



**Temperature I/O
Module**
HE500OCS048 / HE500OCS078
HE500RCS078

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	5 μ A
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 Output			
Number of Channels	2	Analog Output Registers Consumed by Cscape (%AQ)	2
Commons per Module	1	Additional error for temperatures other than 25°C	0.01% / °C
Output Ranges (including over-range)	20.47mA; Clamped @-0.5 - +33VDC Nominal	Maximum Error at 25°C	0.1%
Resolution	12 Bits	Load Impedance	$\leq 1.1k\Omega$ @ 24VDC Loop Voltage
Output Voltage	4 - 30VDC		
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		

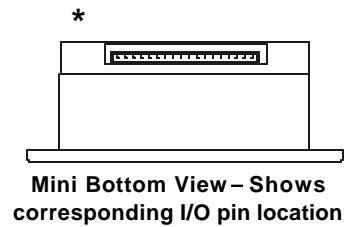
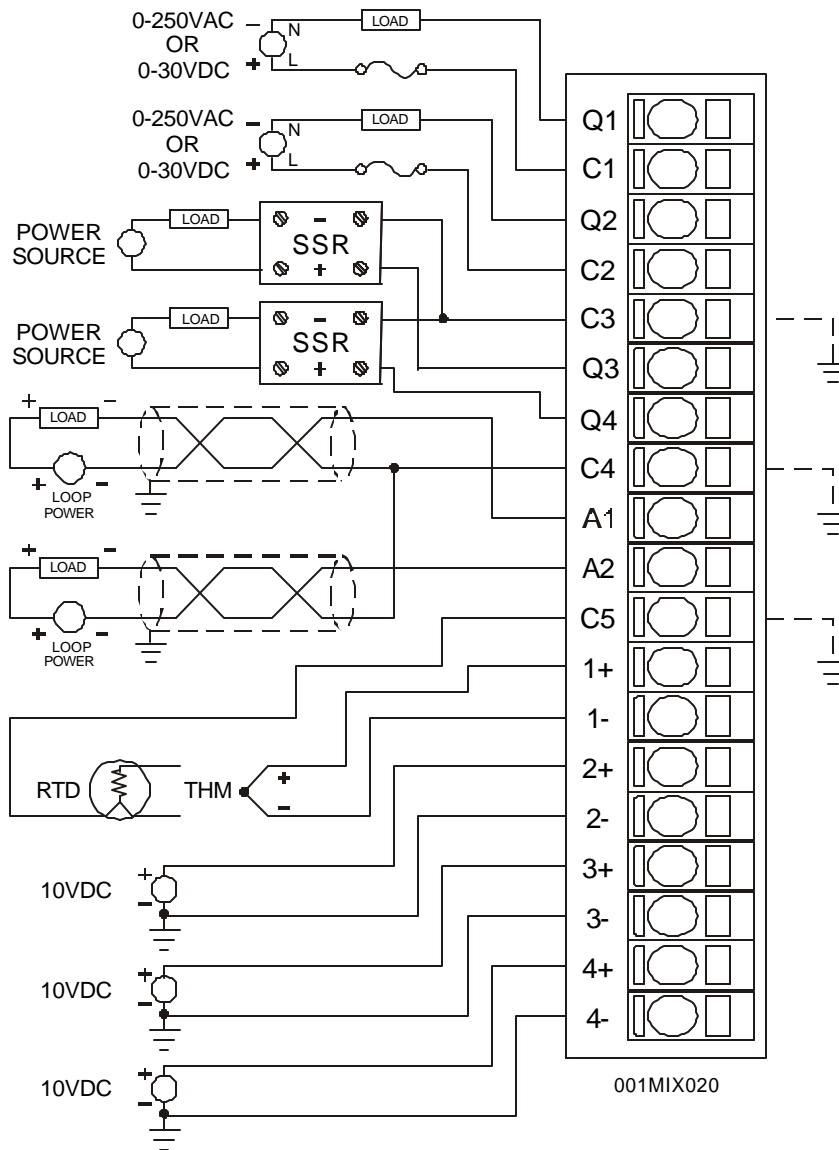
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Thermocouple Input				
Number of Channels	1 (Shared with RTD)		A/D Conversion Time	16 channels/second
Commons per Module	1 (for grounding shielded T/Cs only)		Analog Input Registers Consumed by Cscope (%AI)	1
Input Impedance	20Meg Ohm clamped @ ±24VDC		PLC Update Rate	400ms. For all channels
A/D Conversion Type	Integrating		Cold Junction	Internal
Types Supported	J, K, T, & E		Maximum Sustained Differential O/L	±15VDC
Open Thermocouple Response	High Temperature		Resolution	0.05°C
Thermocouple Common Mode Range	-10.5VDC to + 12VDC			
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 Input				
Number of Channels	1 (Shared with TC)		Input Transient Protection	Zener/Capacitor
Commons per Module	1		Resolution	0.05°C
Analog Input Registers Consumed by Cscope (%AI)	1		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	400ms. For all channels
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			

