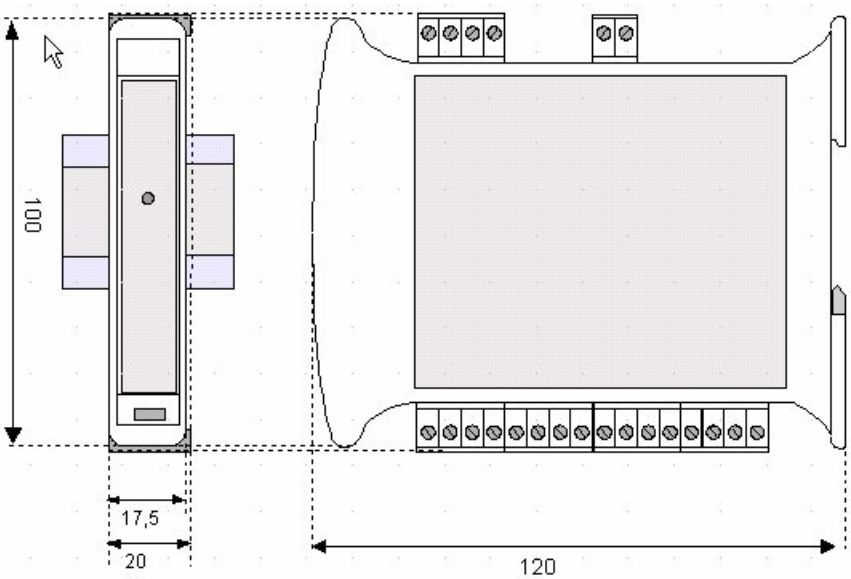
SmartMod
+/-10V Analog Input Module
HE359ADC107 / HE359ADC207
16-Bit Resolution

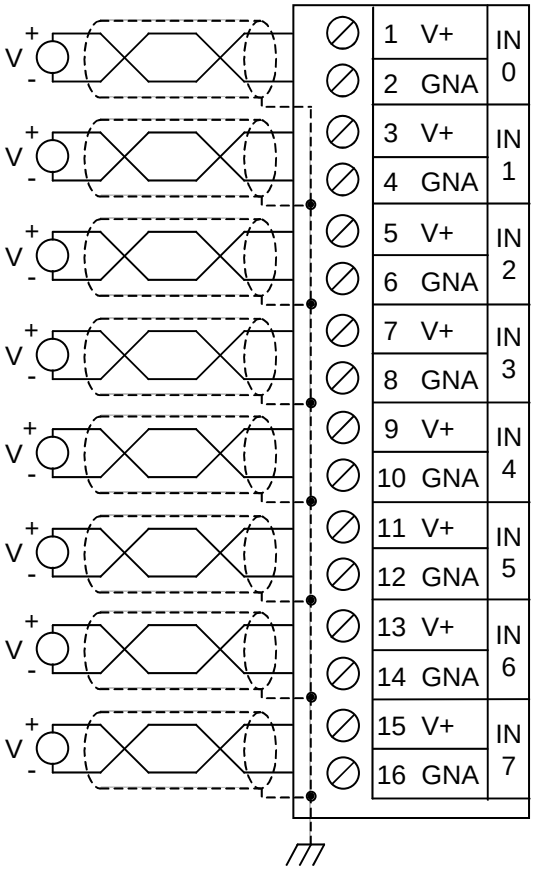
1 SPECIFICATIONS

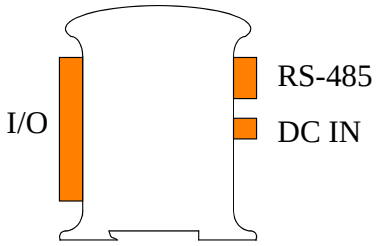
	ADC107	ADC207			ADC107	ADC207
Number of Channels	4	8		Conversion Time (PLC Update Rate)	Determined by Communications w/OCS	
Input Ranges	+/-10V			Terminal Type	Screw Type, Removable	
Resolution	Approximately 16-Bit			Storage Temp.	-40° to 85° Celsius	
Input Impedance	1MOhm			Operating Temp.	-10° to 60° Celsius	
				Relative Humidity	5 to 95% Non-condensing	
Linearity	+/-0.1%			Dimensions WxHxD	17.5mm x 100mm x 120mm 0.69" x 3.94" x 4.72"	
External Power Supply Voltage	10-30Vdc			Weight	150g (6 oz.)	
Required Power (Steady State)	30mA @ 24Vdc, typical			Communications	Modbus/RTU (binary) RS-485 half duplex	
Required Power (Inrush)	Negligible			Default Comms. Parameters	38400 baud, N, 8, 1, no h/s Default Modbus ID 1	
Isolation	2000Vac for 60 seconds (Input/Power & Input/Comms)			Supported Modbus Commands	1,2,3,4,5,6,8,15,16	
CE & UL Compliance	See Compliance Table at http://www.heapg.com/Support/compliance.htm					



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

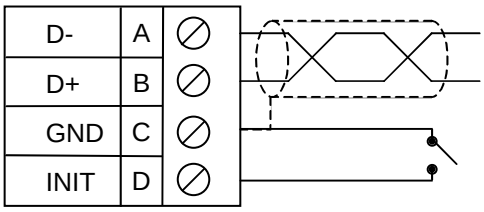
2 WIRING – I/O



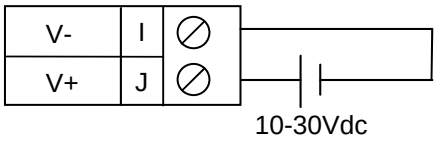


Pin #	ADC107	ADC207
1	INPUT 0+	INPUT 0+
2	ANALOG COMMON	ANALOG COMMON
3	INPUT 1+	INPUT 1+
4	ANALOG COMMON	ANALOG COMMON
5	INPUT 2+	INPUT 2+
6	ANALOG COMMON	ANALOG COMMON
7	INPUT 3+	INPUT 3+
8	ANALOG COMMON	ANALOG COMMON
9	Only Terminals 1 through 8 are present on the ADC107 model	INPUT 4+
10		ANALOG COMMON
11		INPUT 5+
12		ANALOG COMMON
13		INPUT 6+
14		ANALOG COMMON
15		INPUT 7+
16		ANALOG COMMON

WIRING – RS-485

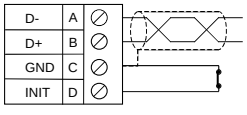


WIRING – DC IN



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..

Init Default Setup:
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

3 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 (Xle, 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	Input Type	4	4	4 (+/-10V)
40012	Channel Enable	See Table		255 (Channels 1-8 enabled)
40013	Reserved			

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	Value	Meaning	0 = 7 Data Bits	Value	Meaning	
		0	Mark		0	1200 baud	
		1	Even		1	2400 baud	
	1 = RTU Mode	2	Odd	1 = 8 Data Bits	2	4800 baud	
		3	Space		3	9600 baud	
					4	19200 baud	
					5-7	38400 baud	

Register 40012 (Channel Enable) Bit Definition								
Bit 8-15	**Bits 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Unused	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
	0 = Disable Input							
	1 = Enable Input							

4 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 40014-40022)					
Modbus Register	**Description**	**Access**	**Minimum**	**Maximum**	**Units**
40010	Mirror of Coil Data	Read/Write	n/a	n/a	n/a
40014	Cold Junction Temperature	Read-only	-1000	6000	0.01 degrees C
40015	Input 0	Read-only	-10000	10000	1mV (0.001V)
40016	Input 1	Read-only	-10000	10000	1mV (0.001V)
40017	Input 2	Read-only	-10000	10000	1mV (0.001V)
40018	Input 3	Read-only	-10000	10000	1mV (0.001V)
40019	Input 4	Read-only	-10000	10000	1mV (0.001V)
40020	Input 5	Read-only	-10000	10000	1mV (0.001V)
40021	Input 6	Read-only	-10000	10000	1mV (0.001V)
40022	Input 7	Read-only	-10000	10000	1mV (0.001V)

Modbus Coil	**Description**	**Access**
00001	Open Detect Input 0	Read/Write
00002	Open Detect Input 1	Read/Write
00003	Open Detect Input 2	Read/Write
00004	Open Detect Input 3	Read/Write
00005	Open Detect Input 4	Read/Write
00006	Open Detect Input 5	Read/Write
00007	Open Detect Input 6	Read/Write
00008	Open Detect Input 7	Read/Write
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.

5 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. (See the **Additional References** section in this document.)

