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.

TABLE OF CONTENTS

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

Table continued on next page

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

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

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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

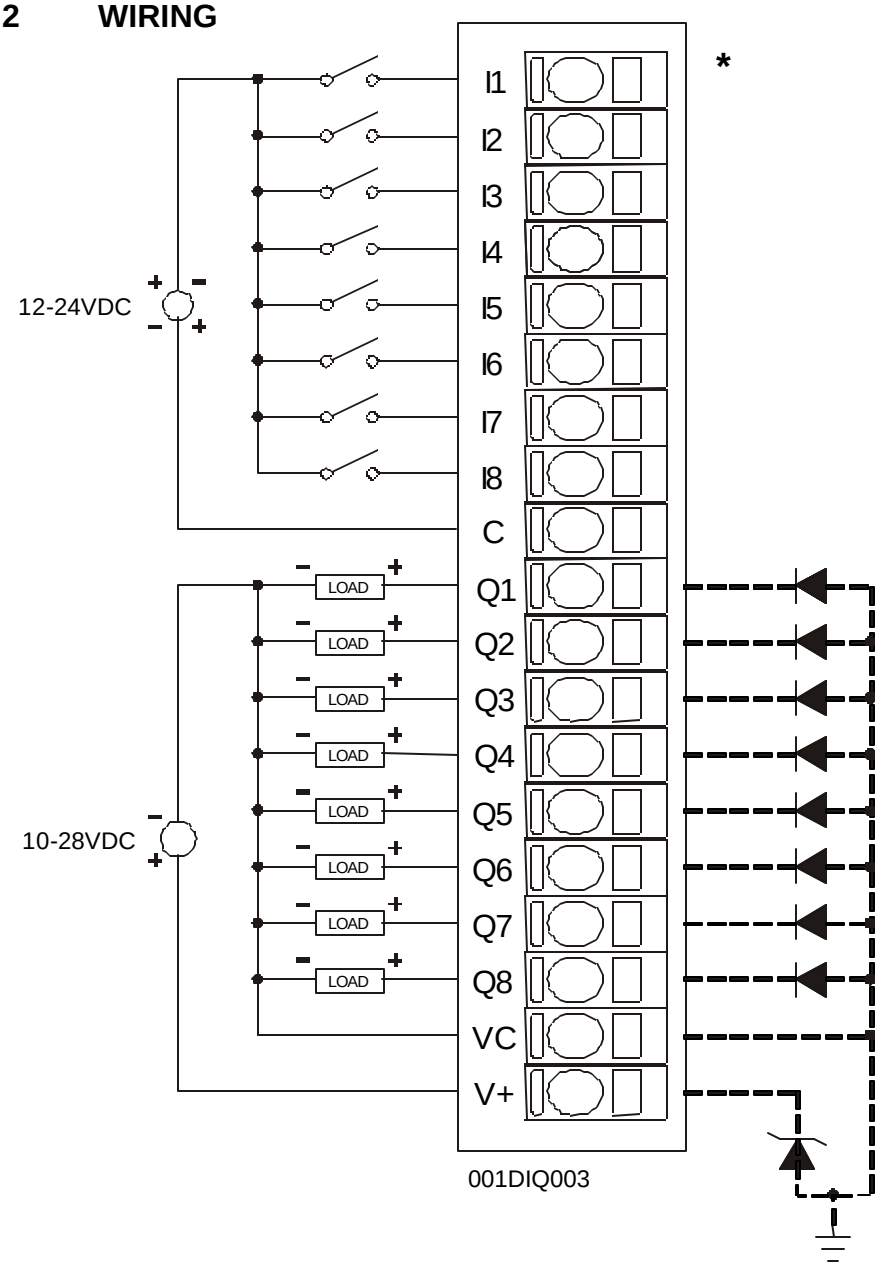
INPUT			
Inputs per Module	8	Input Characteristics	Bidirectional
Commons per Module	1	Input Impedance	10K Ohms
Input Voltage Range	12-24VDC	Minimum ON Current	1mA
Peak Voltage	35VDC Max.	Maximum OFF Current	200µA
Isolation (Channel to Bus)	500VDC	OFF to ON Response	1ms.
ON Voltage Level	9VDC	ON to OFF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

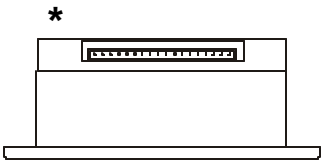
OUTPUT			
Outputs per Module	8	Maximum Inrush Current	650mA per channel
Commons per Module	1	Minimum Load	None
Operating Voltage	10 - 28VDC	OFF to ON Response	1ms.
Output Type	Sourcing / 10K Pull-Down	ON to OFF Response	1ms.
Peak Voltage	28VDC Max.	Output Characteristics	Current Sourcing
Maximum Load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

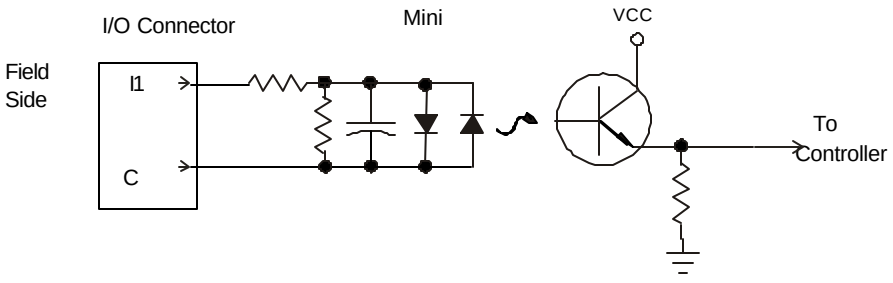




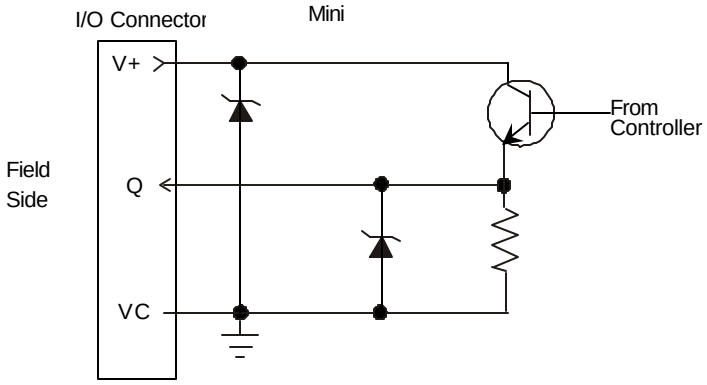
Mini Bottom View – Shows corresponding I/O pin location

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.

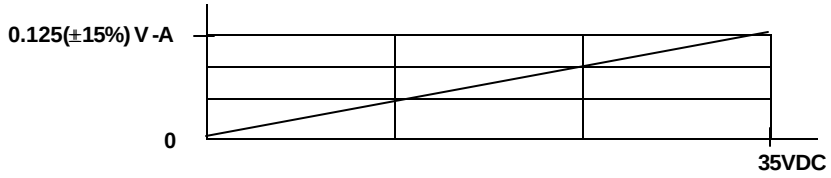
5 INSTALLATION / SAFETY

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.

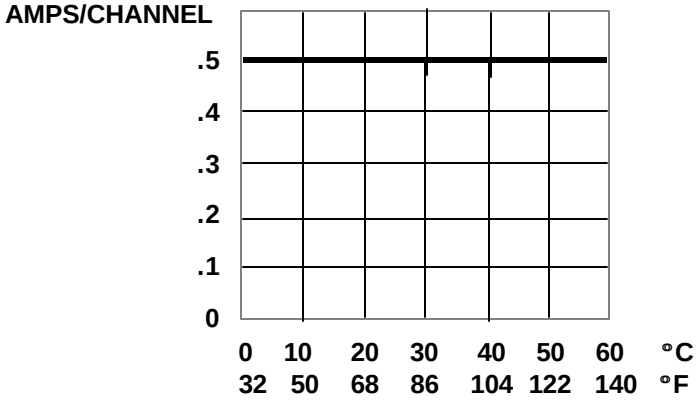
6 INPUT CHARACTERISTICS

Digital Input Chart



7 OUTPUT CHARACTERISTICS

Derating Chart



8 TECHNICAL ASSISTANCE

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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

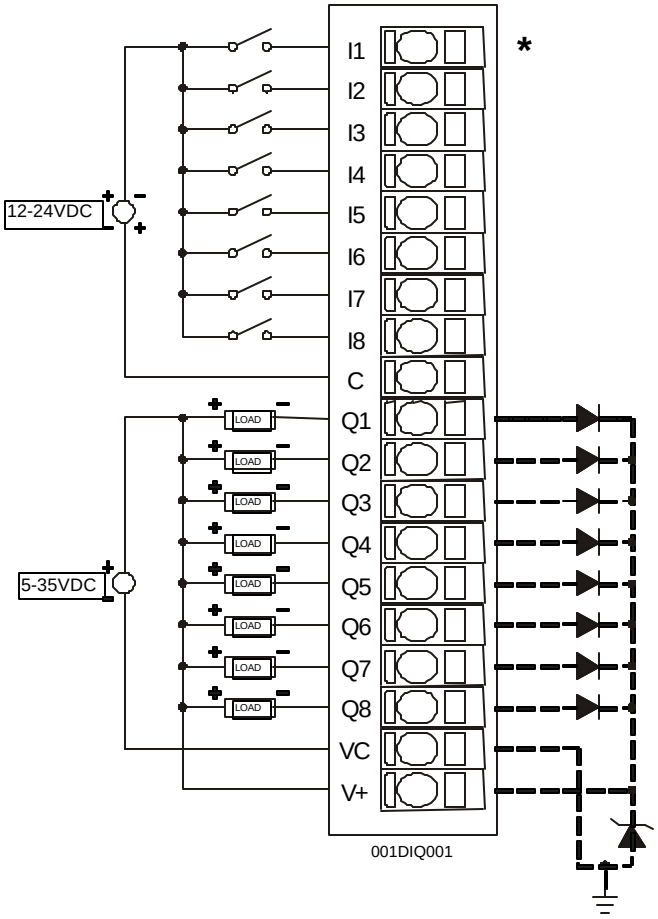
1 SPECIFICATIONS

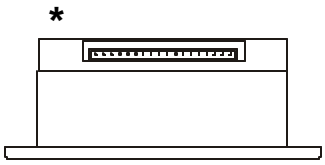
INPUT			
Inputs per Module	8	Input Characteristics	Bidirectional
Commons per Module	1	Input Impedance	10K Ohms
Input Voltage Range	12-24VDC	Minimum ON Current	1mA
Peak Voltage	35VDC Max.	Maximum OFF Current	200µA
Isolation (Channel to Common)	500VDC	OFF to ON Response	1ms.
ON Voltage Level	9VDC	ON to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



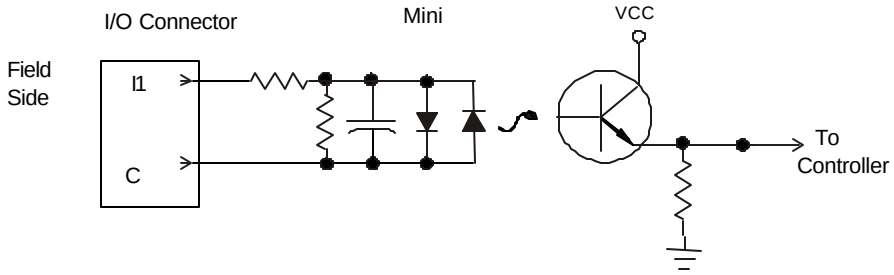


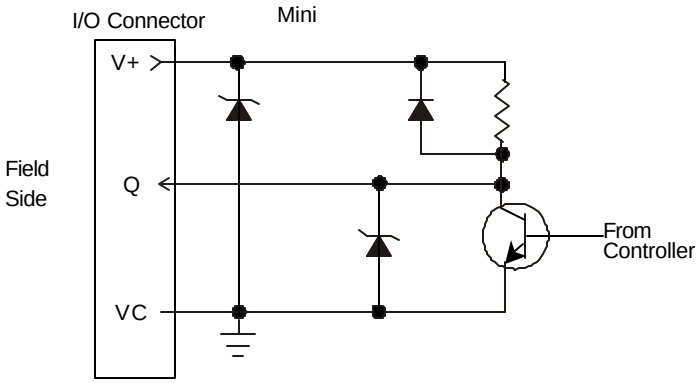
Mini Bottom View – Shows corresponding I/O pin location

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.

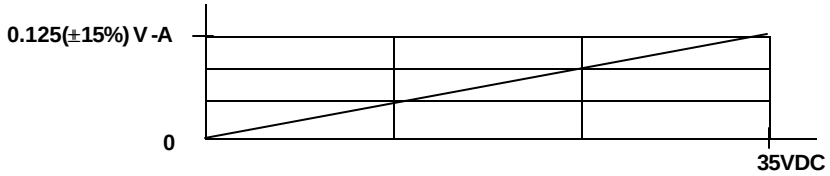
5 INSTALLATION / SAFETY

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.

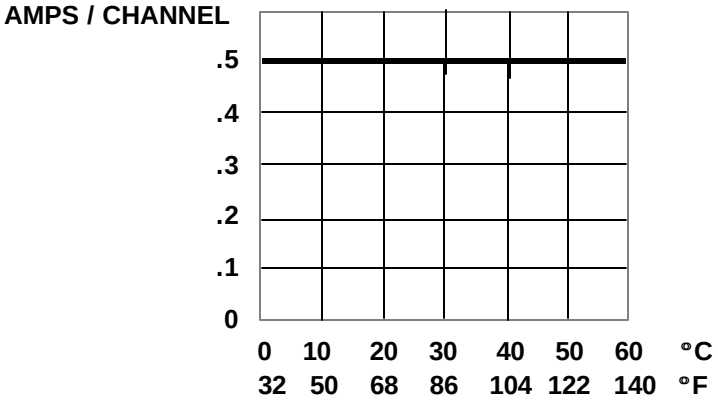
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Output Chart



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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.

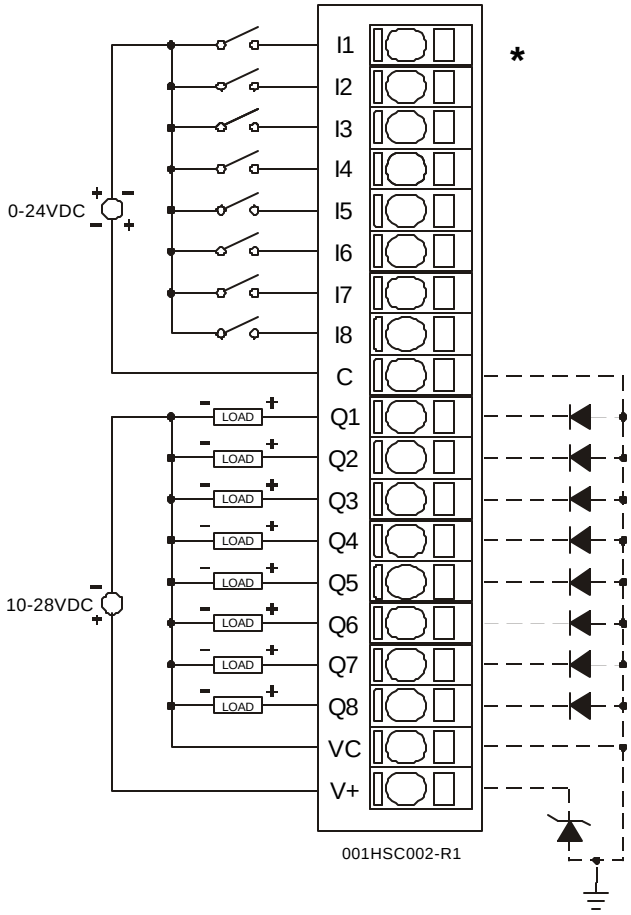
1 SPECIFICATIONS

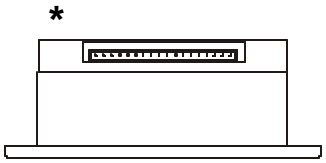
INPUT						
Inputs per Module	8				Commons per Module	1
Programmable Input Voltage Ranges	Zero Crossing	TTL / 5 VDC	12 VDC	24 VDC	Input Type	Positive Logic
					Peak Voltage	35 VDC Max.
ON Voltage Level	+ 0.1	+ 2	+ 8	+ 16	Input Impedance	10K Ohms
OFF Voltage Level	- 0.1	+ 0.8	+ 4	+ 8	Input Filter	500KHz,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

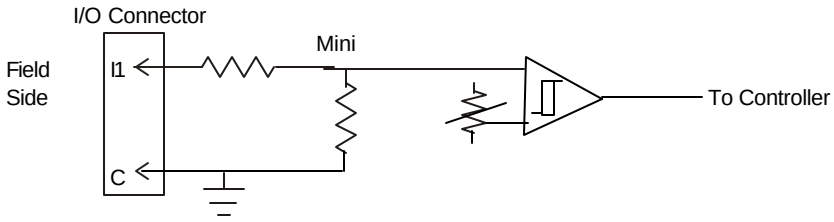


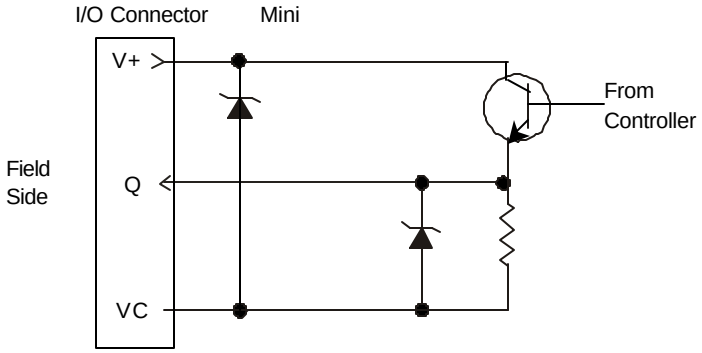


Mini Bottom View – Shows corresponding I/O pin location

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.

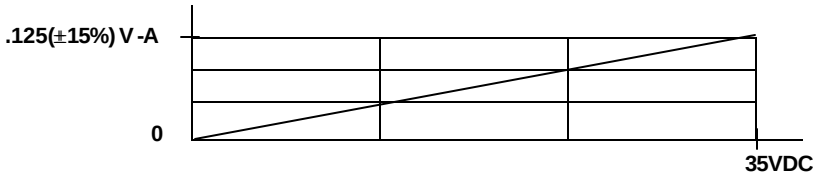
1. Preliminary Configuration procedures that are applicable to **all** Mini OCS Modules are located in the Mini Hardware Manual (MAN0305.)

   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.

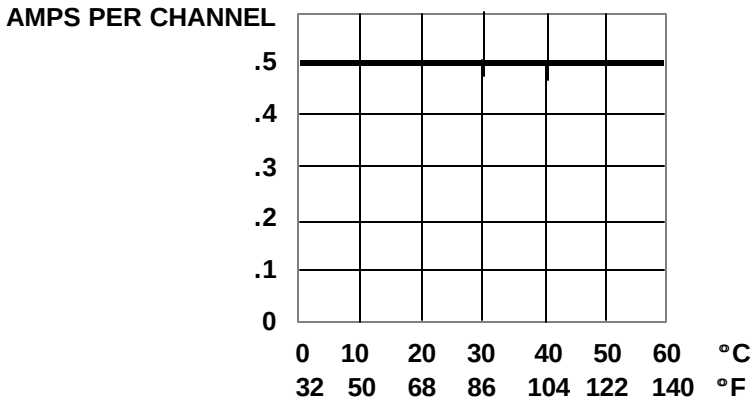
2. Consult the **SmartStack High Speed Counter Manual** (SUP0265) to continue the rest of the configuration process after pressing the **Module Setup** tab and selecting an option.