Voltage Inputs			
Number of Channels	3	A/D Conversion Time	16 channels/second
Commons per Module	1	Analog Input Registers Consumed (%AI)	3
Range	±10VDC	PLC Update Rate	400ms. For all channels
Accuracy	±0.05% of FS	Common Mode Rejection Ratio	50dB, typical
Input Impedance	1Megohm	Maximum Sustained Differential O/L	Limited by CMR
Input type	Pseudo Differential	Resolution	300uV
A/D Conversion Type	Integrating		
Common Mode Range	± 12VDC, Clamped		

Note: The negative voltage inputs are intended to be used to compensate for small ground errors and should be connected to a potential near ground for best accuracy.

2 WIRING



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+	10V Channel 2+
2-	10V Channel 2-
3+	10V Channel 3+
3-	10V Channel 3-
4+	10V Channel 4+
4-	10V Channel 4-

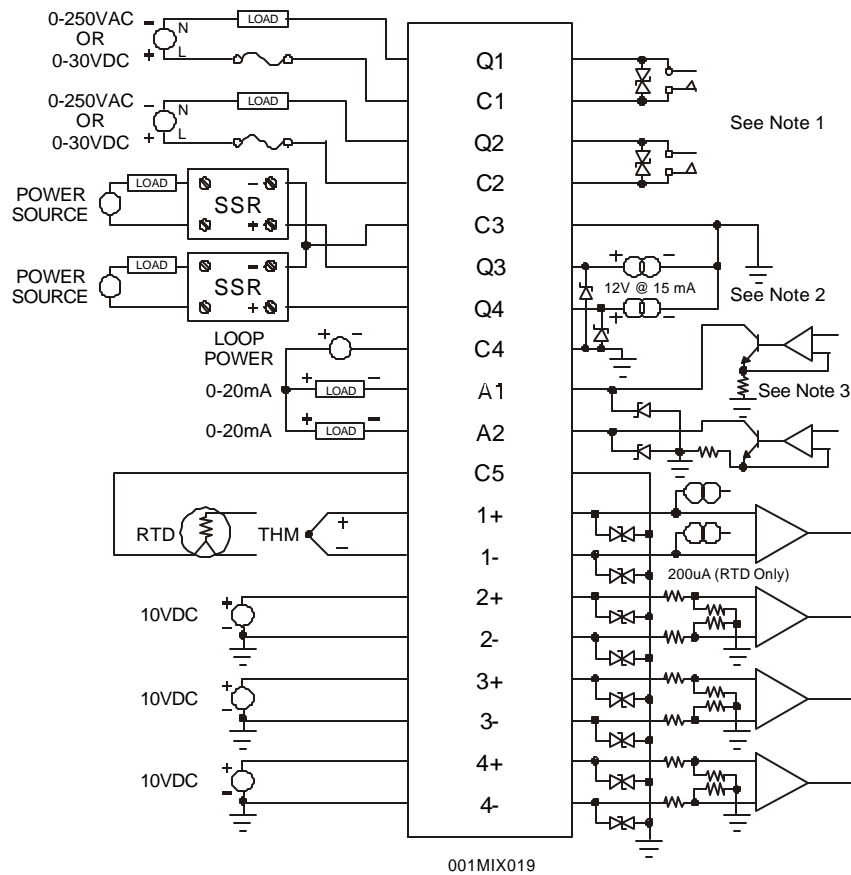
Note regarding Pin C5: The pin is not a THM common but is a thermocouple shielding termination point.