When found on the product, the following symbols specify:

Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

6 TECHNICAL SUPPORT

For assistance and manual up-dates, contact Technical Support at the following locations:

Helpdesk: http://www.horner-apg.com/helpdesk

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

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

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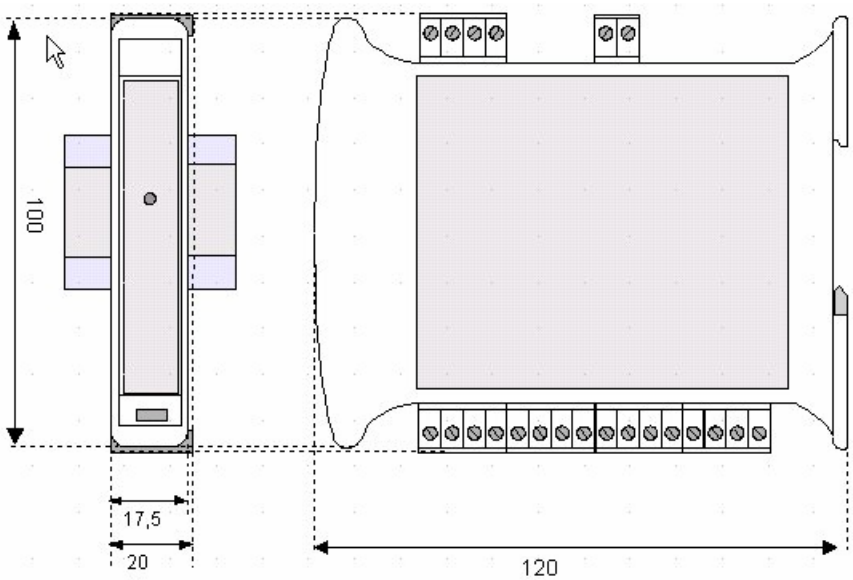
NOTES

SmartMod
20mA Analog Input Module
HE359ADC120 / HE359ADC220
16-Bit Resolution

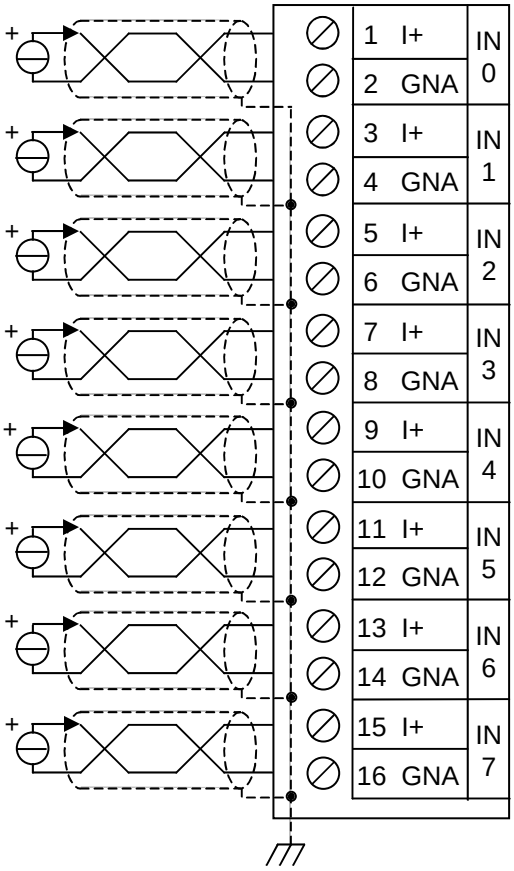
1 SPECIFICATIONS

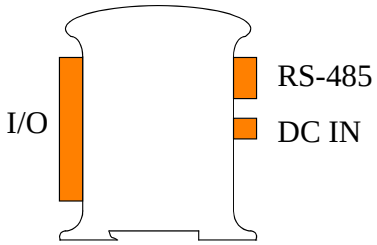
	ADC120	ADC220			ADC120	ADC220
Number of Channels	4	8		Conversion Time (PLC Update Rate)	Determined by Communications w/OCS	
Input Ranges	+/-20mA			Terminal Type	Screw Type, Removable	
Resolution	16-Bit			Storage Temp.	-40° to 85° Celsius	
Input Impedance	<50 Ohms			Operating Temp.	-10° to 60° Celsius	
				Relative Humidity	5 to 90% Non-condensing	
Linearity	+/-0.1%			Dimensions WxHxD	17.5mm x 100mm x 120mm 0.69" x 3.94" x 4.72"	
External Power Supply Voltage	10-30Vdc			Weight	150g (6 oz.)	
Required Power (Steady State)	30mA @ 24Vdc, typical			Communications	Modbus/RTU (binary) RS-485 half duplex	
Required Power (Inrush)	Negligible			Default Comms. Parameters	38400 baud, N, 8, 1, no h/s Default Modbus ID 1	
Isolation	2000Vac for 60 seconds (Input/Power & Input/Serial)			Supported Modbus Commands	1,2,3,4,5,6,8,15,16	
CE & UL Compliance	See Compliance Table at http://www.heapg.com/Support/compliance.htm					



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

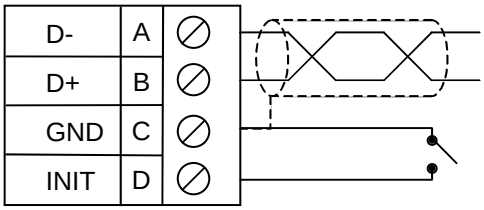
2 WIRING – I/O



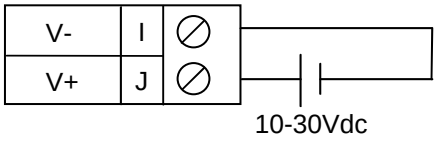


Pin #	ADC120	ADC220
1	INPUT 0+	INPUT 0+
2	ANALOG COMMON	ANALOG COMMON
3	INPUT 1+	INPUT 1+
4	ANALOG COMMON	ANALOG COMMON
5	INPUT 2+	INPUT 2+
6	ANALOG COMMON	ANALOG COMMON
7	INPUT 3+	INPUT 3+
8	ANALOG COMMON	ANALOG COMMON
9	Only Terminals 1 through 8 are present on the ADC120 model	INPUT 4+
10		ANALOG COMMON
11		INPUT 5+
12		ANALOG COMMON
13		INPUT 6+
14		ANALOG COMMON
15		INPUT 7+
16		ANALOG COMMON

WIRING – RS-485

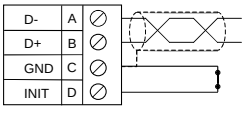


WIRING – DC IN



Notes:
Both ends of the RS-485 network should be terminated with a 100 Ohms, 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..

Init Default Setup:
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

3 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 (Xle, 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	Input Type	6	6	6 (+/-20mA)
40012	Channel Enable	See Table		255 (Channels 1-8 enabled)
40013	Reserved			

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	Value	Meaning	0 = 7 Data Bits	Value	Meaning	
		0	Mark		0	1200 baud	
		1	Even		1	2400 baud	
	1 = RTU Mode	2	Odd	1 = 8 Data Bits	2	4800 baud	
		3	Space		3	9600 baud	
					4	19200 baud	
					5-7	38400 baud	

Register 40012 (Channel Enable) Bit Definition								
Bit 8-15	**Bits 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Unused	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
	0 = Disable Input							
	1 = Enable Input							

4 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 40014-40022)					
Modbus Register	**Description**	**Access**	**Minimum**	**Maximum**	**Units**
40010	Mirror of Coil Data	Read/Write	n/a	n/a	n/a
40014	Cold Junction Temperature	Read-only	-1000	6000	0.01 degrees C
40015	Input 0	Read-only	-20000	+20000	1µA (0.001mA)
40016	Input 1	Read-only	-20000	+20000	1µA (0.001mA)
40017	Input 2	Read-only	-20000	+20000	1µA (0.001mA)
40018	Input 3	Read-only	-20000	+20000	1µA (0.001mA)
40019	Input 4	Read-only	-20000	+20000	1µA (0.001mA)
40020	Input 5	Read-only	-20000	+20000	1µA (0.001mA)
40021	Input 6	Read-only	-20000	+20000	1µA (0.001mA)
40022	Input 7	Read-only	-20000	+20000	1µA (0.001mA)

Modbus Coil	**Description**	**Access**
00001	Open Detect Input 0	Read/Write
00002	Open Detect Input 1	Read/Write
00003	Open Detect Input 2	Read/Write
00004	Open Detect Input 3	Read/Write
00005	Open Detect Input 4	Read/Write
00006	Open Detect Input 5	Read/Write
00007	Open Detect Input 6	Read/Write
00008	Open Detect Input 7	Read/Write
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.

5 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 being used. (See the **Additional References** section in this document.)

When found on the product, the following symbols specify:

Warning: Consult user documentation.

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

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

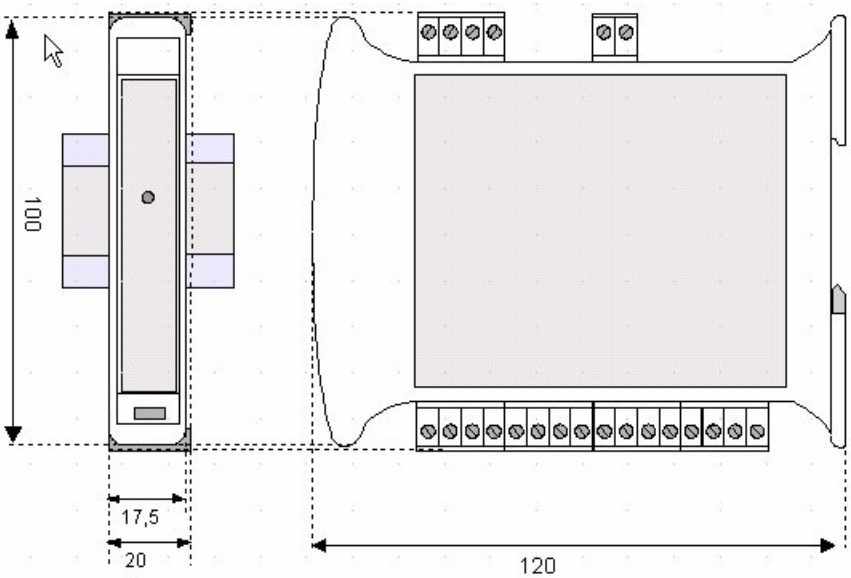
NOTES

Information is subject to change without notice.

