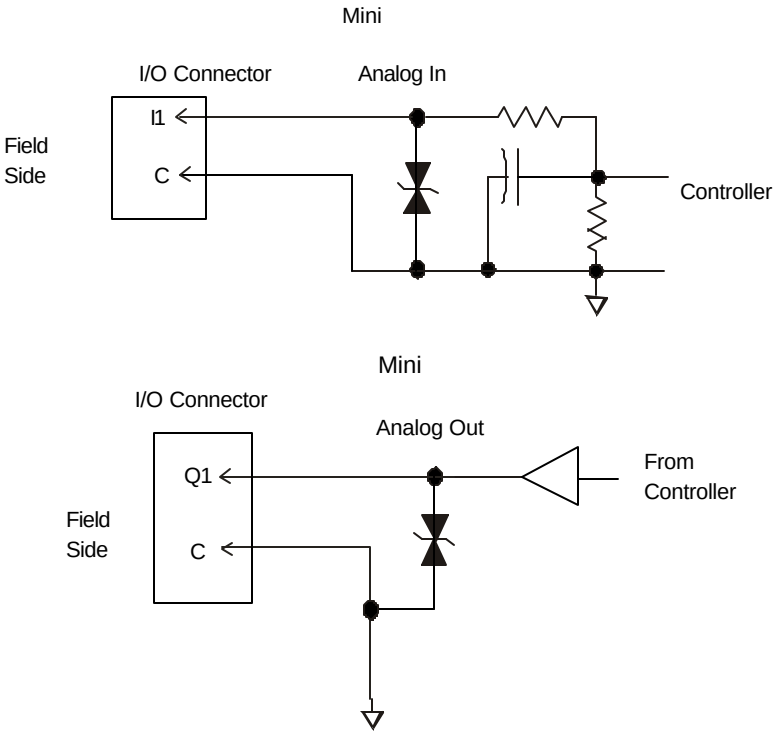


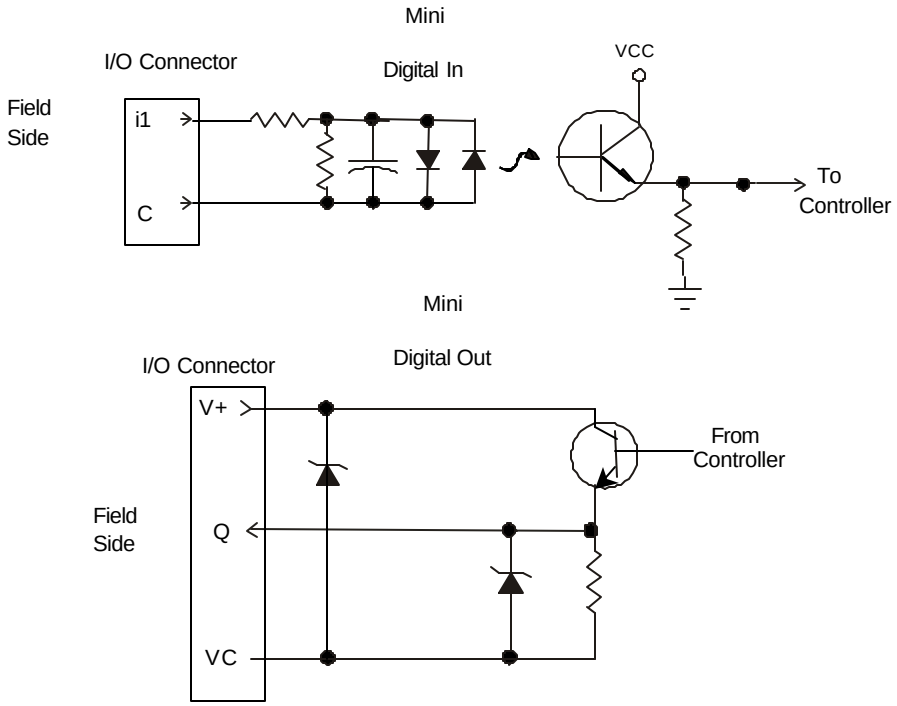

**Mini Top View – Shows corresponding I/O pin location**

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

## 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.

## CONFIGURATION

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

**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.

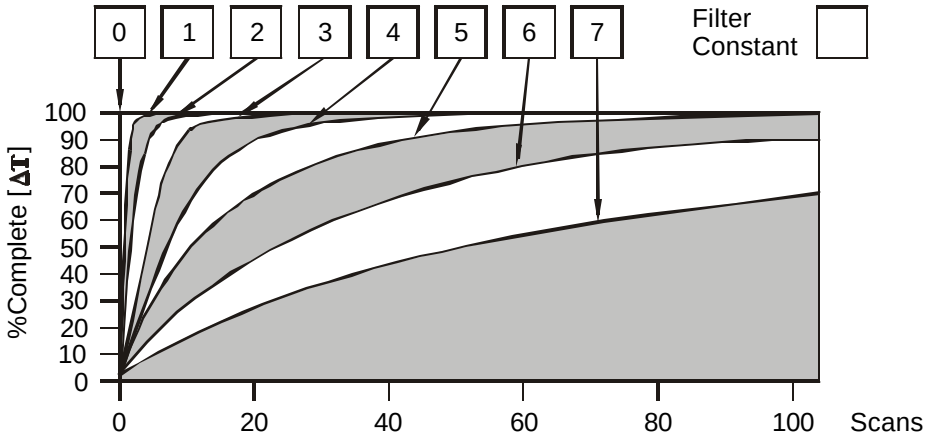
> **Warning:** The default turns the digital outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default settings.

**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:**
a. 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 and is determined by the model number. The I/O Map is not edited by the user.




***Digital Filtering***. The illustration above demonstrates the effect of digital filtering (set with Fillter 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:
   Data = Vin / Conversion Factor
   9600 = 3 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**

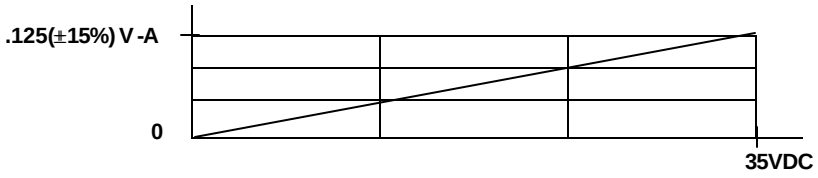
**Example:** The user selects ± 10 VDC output range:

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:
   Data = V out / Conversion Factor
   9600 = 3 VDC / 0.0003125

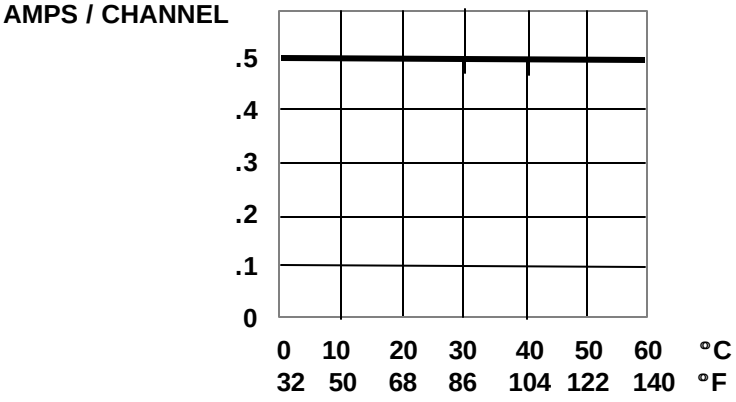
| Conversion of Real-World Outputs into Controller | | | |
|---|---|---|---|
| **Selected Voltage Output Range** | **Data** | **Voltage Out (V out) VDC** | **Conversion Factor** |
| ± 10 VDC Analog Out | + 32736 | +10.23 | 0.0003125 |
| | + 32000 | +10.00 | |
| | 0 | 0.00 | |
| | - 32000 | -10.00 | |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

