



SmartMod Analog Output Module

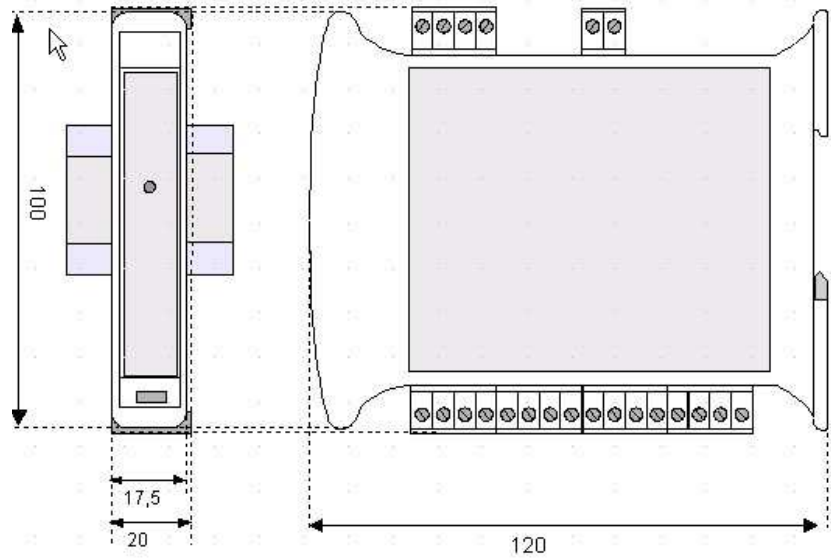
HE359DAC007 / HE359DAC107

Selectable 0-20mA or 0-10V 1 μ A or 1 mV Resolution



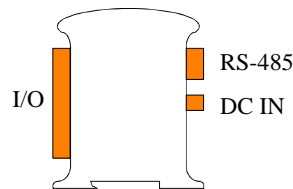
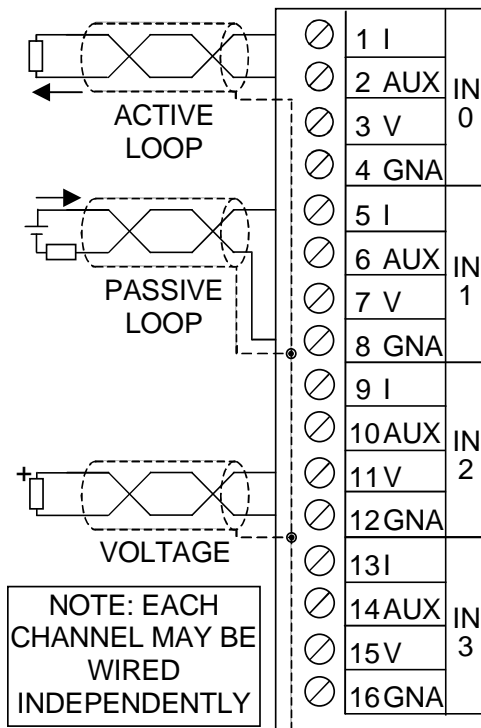
1 Specifications

	DAC007	DAC107		DAC007	DAC107
Number of Channels	2	4	Auxiliary Voltage	12V @ 20mA (4 channels)	
Output Ranges	0-20mA or 0-10V		Terminal Type	Screw Type, Removable	
Resolution	1 μ A or 1 mV		Storage Temp.	-40° to 85° Celsius	
Load Resistance	Voltage: >5Kohm Current: <500ohm		Operating Temp.	-10° to 60° Celsius	
			Relative Humidity	5 to 95% Non-condensing	
Output Calibration	Voltage: +/-10mV Current: +/-20uA		Dimensions WxHxD	17.5mm x 100mm x 120mm 0.69" x 3.94" x 4.72"	
			Weight	150g (6 oz.)	
External Power Supply Voltage	18-30Vdc		Communications	Modbus/RTU (binary) RS-485 half duplex	
Required Power (Steady State)	30mA @ 24Vdc, typical (100mA max)		Factory Default Communications Parameters	38400 baud, N, 8, 1, no h/s Default Modbus ID 1	
Required Power (Inrush)	Negligible		Supported Modbus Commands (family)	1,2,3,4,5,6,8,15,16	
Isolation	2000Vac for 60 seconds (Input/Power & Input/Comms)				
CE & UL Compliance	See Compliance Table at http://www.heapg.com/Pages/TechSupport/ProductCert.html				



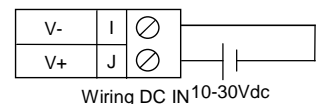
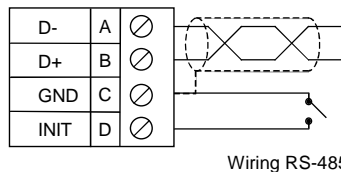
Dimensions in inches are 0.69"W x 3.95"H x 4.72"D
Note: Number of I/O terminal connections vary from model to model

2 Wiring - I/O



Pin #	DAC007	DAC107		Pin #	DAC007	DAC107	
1	I	I	OUT 0	9	I	OUT 2	
2	AUX	AUX		10	AUX		
3	V	V		11	V		
4	GNA	GNA		12	GNA		
5	I	I	OUT 1	13	I	OUT 3	
6	AUX	AUX		14	AUX		
7	V	V		15	V		
8	GNA	GNA		16	GNA		

Only Terminals 1 through 8 are present on the DAC007 model



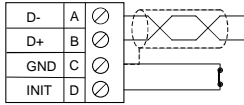
Notes:

Both ends of the RS-485 network should be terminated with a 100ohm, 1/4W, 1% resistor. Many OCS controllers feature dip switches or jumpers which enable appropriate termination if the OCS is located on a network end.