5 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Chart



6 INSTALLATION / SAFETY

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b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

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High Speed Counter

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MINI OCS/RCS

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

1 SPECIFICATIONS

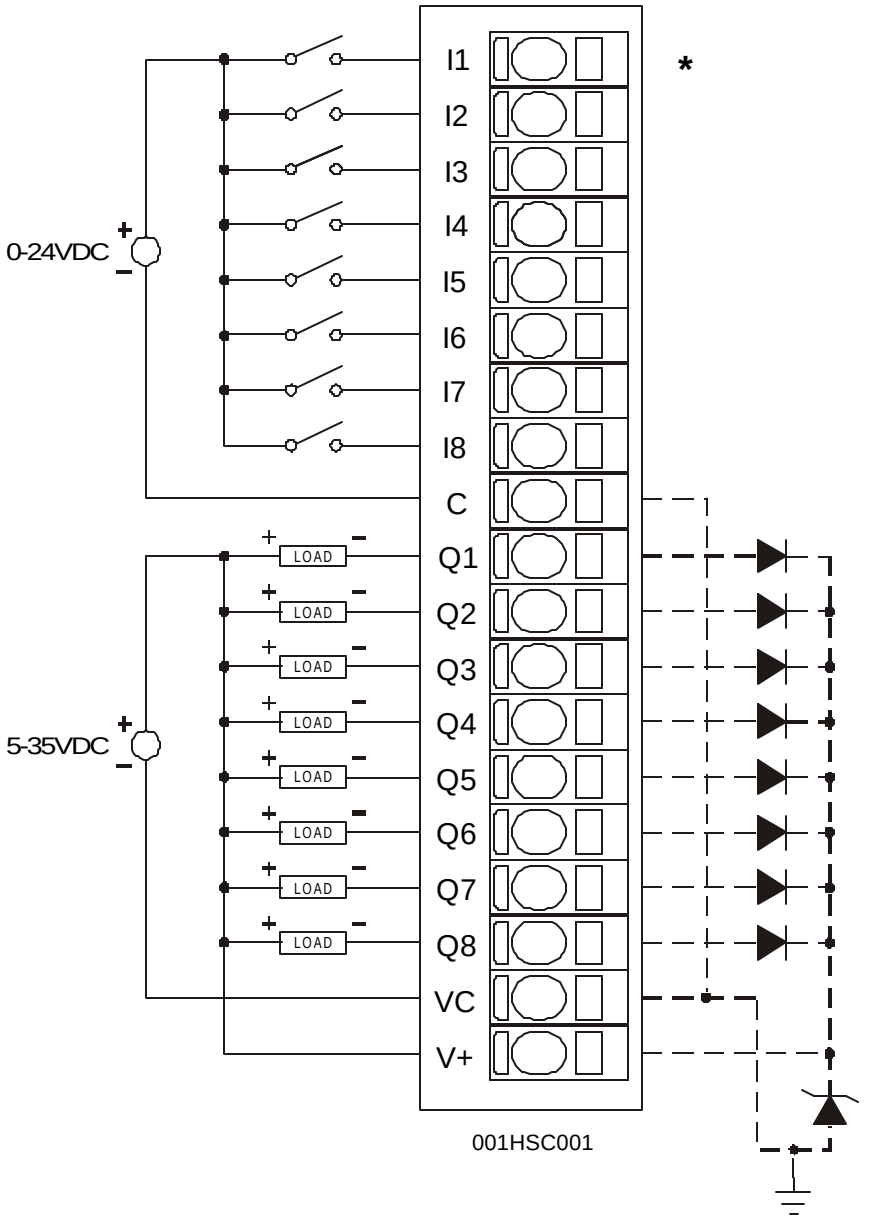
INPUT						
Inputs per Module	8				Commons per Module	1
Programmable Input Voltage Ranges	Zero Crossing	TTL / 5 VDC	12 VDC	24 VDC	Input Type	Positive Logic
					Peak Voltage	35VDC Max.
ON Voltage Level	+ 0.1	+ 2	+ 8	+ 16	Input Impedance	10K Ohms
OFF Voltage Level	- 0.1	+ 0.8	+ 4	+ 8	Input Filter	500KHz,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

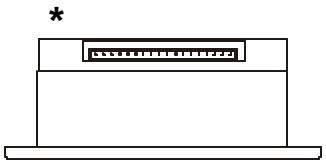
OUTPUT			
Outputs per Module	8	Output Protection	Short Circuit
Commons per Module	1	Maximum Leakage Current	100µA
Operating Voltage	5 - 35VDC	Maximum Inrush Current	600mA. per channel
Output Type	Sinking / 10K Pull-Up Negative Logic	Minimum Load	None
Peak Voltage	35VDC Max.	OFF to ON Response	0.3µS.
Output Characteristics	Current Sinking	ON to OFF Response	2µS.
ON Voltage Level	1.5VDC Max. @ 500mA 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; See Compliance Table at http://www.heapg.com/Support/compliance.htm		

MAN0298-03

2 WIRING





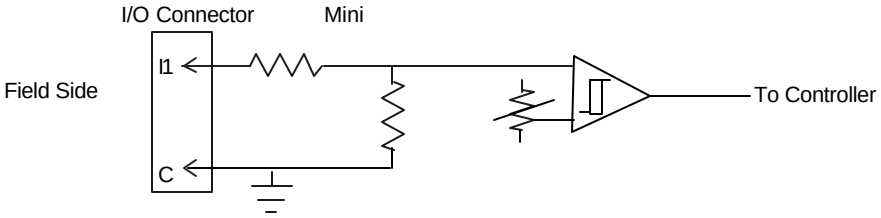
Mini Bottom View – Shows corresponding I/O pin location

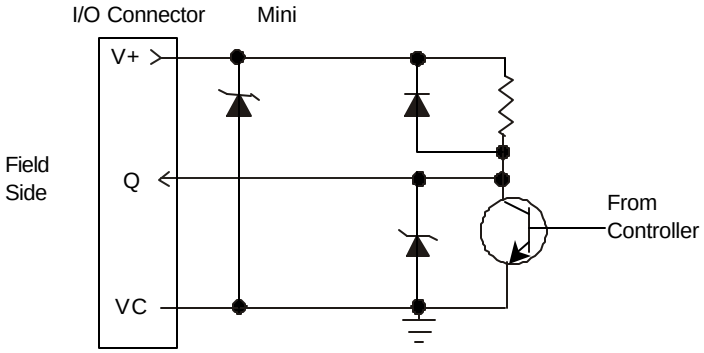
Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C	**Common[1]**
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
VC	**Common[1]**
V+	Load Voltage +

[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.

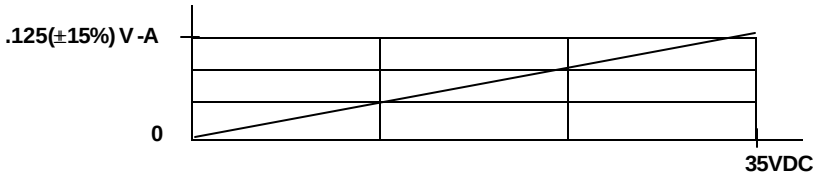
1. Preliminary Configuration procedures that are applicable to **all** Mini OCS Modules are located in the Mini Hardware Manual (MAN0305.)

   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.

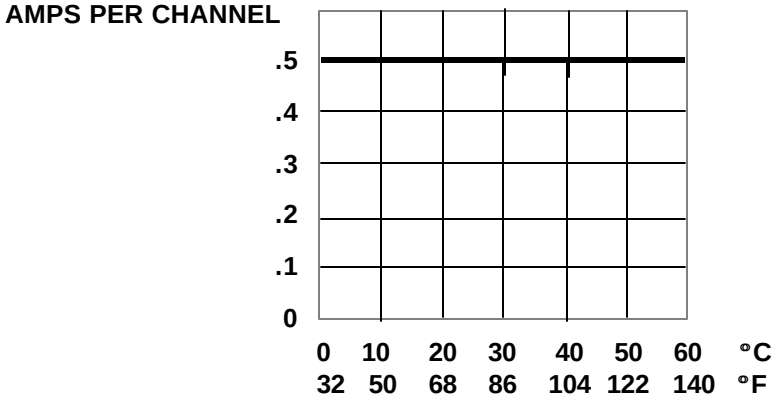
2. Consult the **SmartStack High Speed Counter Manual** (SUP0265) to continue the rest of the configuration process after pressing the **Module Setup** tab and selecting an option.

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

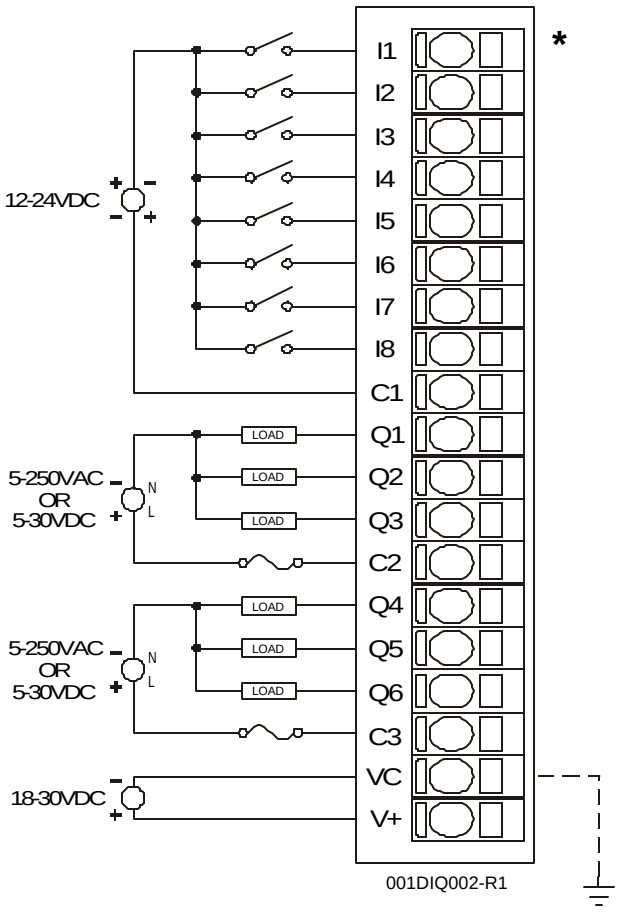
INPUT			
Inputs per Module	8 isolated	Input Impedance	> 10K Ohms
Commons per Module	1	Minimum ON Current	1mA
Input Voltage Range	12/24VDC	Maximum OFF Current	200µA
Peak Voltage	35VDC Max.	OFF to ON Response	1ms.
ON Voltage level	Min. 9VDC	ON to OFF Response	1ms.
OFF Voltage level	Max. 3VDC	Status Indicator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

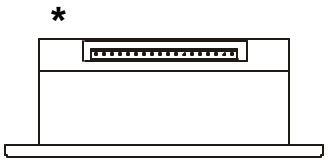
OUTPUT			
Outputs per Module	6 relay	Maximum Leakage Current	5µA
Commons per Module	2	Maximum Inrush Current	3A per channel
Output Type	Relay	Minimum Load	None
Coil Voltage	18-30VDC	OFF to ON Response	6ms. Typical
Contact Voltage	250VAC / 30VDC Max.	ON to OFF Response	.3ms. Typical
ON Voltage drop	0.2V 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 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

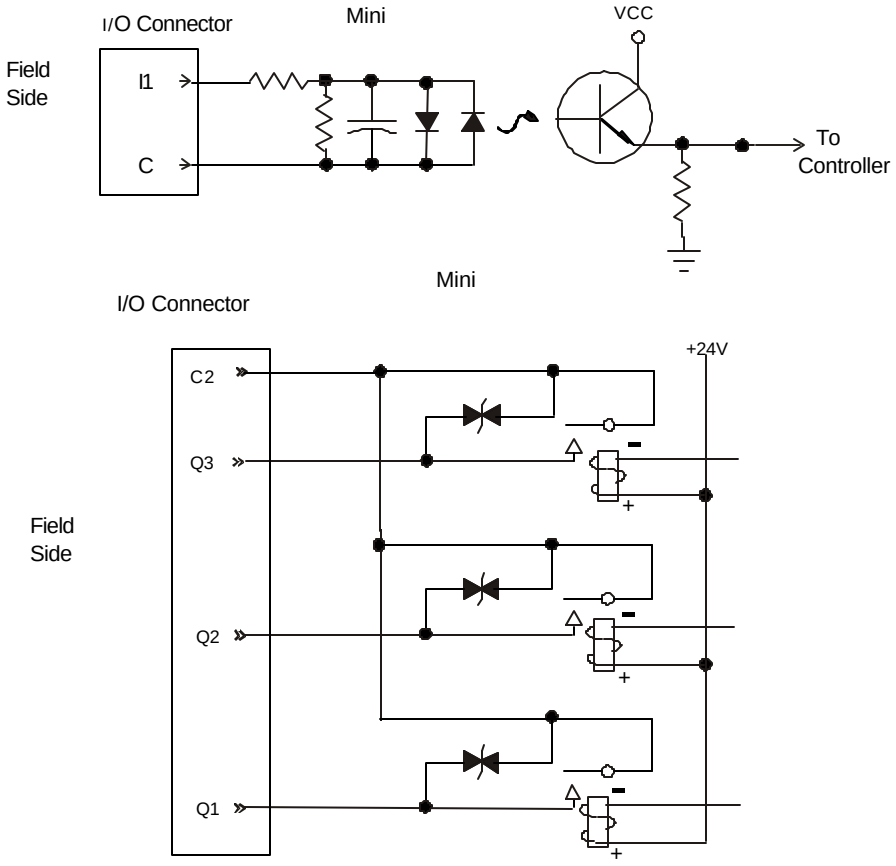
Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C1	Common 1
Q1	Output 1
Q2	Output 2
Q3	Output 3
C2	Common 2
Q4	Output 4
Q5	Output 5
Q6	Output 6
C3	Common 3
VC	Relay Coil Voltage Common
V+	Relay Coil Voltage +

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.

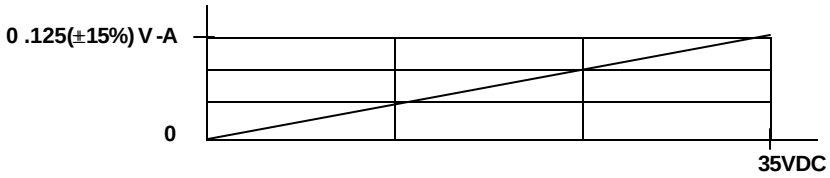
When found on the product, the following symbols specify:

Warning: Consult user documentation.

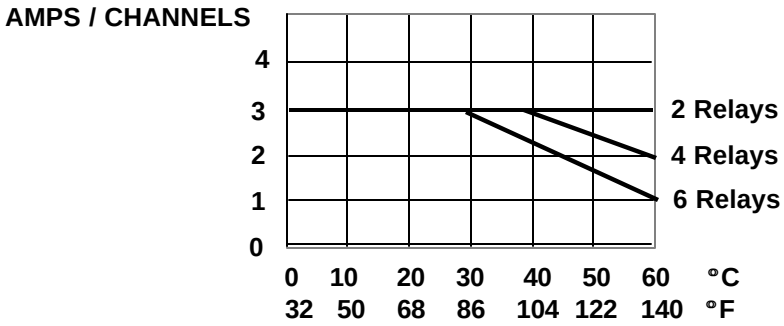
Warning: Electrical Shock Hazard.

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

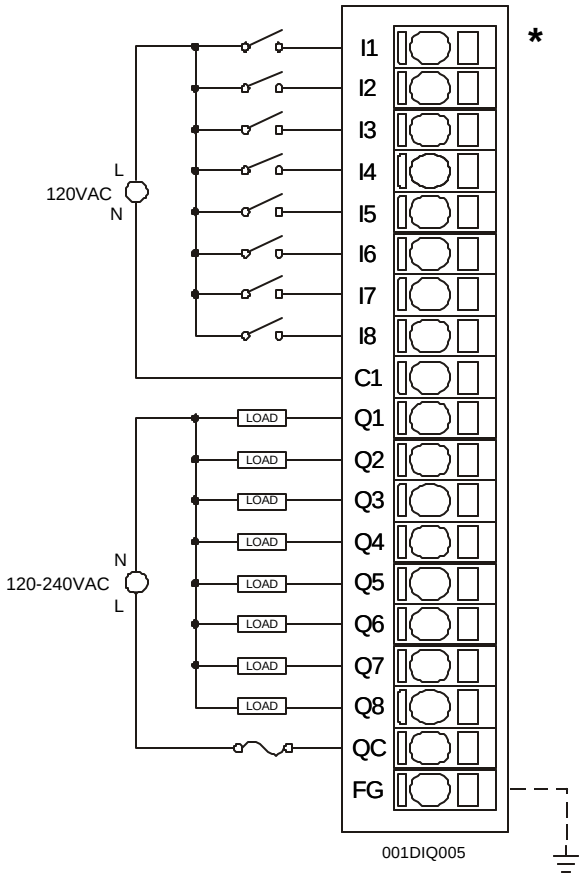
1 SPECIFICATIONS

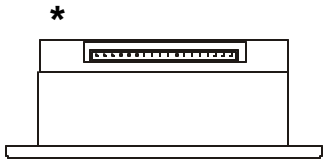
INPUT			
Inputs per Module	8	Input Impedance	0.01µF +10K
Commons per Module	1	Isolation (Channel to Common)	500VDC
Input Voltage Range	120 – 160 VAC	Minimum ON Current	1mA.
Peak Voltage	160VAC	Maximum OFF Current	200µA.
AC Frequency	60Hz	OFF to ON Response	50ms.
ON Voltage Level	70VAC Min.	ON to OFF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

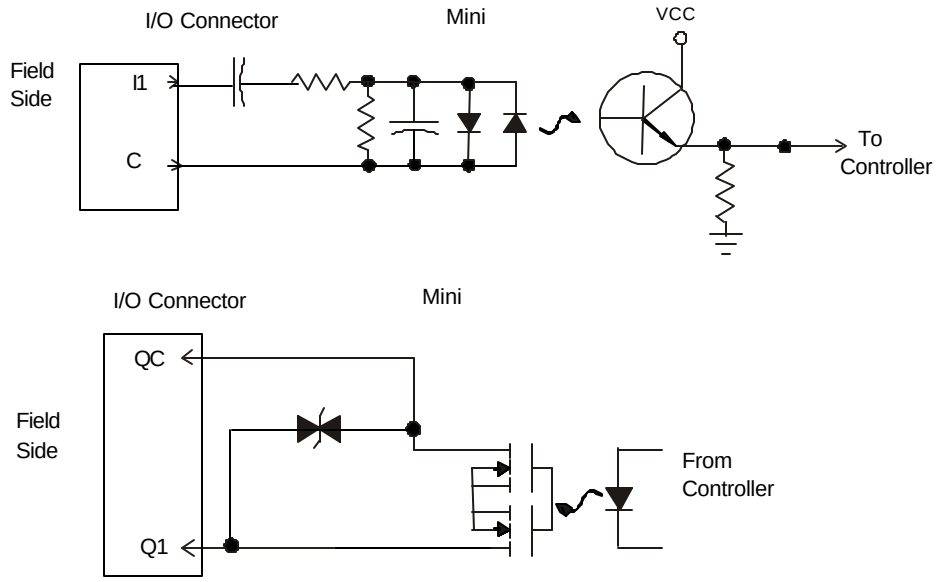
Pins	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
IC	Input Common
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
QC	Output Common
FG	Frame Ground

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.

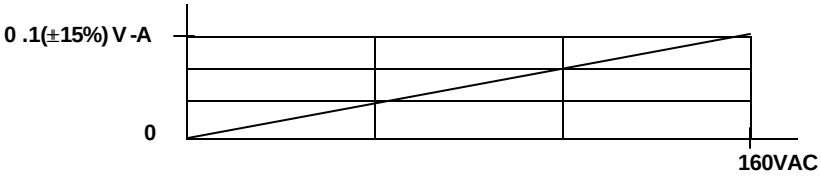
When found on the product, the following symbols specify:

Warning: Consult user documentation.