SmartMod
Analog Output Module
HE359DAC007 / HE359DAC107
Selectable 0-20mA or 0-10V
1 µA or 1 mV Resolution

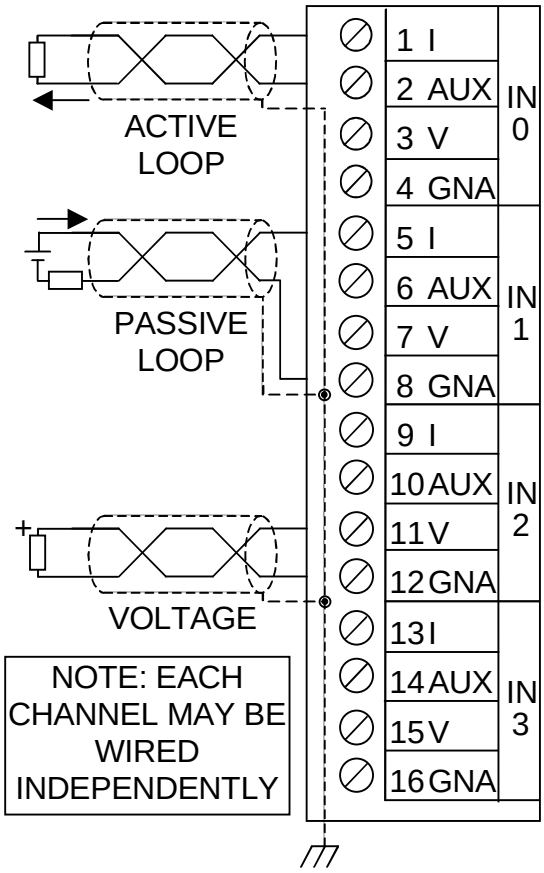
1 SPECIFICATIONS

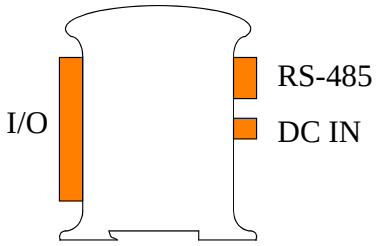
	DAC007	DAC107			DAC007	DAC107
Number of Channels	2	4		Auxiliary Voltage	12V @ 20mA (4 channels)	
Output Ranges	0-20mA or 0-10V			Terminal Type	Screw Type, Removable	
Resolution	1 µA or 1 mV			Storage Temp.	-40° to 85° Celsius	
Load Resistance	Voltage: >5Kohm Current: <500ohm			Operating Temp.	-10° to 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"	
External Power Supply Voltage	18-30Vdc			Weight	150g (6 oz.)	
Required Power (Steady State)	30mA @ 24Vdc, typical (100mA max)			Communications	Modbus/RTU (binary) RS-485 half duplex	
Required Power (Inrush)	Negligible			Default Comms. Parameters	38400 baud, N, 8, 1, no h/s Default Modbus ID 1	
Isolation	2000Vac for 60 seconds (Input/Power & Input/Comms)			Supported Modbus Commands (family)	1,2,3,4,5,6,8,15,16	
CE & UL Compliance	See Compliance Table at http://www.heapg.com/Support/compliance.htm					



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

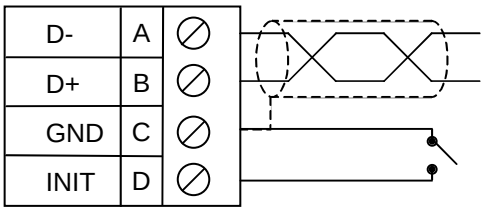
2 WIRING – I/O



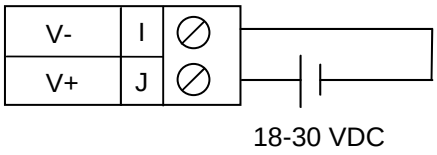


Pin #	DAC007	DAC107	
1	I	I	OUT 0
2	AUX	AUX	
3	V	V	
4	GNA	GNA	
5	I	I	OUT 1
6	AUX	AUX	
7	V	V	
8	GNA	GNA	
9	Only Terminals 1 through 8 are present on the DAC007 model	I	OUT 2
10		AUX	
11		V	
12		GNA	
13		I	OUT 3
14		AUX	
15		V	
16		GNA	

WIRING – RS-485

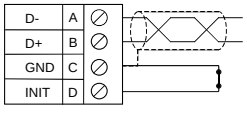


WIRING – DC IN



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..

Init Default Setup:
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.



Information is subject to change without notice.

The INIT Default RS485 Settings Are:
Modbus ID = 1
Baud rate = 9600
Parity = None
Stop Bits = 1

3 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 (Xle, 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	Value	Meaning	0 = 7 Data Bits	Value	Meaning	
		0	Mark		0	1200 baud	
		1	Even		1	2400 baud	
	1 = RTU Mode	2	Odd	1 = 8 Data Bits	2	4800 baud	
		3	Space		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)			

4 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

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

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.

5 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. (See the **Additional References** section in this document.)

When found on the product, the following symbols specify:

Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

6 TECHNICAL SUPPORT

For assistance and manual up-dates, contact Technical Support at the following locations:

Helpdesk: http://www.horner-apg.com/helpdesk

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

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

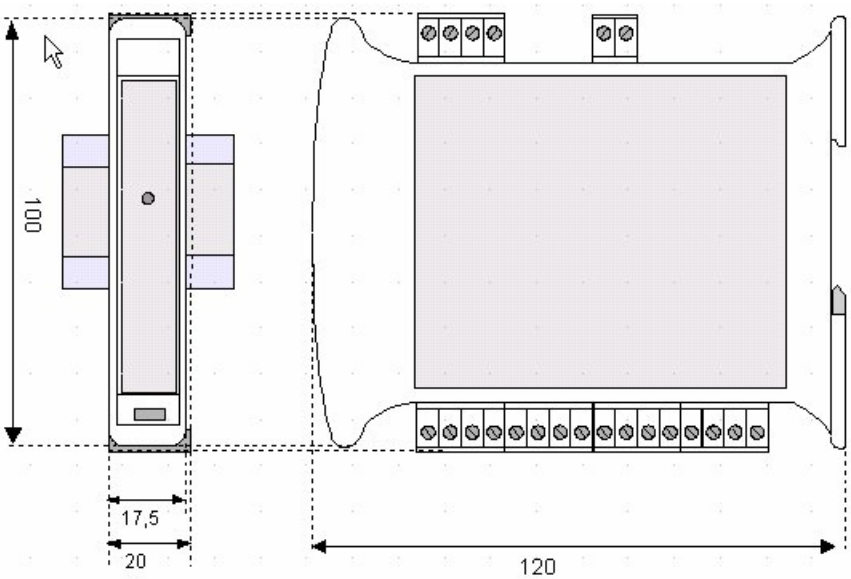
NOTES

Information is subject to change without notice.

