AC Power Monitor

Voltage Inputs
Current Inputs
HE800ACM200

1 SPECIFICATIONS

VOLTAGE INPUTS			
Input Range	120 three-phase Wye, 208V line to line	**Input Impedance**	1 Megohm to ground; External Potential Transformers (PTs) required
Overrange	50%	**Input Frequency**	50 to 70Hz
Conversion Time	Voltage values updated once per PLC scan	**Voltage Measurement**	Average scaled to RMS sine wave equivalent
Accuracy	0.2%	**Voltage Resolution**	0.1V
Filter Delay	Less than 2 line cycles	**Frequency**	Referenced to L1
Phase Accuracy	0.2°	**Frequency Resolution**	0.01Hz
Phase	Referenced to L1	**Frequency Accuracy**	0.1%
Phase Resolution	0.1°	**Frequency Measurement**	Values updated once per line cycle
Phase Measurement	Values updated once per line cycle		
CURRENT INPUTS			
AC Current	Three-phase 5A, External Current Transformers (CTs) required	**Common Mode**	1Vrms maximum to common. Each CT low input must be returned to common directly or through a suitable monitoring switch unit.
Overrange (See Note 1)	6A continuous 10A / 10 seconds.	**Input Frequency**	50 to 70Hz
Input Impedance	0.1 ohm, 1VA burden at 100%overload	**Current Measurement**	Average scaled to RMS sine wave equivalent
Accuracy	0.2%	**Resolution**	0.005A
Conversion Time	Current values updated once per PLC scan	**Filter Delay**	Less than 2 line cycles
Phase	Referenced to L1 voltage channel	**Phase Accuracy**	0.2°
Phase Resolution	0.1°	**Phase Measurement**	Values updated once per line cycle
Differential Phase	**See Note 2**	**Differential Phase Resolution**	0.1°
Differential Phase Accuracy	0.2°		
GENERAL SPECIFICATIONS			
Required Power (Steady State)	1.5 W (60mA @ 24VDC)	Relative Humidity	5 to 95% Non-condensing
Required Power (Inrush)	80mA @ 24VDC	Operating Temperature	0° to 60° Celsius
Connectors	Fixed, front access, spring	Weight	9 oz. (256 g)
Terminal Type	Spring Clamp, Removable	UL	SUP0259

Note 1: As an option, a measured, 60A, 1 second overload is available on current inputs. For this option, current amplitude accuracy is 1.0% up to 60A. Current phase accuracy also changes to 1 degree. Voltage phase accuracy is not affected

Note 2: Unit reports phase difference between itself and the next lower adjacent unit on the stack. Phase difference is the relative phase between L1 channels. If all four modules on stack are AC Monitor modules, the bottom unit reports the phase difference between itself and the top unit.

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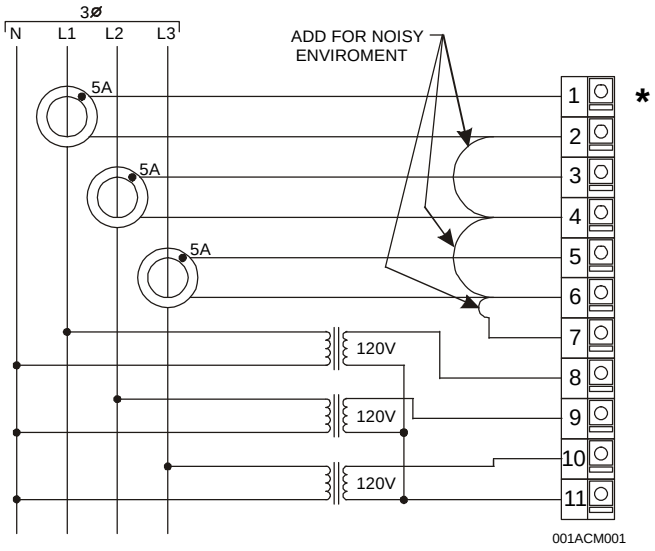
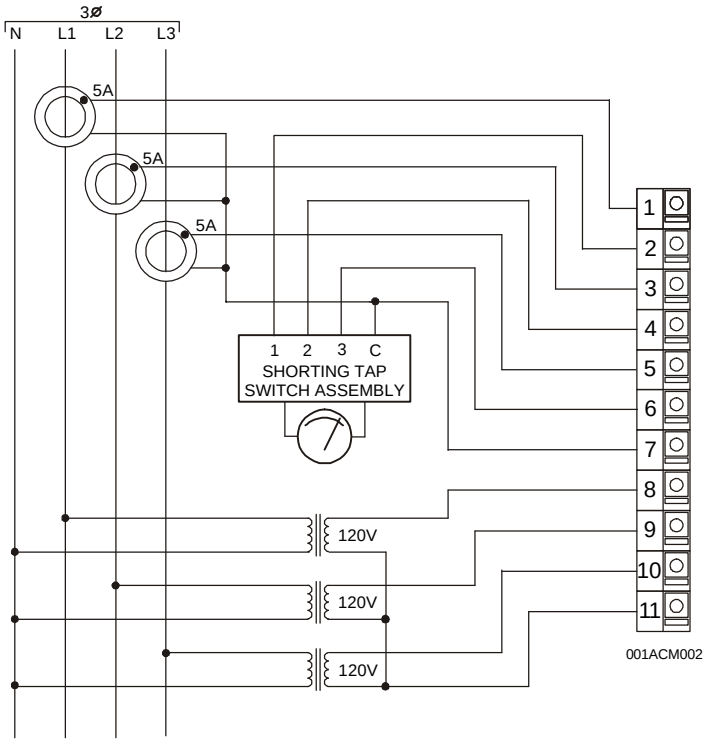
2 WIRING