## 6 DIGITAL INPUT / OUTPUT CHARACTERISTICS

**Digital Input Chart**




**Derating Chart**



# 7 INSTALLATION / SAFETY

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 may be terminated at the module terminal strip.
d. In severe applications, shields should be tied directly to the ground block within the panel.
e. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

# 8 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

**North America:**
(317) 916-4274 or visit our website at www.heapg.com.

**Europe:**
(+) 353-21-4321-266

**NOTES**

# 24VDC Bipolar Digital In
# 10-28VDC, 0.5A Sourcing Digital Out
# 4-20mA Analog In/Out
# HE500OCS053 / HE500OCS083
# HE500RCS083

*Mini OCS/RCS*

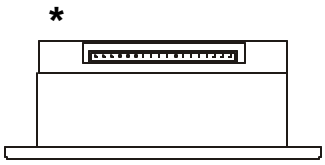
## 1 SPECIFICATIONS

| | | | |
|---|---|---|---|
| **ANALOG INPUT** | | | |
| Number of Channels | 4 | Analog Inputs Input Points Required | 4 |
| Input Ranges (including over-range) | Nominal: 0-20.47mA | Conversion Time (PLC Update Rate) | Set by PLC Scan Time |
| Resolution | 12-Bit | Converter Type | Successive Approximation |
| Input Impedance | 200 Ohms < 12VDC, Clamped @ 12VDC, 35mA Max. Continuous | Additional error for temperatures other than 25°C | 0.01% / °C |
| Maximum Error at 25°C | 0.1% | Maximum Over-Current | 35mA |
| **DIGITAL INPUT** | | | |
| 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 Channel and Channel to 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; Output Points Required | 2 |
| Output Ranges (including over-range) | 20.47mA; Clamped @-0.5 - +33VDC Nominal | Additional error for temperatures other than 25°C | 0.01% / °C |
| Resolution | 12 Bits | Maximum Error at 25°C | 0.1% (Note: Used 2% error under EMC testing.) |
| Output Voltage | 4 - 30VDC | | |
| **DIGITAL OUTPUT** | | | |
| Outputs per Module | 8 | Maximum Inrush Current | 650mA |
| 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 |

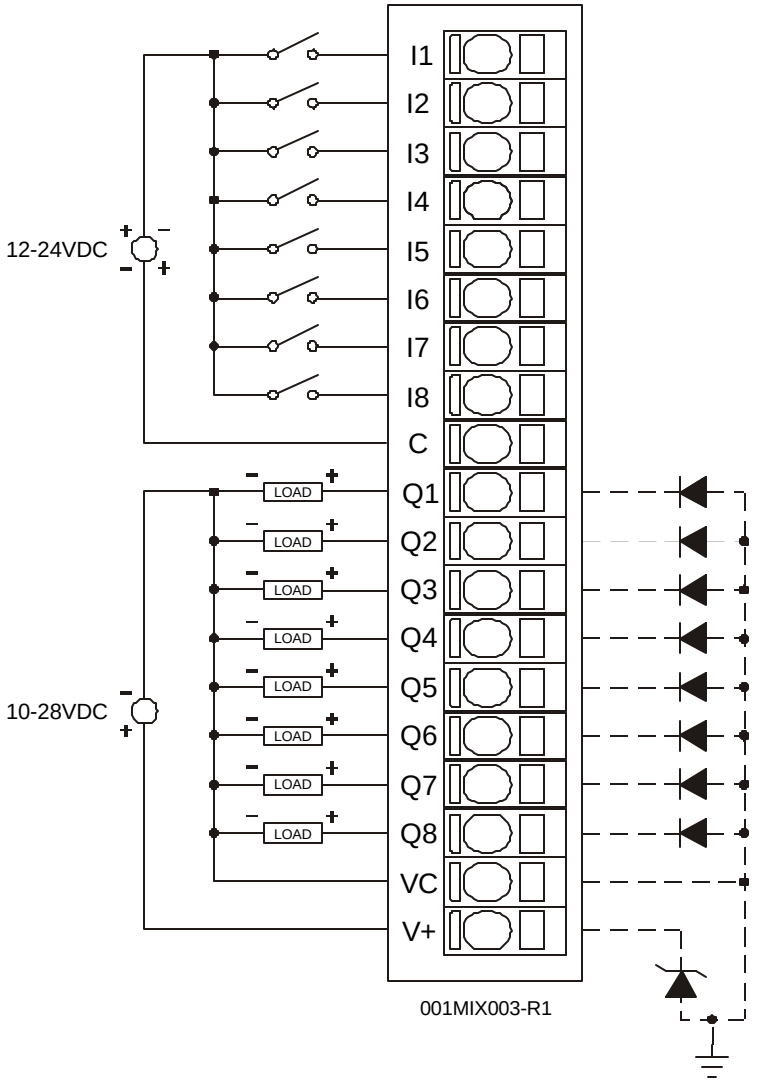
| General Specifications | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9.5 oz. (270 g) |
| CE | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |
| UL | | | |

# 2 WIRING

## 2.1 Digital Input / Output (P1)

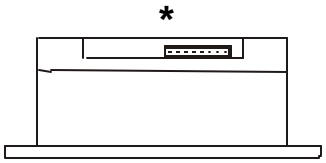



**Mini Bottom View – Shows corresponding I/O pin location**

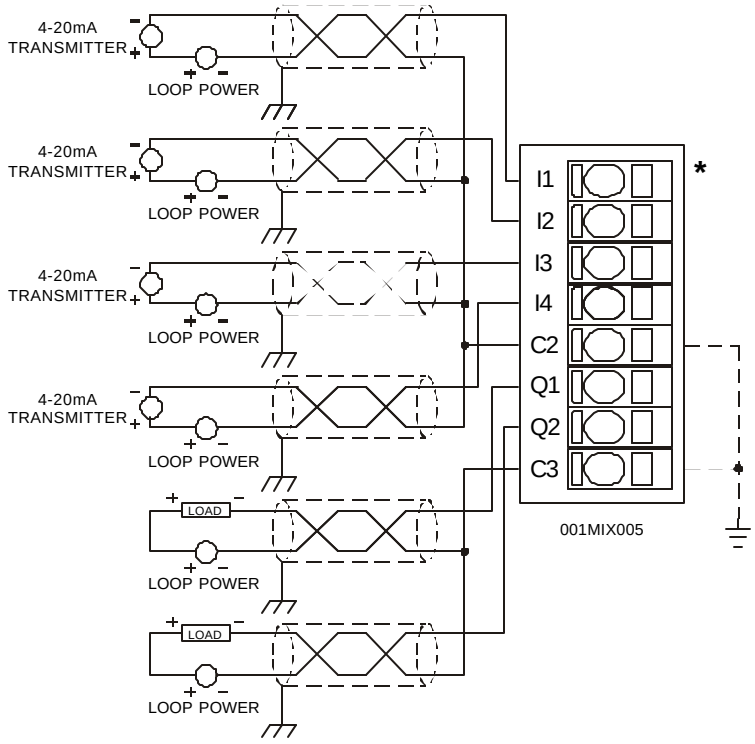



| Pin | Digital Input / Output |
|---|---|
| I1 | Input 1 |
| I2 | Input 2 |
| I3 | Input 3 |
| I4 | Input 4 |
| I5 | Input 5 |
| I6 | Input 6 |
| I7 | Input 7 |
| I8 | Input 8 |
| C1 | Common (Isolated) |
| Q1 | Output 1 |
| Q2 | Output 2 |
| Q3 | Output 3 |
| Q4 | Output 4 |
| Q5 | Output 5 |
| Q6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