SmartMod
Analog Output Module
HE359DAC201
0-10V
14-Bit Resolution

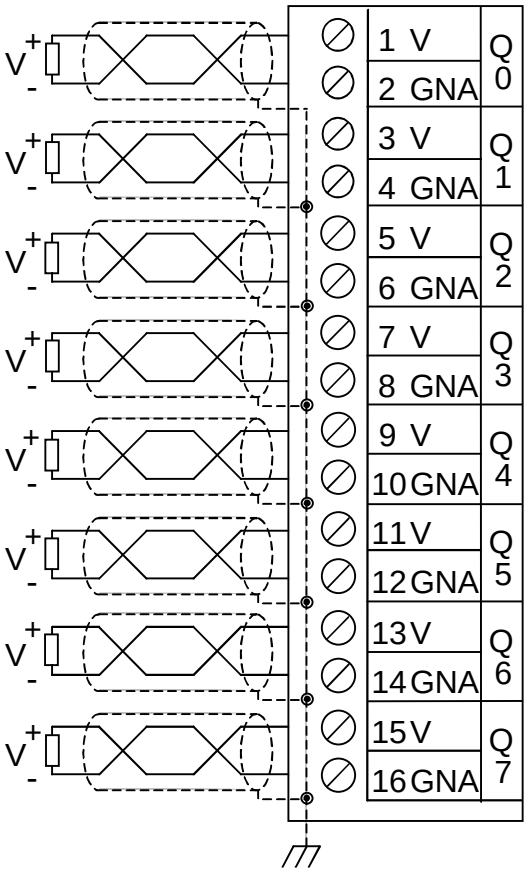
1 SPECIFICATIONS

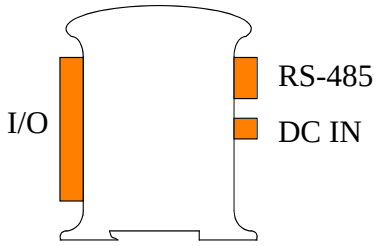
	DAC201		DAC201
Number of Channels	8	Thermal Drift	100ppm max
Output Ranges	0-10V	Terminal Type	Screw Type, Removable
Resolution	Approximately 14-Bit	Storage Temp.	-40° to 85° Celsius
Load Resistance	Voltage: >5Kohm	Operating Temp.	-10° to 60° Celsius
		Relative Humidity	5 to 95% Non-condensing
Output Calibration	Voltage: +/-10mV	Dimensions WxHxD	17.5mm x 100mm x 120mm 0.69" x 3.94" x 4.72"
External Power Supply Voltage	18-30Vdc	Weight	150g (6 oz.)
Required Power (Steady State)	30mA @ 24Vdc, typical	Communications	Modbus/RTU (binary) RS-485 half duplex
Required Power (Inrush)	Negligible	Default Comms. Parameters	38400 baud, N, 8, 1, no h/s Default Modbus ID 1
Isolation	2000Vac for 60 seconds (Input/Power & Input/Comms)	Supported Modbus Commands (family)	1,2,3,4,5,6,8,15,16
CE & UL Compliance	See Compliance Table at http://www.heapg.com/Support/compliance.htm		



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

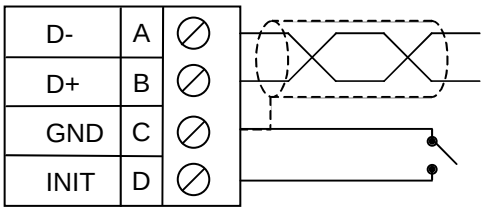
2 WIRING – I/O



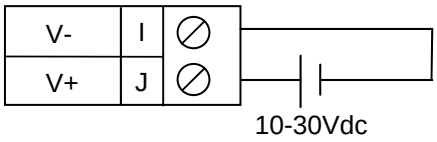


Pin #	DAC201	
1	V	OUT 0
2	GNA	
3	V	OUT 1
4	GNA	
5	V	OUT 2
6	GNA	
7	V	OUT 3
8	GNA	
9	V	OUT 4
10	GNA	
11	V	OUT 5
12	GNA	
13	V	OUT 6
14	GNA	
15	V	OUT 7
16	GNA	

WIRING – RS-485

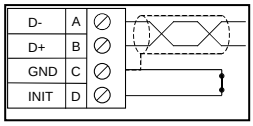


WIRING – DC IN



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..

Init Default Setup:
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

3 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 (Xle, 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	255	255	255 (All channels Voltage)

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	Value	Meaning	0 = 7 Data Bits	Value	Meaning	
		0	Mark		0	1200 baud	
		1	Even		1	2400 baud	
	1 = RTU Mode	2	Odd	1 = 8 Data Bits	2	4800 baud	
		3	Space		3	9600 baud	
					4	19200 baud	
					5-7	38400 baud	

4 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	10000	1mV
40016	Output 2	Read/Write	0	10000	1mV
40017	Output 4	Read/Write	0	10000	1mV
40018	Output 6	Read/Write	0	10000	1mV
40019	Output 1	Read/Write	0	10000	1mV
40020	Output 3	Read/Write	0	10000	1mV
40021	Output 5	Read/Write	0	10000	1mV
40022	Output 7	Read/Write	0	10000	1mV
40023	Default/Safe Value Out 0	Read/Write	0	10000	1mV
40024	Default/Safe Value Out 1	Read/Write	0	10000	1mV
40025	Default/Safe Value Out 2	Read/Write	0	10000	1mV
40026	Default/Safe Value Out 3	Read/Write	0	10000	1mV
40027	Default/Safe Value Out 4	Read/Write	0	10000	1mV
40028	Default/Safe Value Out 5	Read/Write	0	10000	1mV
40029	Default/Safe Value Out 6	Read/Write	0	10000	1mV
40030	Default/Safe Value Out 7	Read/Write	0	10000	1mV

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

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

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.

5 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. (See the **Additional References** section in this document.)

When found on the product, the following symbols specify:

Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

6 TECHNICAL SUPPORT

Helpdesk: http://www.horner-apg.com/helpdesk

For assistance and manual up-dates, contact Technical Support at the following locations:

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

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

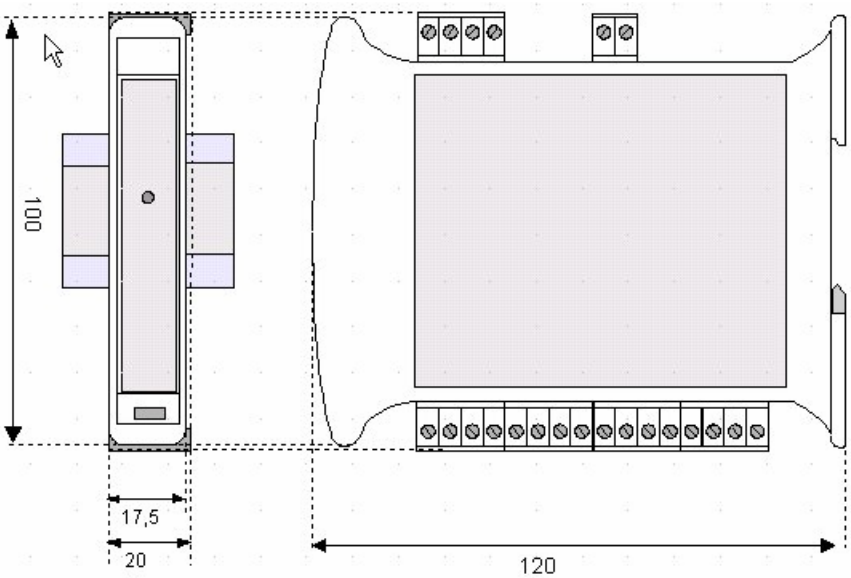
NOTES

Information is subject to change without notice.

SmartMod
DC Digital Input Module
HE359DIM610
12/24VDC Negative Logic

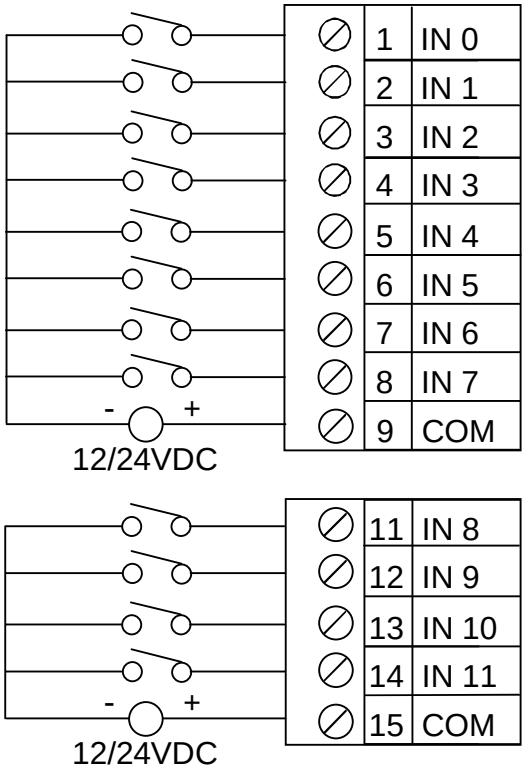
1 SPECIFICATIONS

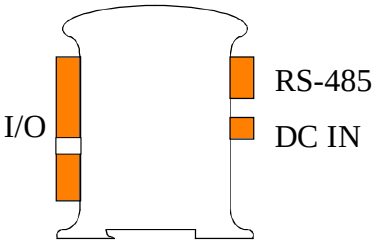
	DIM610		DIM610
Number of Channels	12	PLC Update Rate	Determined by Communications w/OCS
Input Ranges	12/24 VDC	Terminal Type	Screw Type, Removable
OFF Point	0-3VDC	Storage Temp.	-40° to 85° Celsius
ON Point	10-30VDC	Operating Temp.	-10° to 60° Celsius
		Relative Humidity	5 to 95% Non-condensing
Input Impedence	4.7Kohm	Dimensions WxHxD	17.5mm x 100mm x 120mm 0.69" x 3.94" x 4.72"
External Power Supply Voltage	10-30Vdc	Weight	150g (6 oz.)
Required Power (Steady State)	35mA @ 24Vdc, typical	Communications	Modbus/RTU (binary) RS-485 half duplex
Required Power (Inrush)	Negligible	Default Comms. Parameters	38400 baud, N, 8, 1, no h/s Default Modbus ID 1
Isolation	2000Vac for 60 seconds (Input/Power & Input/Comms)	Supported Modbus Commands	1,2,3,4,5,6,8,15,16
CE & UL Compliance	See Compliance Table at http://www.heapg.com/Support/compliance.htm		



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



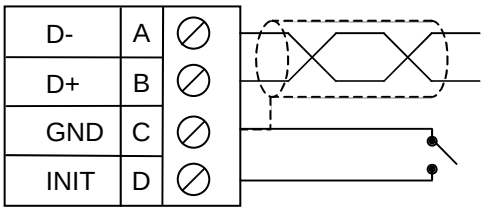


Pin #	DIM610
1	INPUT 0
2	INPUT 1
3	INPUT 2
4	INPUT 3
5	INPUT 4
6	INPUT 5
7	INPUT 6
8	INPUT 7
9	INPUT COMMON 1

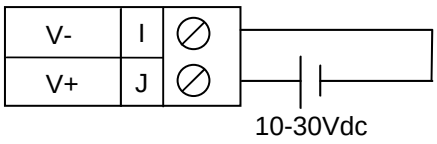
11	INPUT 8
12	INPUT 9
13	INPUT 10
14	INPUT 11
15	INPUT COMMON 2

INPUTS 0-7 & 8-11 are isolated from each other

WIRING – RS-485

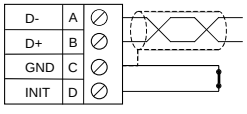


WIRING – DC IN



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..