3 Init Default Setup

Communication parameters will be set to INIT default after performing the procedure:

1. Install jumper between INIT and GND terminals of the RS-485 port.
2. Apply power to Smartmod unit.
3. Read parameter words to see current parameters.
4. Write changes if necessary.



The INIT Default RS485 Settings Are:

Modbus ID = 1
 Baud rate = 9600
 Parity = None
 Stop Bits = 1
 Data Bits = 8
 No handshake

Note: There are 2 types of default settings possible:
 1. Factory default as described in section 1 (Specifications)
 2. Default after INIT as described in section 3 (INIT Default Setup)

4 Configuration DATA

SmartMod Configuration settings are mapped into Modbus Register space. This configuration data may be modified with any Modbus/RTU Master device. For convenience, Horner APG has developed a variety of Cscape application files which allow an OCS (X1e, NX, LX, QX) to act as a SmartMod configurator. Initial configuration of SmartMod module should be done on an individual basis, since all modules come from the factory with a default Modbus ID of 1. Once each module on the network has its own unique Modbus ID, further configuration adjustments can be made with the entire network powered.

All configuration parameters listed below (except 40012 Channel Enable) are stored in EPROM. That means they should not be constantly rewritten.

Configuration Parameters – Registers 40001 through 40013				
Modbus Register	Description	Min	Max	Default
40001-40005	Reserved			
40006	Communications Parameters	See Table		38.4kbaud, N, 8, 1, RTU Mode
40007	Modbus ID	1	255	1
40008	Rx/Tx Delay (in 2mS steps)	0	255	0mS
40009	Watchdog Timer (in 0.5s steps)	0	255	10 (5s)
40010	Modbus Coil Data	Not Configuration Data – See I/O Data		
40011		Reserved		
40012		Reserved		
40013		Reserved		
40014	Output Type	See Table		0 (All Channels Current)

Register 40006 (Communications Parameters) Bit Definition							
Bits 7-15	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Unused	Mode	Parity		Data Bits	Baud Rate		
0 = ASCII Mode	0	Value	Meaning	0 = 7 Data Bits	Value	Meaning	
		0	Mark		0	1200 baud	
	1	Even	1		2400 baud		
	2	Odd	2		4800 baud		
1 = RTU Mode	3	Space	1 = 8 Data Bits	3	9600 baud		
				4	19200 baud		
		5-7		38400 baud			

Register 40014 (Output Type) Bit Definition				
Bit 4-15	Bit 3	Bit 2	Bit 1	Bit 0
Unused	Output 3	Output 2	Output 1	Output 0
	0 = Current (0-20mA)			
	1 = Voltage (0-10V)			

5 Input/Output DATA

SmartMod Analog I/O utilizes both Modbus Registers (40001-40030) and Coils (1-11). It is possible to access all data using Registers only, because the Coils can be accessed through Register 40010.

The following tables lists all Modbus I/O data available.

I/O Register Data (Registers 40010-40026)					
Modbus Register	Description	Access	Minimum	Maximum	Units
40010	Mirror of Coil Data	Read/Write	n/a	n/a	n/a
40015	Output 0	Read/Write	0	20000	1uA or 1mV
40016	Output 1	Read/Write	0	20000	1uA or 1mV
40017	Output 2	Read/Write	0	20000	1uA or 1mV
40018	Output 3	Read/Write	0	20000	1uA or 1mV
40019-40022	Reserved				
40023	Default/Safe Value Out 0	Read/Write	0	20000	1uA or 1mV
40024	Default/Safe Value Out 1	Read/Write	0	20000	1uA or 1mV
40025	Default/Safe Value Out 2	Read/Write	0	20000	1uA or 1mV
40026	Default/Safe Value Out 3	Read/Write	0	20000	1uA or 1mV

Modbus Coil	Description	Access
00009	Watchdog Enabled	Read/Write
00010	Watchdog Event	Read/Write
00011	Power-up Event	Read/Write

Watchdog Event & Power-up Event Operation

If Coil 9 (Watchdog Enabled) is set, Coil 10 (Watchdog Event) will set if the Watchdog Timeout value is exceeded. The Watchdog Timeout value is set in Register 40009. When set, Coil 10 can be reset by the controller when normal communications resumes.

The Power-up Event (Coil 11) is set every time the power is applied. It can be cleared by the controller if desired.

Modbus Register	Description	Access
40010 bit 0	Watchdog Enabled	Read/Write
40010 bit 1	Watchdog Event	Read/Write
40010 bit 2	Power-up Event	Read/Write

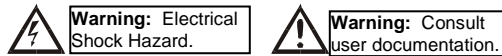
6 Installation / safety

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 8441.

For detailed installation and a [handy checklist](#) that covers panel box layout requirements and minimum clearances, refer to the hardware manual of the controller you are using.

When found on the product, the following symbols specify:



7 Technical Support

Technical Support at the following locations:

North America:
 Tel: 317 916-4274
 Fax: 317 639-4279
 Web: <http://www.heapg.com>
 Email: techsppt@heapg.com

Europe:
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 Fax: +353-21-4321826
 Web: <http://www.horner-apg.com>
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