## 2.2 Analog Input / Output (P2)

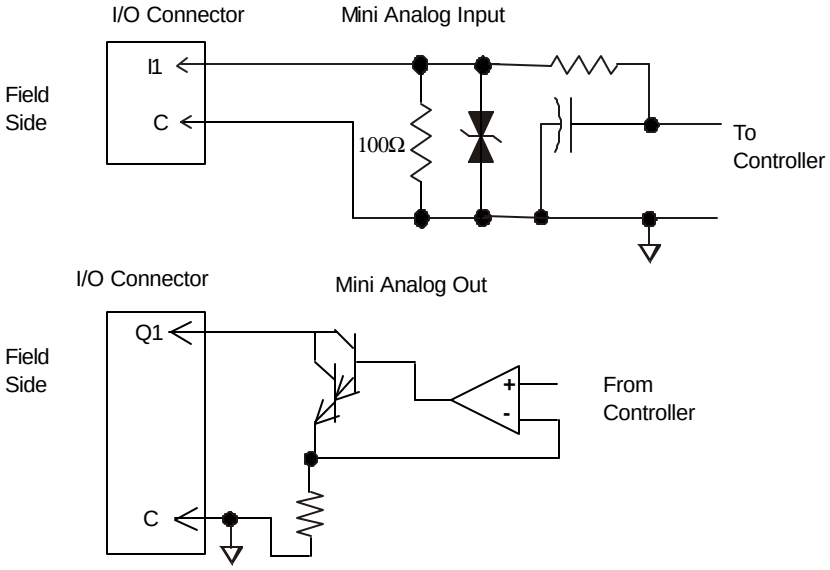



**Mini Top View – Shows corresponding I/O pin location**

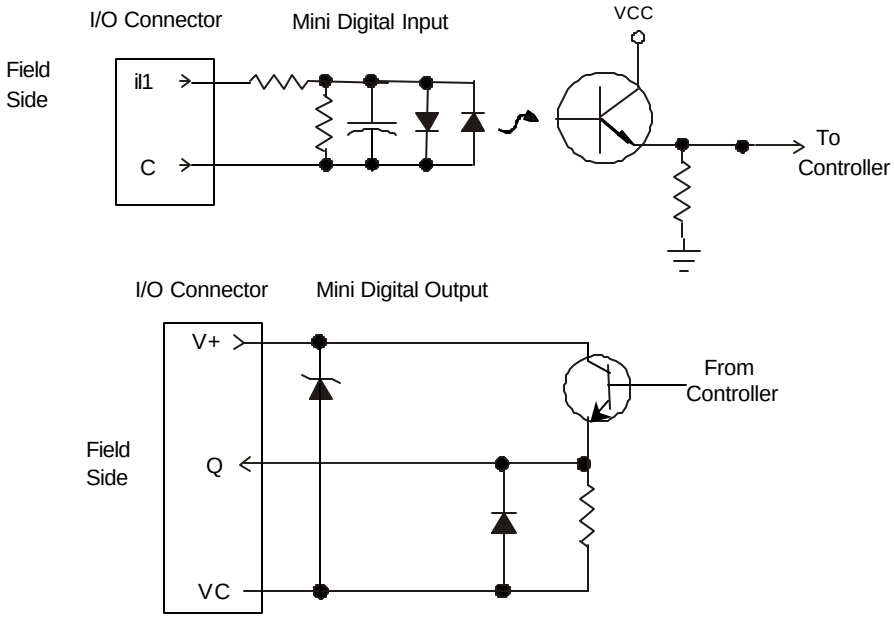



| Pin | Analog In and Out |
|---|---|
| I1 | Input 1 |
| I2 | Input 2 |
| I3 | Input 3 |
| I4 | Input 4 |
| C2 | Input Common |
| Q1 | Output 1 |
| Q2 | Output 2 |
| C3 | Output Common |

# 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.

**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.

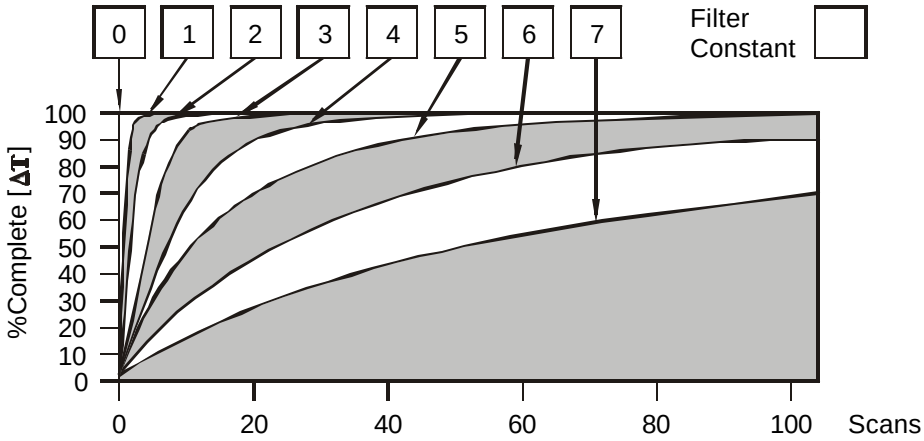
> **Warning:** The default turns the digital outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default settings.

**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. The I/O Map is not edited by the user.




***Digital Filtering***. The illustration above demonstrates the effect of digital filtering (set with Fillter 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 - +20mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Input Current (mA) / Conversion Factor
   22400 = 14mA / 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:

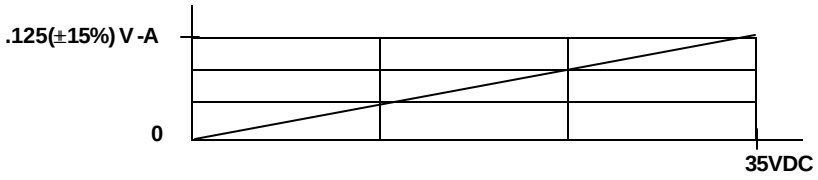
1. The desired output current is 12mA.
2. Using the table, the conversion factor for the current range of +20 mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Output Current (mA) / Conversion Factor
   19200 = 12mA / 0.000625