Init Default Setup:
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

3 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 (Xle, 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 are stored in EPROM. That means they should not be constantly rewritten.

Configuration Parameters – Registers 40001 through 40014				
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 (2mS steps)	0	255	0mS
40009	Watchdog Timer (0.5s steps)	0	255	10 (5s)
40010	Watchdog Data	I/O Watchdog Data – See Table Below		
40011	Input Data	I/O Data – See Table Below		
40012-40014	Reserved			

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	Value	Meaning	0 = 7 Data Bits	Value	Meaning	
		0	Mark		0	1200 baud	
		1	Even		1	2400 baud	
	1 = RTU Mode	2	Odd	1 = 8 Data Bits	2	4800 baud	
		3	Space		3	9600 baud	
					4	19200 baud	
					5-7	38400 baud	

Register 40010 (Watchdog Coils Mirror) Bit Definition				
Bit 11-15	**Bit 10**	**Bit 9**	**Bit 8**	**Bit 0-7**
Unused	Power-up Event	Watchdog Event	Watchdog Enable	Unused
	0 = No Event	0 = No Event	0 = Not Enabled	
	1 = Event Ocurred	1 = Event Ocurred	1 = Enabled	

Register 40011 (Input Coil Mirror) Bit Definition												
Bit 15	**Bit 14**	**Bit 13**	**Bit 12**	**Bit 11**	**Bit 10**	**Bit 9**	**Bit 8**	**Bit 4-7**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
IN 7	IN 6	IN 5	IN 4	IN 3	IN 2	IN 1	IN 0	reserved	IN 11	IN 10	IN 9	IN 8

4 INPUT / OUTPUT DATA

SmartMod Digital I/O utilizes both Modbus Registers (40001-40014) and Coils (1-28). It is possible to access all data using Registers only, because the Coils can be accessed through Register 40010-40011.

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

I/O Register Data (Registers 40014-40022)			
Modbus Register	**Description**	**Access**	**Notes**
40010	Mirror of Watchdog Coils	Read/Write	See Chart in Section 3 (Register 40010)
40011	Mirror of Digital Input Coils	Read-only	See Chart in Section 3 (Register 40011)
40012-40014	Reserved		

Modbus Coil	**Description**	**Access**
00001	Watchdog Enabled	Read/Write
00002	Watchdog Event	Read/Write
00003	Power-up Event	Read/Write
00017	Digital Input 0	Read-only
00018	Digital Input 1	Read-only
00019	Digital Input 2	Read-only
00020	Digital Input 3	Read-only
00021	Digital Input 4	Read-only
00022	Digital Input 5	Read-only
00023	Digital Input 6	Read-only
00024	Digital Input 7	Read-only
00025	Digital Input 8	Read-only
00026	Digital Input 9	Read-only
00027	Digital Input 10	Read-only
00028	Digital Input 11	Read-only

Watchdog Event & Power-up Event Operation

If Coil 1 (Watchdog Enabled) is set, Coil 2 (Watchdog Event) will set if the Watchdog Timeout value is exceeded. The Watchdog Timeout value is set in Register 40009. When set, Coil 2 can be reset by the controller when normal communications resumes.

The Power-up Event (Coil 3) is set every time the power is applied. It can be cleared by the controller if desired.

5 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. (See the **Additional References** section in this document.)

When found on the product, the following symbols specify:

Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

6 TECHNICAL SUPPORT

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www.heapg.com

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

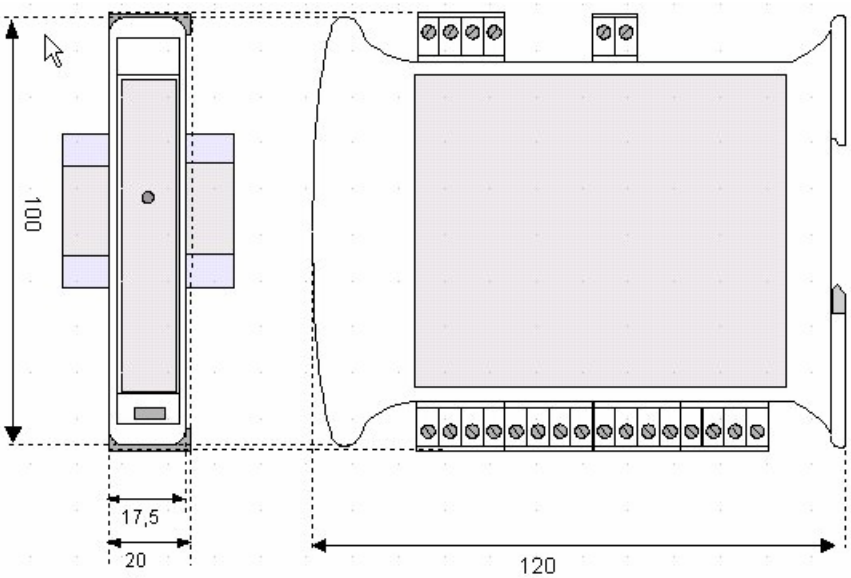
NOTES

Information is subject to change without notice.

SmartMod
Digital Input/Output Module
HE359DIQ512
Four 12/24V DC Inputs (neg. logic)
Four Relay Outputs (2A, max)

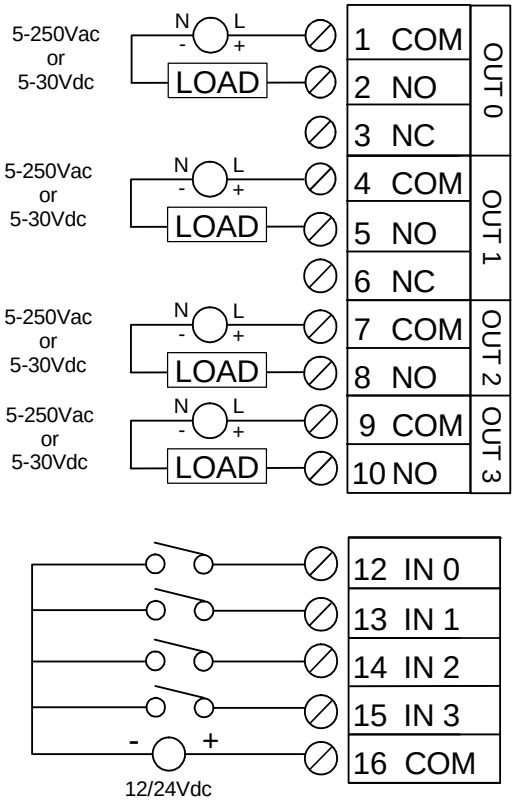
1 SPECIFICATIONS

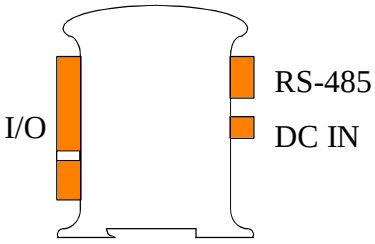
	DIQ512		DIQ512
Inputs per Module (Commons)	4 (1 Common)	Sample Time (PLC Update Rate)	Min. 20mS - Determined by Communications w/OCS
Input Voltage Range	12/24 VDC	Terminal Type	Screw Type, Removable
Impedence	4.7k ohms		
Peak Voltage	30 VDC	Storage Temp.	-40° to 85° Celsius
ON voltage level	10 VDC		
OFF voltage level	0-3 VDC	Operating Temp.	-10° to 60° Celsius
Outputs per Module	4 (2 SPDT, 2 SPST)	Relative Humidity	5 to 95% Non-condensing
Max Switching Power	2A @ 250 VAC 2A @ 30 VDC	Dimensions WxHxD	17.5mm x 100mm x 120mm 0.69" x 3.94" x 4.72"
Minimum Load	5 VDC, 10mA	Weight	210g (8.4 oz.)
Maximum Voltage	250VAC, 110 VDC		
Required Power (Steady State)	45mA @ 24Vdc, typical	Communications	Modbus/RTU (binary) RS-485 half duplex
Required Power (Inrush)	Negligible	Default Comms. Parameters	38400 baud, N, 8, 1, no h/s Default Modbus ID 1
Isolation	2000Vac for 60 seconds (Input/Power & Input/Comms)	Supported Modbus Commands	1,2,3,4,5,6,8,15,16
CE & UL Compliance	See Compliance Table at http://www.heapg.com/Support/compliance.htm		