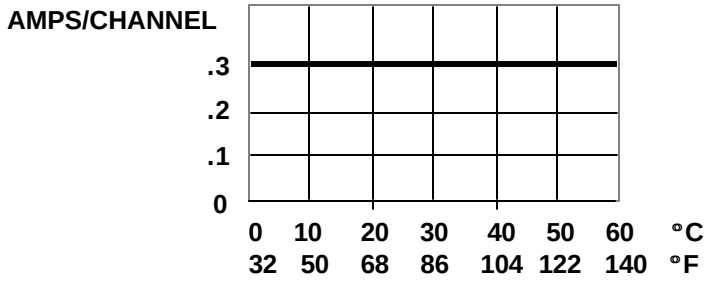
Warning: Electrical Shock Hazard.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart

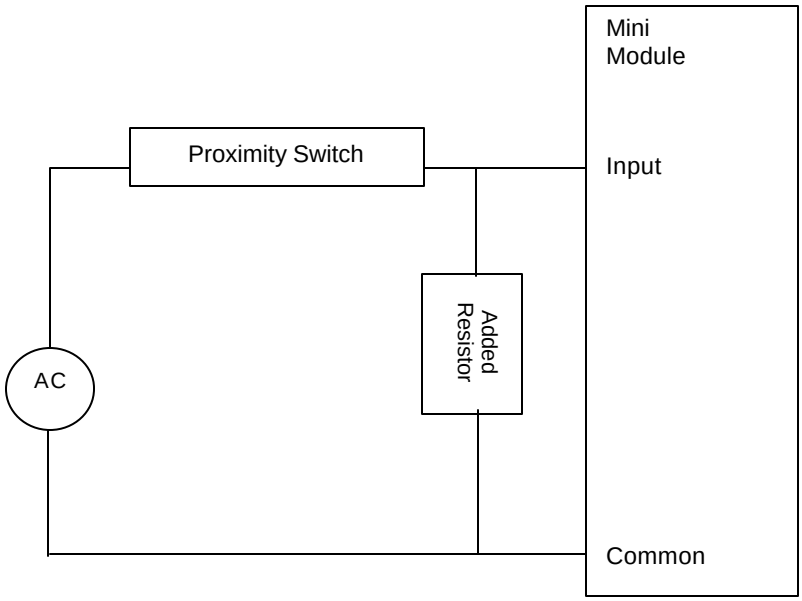


Derating Output Chart



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

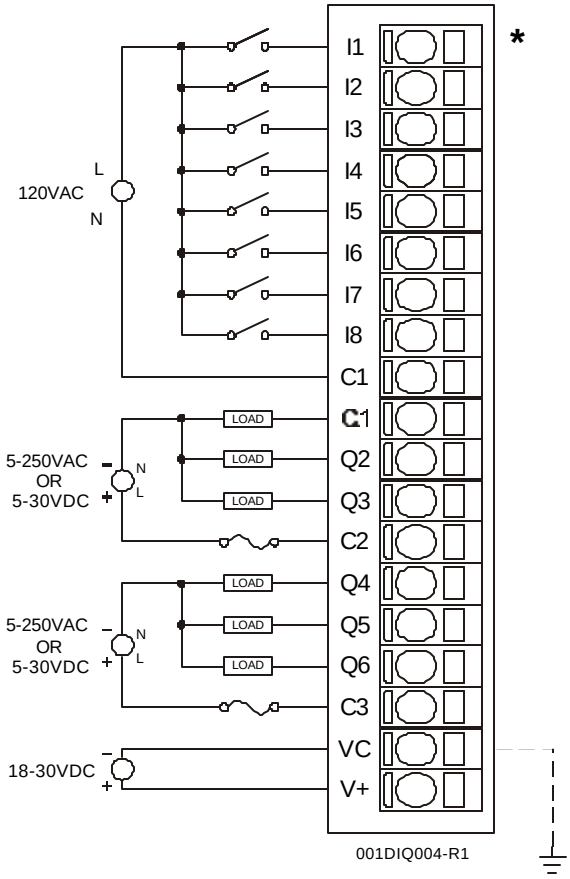
INPUT			
Inputs per Module	8	Input Impedance	0.01µF +10K
Commons per Module	1	Isolation (Channel to Bus)	500VDC
Input Voltage Range	120 – 160 VAC	Minimum ON Current	1mA.
Peak Voltage	160VAC	Maximum OFF Current	200µA.
AC Frequency	50 / 60Hz	OFF to ON Response	50ms.
ON Voltage Level	70VAC Min.	ON to OFF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

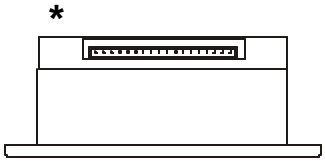
OUTPUT			
Outputs per Module	6 relay	Maximum Leakage Current	5µA
Commons per Module	2	Maximum Inrush Current	3A per channel
Output Type	Relay	Minimum Load	None
Coil Voltage	18-30VDC	OFF to ON Response	6ms. Typical
Contact Voltage	250VAC / 30VDC Max.	ON to OFF Response	0.3ms. Typical
ON Voltage drop	.1V 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 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

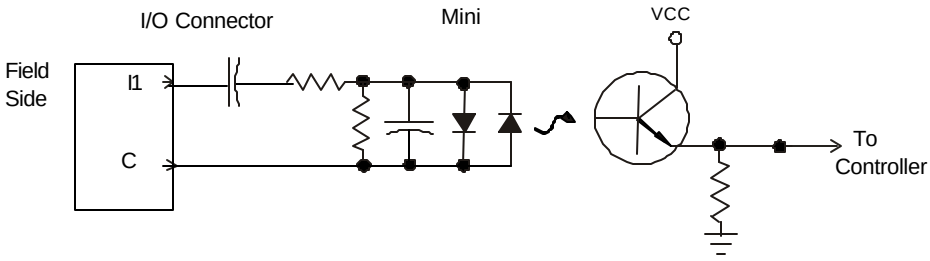
Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C1	Common 1
Q1	Output 1
Q2	Output 2
Q3	Output 3
C2	Common 2
Q4	Output 4
Q5	Output 5
Q6	Output 6
C3	Common 3
VC	Relay Coil Voltage Common
V+	Relay Coil Voltage +

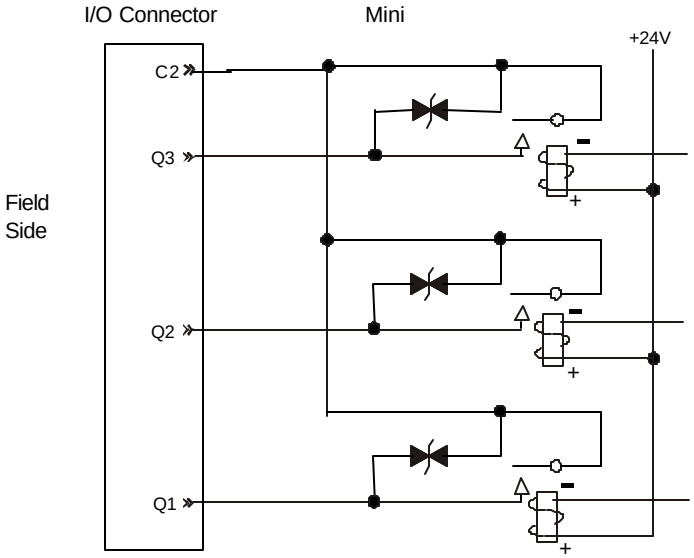
Warning: To protect the module and associated wiring from load faults, use external fuse **(10 A)** as shown. **This warning affects OCS037 / OCS067, Revisions E or higher and all versions of the Mini RCS067.**

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.

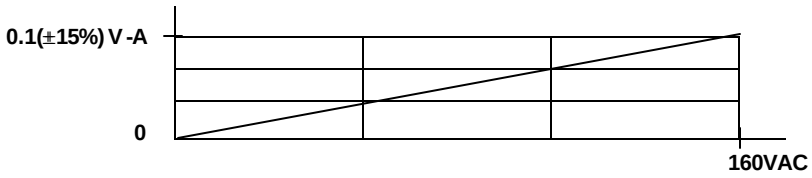
When found on the product, the following symbols specify:

Warning: Consult user documentation.

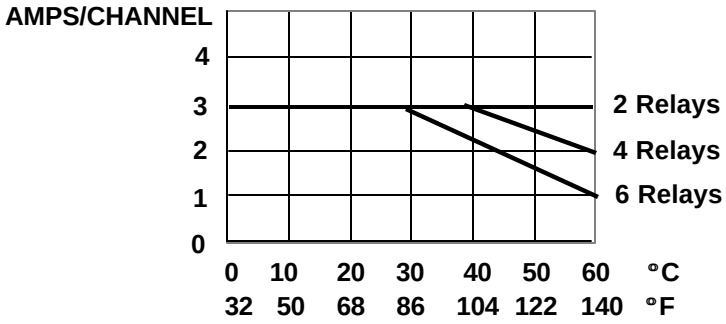
Warning: Electrical Shock Hazard.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



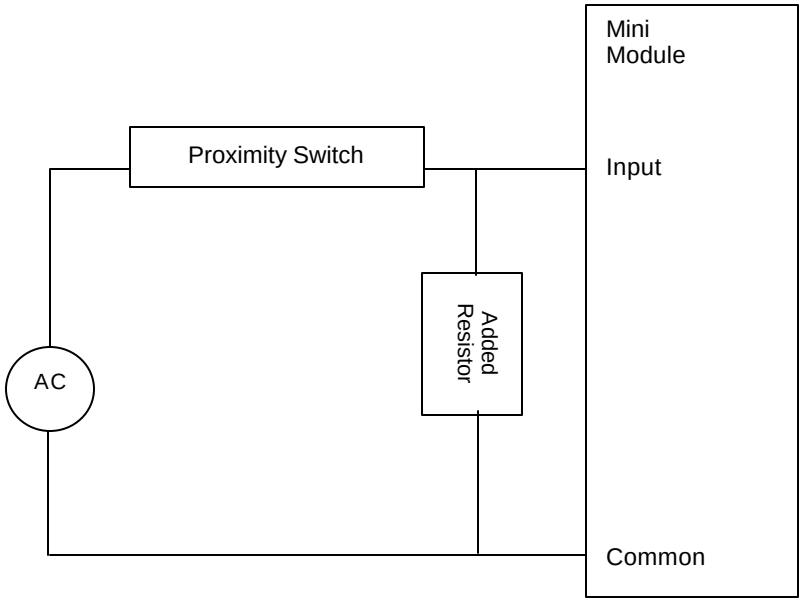
Derating Output Chart



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

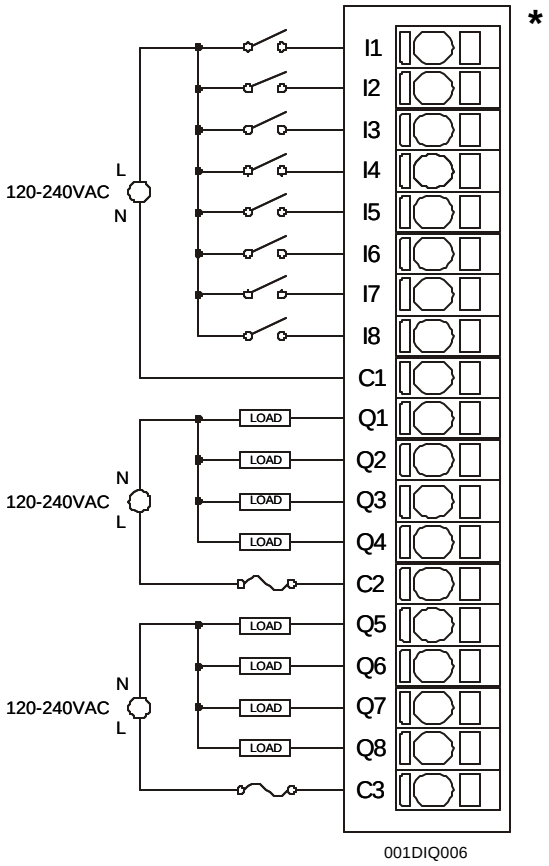
Mini OCS/RCS

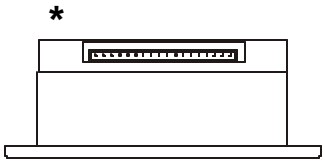
1 SPECIFICATIONS

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	See Compliance Table at http://www.heapg.com/Support/compliance.htm		
UL			

2 WIRING





Mini Bottom View – Shows corresponding I/O pin location

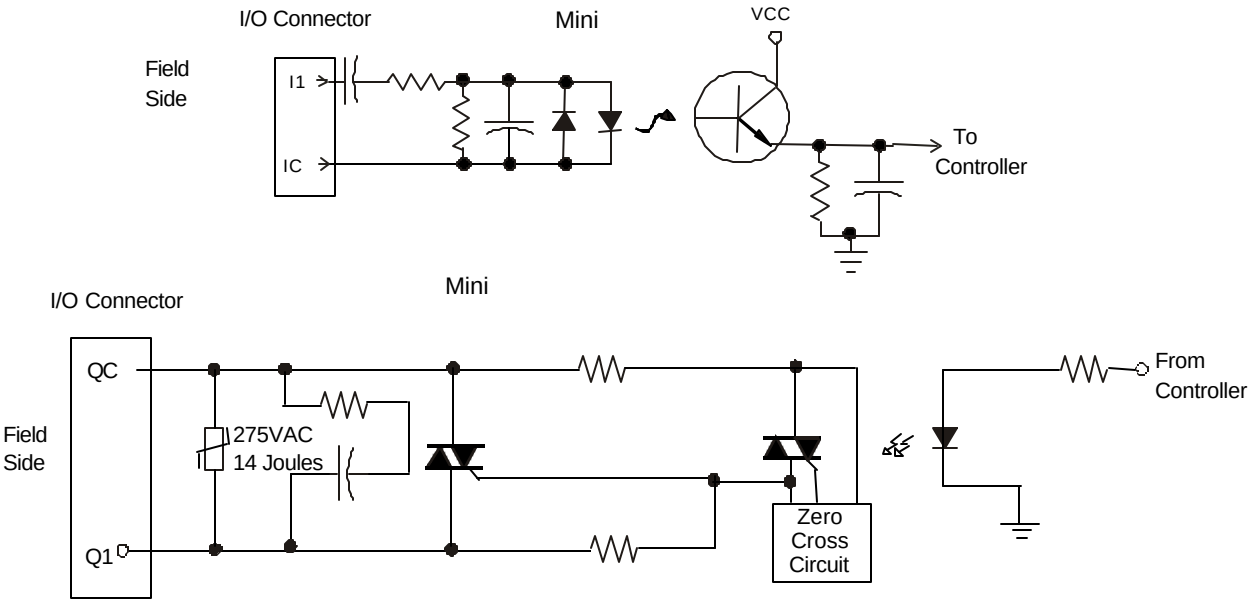
Pins	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
IC	Input Common Isolated
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
C2	Output Common 2 Isolated
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
C3	Output Common 3 Isolated

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.

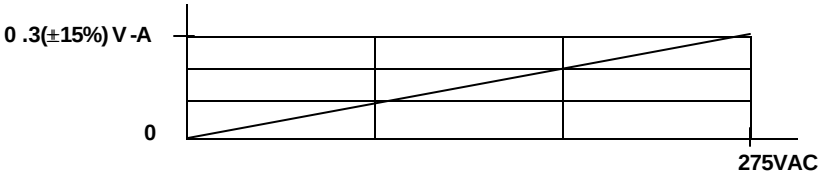
When found on the product, the following symbols specify:

Warning: Consult user documentation.

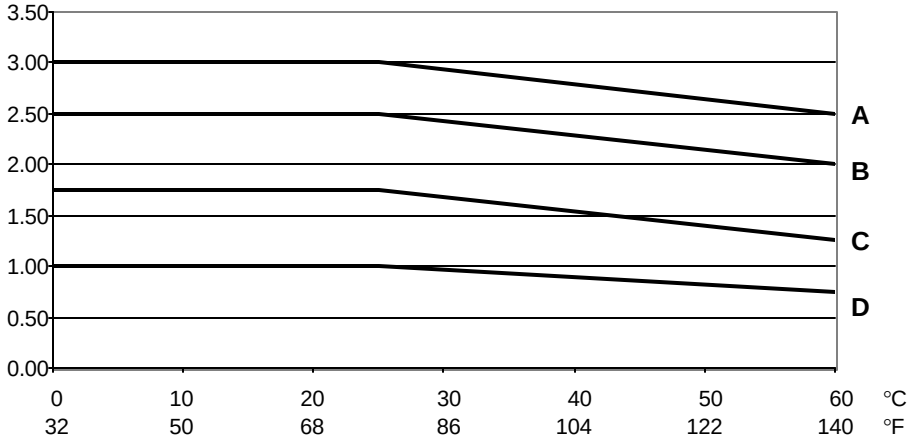
Warning: Electrical Shock Hazard.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Chart



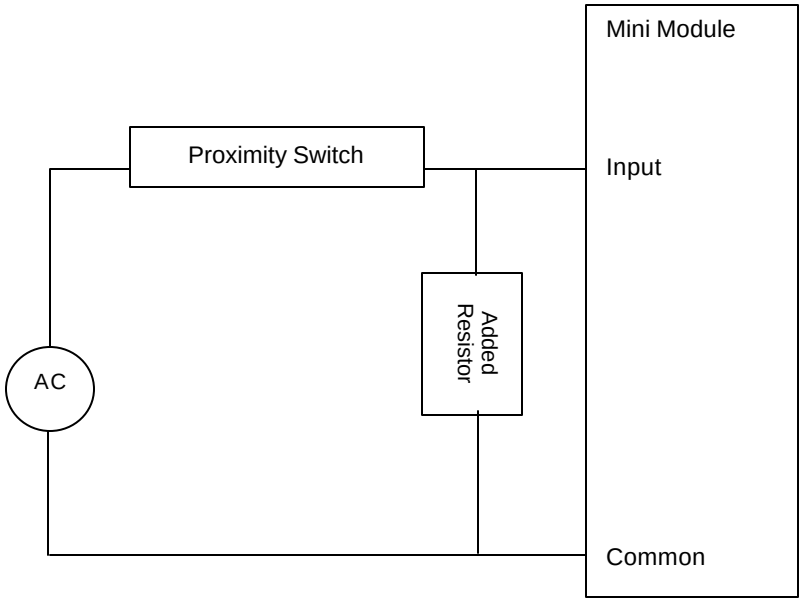
Derating Legend	
A	1 Channel ON
B	2 Channels ON ▪ One even channel and one odd channel or ▪ One low channel (1-4) and one high channel (5-8).
C	4 Channels ON ▪ One channel (1 or 3) ▪ One channel (2 or 4) ▪ One channel (5 or 7) ▪ One channel (6 or 8)
D	8 Channels ON

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

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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