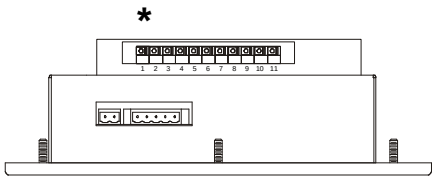


CT Mode: Return through Monitoring Switch

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



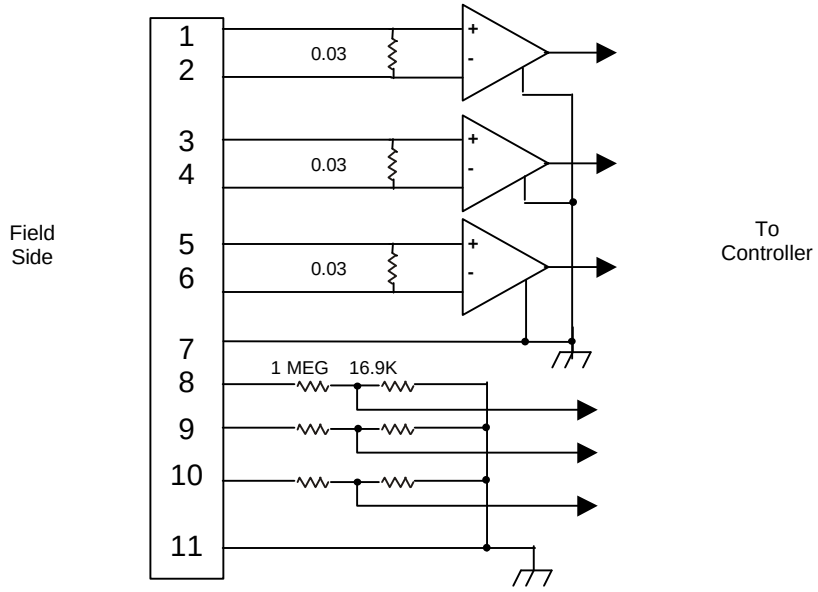
CT Mode: Return to Common Directly



OCS Bottom View – Shows corresponding I/O pin location for Pin 1. Also applies to RCS and Graphical OCS units.

Pin #	ACM200
1	Current Phase 1 In
2	Current Phase 1 Out
3	Current Phase 1 In
4	Current Phase 1 Out
5	Current Phase 1 In
6	Current Phase 1 Out
7	Current Sense Common (Connected to bus common)
8	Voltage Phase 1
9	Voltage Phase 2
10	Voltage Phase 3
11	Voltage Common (Connected to bus common)

3 INTERNAL CIRCUIT SCHEMATIC



4 CONFIGURATION

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

4.1 Software Configuration

Preliminary configuration procedures that are applicable to all SmartStack™ Modules are located in the Control Station Hardware Manual (MAN0227).

I/O Map Tab

The I/O Map describes which I/O registers are assigned to a specific SmartStack™ Module and where the module is located in the point map. The I/O Map is determined by the model number and location within the SmartStack™. The I/O Map is not edited by the user.

Phase and frequency values are referenced to the L1 voltage input.

%AI1	L1 Voltage Value
%AI2	L2 Voltage Value
%AI3	L3 Voltage Value
%AI4	L1 Current Value
%AI5	L2 Current Value
%AI6	L3 Current Value
%AI7	Differential Phase
%AI8	L2 Voltage Phase
%AI9	L3 Voltage Phase
%AI10	L1 Current Phase
%AI11	L2 Current Phase
%AI12	L3 Current Phase
%AI13	Frequency

5 INPUT CONVERSION FACTOR

a. Scaling Inputs

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 user selects a voltage of 120 Volts.

1. The known input voltage is 120 Volts.
2. Using the table, the conversion factor for 120 Volts is **0.1**.
3. To determine the data value, the formula is used: Data = Vin / Conversion Factor
   1200 = 120Volts / 0.1

Conversion of Real-World Inputs into Controller			
Range	**Input**	**%AI Value**	**Conversion Factor**
120 Volts	0	0	0.1
	120	1200	
5 Amps	0	0	0.005
	5	1000	
Frequency	60	6000	0.01
Phase	0	0	0.1
	- 180	- 1800	
	+ 180	+ 1800	

b. Calculation of Additional Power System Values

Using the %AI registers listed in Section 4.1:

Volt-Amperes for phase 1, VA1, is %AI1 times %AI4 divided by 2000
Volt-Amperes for phase 2, VA2, is %AI2 times %AI5 divided by 2000
Volt-Amperes for phase 3, VA3, is %AI3 times %AI6 divided by 2000
Total Volt-Amperes, VA, is the sum of VA1 plus VA2 plus VA3

Watts for phase 1, W1, is the product of VA1 and the cosine of the product of 0.0017453 and %AI10
Watts for phase 2, W2, is the product of VA2 and the cosine of the product of 0.0017453 and the difference between %AI8 and %AI11
Watts for phase 3, W3, is the product of VA3 and the cosine of the product of 0.0017453 and the difference between %AI9 and %AI12
Total power, W, is the sum of W1 plus W2 plus W3

Power Factor, PF, is W divided by VA
VAR is VA minus W

KWhr can be accumulated by setting a timer to trigger a calculation every 100 milliseconds for instance. The calculation consists of dividing W by 10, the reciprocal of the calculation interval in seconds and adding the result to a running Watt-second total, WS. Divide WS by 3,600,000 to display KWhr.

6 INSTALLATION / SAFETY

Warning: Remove power from the OCS controller, CAN port, and any peripheral equipment connected to this local system before adding or replacing this or any module.

a. 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 Chapter Two in the Control Station Hardware Manual (MAN0227). 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:

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

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

NOTES