| 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

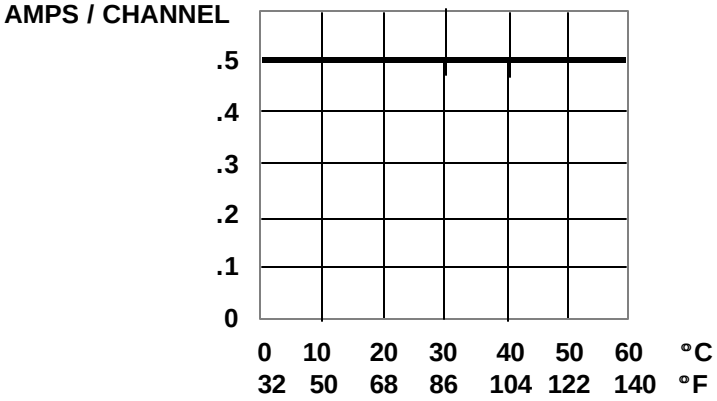
## 7.1 Digital Input

**Digital Input Chart**

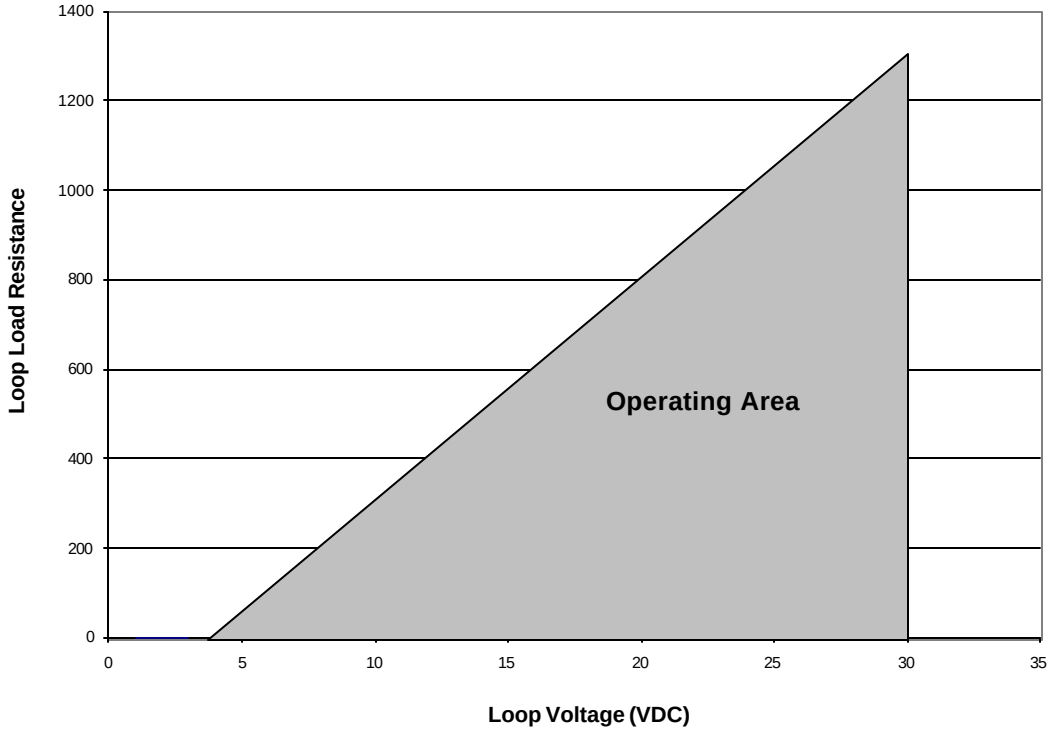



## 7.2 Digital Output

**Derating Chart**



### 6.3 Operating Area




## 7 INSTALLATION / SAFETY

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 (Analog I/O).
c. Shields may be terminated at the module terminal strip.
d. In severe applications, shields should be tied directly to the ground block within the panel.
e. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger for digital I/O and Belden 8441 for Analog I/O.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

## 8 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

**North America:**
(317) 916-4274
www.heapg.com

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

**NOTES**

# 24VDC Bipolar Digital In
# 10-28VDC, 0.5A Sinking Digital Out
## HE500OCS055 / HE500OCS085
## HE500RCS085
## 4-20mA Analog In/Out

*Mini OCS/RCS*

## 1 SPECIFICATIONS

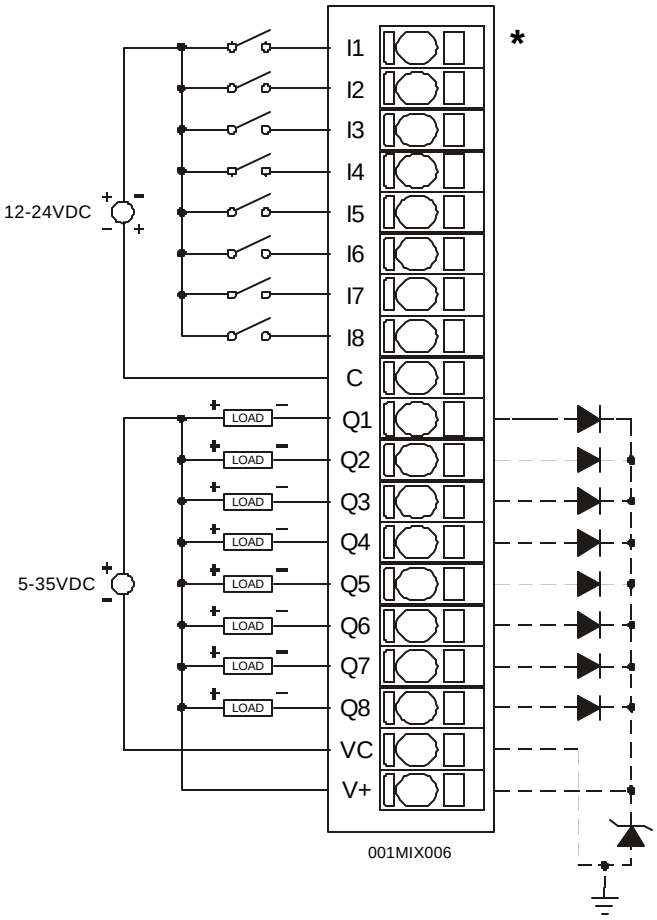
| ANALOG INPUT | | | |
|---|---|---|---|
| Number of Channels | 4 | Analog Inputs Input Points Required | 4 |
| Input Ranges (including over-range) | Nominal: 0-20.47mA | Conversion Time (PLC Update Rate) | Set by PLC Scan Time All channels updated to once per scan. |
| Resolution | 12-Bit | Converter Type | Successive Approximation |
| Input Impedance | 200 Ohms < 12VDC, Clamped @ 12VDC, 35mA Max. Continuous | Additional error for temperatures other than 25°C | 0.01% / °C |
| Maximum Error at 25°C | 0.1% | Maximum Over-Current | 35mA |
| **DIGITAL INPUT** | | | |
| 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 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; Output Points Required | 2 |
| Output Ranges (including over-range) | 0-20.47mA; Clamped @-0.5 - +33VDC Nominal | Additional error for temperatures other than 25°C | 0.01% / °C |
| Resolution | 12 Bits | Maximum Error at 25°C | 0.1% (Note: Used 2% error under EMC testing.) |
| Output Voltage | 4 - 30VDC | | |
| **DIGITAL OUTPUT** | | | |
| Outputs per Module | 8 | Output Protection | Short Circuit |
| Commons per Module | 1 | Maximum Leakage Current | 100µA |
| Operating Voltage | 5 - 35VDC | Maximum Inrush Current | 600mA. per channels |
| Output Type | Sinking / 10K Pull-Up | Minimum Load | None |
| Peak Voltage | 35VDC Max. | OFF to ON Response | 1ms. |
| Output Characteristics | Current Sinking | ON to OFF Response | 1ms. |
| ON Voltage Level | 1.5VDC Max. | Maximum Current per Channel | 500mA |
| | | Total Maximum Current | 4A |

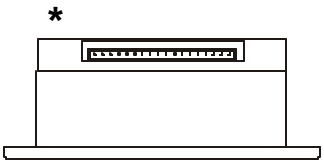
**MAN0367-01**

| General Specifications | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | Operating Temperature | 0° to 50° Celsius |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | Terminal Type | Spring Clamp, Removable |
| Relative Humidity | 5 to 95% Non-condensing | Weight | 9.5 oz. (270 g) |
| UL | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |

# 2 WIRING

## 2.1 Digital Input / Output (P1)



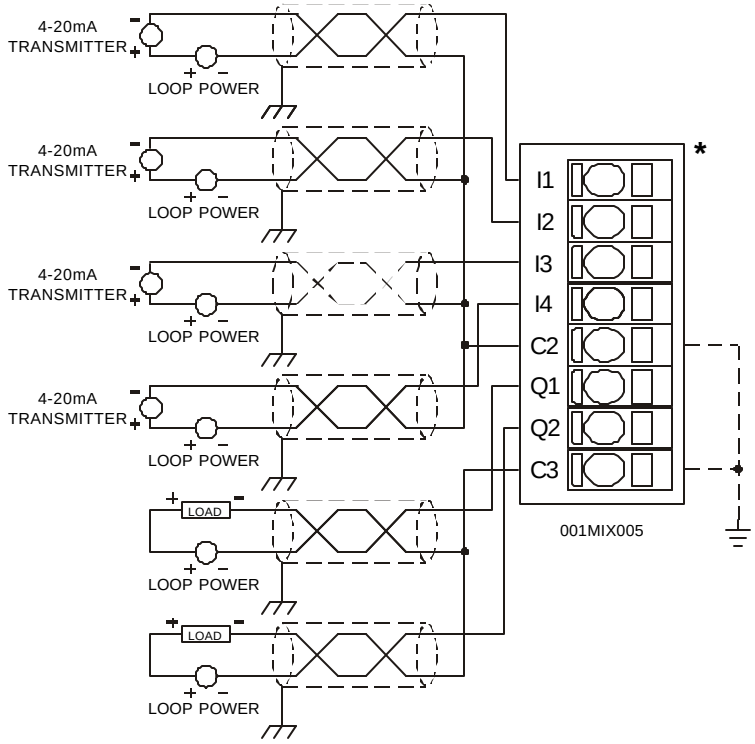



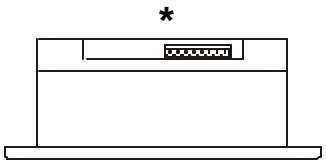

**Mini Bottom View – Shows corresponding I/O pin location**

| Pin | Digital Input / Output |
|---|---|
| I1 | Input 1 |
| I2 | Input 2 |
| I3 | Input 3 |
| I4 | Input 4 |
| I5 | Input 5 |
| I6 | Input 6 |
| I7 | Input 7 |
| I8 | Input 8 |
| C | Common |
| 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 | Common |
| V+ | Load Voltage + |