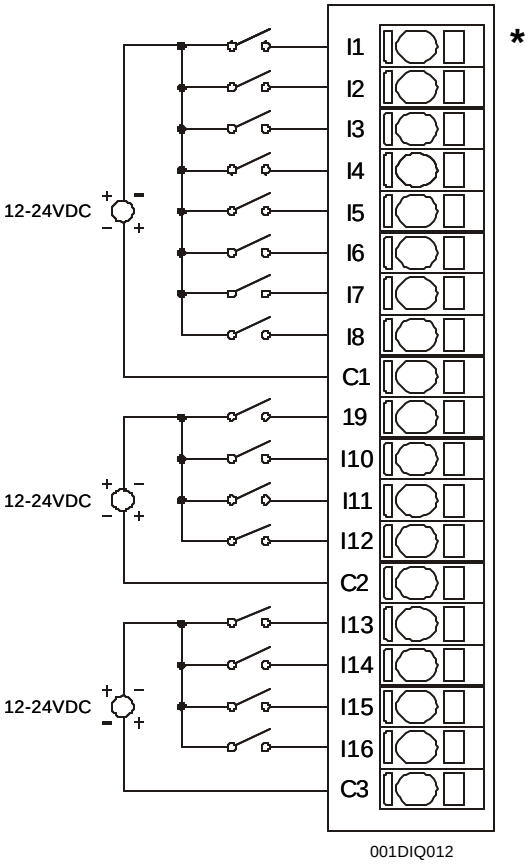
INPUT			
Inputs per Module	16	Input Characteristics	Bidirectional
Commons per Module	3	Input Impedance	10K Ohms
Input Voltage Range	12-24VDC	Minimum ON Current	1mA
Peak Voltage	35VDC Max.	Maximum OFF Current	200µA
Isolation (Channel to Channel)	500VDC	OFF to ON Response	1ms.
ON Voltage Level	9VDC /1mA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

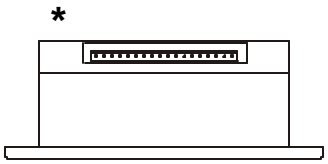
OUTPUT			
Outputs per Module	12	Maximum Inrush Current	650mA
Commons per Module	1	Minimum Load	None
Operating Voltage	10 - 28VDC	OFF to ON Response	1ms.
Output Type	Sourcing / 10K Pull-Down	ON to OFF Response	1ms.
Peak Voltage	28VDC Max.	Output Characteristics	Current Sourcing
Maximum Load Current per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

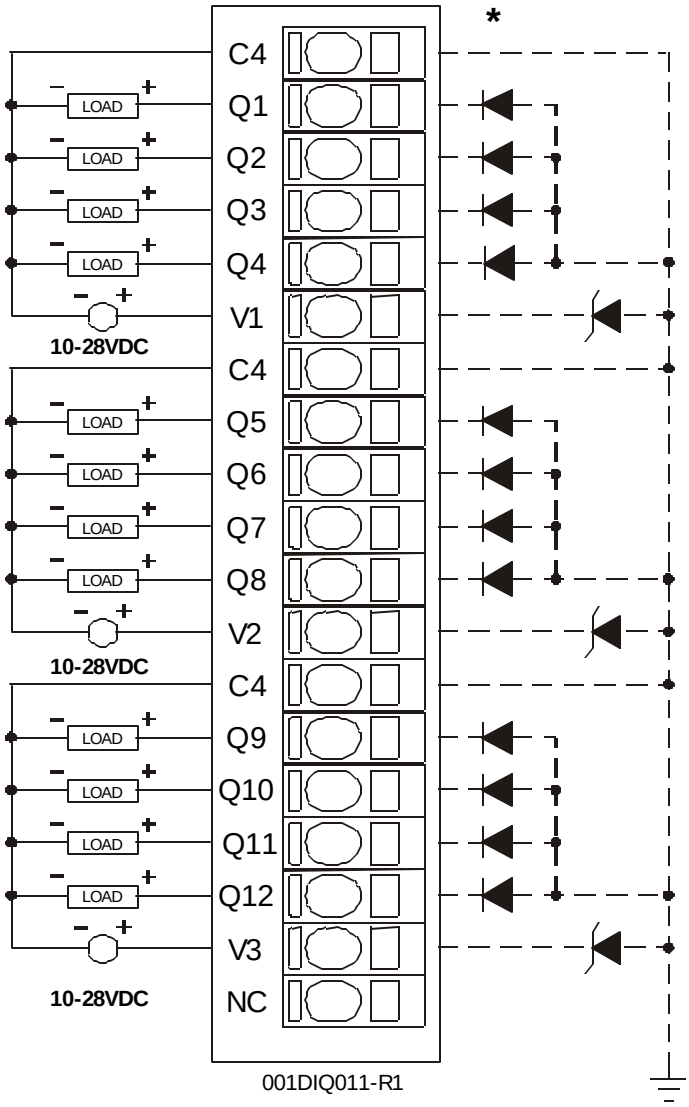


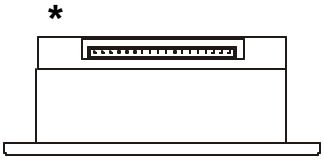


Mini Top View – Shows corresponding I/O pin location

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

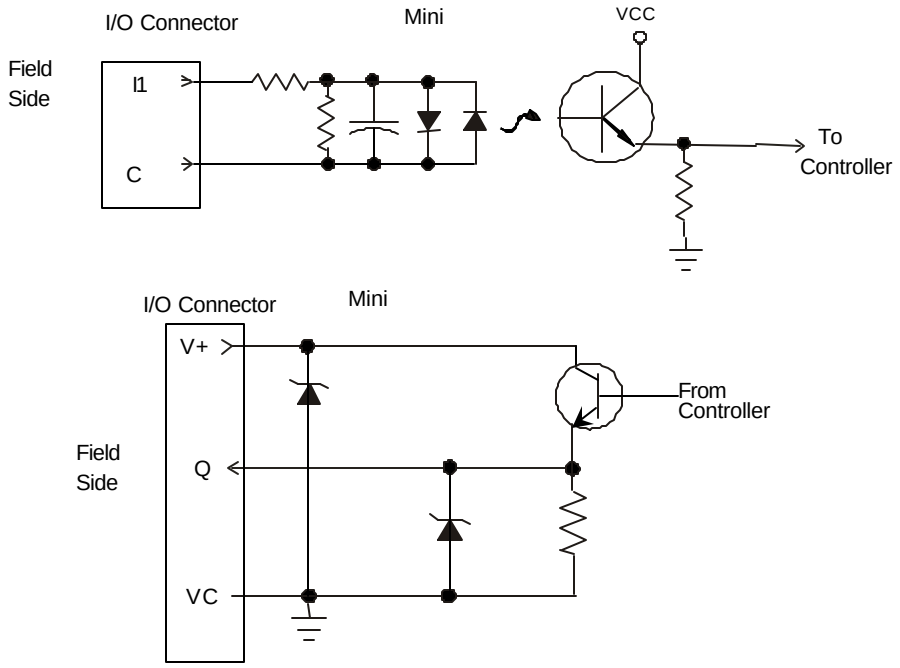




Mini Bottom View – Shows corresponding I/O pin location

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.

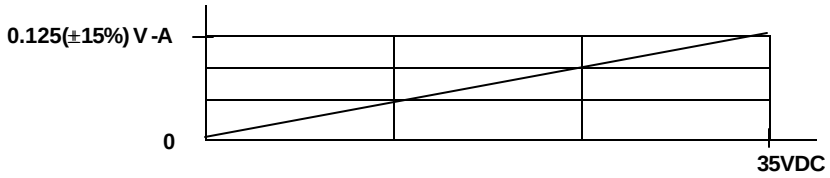
5 INSTALLATION / SAFETY

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.

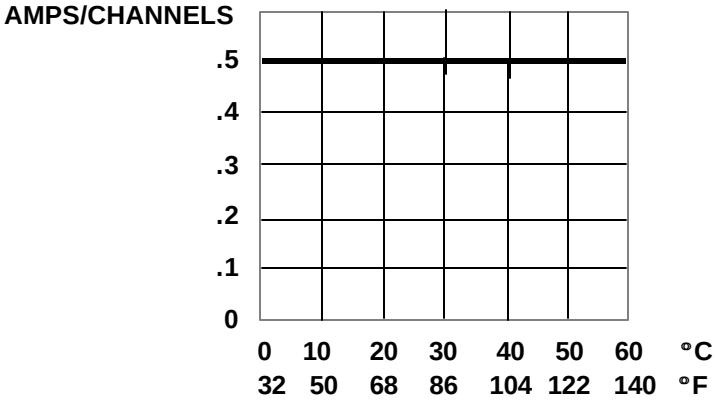
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

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		

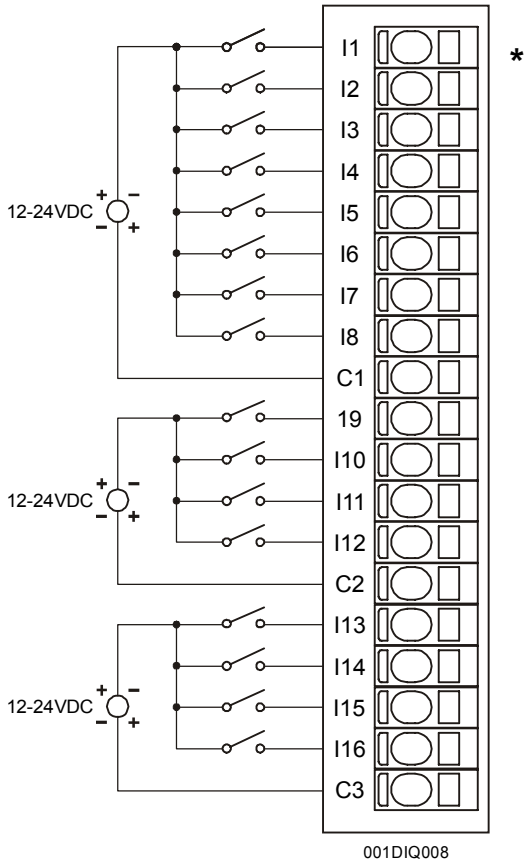
OUTPUT			
Outputs per Module	12	Output Protection	Short Circuit
Commons per Module	1	Maximum Leakage Current	100μA
Operating Voltage	5 - 35VDC	Maximum Inrush Current	600mA. per channel
Output Type	Sinking / 10K Pull-Up	Minimum Load	None
Peak Voltage	35VDC Max.	OFF to ON Response	1ms.
Output Characteristics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

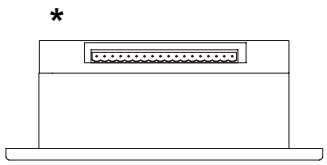
General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	Operating Temperature	0° to 50° Celsius
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	Terminal Type	Spring Clamp, Removable
Relative Humidity	5 to 95% Non-condensing	Weight	9.5 oz. (270 g)
CE	See Compliance Table at http://www.heapg.com/Support/compliance.htm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

MAN0303-03

2 WIRING

2.1 Input Wiring

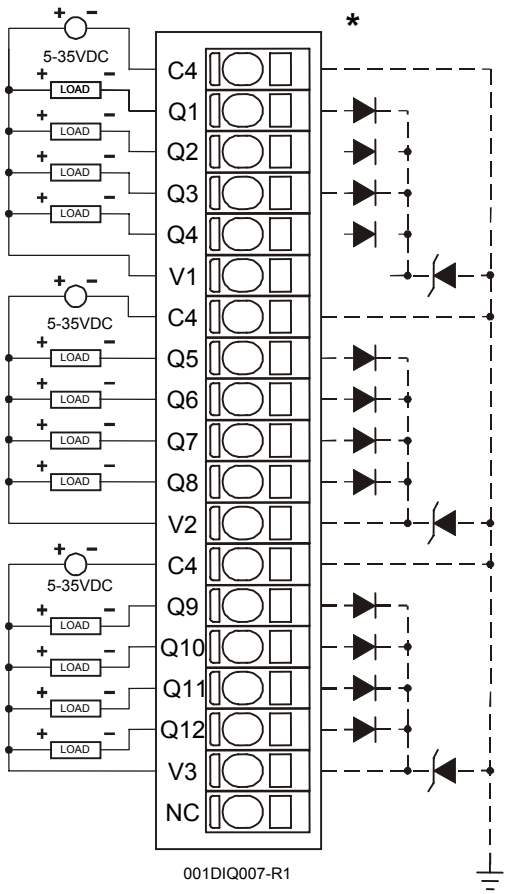


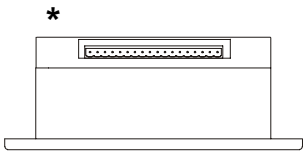


Mini Top View – Shows corresponding I/O pin location

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



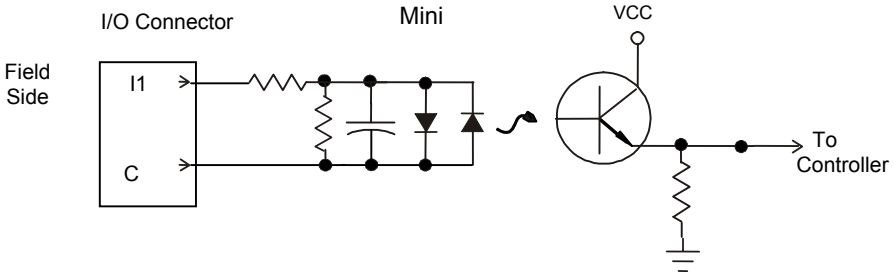


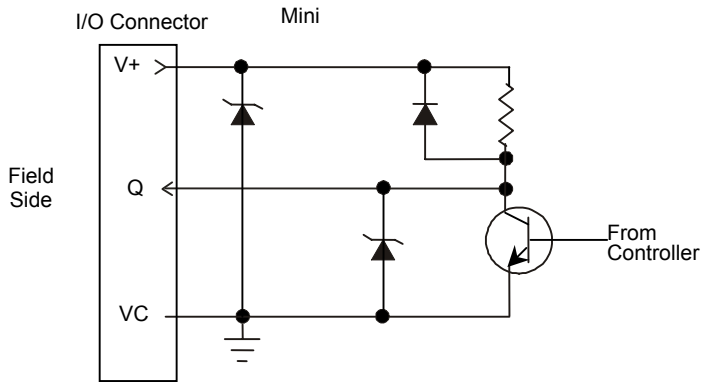
Mini Bottom View – Shows corresponding I/O pin location

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.

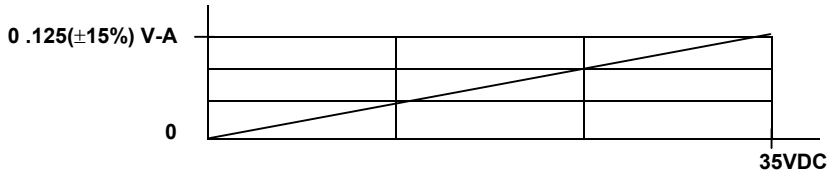
5 INSTALLATION / SAFETY

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.

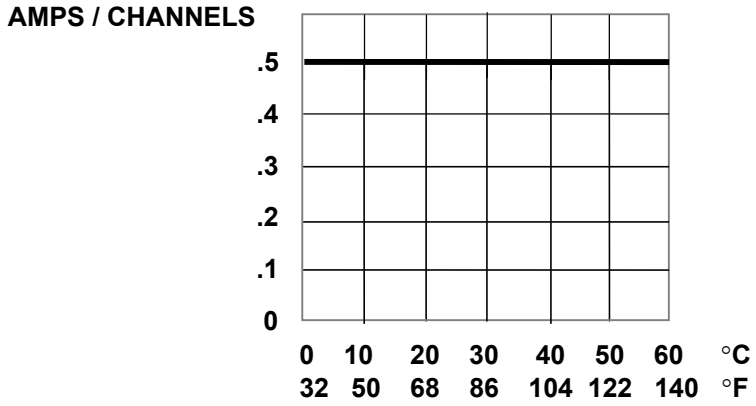
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Output Chart



7 TECHNICAL ASSISTANCE

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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		

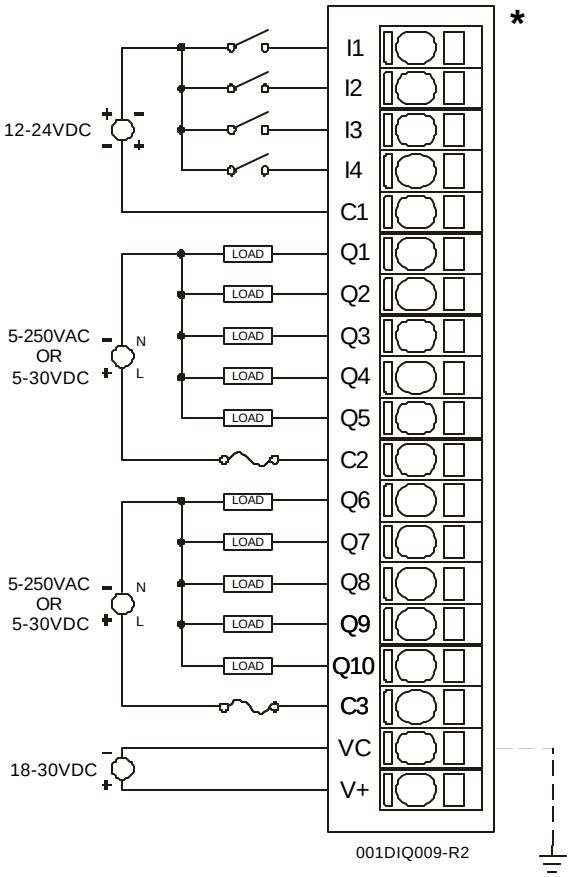
OUTPUT			
Outputs per Module	10 relay	Maximum Inrush Current	3A
Commons per Module	2	Minimum Load	None
Output Type	Relay	OFF to ON Response	6ms. Typical
Coil Voltage	18-30VDC	ON to OFF Response	0.3ms. Typical
Contact Voltage	250VAC / 30VDC Max.	Isolation (Channel to Channel and Channel to Common)	2500VDC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

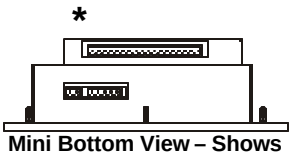
General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	Operating Temperature	0° to 50° Celsius
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	Terminal Type	Spring Clamp, Removable
Relative Humidity	5 to 95% Non-condensing	Weight	9.5 oz. (270 g)
CE	See Compliance Table at http://www.heapg.com/Support/compliance.htm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

MAN0319-03

2 WIRING

2.1 Input / Output Connector Wiring





Mini Bottom View – Shows Corresponding I/O Pin

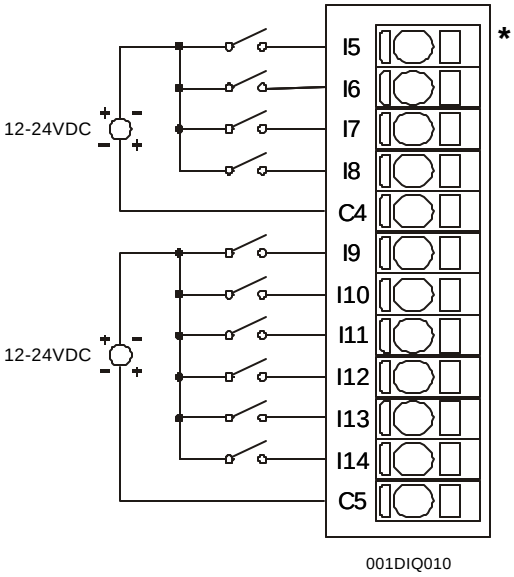
Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
C1	Common for Inputs1,2,3,4
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
C2	Common for Outputs 1,2,3,4,5
Q6	Output 6
Q7	Output 7
Q8	Output 8
Q9	Output 9
Q10	Output 10
C3	Common for Outputs 6,7,8,9,10
VC	Relay Coil power common, connected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

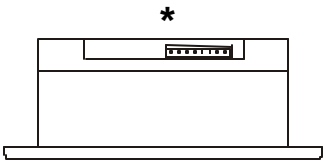
Warning: To protect the module and associated wiring from load faults, use external fuse (**10 A**) as shown. **This warning affects OCS045 / OCS075, Revisions E or higher and all versions of the Mini RCS075.**

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

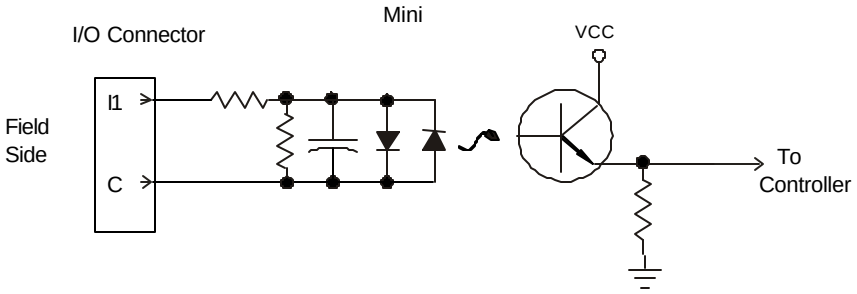


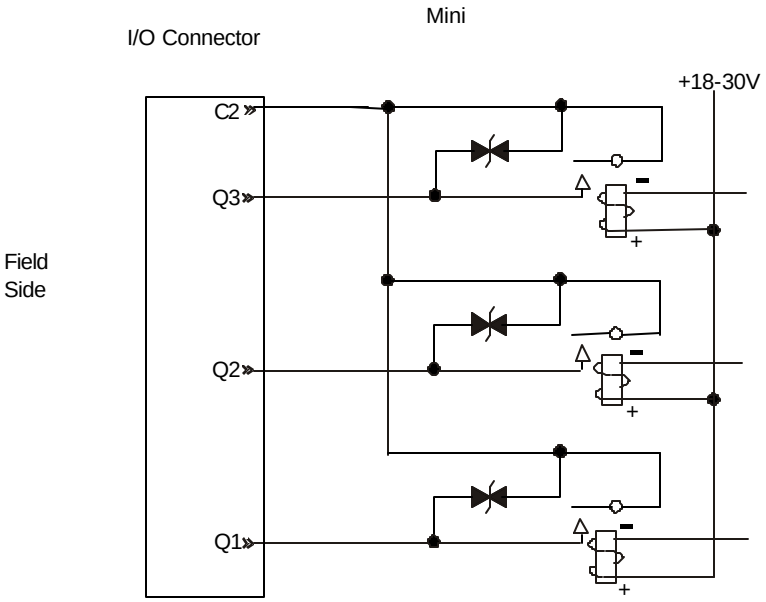


Mini Top View – Shows corresponding I/O pin location

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.