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

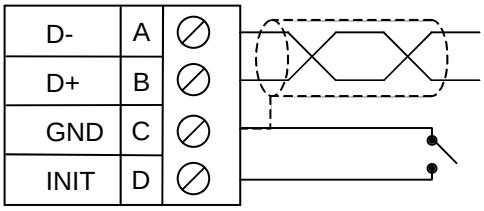




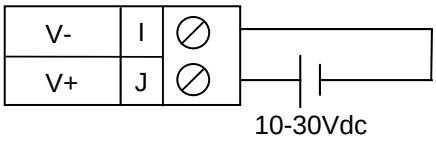
Pin #	DIQ512	
1	COM	OUT 0
2	N. O.	
3	N. C.	
4	COM	OUT 1
5	N. O.	
6	N. C.	
7	COM	OUT 2
8	N.O.	
9	COM	OUT 3
10	N.O.	

12	INPUT 0	Note: Each Output COM isolated
13	INPUT 1	
14	INPUT 2	
15	INPUT 3	
16	COM	

WIRING – RS-485

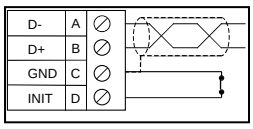


WIRING – DC IN



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.

Init Default Setup:
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

3 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 (XLe, 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 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	Input Coils	Not Configuration Data – See I/O Data		
40010	Output Coils			
40011	Coils			
40012	Power Up/Safe	See Table		0
40013	Watchdog Timer (in 0.5s steps)	0	255	10 (5s)

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	Value	Meaning	0 = 7 Data Bits	Value	Meaning	
		0	Mark		0	1200 baud	
		1	Even		1	2400 baud	
	1 = RTU Mode	2	Odd	1 = 8 Data Bits	2	4800 baud	
		3	Space		3	9600 baud	
					4	19200 baud	
					5-7	38400 baud	

Register 40012 (Power Up / Safe) Bit Definition									
Bits 12-15	**Bit 11**	**Bit 10**	**Bit 9**	**Bit 8**	**Bit 4-7**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Unused	Out 3	Out 2	Out 1	Out 0	Unused	Out 3	Out 2	Out 1	Out 0
	PowerUp Value					Safe Value			

4 INPUT / OUTPUT DATA

SmartMod Digital I/O data utilizes both Modbus Registers (40009-40011) and Coils (1-35). It is possible to access all data using Registers only, because the Coils data can be accessed through Registers.

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

I/O Register Data (Registers 40009-40011)							
Modbus Register	**Description**	**Access**	**Bits 4-15**	**Bit 12**	**Bit 11**	**Bit 10**	**Bit 9**
40009	Mirror of Input Coil Data	Read-only	unused	In 3	In 2	In 1	In 0
40010	Mirror of Output Data	Read/Write	unused	Out 3	Out 2	Out 1	Out 0
40011	Mirror of WatchDog Data	Read/Write	unused		PwrUp Event	W.D.* Event	W.D.* Enbld

*W.D. = Watchdog

Modbus Coil	**Description**	**Access**
00001	Input 0	Read-only
00002	Input 1	Read-only
00003	Input 2	Read-only
00004	Input 3	Read-only
0005-00016	Reserved	
00017	Output 0	Read/Write
00018	Output 1	Read/Write
00019	Output 2	Read/Write
00020	Output 3	Read/Write
00021-00032	Reserved	
00033	Watchdog Enabled	Read/Write
00034	Watchdog Event	Read/Write
00035	Power-up Event	Read/Write

Watchdog Event & Power-up Event Operation

If Coil 33 (Watchdog Enabled) is set, Coil 34 (Watchdog Event) will set if the Watchdog Timeout value is exceeded. The Watchdog Timeout value is set in Register 40013. When set, Coil 34 can be reset by the controller when normal communications resumes.

The Power-up Event (Coil 35) is set every time the power is applied. It can be cleared by the controller if desired.

5 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. (See the **Additional References** section in this document.)

When found on the product, the following symbols specify:

Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

6 TECHNICAL SUPPORT

For assistance and manual up-dates, contact Technical Support at the following locations:

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

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

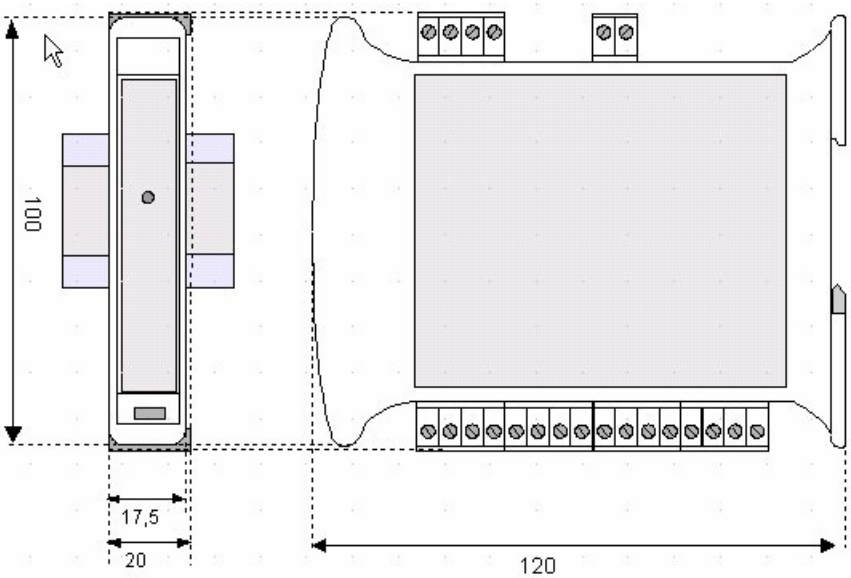
NOTES

Information is subject to change without notice.

SmartMod
RTD Input Module
HE359RTD100
0.1C or 0.1ohm Resolution

1 SPECIFICATIONS

	RTD100			RTD100
Number of Channels	4		Conversion Time (PLC Update Rate)	Determined by Communications w/OCS
Input Ranges	RTD Pt-100, Ni-100, Pt-1000, & Ni-1000, 0-2000ohm, 0-500ohm (PT, .00385)		Terminal Type	Screw Type, Removable
Resolution	0.1C or 0.1ohm		Storage Temp.	-40° to 85° Celsius
RTD Excitation Current	350microamp, typical		Operating Temp.	-10° to 60° Celsius
			Relative Humidity	5 to 95% Non-condensing
Accuracy	+/-0.1% F.S.		Dimensions WxHxD	17.5mm x 100mm x 120mm 0.69" x 3.94" x 4.72"
External Power Supply Voltage	10-30Vdc		Weight	150g (6 oz.)
Required Power (Steady State)	30mA @ 24Vdc, typical		Communications	Modbus/RTU (binary) RS-485 half duplex
Required Power (Inrush)	Negligible		Default Comms. Parameters	38400 baud, N, 8, 1, no h/s Default Modbus ID 1
Isolation	2000Vac for 60 seconds (Input/Power & Input/Comms)		Supported Modbus Commands	1,2,3,4,5,6,8,15,16
CE & UL Compliance	See Compliance Table at http://www.heapg.com/Support/compliance.htm			



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

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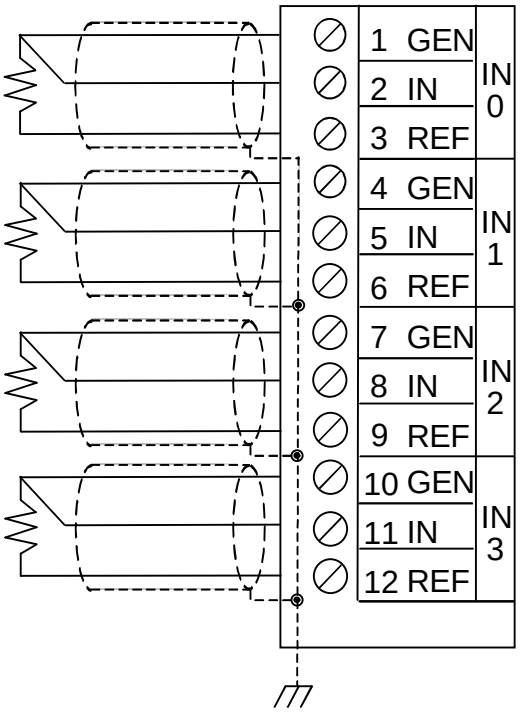
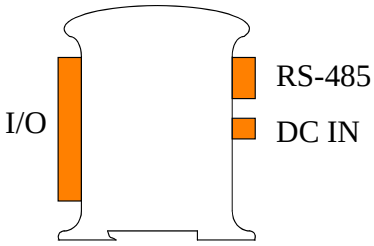
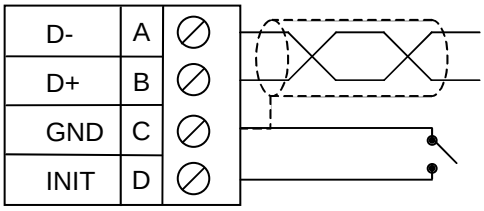
2 WIRING – I/O



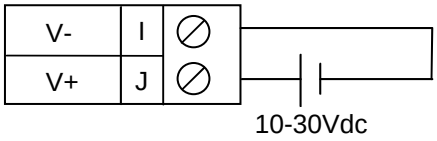


Pin #	RTD100	
1	GEN	IN 0
2	IN	
3	REF	
4	GEN	IN 1
5	IN	
6	REF	
7	GEN	IN 2
8	IN	
9	REF	
10	GEN	IN 3
11	IN	
12	REF	

WIRING – RS-485



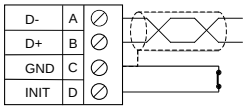
WIRING – DC IN



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..