**Warning:** This is a negative logic device. Use of it may be considered an unsafe practice under CE directives.

## 2.2 Analog Input / Output (P2)

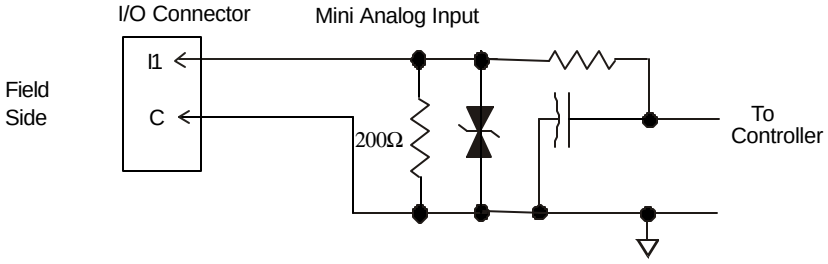


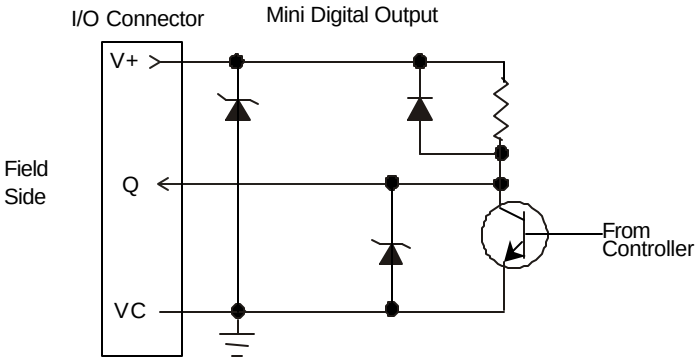




**Mini Top View – Shows corresponding I/O pin location**

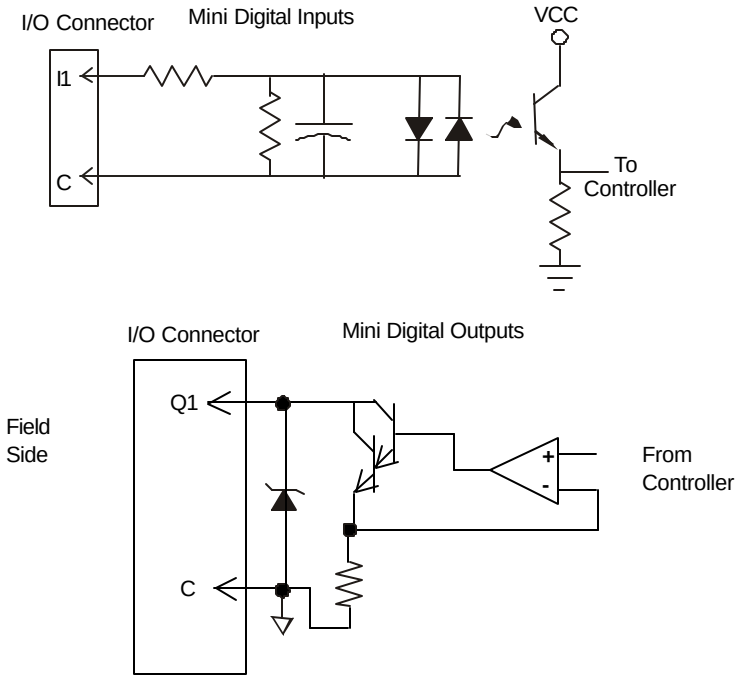
| Pin | Analog In and Out |
|---|---|
| I1 | Input 1 |
| I2 | Input 2 |
| I3 | Input 3 |
| I4 | Input 4 |
| C2 | Input Common |
| Q1 | Output 1 |
| Q2 | Output 2 |
| C3 | Output Common |

# 3 INTERNAL CIRCUIT SCHEMATIC




Specification for transient voltage suppressors (transorbs) used on output circuitry is 36VDC, 300 watts.




Specification for transient voltage suppressors (transorbs) used on output circuitry is 30VDC, 300 watts.

## 4 CONFIGURATION

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

**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.

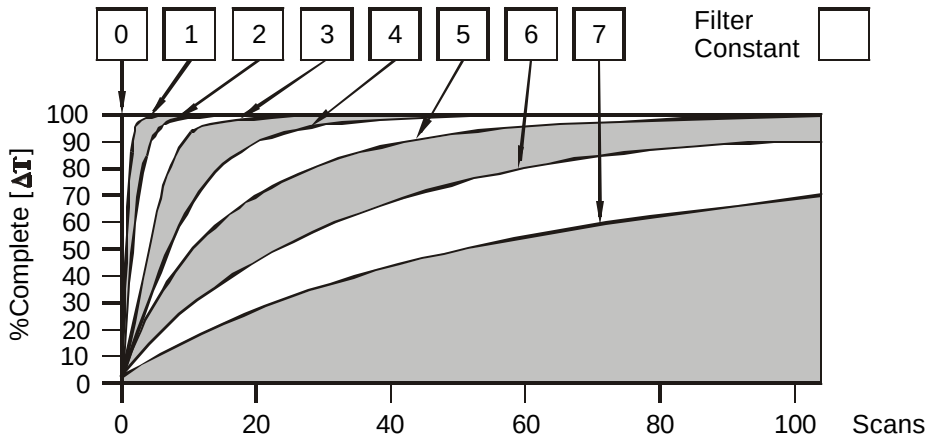
> **Warning:** The default turns the digital outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default settings.

**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 I/O registers. The I/O Map is not edited by the user.




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

# 5 ANALOG INPUT and OUTPUT CONVERSION FACTORS

## 5.1 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 0.000625.
3. To determine the data value, the formula is used:
   Data = Input Current (mA) / Conversion Factor
   22400 = 14mA / 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 | |

### 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 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:

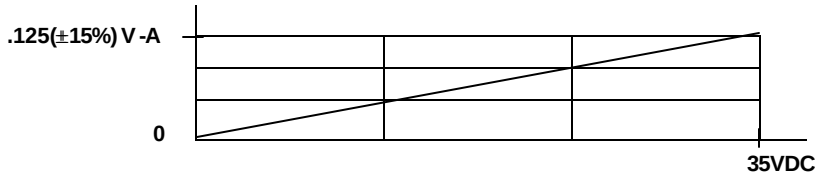
1. The desired output current is 12mA.
2. Using the table, the conversion factor for the current range of +20 mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Output Current (mA) / Conversion Factor
   19200 = 12mA / 0.000625