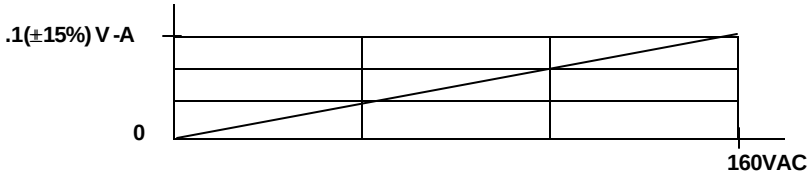
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

Warning: Consult user documentation.

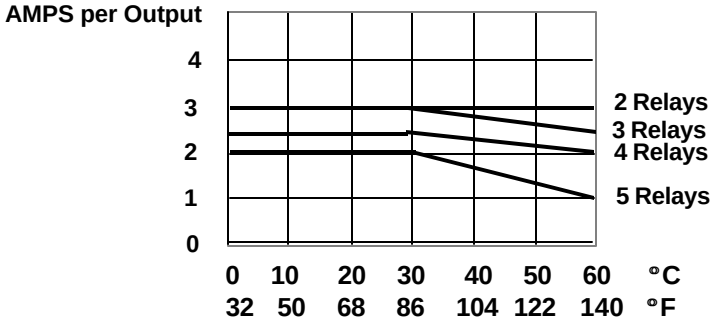
Warning: Electrical Shock Hazard.

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

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

Mini OCS/RCS

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.		

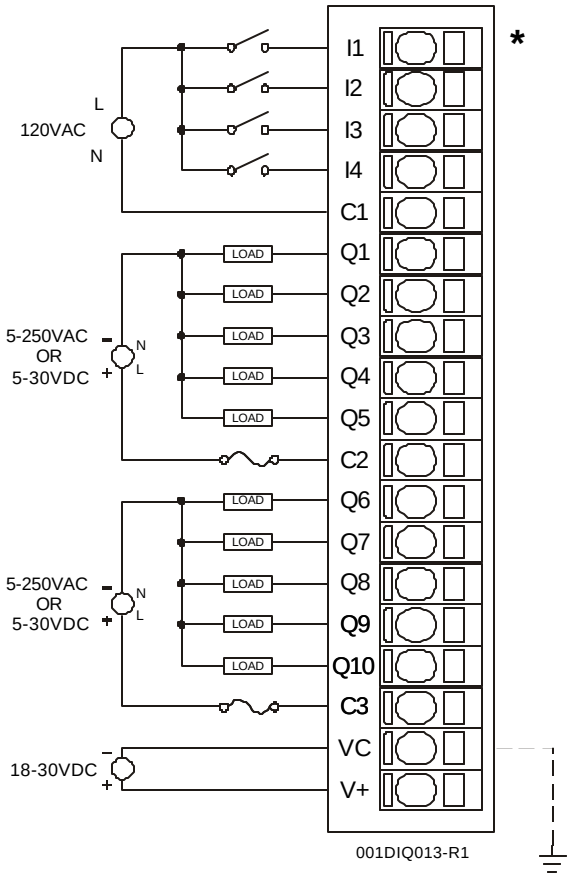
OUTPUT			
Outputs per Module	10 relay	Maximum Leakage Current	5µA
Commons per Module	2	Maximum Inrush Current	3A
Output Type	Relay	Minimum Load	None
Coil Voltage	18-30VDC	OFF to ON Response	6ms. Typical
Contact Voltage	250VAC / 30VDC Max.	ON to OFF Response	0.3ms. Typical
ON Voltage drop	0.2VDC max.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

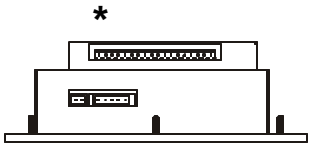
General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	Operating Temperature	0° to 50° Celsius
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	Terminal Type	Spring Clamp, Removable
Relative Humidity	5 to 95% Non-condensing	Weight	9.5 oz. (270 g)
CE	See Compliance Table at http://www.heapg.com/Support/compliance.htm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

MAN0318-02

2 WIRING

2.1 Input / Output Connector Wiring





Mini Bottom View – Shows Corresponding I/O Pin

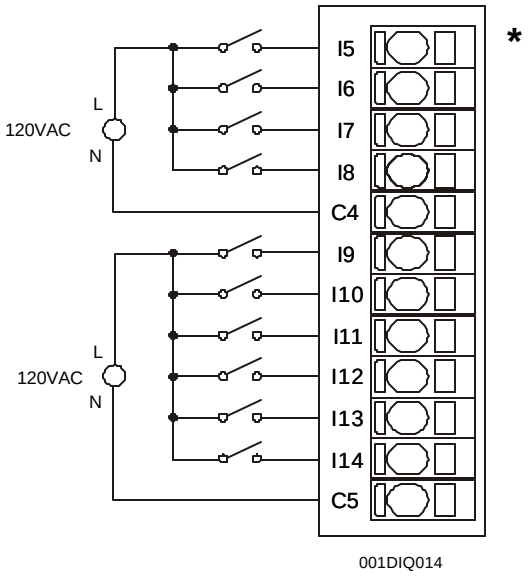
Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
C1	Common for Inputs 1,2,3,4
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
C2	Common for Outputs 1,2,3,4,5
Q6	Output 6
Q7	Output 7
Q8	Output 8
Q9	Output 9
Q10	Output 10
C3	Common for Outputs 6,7,8,9,10
VC	Relay Coil power common, connected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

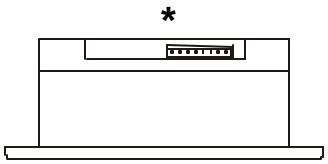
Warning: To protect the module and associated wiring from load faults, use external **(10 A)** fuse(s) as shown. **This warning affects OCS047 / OCS077, Revisions E or higher and all versions of the Mini RCS077.**

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

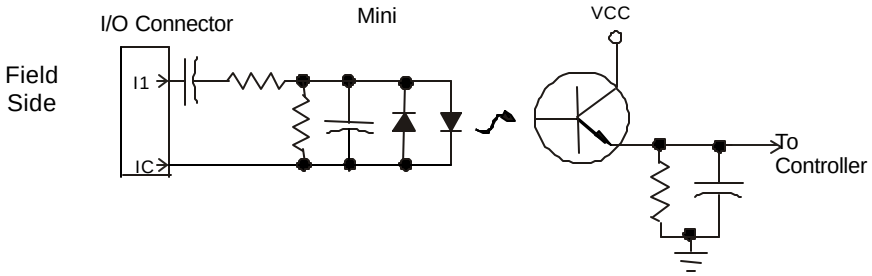


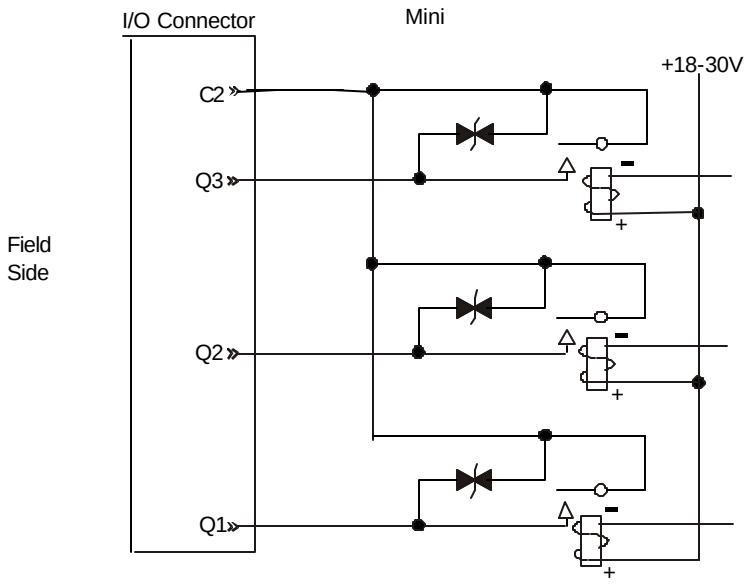


Mini Top View – Shows corresponding I/O pin location

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:

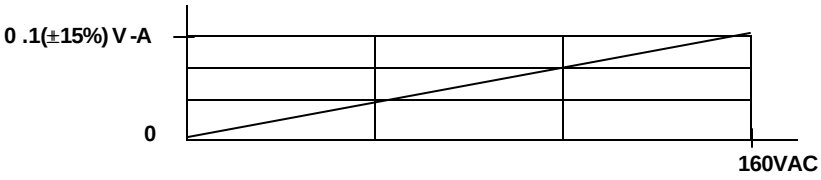
Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

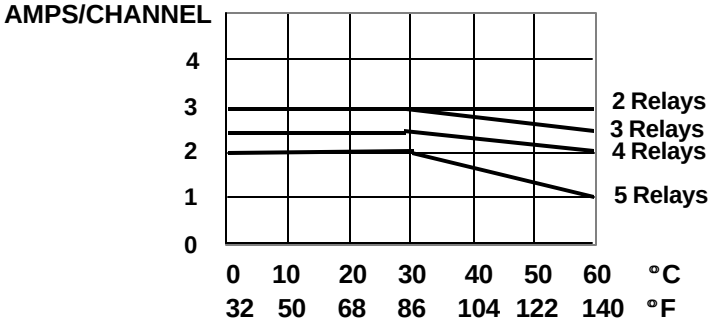
For detailed installation information, refer to Mini Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

6 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



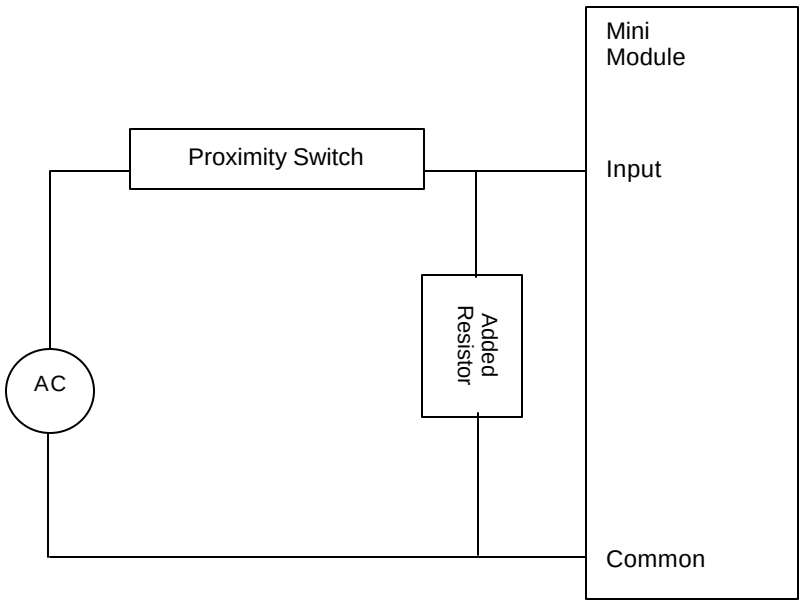
Derating Chart
(Each group of 5)



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			

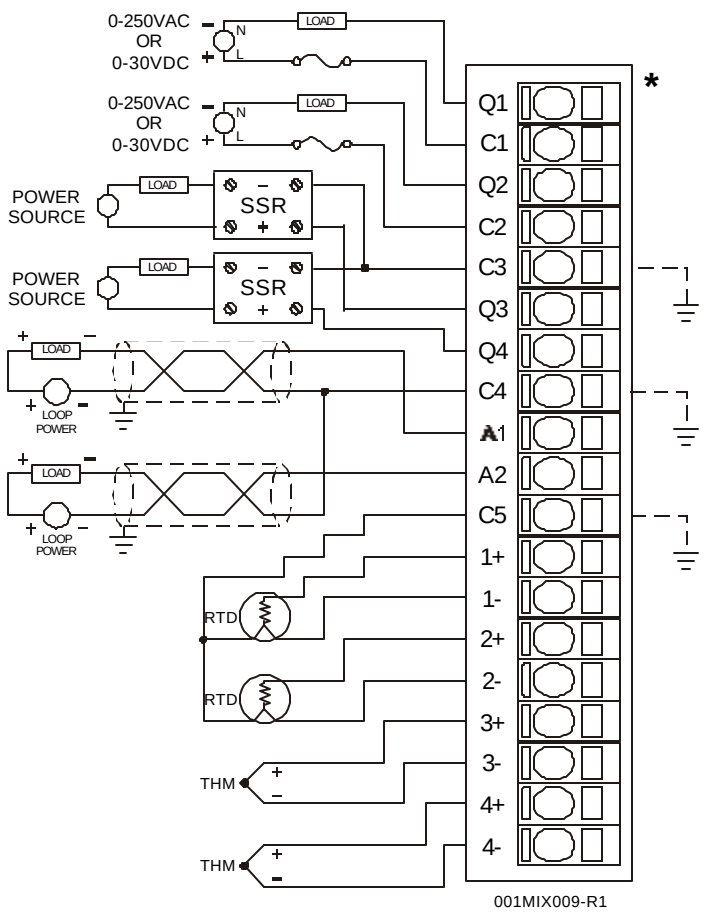
MAN0359-01

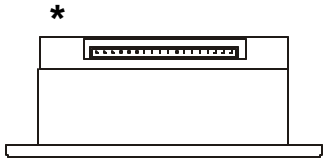
Thermocouple Inputs					
Number of Channels	4		A/D Conversion Time	16 channels/second	
Commons per Module	1 (for grounding shielded T/Cs only)		Analog Input Registers Consumed by Cscape (%AI)	4	
Input Impedance	20Meg Ohm clamped @ ±24VDC		PLC Update Rate	Set by PLC Scan Rate	
A/D Conversion Type	Integrating		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-

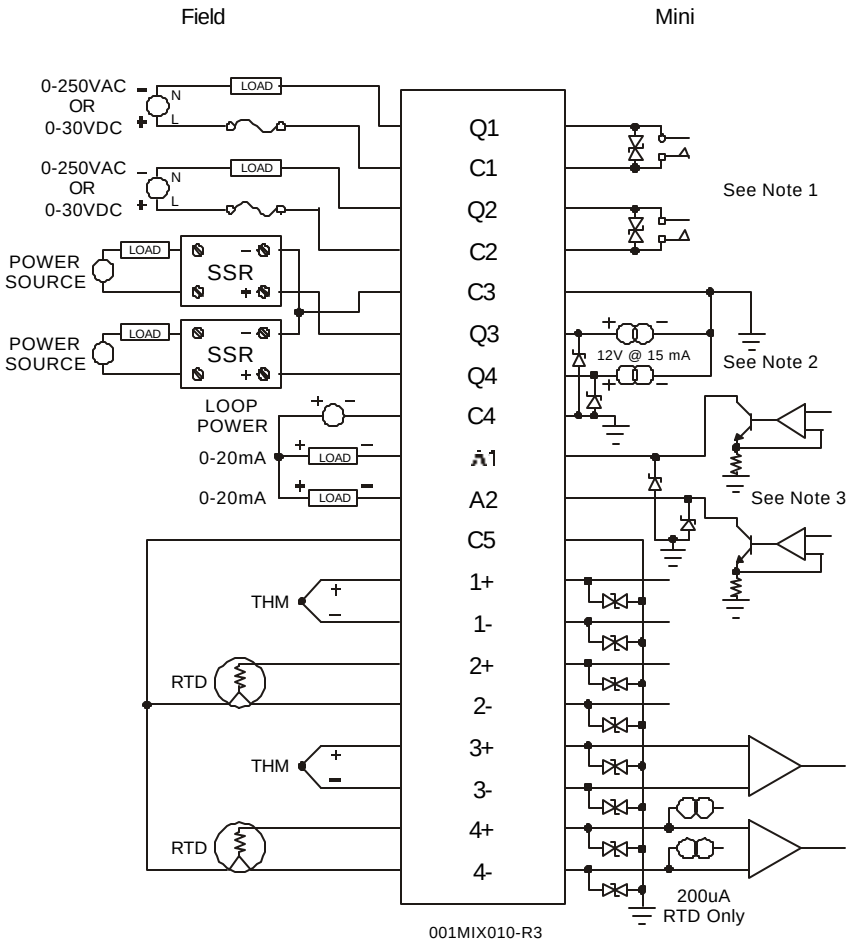
Note regarding Pin C5: The pin is not a THM common but is a thermocouple shielding termination point.

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.

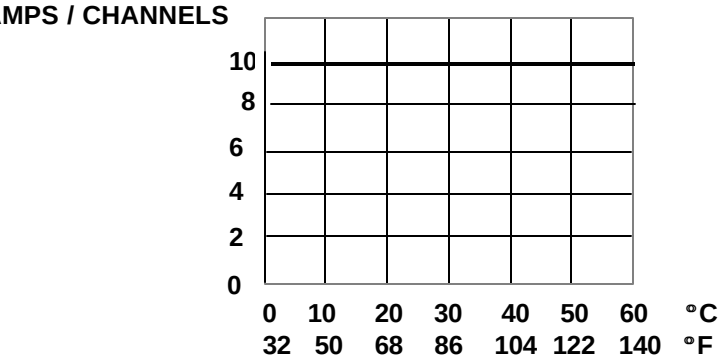
c. Filter Constant sets the level of digital filtering according to the chart below.