When the INIT terminal is shorted to GND, factory default parameters are loaded into the module (RTU mode, 38.4kbaud, N, 8, 1 with Modbus ID 1)

Init Default Setup:
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

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3 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 (Xle, 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	Input Type	See Table		23 (RTD Pt-100 Type)
40012	Channel Enable	See Table		255 (All channels enabled)
40013	Reserved			

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	Value	Meaning	0 = 7 Data Bits	Value	Meaning	
		0	Mark		0	1200 baud	
		1	Even		1	2400 baud	
	1 = RTU Mode	2	Odd	1 = 8 Data Bits	2	4800 baud	
		3	Space		3	9600 baud	
					4	19200 baud	
					5-7	38400 baud	

Register 40011 (Input Type) Value Definition	
Value	**Input Type**
7	0-2000ohm Resistance
8	0-500ohm Resistance
23	RTD Pt-100 Type
24	RTD Ni-100 Type
25	RTD Pt-1000 Type
26	RTD Ni-1000 Type

Register 40012 (Channel Enable) Bit Definition				
Bit 4-15	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Unused	Input 3	Input 2	Input 1	Input 0
	0 = Disable Input			
	1 = Enable Input			

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4 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 40014-40022)					
Modbus Register	**Description**	**Access**	**Minimum**	**Maximum**	**Units**
40010	Mirror of Coil Data	Read/Write	n/a	n/a	n/a
40014	Cold Junction Temperature	Read-only	-1000	6000	0.01 degrees C
40015	Input 0	Read-only	Depends on Input Type	Depends on Input Type	0.1C or 0.1 ohm
40016	Input 1	Read-only			
40017	Input 2	Read-only			
40018	Input 3	Read-only			
40019	Input 4	Read-only			
40020	Input 5	Read-only			
40021	Input 6	Read-only			
40022	Input 7	Read-only			

Modbus Coil	Description	Access
00001	Open Detect Input 0	Read/Write
00002	Open Detect Input 1	Read/Write
00003	Open Detect Input 2	Read/Write
00004	Open Detect Input 3	Read/Write
00005	Open Detect Input 4	Read/Write
00006	Open Detect Input 5	Read/Write
00007	Open Detect Input 6	Read/Write
00008	Open Detect Input 7	Read/Write
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.

RTD Sensor Temperature Ranges		
RTD Sensor Type	**Minimum Temperature**	**Maximum Temperature**
Pt-100	-200 degrees C	+850 degrees C
Ni-100	-80 degrees C	+180 degrees C
Pt-1000	-200 degrees C	+200 degrees C
Ni-1000	-60 degrees C	+150 degrees C

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5 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. (See the **Additional References** section in this document.)

When found on the product, the following symbols specify:

Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

6 TECHNICAL SUPPORT

For assistance and manual up-dates, contact Technical Support at the following locations:

Helpdesk: http://www.horner-apg.com/helpdesk

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

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

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NOTES

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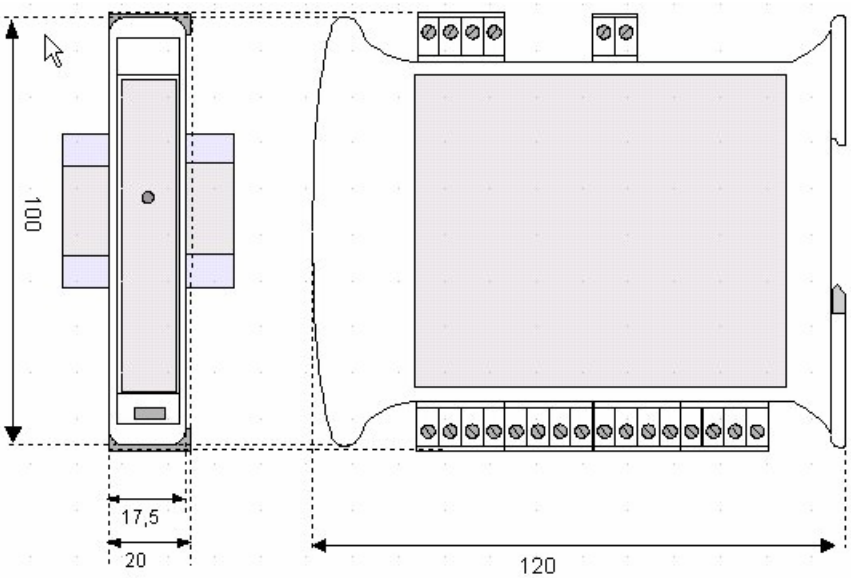
SmartMod
Thermocouple Input Module
HE359THM100 / HE359THM200
0.1C or 0.001mV Resolution

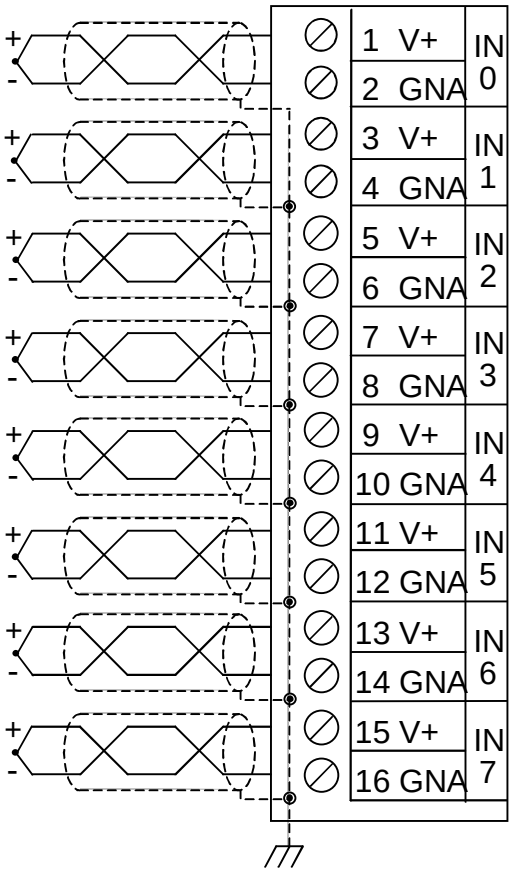
1 SPECIFICATIONS

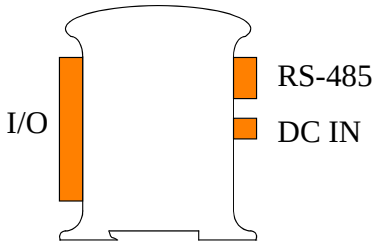
	THM100	THM200		THM100	THM200
Number of Channels	4	8	Conversion Time (PLC Update Rate)	Determined by Communications w/OCS	
Input Ranges	J, K, R, S,B,E,T,N, +/-50mV, +/-100mV, +/-500mV, +/-1V		Terminal Type	Screw Type, Removable	
Resolution	0.1C or 0.001mV		Storage Temp.	-40° to 85° Celsius	
Input Impedance	>10MOhm		Operating Temp.	-10° to 60° Celsius	
			Relative Humidity	5 to 95% Non-condensing	
Accuracy	+/-0.1% F.S.		Dimensions WxHxD	17.5mm x 100mm x 120mm 0.69" x 3.94" x 4.72"	
External Power Supply Voltage	10-30Vdc		Weight	150g (6 oz.)	
Required Power (Steady State)	30mA @ 24Vdc, typical		Communications	Modbus/RTU (binary) RS-485 half duplex	
Required Power (Inrush)	Negligible		Default Comms. Parameters	38400 baud, N, 8, 1, no h/s Default Modbus ID 1	
Isolation	2000Vac for 60 seconds (Input/Power & Input/Comms)		Supported Modbus Commands	1,2,3,4,5,6,8,15,16	
CE & UL Compliance	See Compliance Table at http://www.heapg.com/Support/compliance.htm				