| 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 | |

## 6 INPUT / OUTPUT CHARACTERISTICS

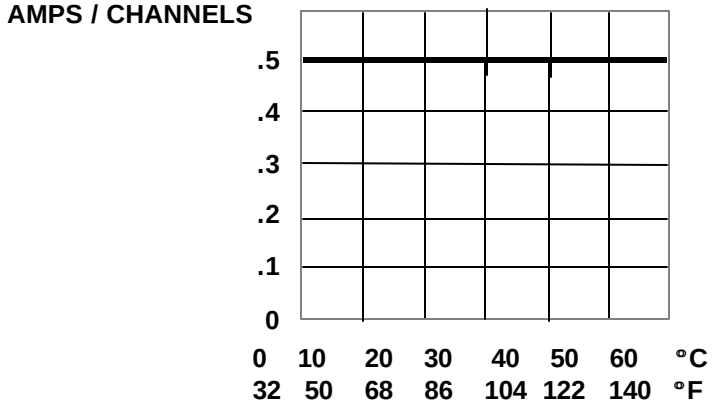
### 6.1 Digital Input

**Digital Input Chart**

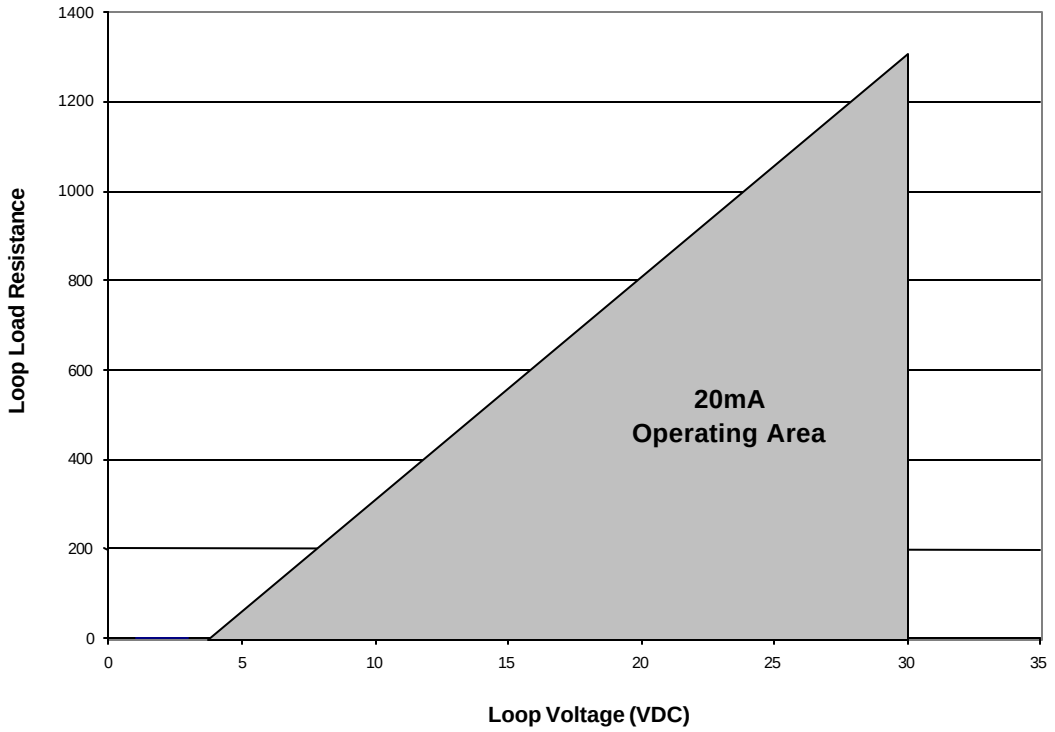



### 6.2 Digital Output

**Derating Output Chart**



### 6.3 Operating Area




## 7 INSTALLATION / SAFETY

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 (Analog I/O).
c. Shields may be terminated at the module terminal strip.
d. In severe applications, shields should be tied directly to the ground block within the panel.
e. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger for digital I/O and Belden 8441 for Analog I/O.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

## 8 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

**North America:**
(317) 916-4274
www.heapg.com

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

**NOTES**

# 24VDC Bipolar Digital In
# 10-30VDC, 0.5A Sourcing Digital Out
# 4-20mA Isolated Analog In/Out

**HE500OCS057 / HE500OCS087**
**HE500RCS 087**

***Mini OCS/RCS***

## 1 SPECIFICATIONS

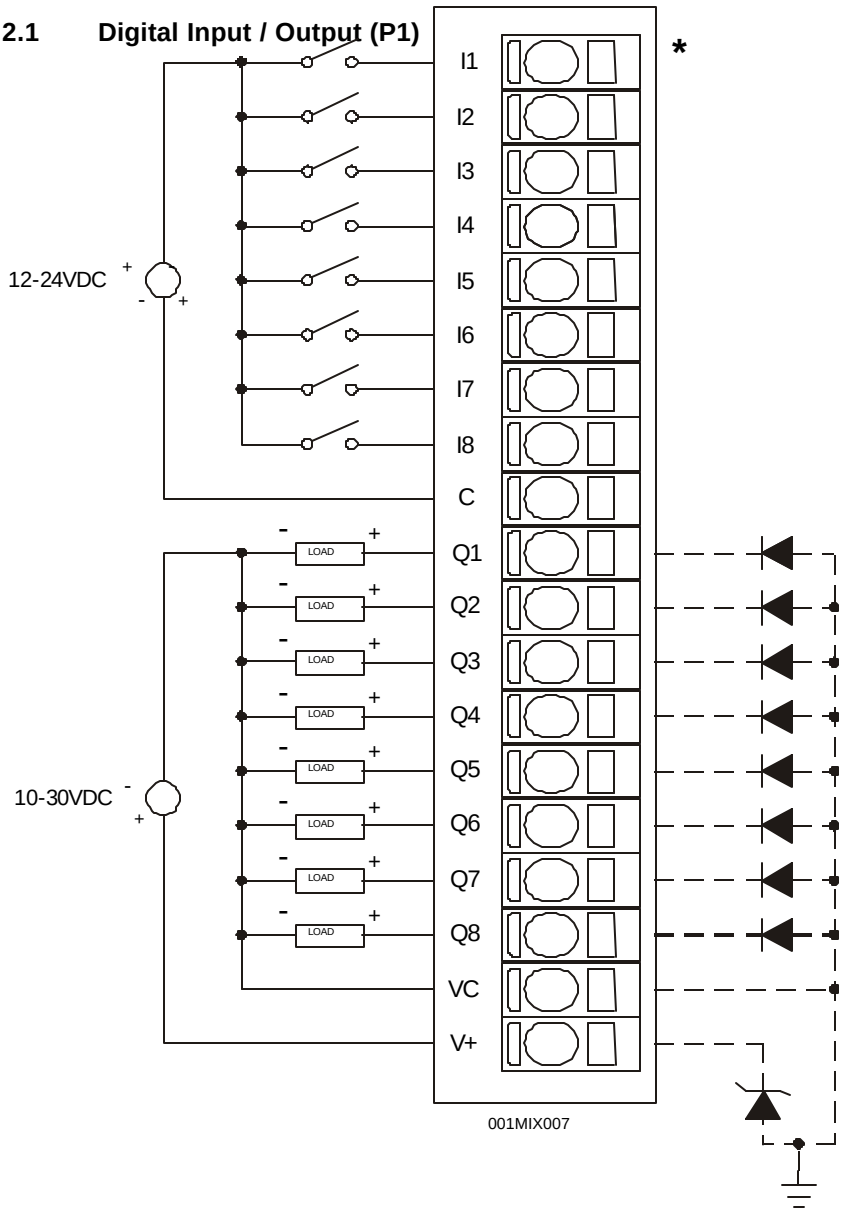
| | | | |
|---|---|---|---|
| **ANALOG INPUT** | | | |
| Number of Channels | 4 | Analog Inputs Input Points Required | 4 |
| Input Ranges | Nominal: 4-20mA | Conversion Time (PLC Update Rate) | All channels updated once per PLC scan. |
| Resolution | 12-Bits | Analog Isolation Channel to Channel and Channel to Common | 1000VDC |
| Input Burden | 50 Ohms + 3VDC, Clamped @ 6VDC, 35mA Max. Continuous | Additional error for temperatures other than 25°C | 0.01% / °C |
| Maximum Error at 25°C | 0.1% | Maximum Over-Current | 35mA |
| **DIGITAL INPUT** | | | |
| 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 |
| Channel to channel and Channel to common | 500VDC | OFF to ON Response | 1ms. |
| ON Voltage Level | 9VDC Minimum | ON to OFF Response | 1ms. |
| OFF Voltage Level | 3VDC Maximum | | |
| **ANALOG OUTPUT** | | | |
| Number of Channels | 2 | Analog Outputs; Output Points Required | 2 |
| Output Range | Nominal: 4-20mA Clamped @-0.5 - +30VDC | Conversion Time (PLC Update Rate) | All channels updated once per PLC scan. |
| Resolution | 12 Bits | Isolation Channel to Channel and Channel to Common | 1000VDC |
| Maximum Error at 25°C | 0.3% | Additional error for temperatures other than 25°C | 0.01% / °C |
| | | Output Voltage | 4 - 30VDC |
| **DIGITAL OUTPUT** | | | |
| Outputs per Module | 8 | Maximum Inrush Current | 650mA per channel |
| Commons per Module | 1 | Minimum Load | None |
| Operating Voltage | 10 - 30VDC | OFF to ON Response | 1ms. |
| Output Type | Sourcing / 10K Pull-Down | ON to OFF Response | 1ms. |
| Peak Voltage | 30VDC Max. | Output Characteristics | Current Sourcing |
| Maximum Load Current per Output | 0.5A Max. | Output Protection | Short Circuit |
| Maximum Total Output | 4A | | |