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

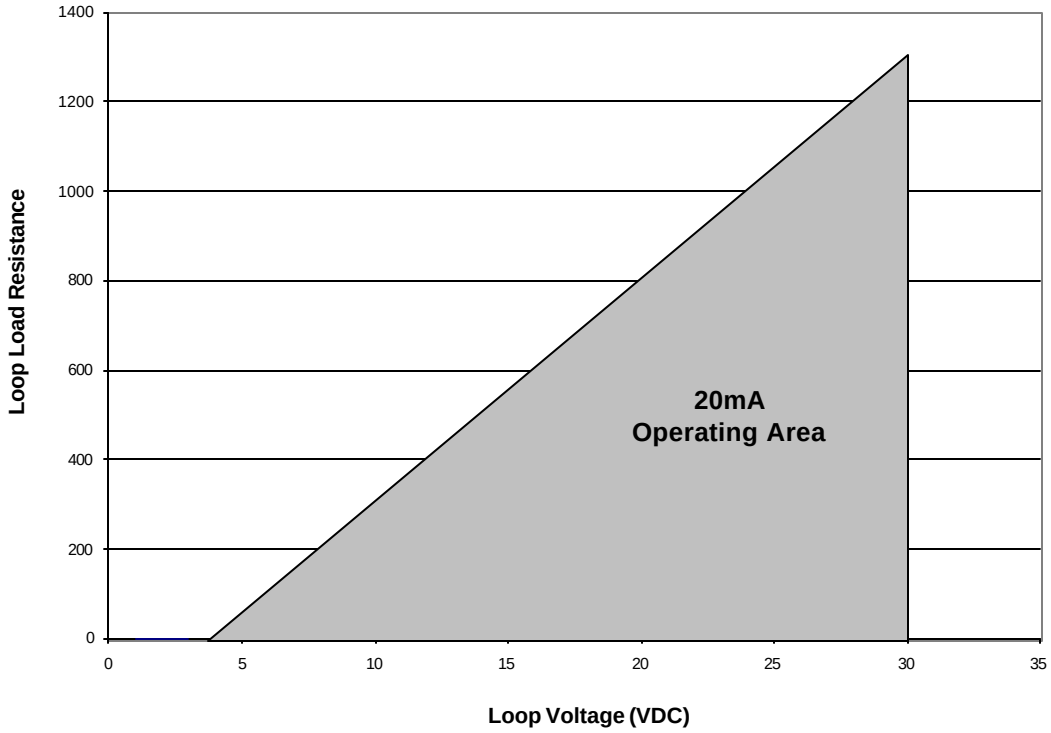
The following table describes how program data values are scaled to real-world analog voltage outputs by the module. Given a desired output current, the data value is converted by using the conversion factor from the table. The following formula is used: **Data = Output Current (mA) / Conversion Factor**

Example:

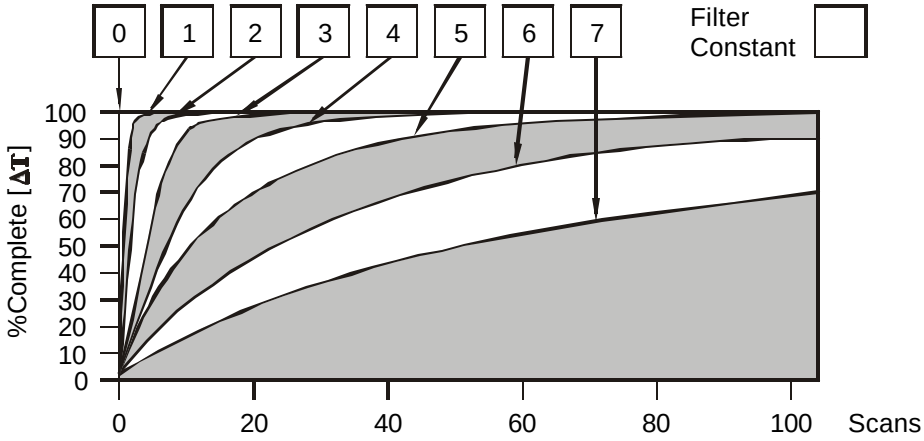
1. The desired output current is 12mA.
2. Using the table, the conversion factor for the current range of +20 mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Output Current (mA) / Conversion Factor
   19200 = 12mA / 0.000625

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

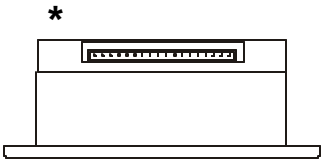
General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	Operating Temperature	0° to 50° Celsius
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	Terminal Type	Spring Clamp, Removable
Relative Humidity	5 to 95% Non-condensing	Weight	9.5 oz. (270 g)
CE	See Compliance Table at http://www.heapg.com/Support/compliance.htm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

MAN0307-03

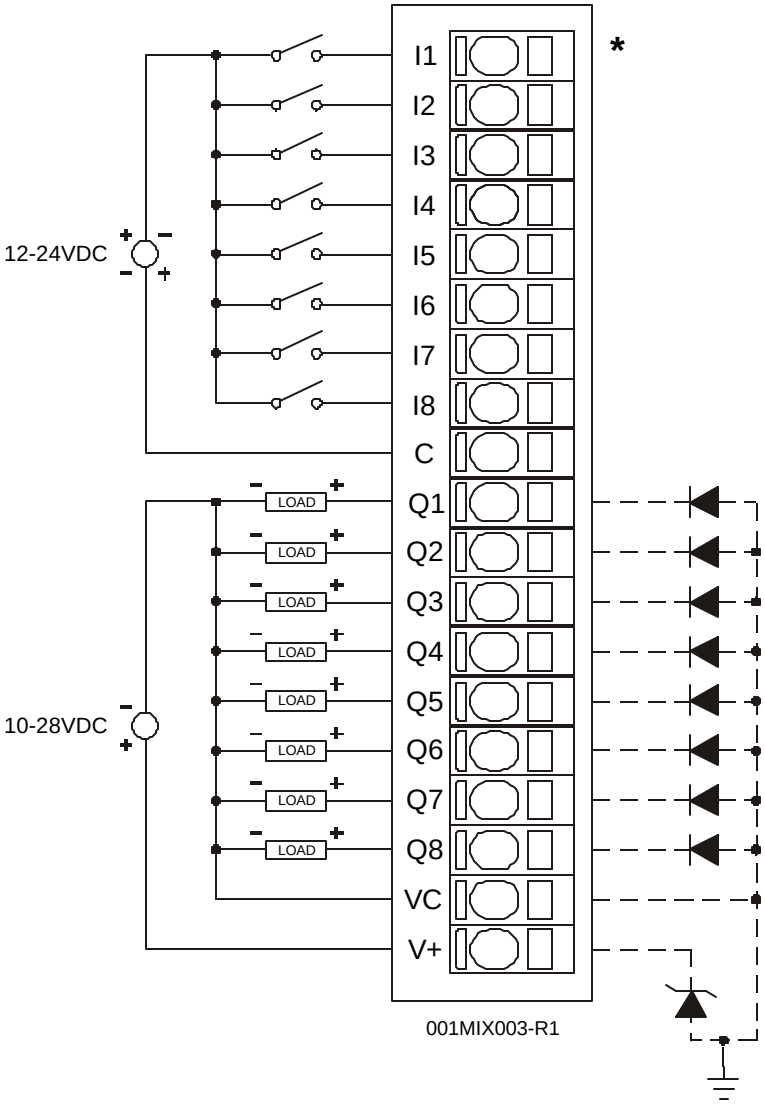
This Data Sheet is published individually & also as a part of the current version of Mini I/O Manual (MAN0581).
Information is subject to change without notice.

2 WIRING

2.1 Digital Input / Output (P1)

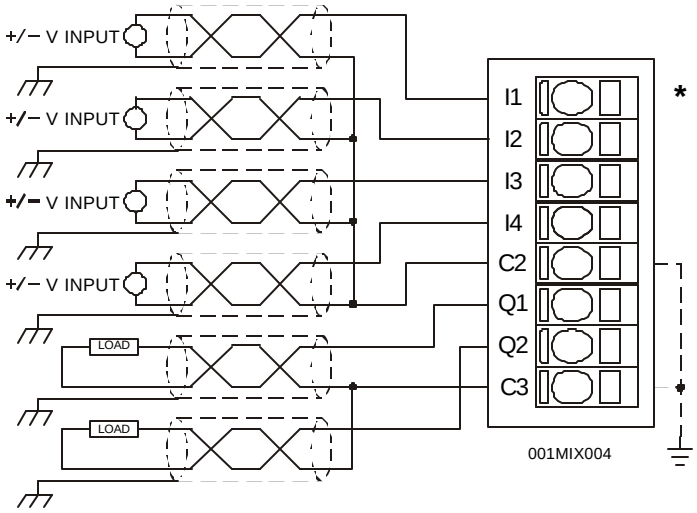


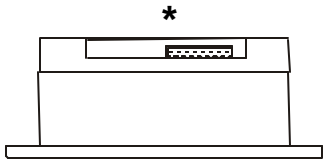
Mini Bottom View – Shows corresponding I/O pin location



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)

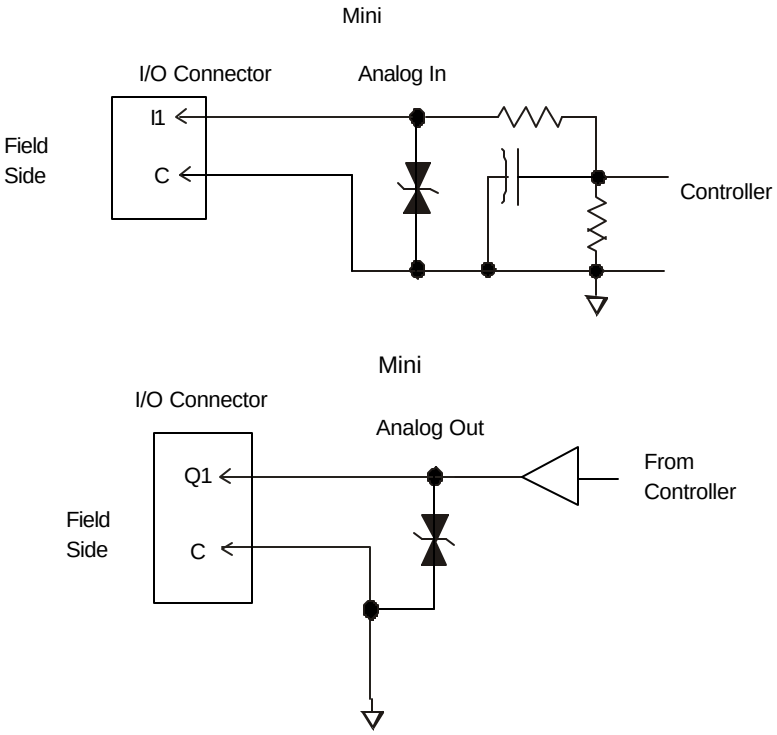




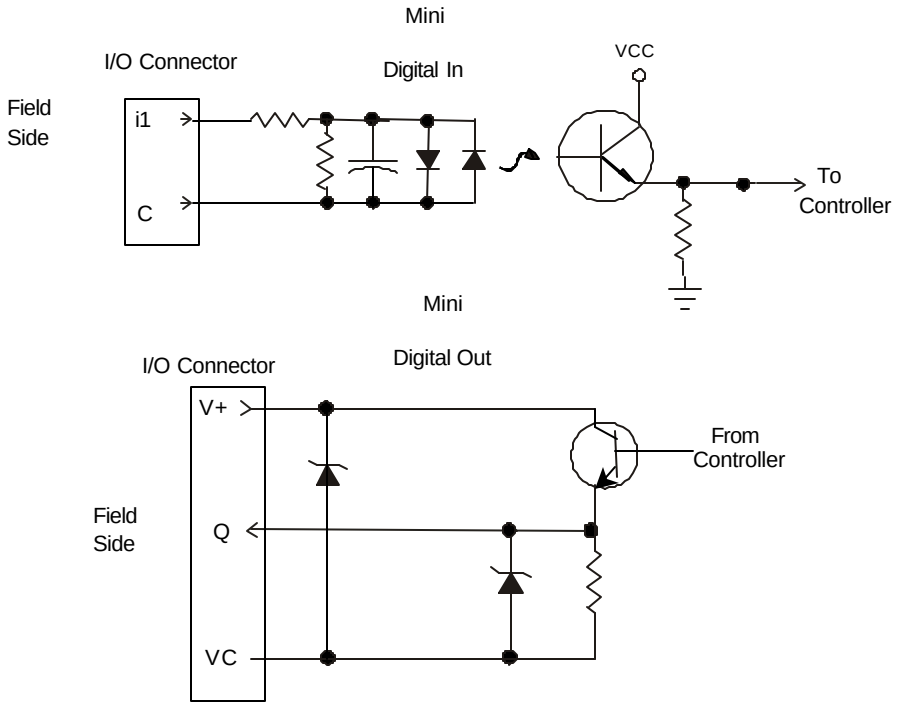
Mini Top View – Shows corresponding I/O pin location

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.

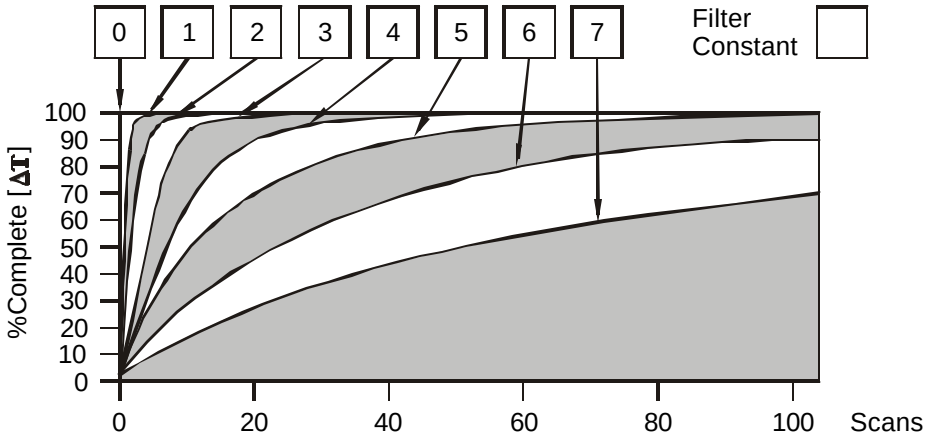
> **Warning:** The default turns the digital outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default settings.

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**

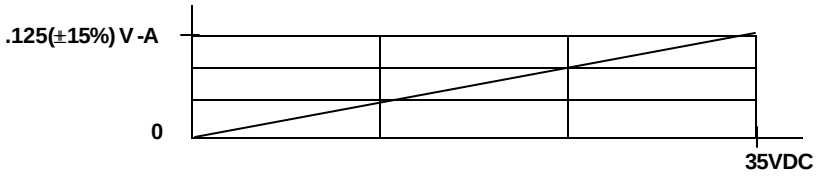
Example: The user selects ± 10 VDC output range:

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

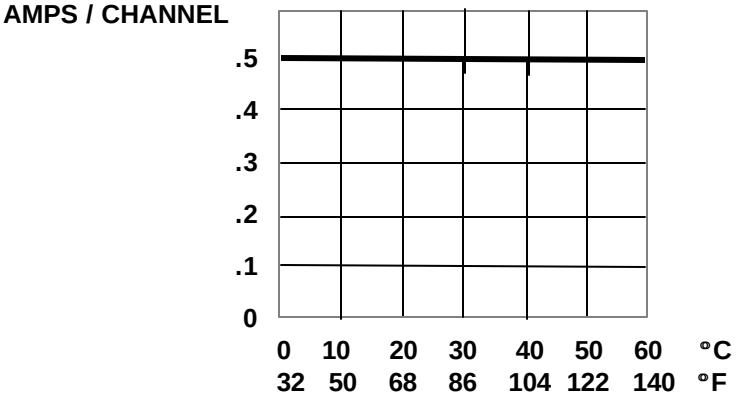
Conversion of Real-World Outputs into Controller			
Selected Voltage Output Range	**Data**	**Voltage Out (V out) VDC**	**Conversion Factor**
± 10 VDC Analog Out	+ 32736	+10.23	0.0003125
	+ 32000	+10.00	
	0	0.00	
	- 32000	-10.00	
	- 32736	-10.23	

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

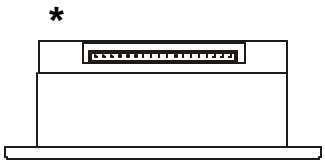
1 SPECIFICATIONS

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

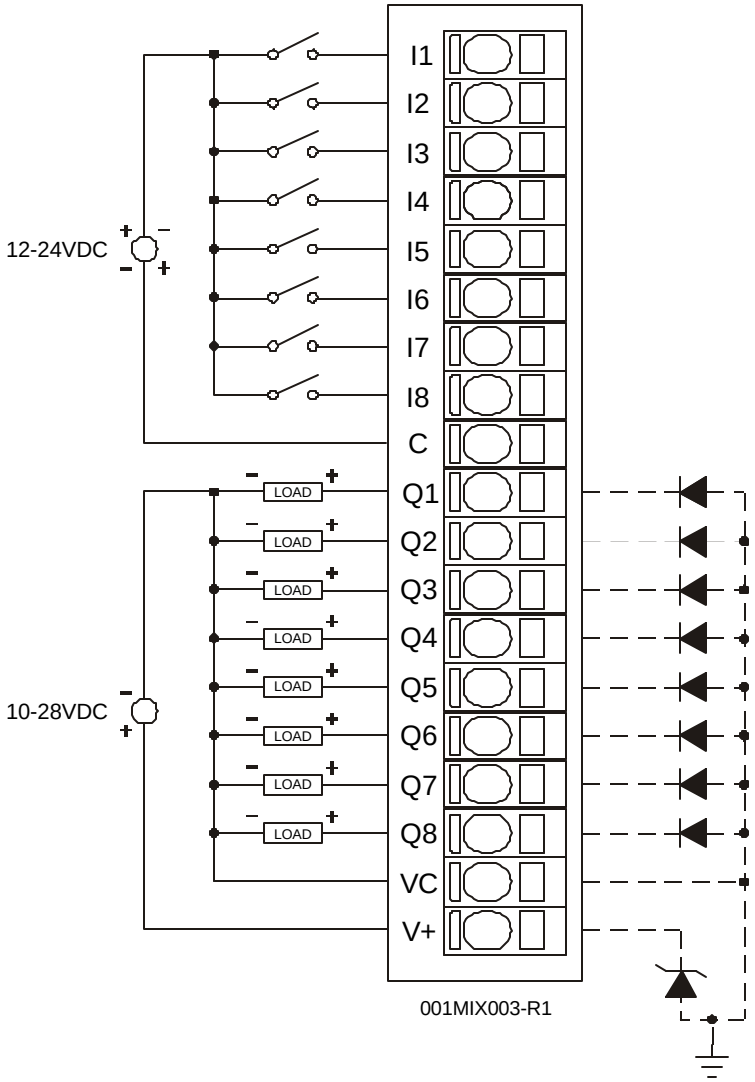
General Specifications			
Required Power (Steady State)	4.8W (200mA @ 24VDC)	Operating Temperature	0° to 50° Celsius
Required Power (Inrush)	900mA max. @ 24VDC for 1ms.	Terminal Type	Spring Clamp, Removable
Relative Humidity	5 to 95% Non-condensing	Weight	9.5 oz. (270 g)
CE	See Compliance Table at http://www.heapg.com/Support/compliance.htm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