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

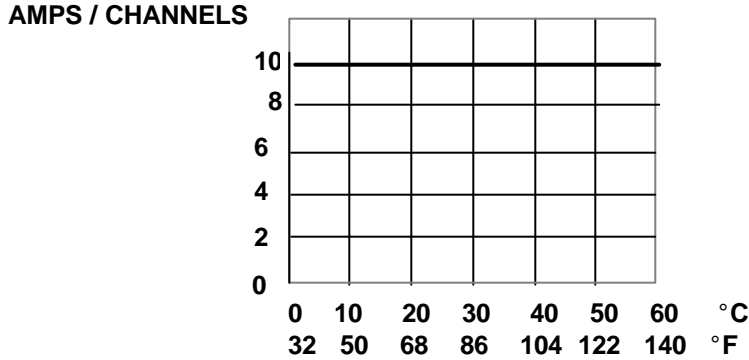
- a. Sensor Type for each channel must match what is physically attached.
- b. Temperature format may be set for various C° or F° ranges.
- c. Filter Constant sets the level of digital filtering according to the chart below.
- d. Reject Rates sets the frequency level for noise rejection at 50 or 60HZ.

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:

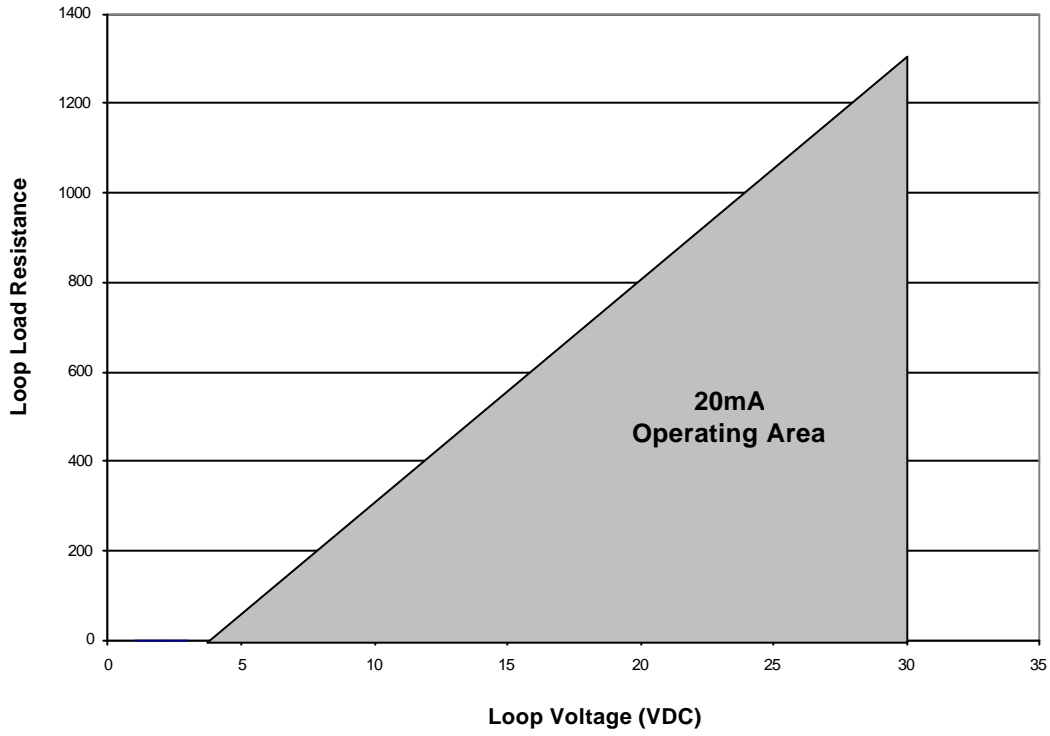
- The desired output current is 12mA.
- Using the table, the conversion factor for the current range of +20 mA is 0.000625.
- To determine the data value, the formula is used:

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

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

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

6.2 Operating Area



7 VOLTAGE INPUT CONVERSION FACTOR

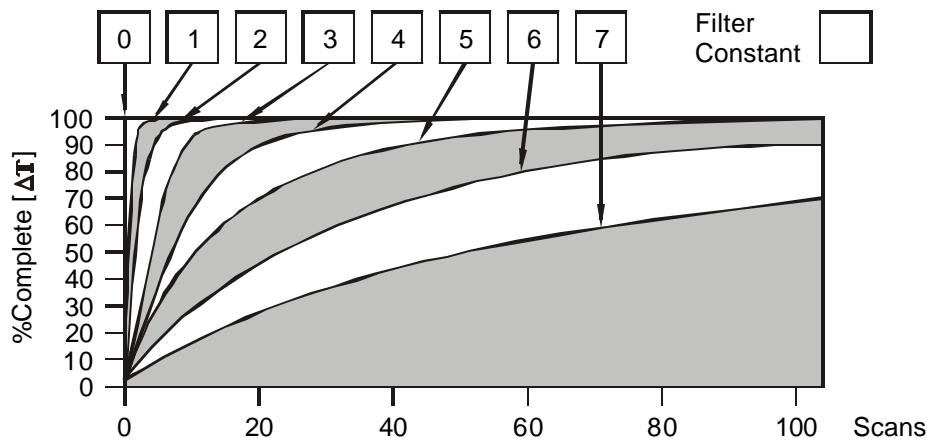
The following table describes how real-world inputs are scaled into the controller. Given a known input voltage, the register data value may be calculated by using the conversion factor from the table. The following formula is used: **Data = Voltage In / Conversion Factor**

Example: The voltage range is ±10 V:

1. The known input voltage is 6 VDC.
2. Using the table, the conversion factor for the range of ±10 V is .0003125.
3. To determine the data value, the formula is used: $\text{Data} = V_{in} / \text{Conversion Factor}$
 $19200 = 6 \text{ VDC} / 0.0003125$

Conversion of Real-World Inputs into Register Values			
Selected Range	Input mA or Volts	Data Out	Conversion Factor
±10.00 V	> +10.23	32767	0.0003125
	+10.00	32000	
	0.00	0	
	-10.00	-32000	
	< -10.23	-32768	

8 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°	$^{\circ}\text{C} = \%AI / 20 *$	$^{\circ}\text{F} = \%AI / 20 *$
0.1°	$^{\circ}\text{C} = \%AI / 10$	$^{\circ}\text{F} = \%AI / 10$
0.5°	$^{\circ}\text{C} = \%AI / 2$	$^{\circ}\text{F} = \%AI / 2$
* Maximum reading in 0.05°F or 0.05°C format is limited to 1638.3 because of %AI resolution.		

9 INSTALLATION / SAFETY

- All applicable codes and standards should be followed in the installation of this product.
- 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.
- Shielded, twisted-pair wiring should be used for best performance (analog I/O).
- Shields may be terminated at the module terminal strip.
- In severe applications, shields should be tied directly to the ground block within the panel.
- 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.

10 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