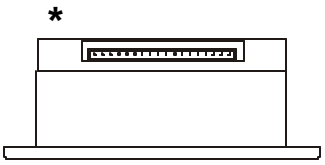
**MAN0368-01**

| General Specifications | | | |
|---|---|---|---|
| Required Power (Steady State) | 4.8W (200mA @ 24VDC) | | |
| Required Power (Inrush) | 900mA max. @ 24VDC for 1ms. | | |
| Relative Humidity | 5 to 95% Non-condensing | Terminal Type | Spring Clamp, Removable |
| Operating Temperature | 0° to 50° Celsius | Weight | 9.5 oz. (270 g) |
| UL<br>CE | See Compliance Table at http://www.heapg.com/Support/compliance.htm | | |

# 2 WIRING

## 2.1 Digital Input / Output (P1)

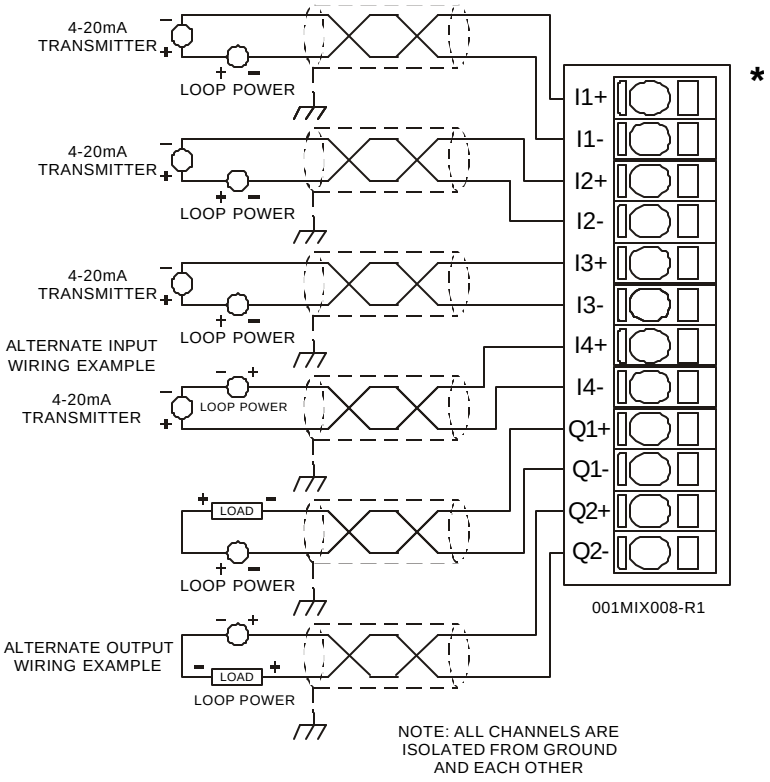


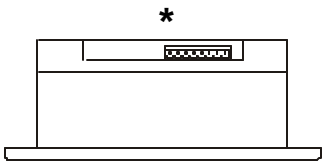




**Mini Bottom View – Shows corresponding I/O pin location**

| Pin | Digital Input / Output |
|---|---|
| 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)

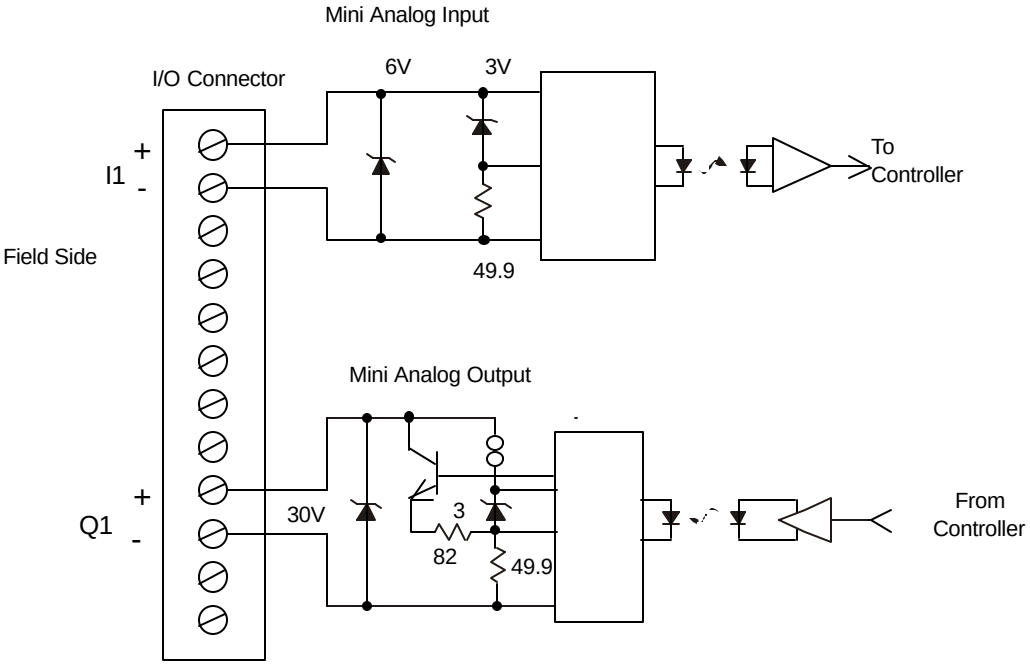


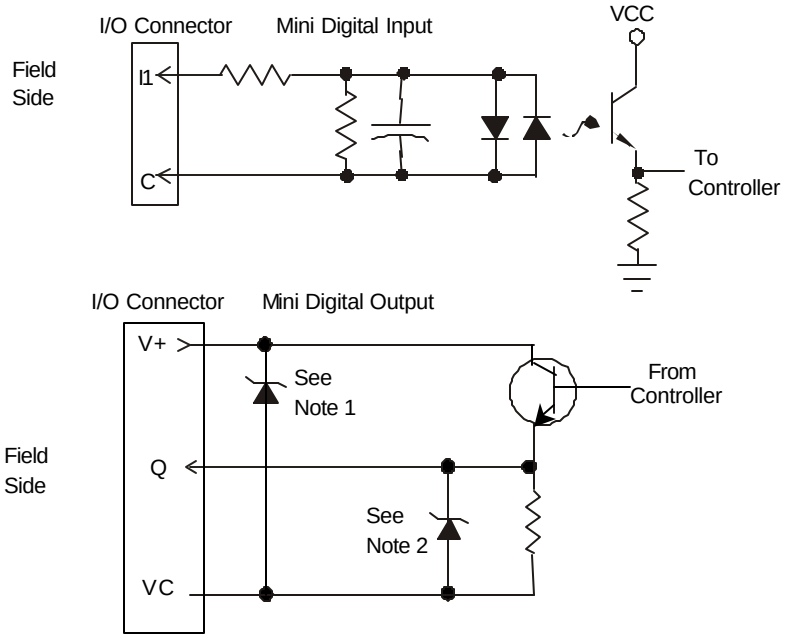

**Mini Top View – Shows corresponding I/O pin location**

| Pin | Analog Input / Output Signal |
|---|---|
| I1+ | Input 1+ |
| I1- | Input 1- |
| I2+ | Input 2+ |
| I2- | Input 2- |
| I3+ | Input 3+ |
| I3- | Input 3- |
| 14+ | Input 4+ |
| 14- | Input 4- |
| Q1+ | Output 1+ |
| Q1- | Output 1- |
| Q2+ | Output 2+ |
| Q2- | Output 2- |

## 3 INTERNAL CIRCUIT SCHEMATIC




Specification for transient voltage suppressors (transorbs) used on output circuitry is 30V, 300W.