2 WIRING

2.1 Digital Input / Output (P1)

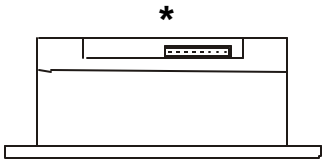


Mini Bottom View – Shows corresponding I/O pin location

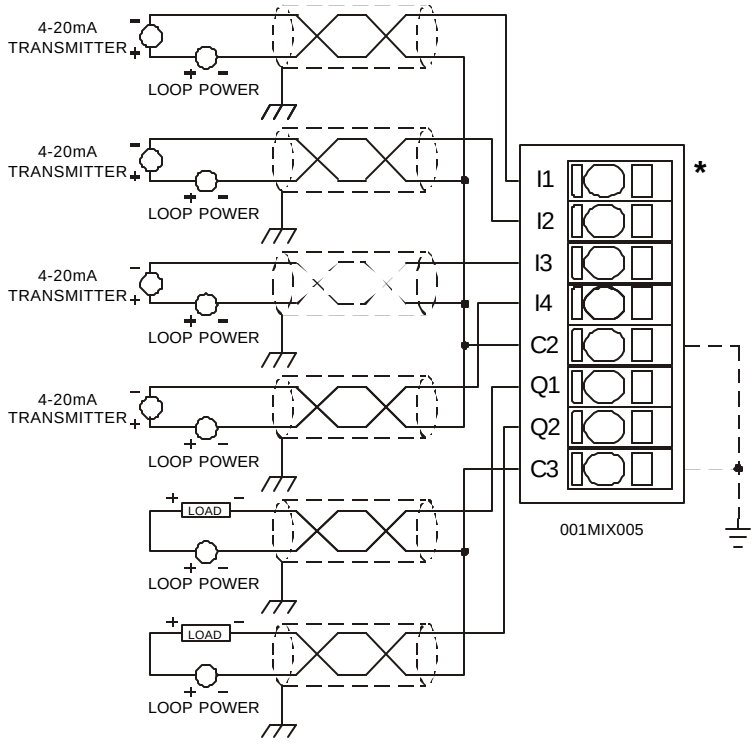


Pin	Digital Input / Output
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
C1	Common (Isolated)
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
VC	Load Power Common
V+	Load Voltage +

2.2 Analog Input / Output (P2)

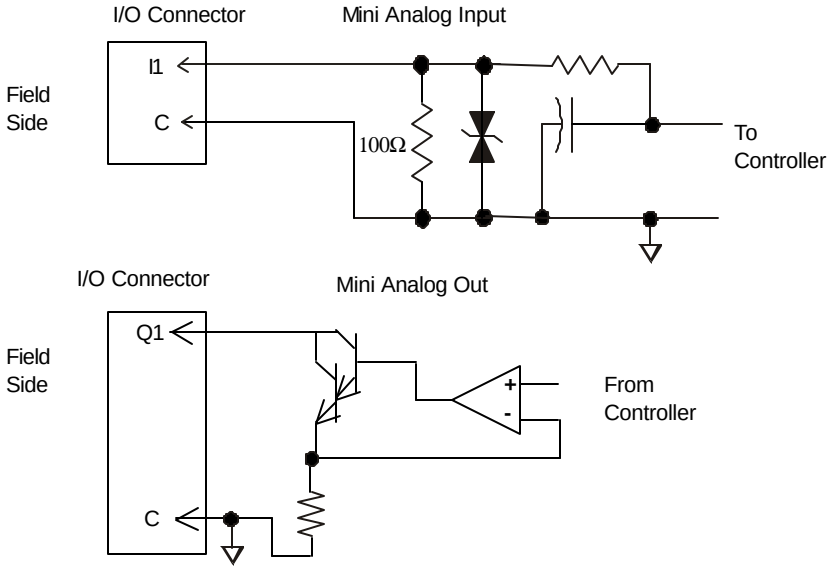


Mini Top View – Shows corresponding I/O pin location

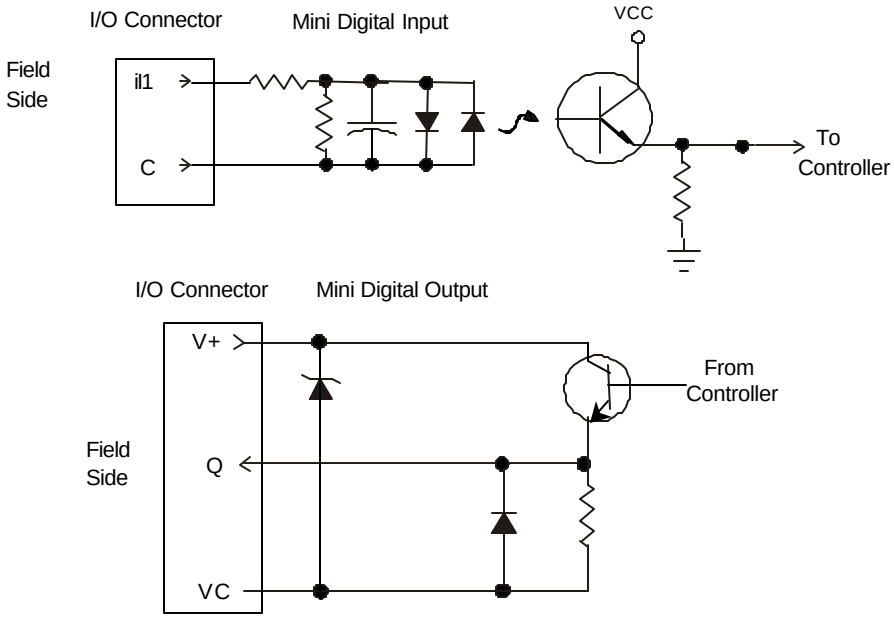


Pin	Analog In and Out
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
C2	Input Common
Q1	Output 1
Q2	Output 2
C3	Output Common

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.

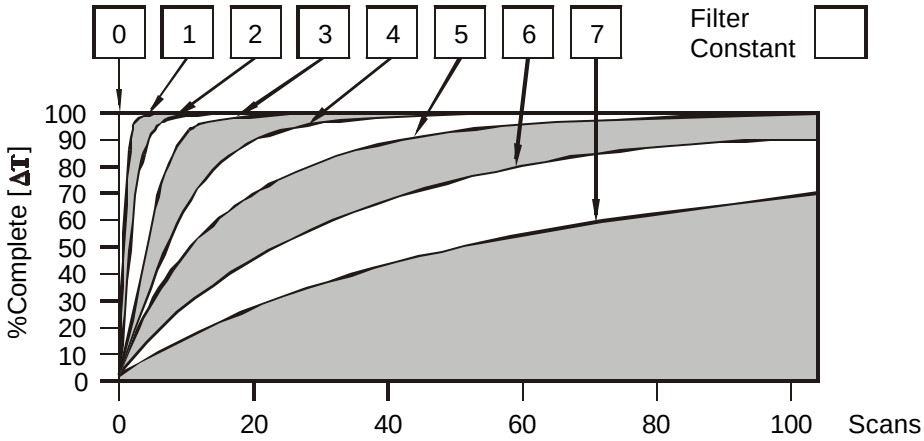
> **Warning:** The default turns the digital outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default settings.

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:

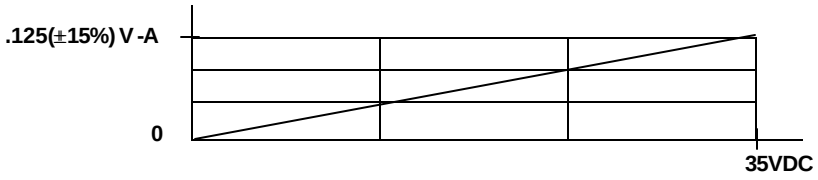
1. The desired output current is 12mA.
2. Using the table, the conversion factor for the current range of +20 mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Output Current (mA) / Conversion Factor
   19200 = 12mA / 0.000625

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

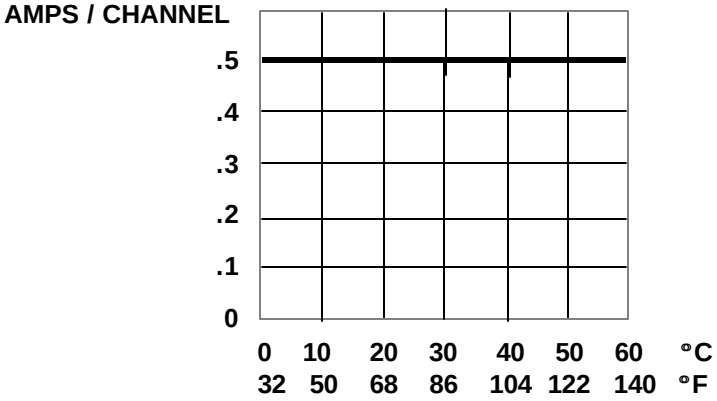
7.1 Digital Input

Digital Input Chart

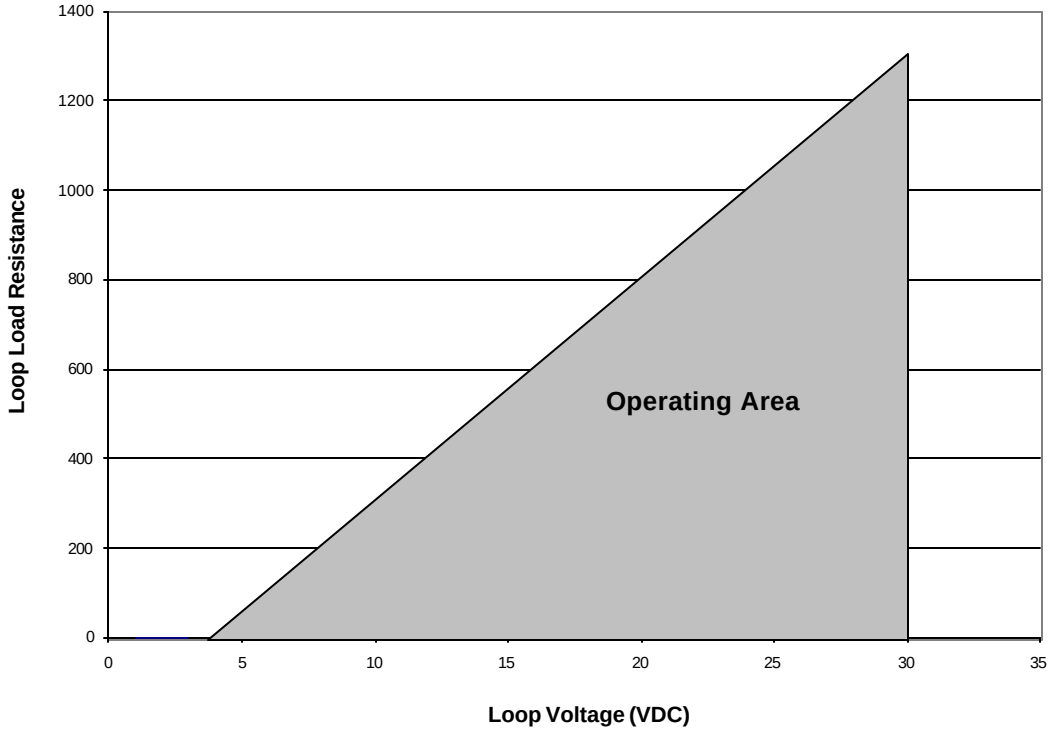


7.2 Digital Output

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

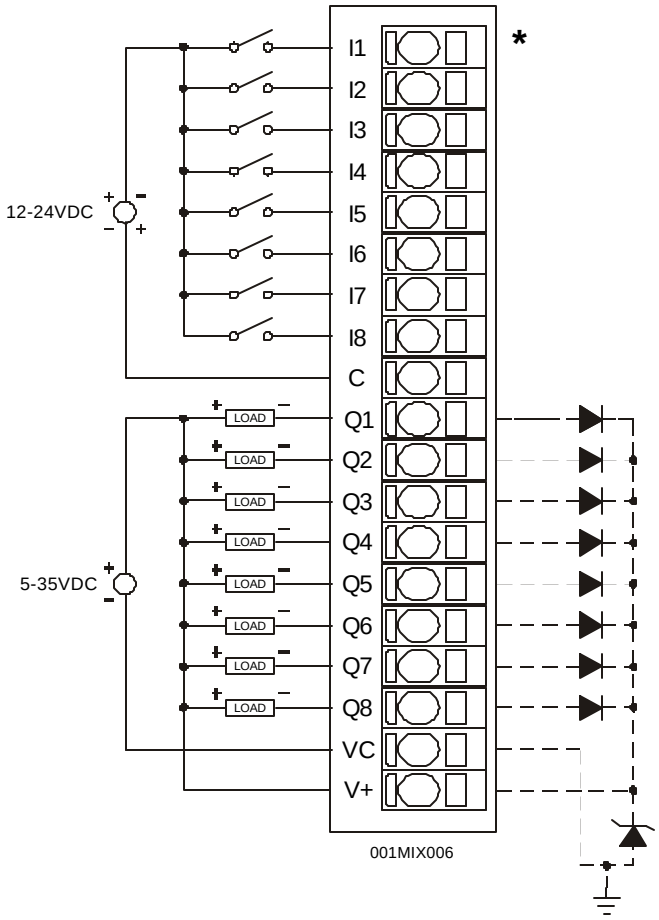
MAN0367-01

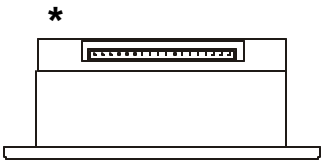
This Data Sheet is published individually & also as a part of the current version of Mini I/O Manual (MAN0581).
Information is subject to change without notice.

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)



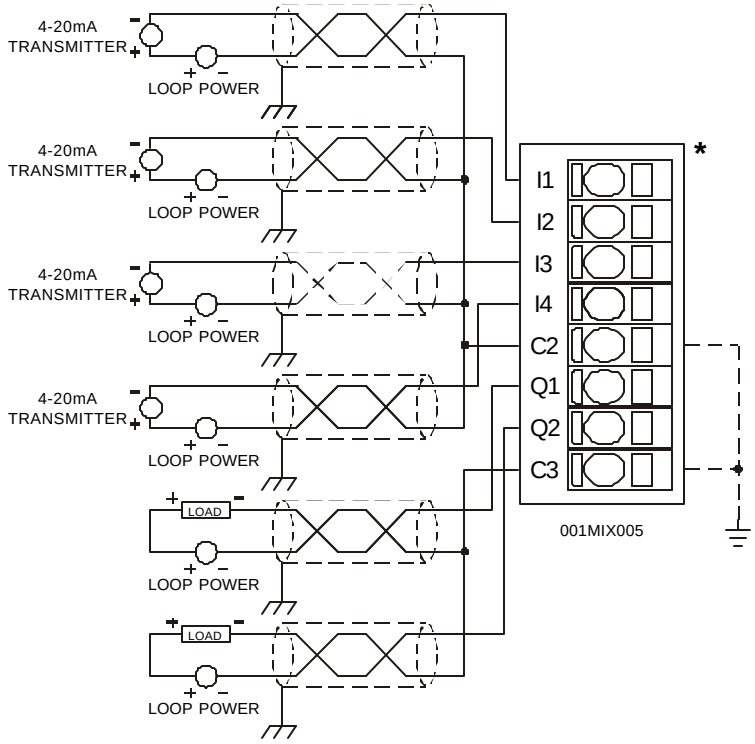


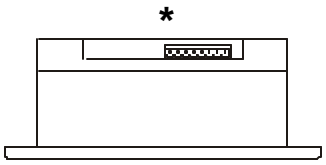
Mini Bottom View – Shows corresponding I/O pin location

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)

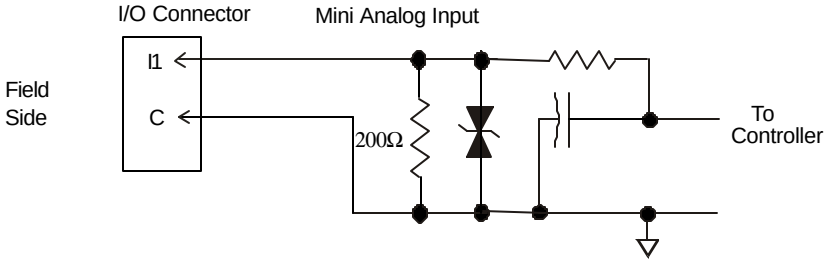


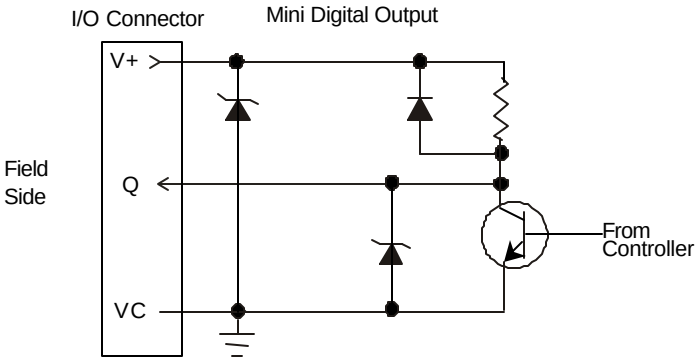


Mini Top View – Shows corresponding I/O pin location

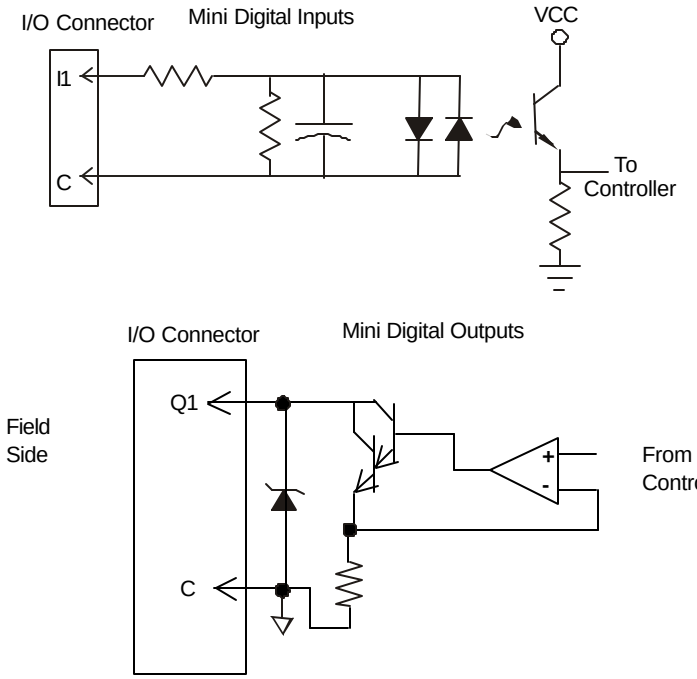
Pin	Analog In and Out
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
C2	Input Common
Q1	Output 1
Q2	Output 2
C3	Output Common

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.

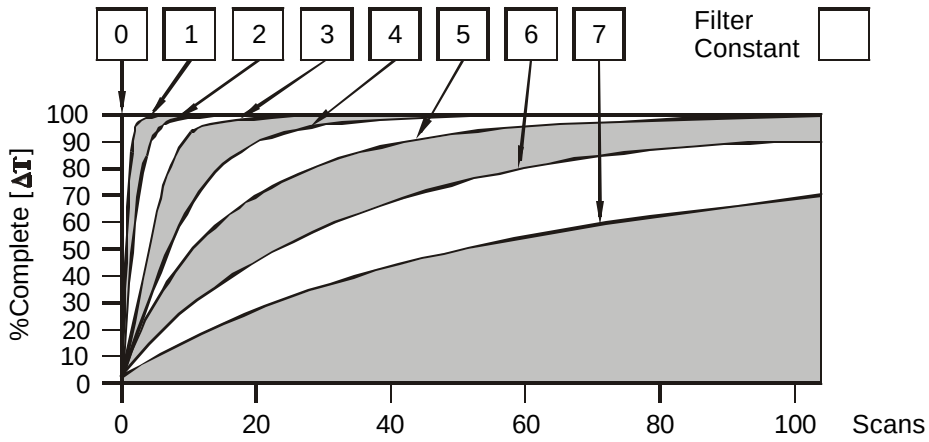
> **Warning:** The default turns the digital outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default settings.

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:

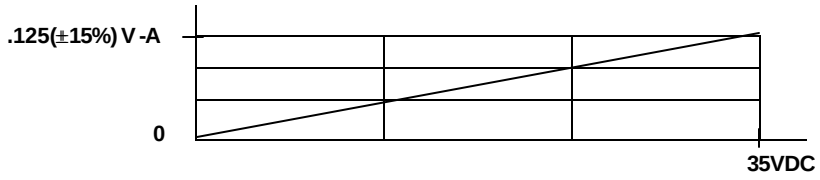
1. The desired output current is 12mA.
2. Using the table, the conversion factor for the current range of +20 mA is 0.000625.
3. To determine the data value, the formula is used:
   Data = Output Current (mA) / Conversion Factor
   19200 = 12mA / 0.000625

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

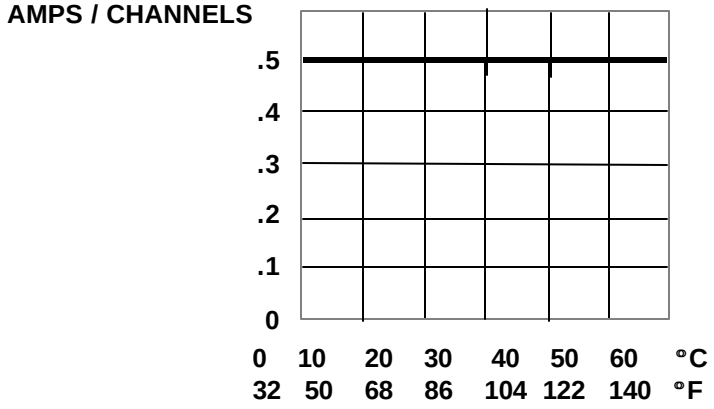
6.1 Digital Input

Digital Input Chart

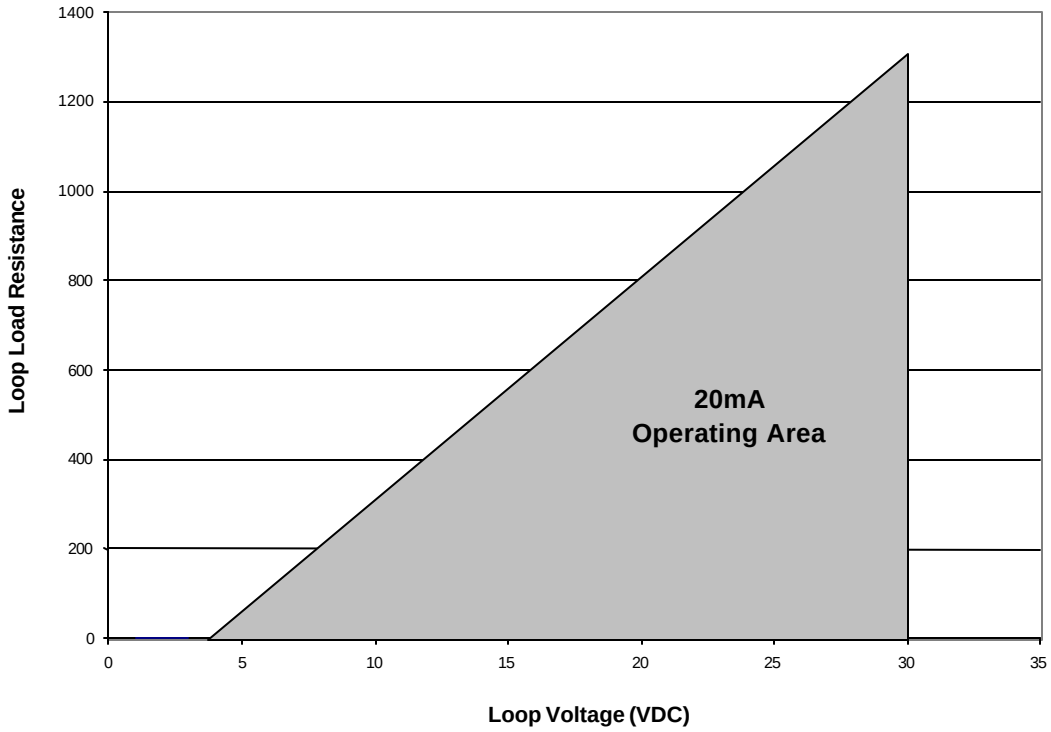


6.2 Digital Output

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

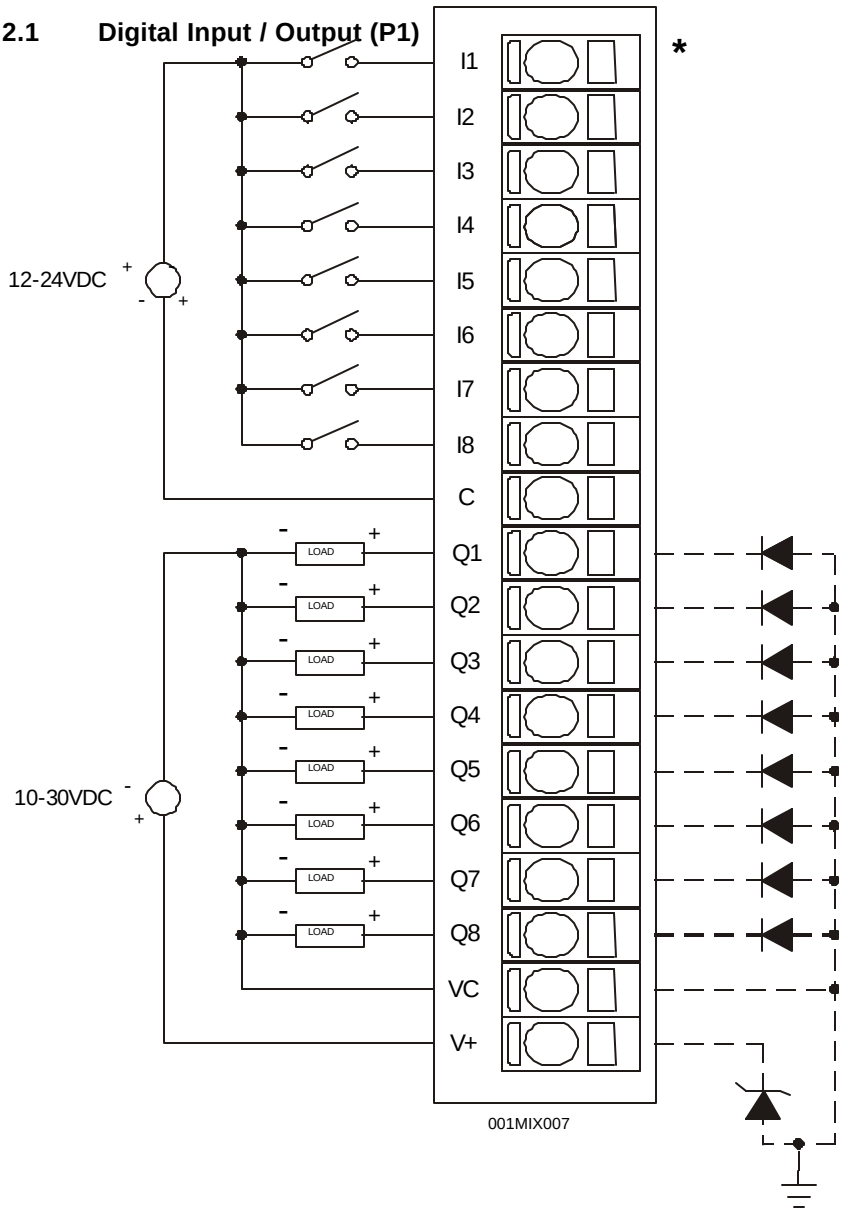
ANALOG INPUT			
Number of Channels	4	Analog Inputs Input Points Required	4
Input Ranges	Nominal: 4-20mA	Conversion Time (PLC Update Rate)	All channels updated once per PLC scan.
Resolution	12-Bits	Analog Isolation Channel to Channel and Channel to Common	1000VDC
Input Burden	50 Ohms + 3VDC, Clamped @ 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		

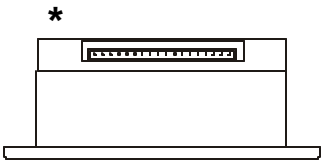
MAN0368-01

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 CE	See Compliance Table at http://www.heapg.com/Support/compliance.htm		

2 WIRING

2.1 Digital Input / Output (P1)

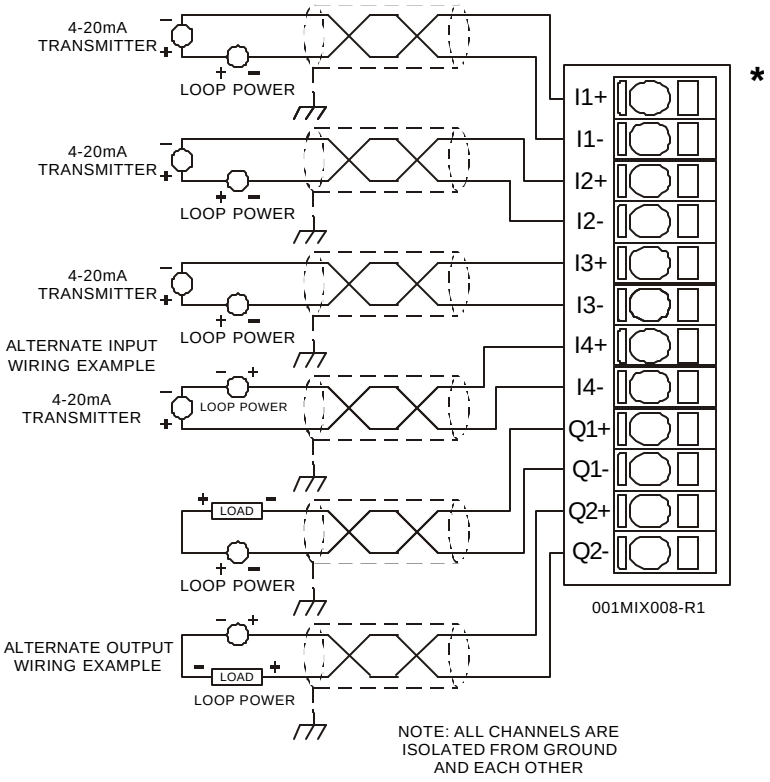


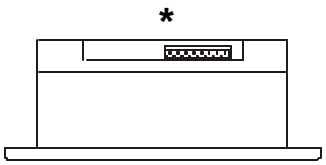


Mini Bottom View – Shows corresponding I/O pin location

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)

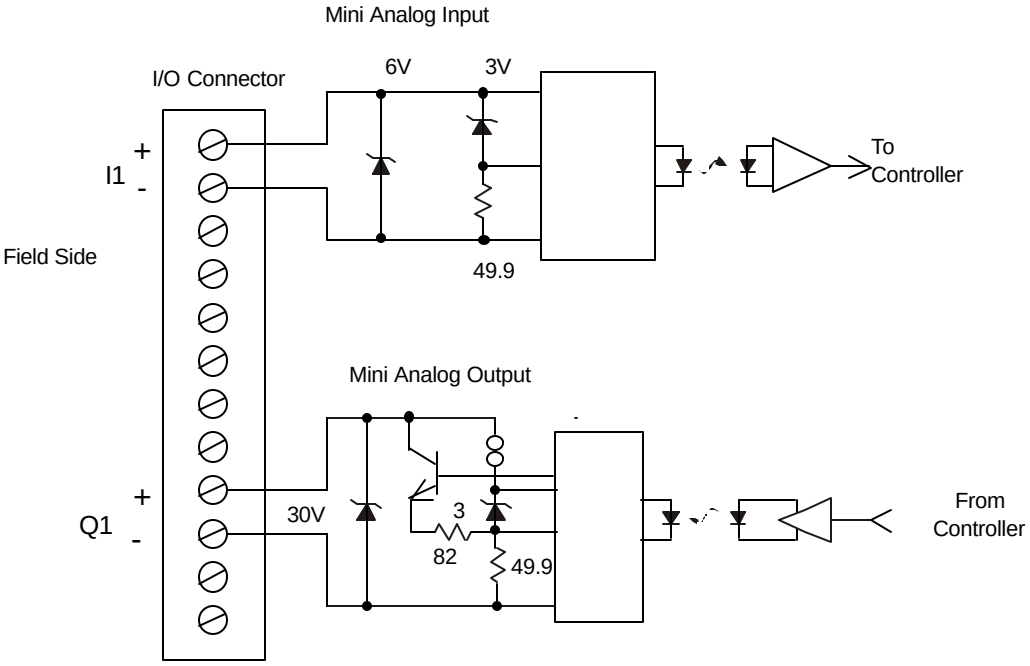




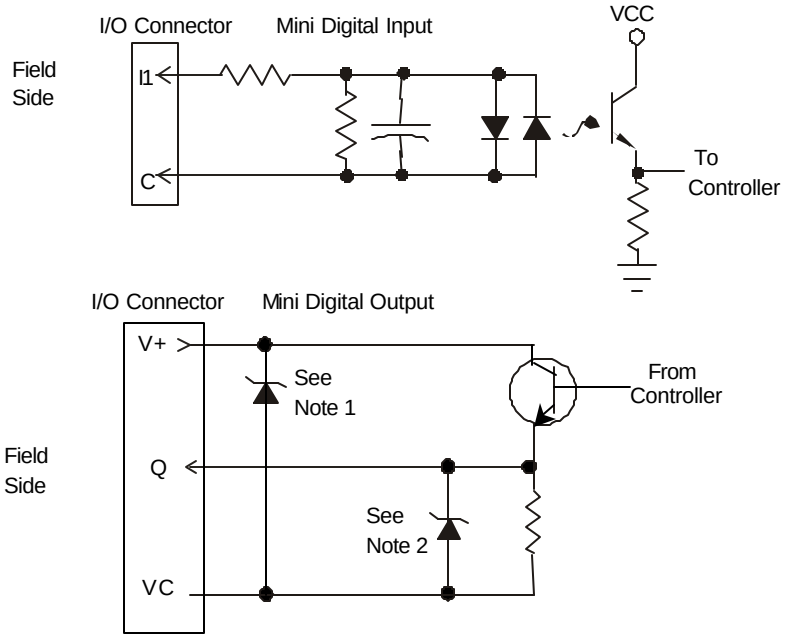
Mini Top View – Shows corresponding I/O pin location

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.

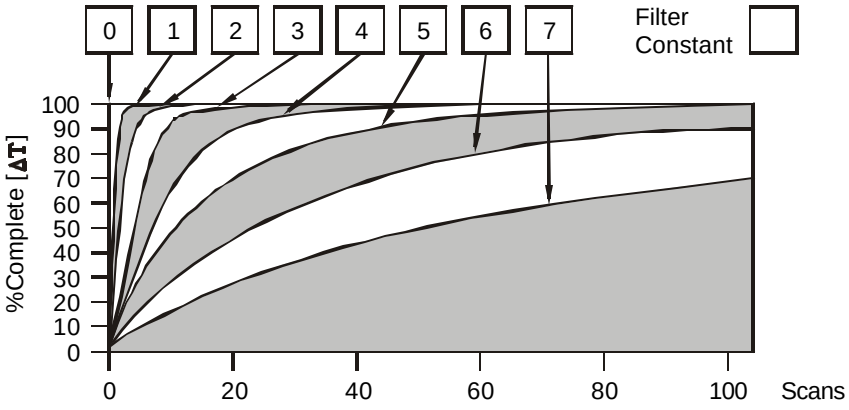
Warning: The default turns the digital outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default settings.

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

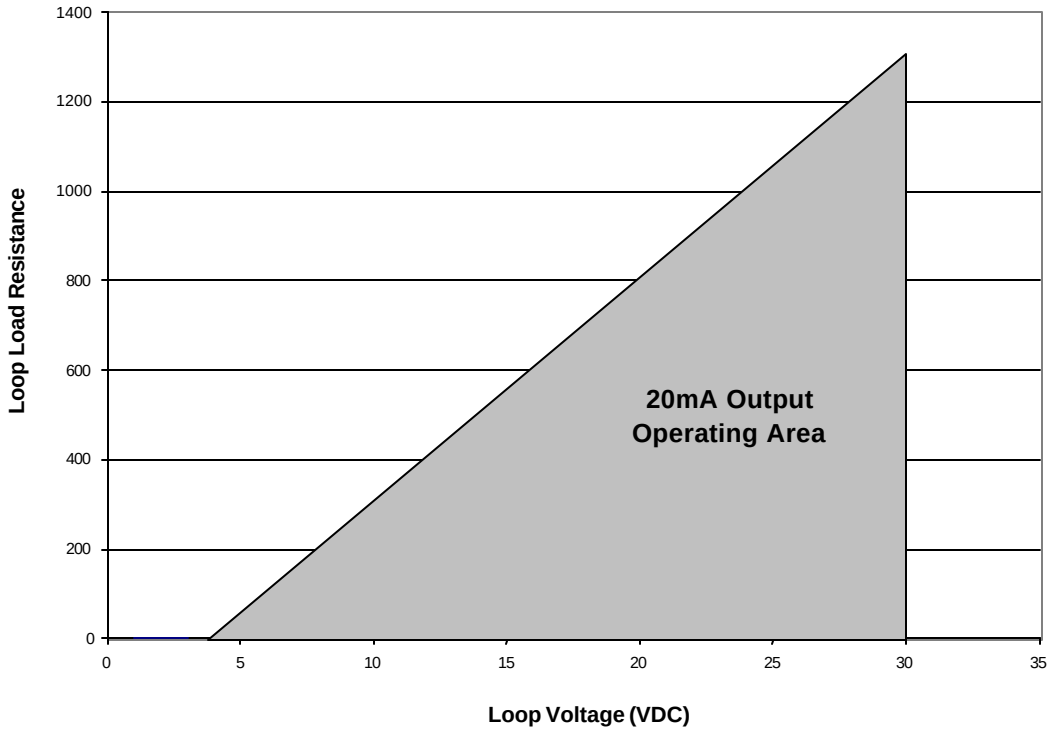
The following table describes how program data values are scaled to real-world analog voltage outputs by the module. Given a desired output current, the data value is converted by using the conversion factor from the table. The following formula is used: **Data = Output Current (mA) / Conversion Factor**

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

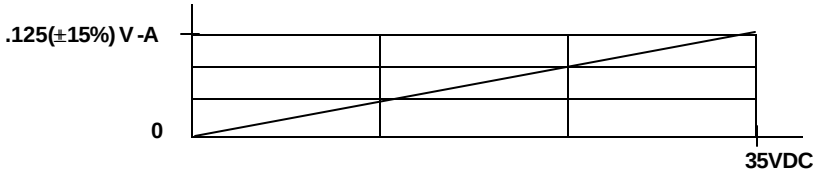
Conversion of Real-World Outputs into Controller			
Selected Current Range	**Output Current (mA)**	**Data**	**Conversion Factor**
4 – 20mA	20.00	32000	0.000625
	4.00	6400	

5.3 Output Operating Area

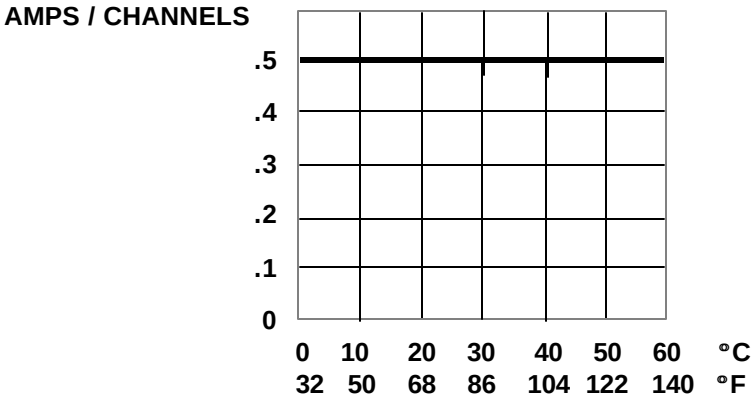


6 DIGITAL INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Chart



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.

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