Note 1: Specification for transient voltage suppressors (transorbs) used on output circuitry is 33V, 1500W.

Note 2: 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.

**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.

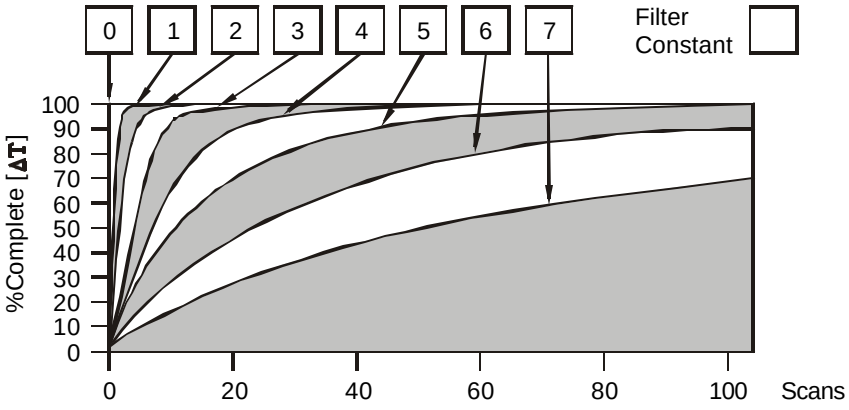
**Warning:** The default turns the digital outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default settings.

**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 I/O registersThe 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.

# 5 ANALOG INPUT / OUTPUT CHARACTERISTICS

## 5.1 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:**

1. The known input current is 14mA.
2. Using the table, the conversion factor for the current range of 4 - +20mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Input Current (mA) / Conversion Factor
   22400 = 14mA / 0.000625

| Conversion of Real-World Inputs into Controller | | | |
|---|---|---|---|
| **Selected Current Range** | **Input Current (mA)** | **Data** | **Conversion Factor** |
| 4 – 20mA | 20.00 | 32000 | 0.000625 |
| | 4.00 | 6400 | |

## 5.2 Output Conversion Factor

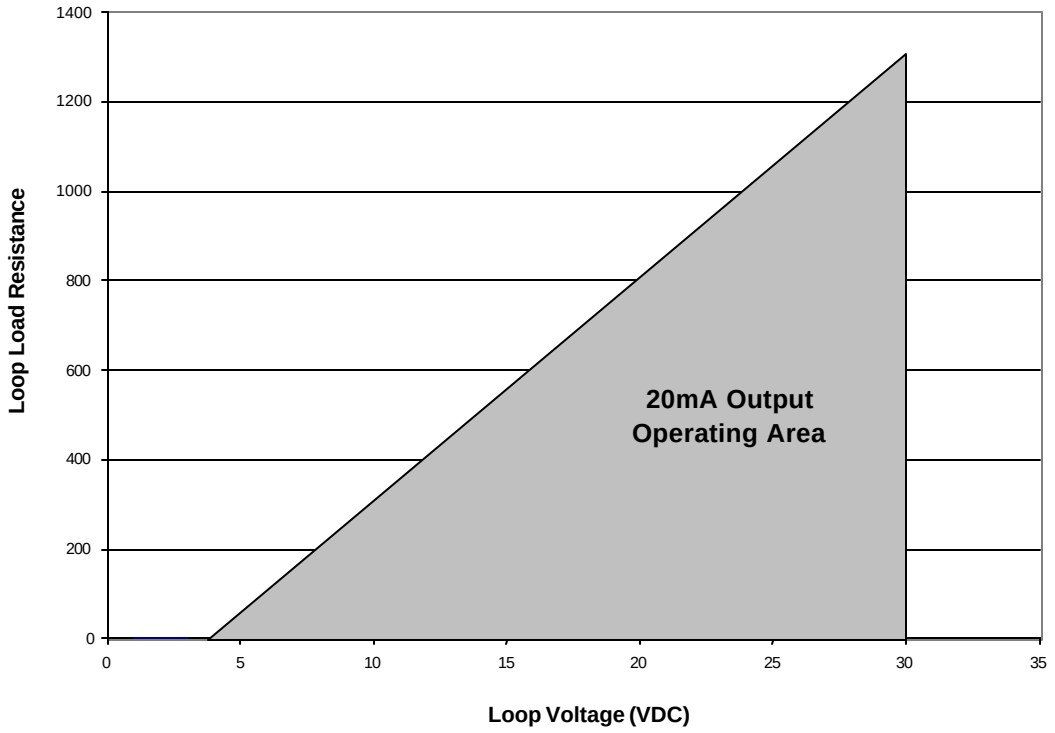
The following table describes how program data values are scaled to real-world analog voltage outputs by the module. Given a desired output current, the data value is converted by using the conversion factor from the table. The following formula is used: **Data = Output Current (mA) / Conversion Factor**

**Example:**

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:
   Data = Output Current (mA) / Conversion Factor
   19200 = 12mA / 0.000625

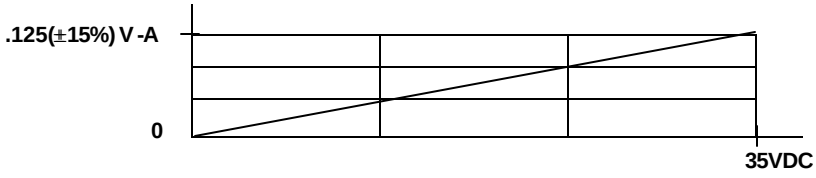
| Conversion of Real-World Outputs into Controller | | | |
|---|---|---|---|
| **Selected Current Range** | **Output Current (mA)** | **Data** | **Conversion Factor** |
| 4 – 20mA | 20.00 | 32000 | 0.000625 |
| | 4.00 | 6400 | |

### 5.3 Output Operating Area

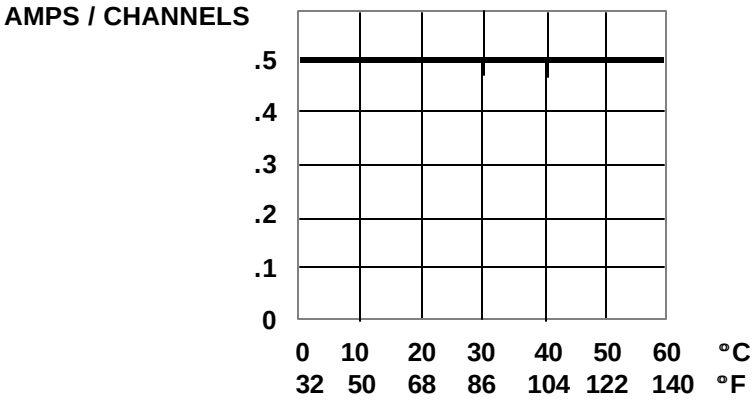



## 6 DIGITAL INPUT / OUTPUT CHARACTERISTICS

**Digital Input Chart**




**Derating Chart**




This Data Sheet is published individually & also as a part of the current version of Mini I/O Manual (MAN0581).
Information is subject to change without notice.

# 7 INSTALLATION / SAFETY

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 (Analog I/O).
c. Shields may be terminated at the module terminal strip.
d. In severe applications, shields should be tied directly to the ground block within the panel.
e. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger for digital I/O and Belden 8441 for Analog I/O.

For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

# 8 TECHNICAL ASSISTANCE

For assistance, contact Technical Support at the following locations:

**North America:**
(317) 916-4274
www.heapg.com

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