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

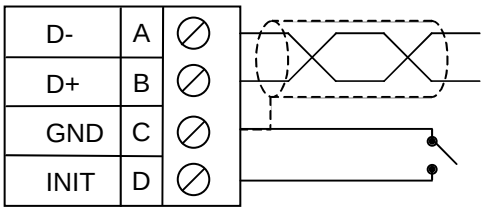
2 WIRING – I/O



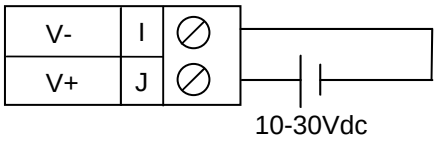


Pin #	ADC107	ADC207
1	INPUT 0+	INPUT 0+
2	ANALOG COMMON	ANALOG COMMON
3	INPUT 1+	INPUT 1+
4	ANALOG COMMON	ANALOG COMMON
5	INPUT 2+	INPUT 2+
6	ANALOG COMMON	ANALOG COMMON
7	INPUT 3+	INPUT 3+
8	ANALOG COMMON	ANALOG COMMON
9	Only Terminals 1 through 8 are present on the ADC107 model	INPUT 4+
10		ANALOG COMMON
11		INPUT 5+
12		ANALOG COMMON
13		INPUT 6+
14		ANALOG COMMON
15		INPUT 7+
16		ANALOG COMMON

WIRING – RS-485

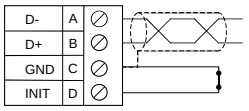


WIRING – DC IN



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..

Init Default Setup:
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

3 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 (Xle, 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	Input Type	See Table		1 (+/-50mV)
40012	Channel Enable	See Table		255 (Channels 1-8 enabled)
40013	Reserved			

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	Value	Meaning	0 = 7 Data Bits	Value	Meaning	
		0	Mark		0	1200 baud	
		1	Even		1	2400 baud	
	1 = RTU Mode	2	Odd	1 = 8 Data Bits	2	4800 baud	
		3	Space		3	9600 baud	
					4	19200 baud	
					5-7	38400 baud	

Register 40011 (Input Type) Value Definition				
Value	**Input Type**		**Value**	**Input Type**
1	+/-50mV		14	Type J T/C
2	+/-100mV		15	Type K T/C
3	+/-250mV		16	Type T T/C
4	+/-1000mV		17	Type E T/C
5-13	Not Used		18	Type R T/C
			19	Type S T/C
			20	Type B T/C
			21	Type N T/C

Register 40012 (Channel Enable) Bit Definition								
Bit 8-15	**Bits 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Unused	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
	0 = Disable Input							
	1 = Enable Input							

4 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 40014-40022)					
Modbus Register	**Description**	**Access**	**Minimum**	**Maximum**	**Units**
40010	Mirror of Coil Data	Read/Write	n/a	n/a	n/a
40014	Cold Junction Temperature	Read-only	-1000	6000	0.01 degrees C
40015	Input 0	Read-only	Depends on Input Type	Depends on Input Type	0.1C or 0.001mV
40016	Input 1	Read-only			0.1C or 0.001mV
40017	Input 2	Read-only			0.1C or 0.001mV
40018	Input 3	Read-only			0.1C or 0.001mV
40019	Input 4	Read-only			0.1C or 0.001mV
40020	Input 5	Read-only			0.1C or 0.001mV
40021	Input 6	Read-only			0.1C or 0.001mV
40022	Input 7	Read-only			0.1C or 0.001mV

Modbus Coil	**Description**	**Access**
00001	Open Detect Input 0	Read/Write
00002	Open Detect Input 1	Read/Write
00003	Open Detect Input 2	Read/Write
00004	Open Detect Input 3	Read/Write
00005	Open Detect Input 4	Read/Write
00006	Open Detect Input 5	Read/Write
00007	Open Detect Input 6	Read/Write
00008	Open Detect Input 7	Read/Write
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.

5 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. (See the **Additional References** section in this document.)

When found on the product, the following symbols specify:

Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

6 TECHNICAL SUPPORT

For assistance and manual up-dates, contact Technical Support at the following locations:

Helpdesk: http://www.horner-apg.com/helpdesk

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

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

NOTES

Information is subject to change without notice.

SmartStix™ HE559DIM610/HE559DIM710

Remote I/O for the OCS/RCS Family

16 DC Inputs (24VDC, positive/negative logic) / 32 DC Inputs (24VDC, positive/negative logic)

1 GENERAL SPECIFICATIONS

General Specifications			
Storage Temperature	-25° to 70° C	**Operating and Storage Humidity**	5 to 95% Non-condensing
Operating Temperature	0° to 55° C	**Pollution degree**	2 or lower
Atmosphere	Free from corrosive gases and excessive dust	**Cooling method**	Self-cooling

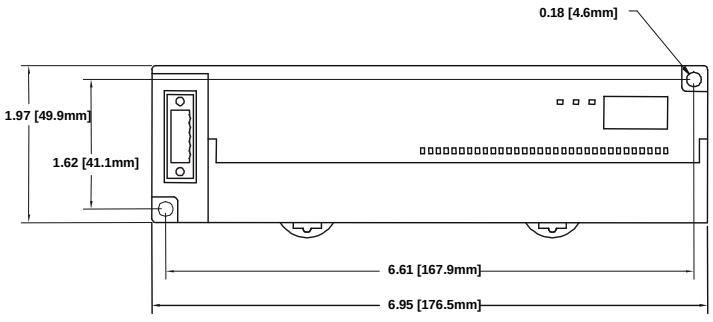
Vibration			
Occasional Vibration			
Frequency	**Acceleration**	**Amplitude**	**Sweep Count**
10 ≤ f < 57 Hz	-	0.075 mm	10 times in each direction for X,Y,Z
57 ≤ f ≤ 150 Hz	9.8 m/s^2 {1G}	-	
Continuous Vibration			
Frequency	**Acceleration**	**Amplitude**	**Sweep Count**
10 ≤ f < 57 Hz	-	0.035 mm	10 times in each direction for X,Y,Z
57≤ f ≤ 150 Hz	4.9 m/s^2 {0.5G}	-	

Shocks	
Maximum shock acceleration	147 m/s^2 {15G}
Duration Time	11 ms.
Pulse Wave	Half sine wave pulse (3 times in each of X, Y, Z directions)

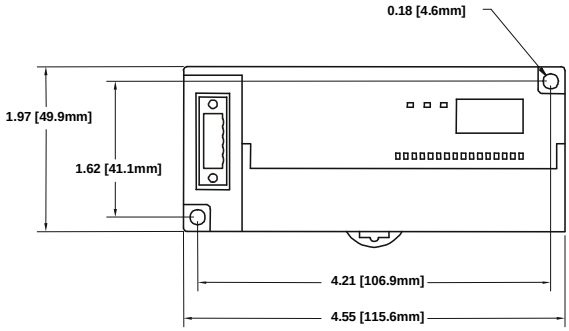
Noise Immunity				
Square wave impulse noise	AC: ± 1,500VDC DC: ± 900VDC			
Electrostatic Discharge	Voltage: 4kV (contact discharge)			
Radiated electromagnetic field	27 – 500MHz, 10V/m			
Fast Transient Burst Noise	**Severity level**	All power modules	Digital I/Os (Ue < 24 V)	Digital I/Os (Ue ≥24V) Analog I/Os Communication I/Os
	Voltage	2 kV	1 kV	0.25 kV

2 DIMENSIONS

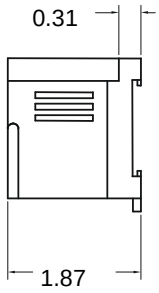
a. DIM710



b. DIM610



c. Terminal Strips



HE559-With Removable Strip

3 NETWORK CABLE

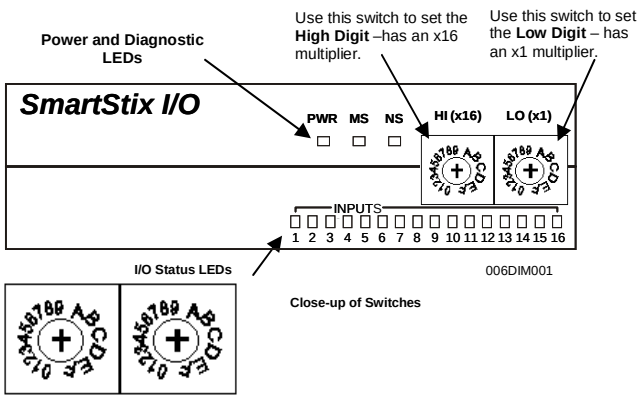
For detailed wiring information, refer to the Control Station Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances. **See Section 10 for our web address.**

		Pin	Description
⊘	**RED**	1	V+
⊘	**WHT**	2	CAN_H
⊘	**NC**	3	No Connection
⊘	**BLU**	4	CAN_L
⊘	**BLK**	5	V-

Recommended Cable	
Thick: (Max Distance = 500m)	Belden 3082A
Thin: (Max Distance = 100m)	Belden 3084A

4 ID SWITCHES (SETTING CSCAN NETWORK IDs)

CsCAN Network IDs are set using the hexadecimal number system from 01 to FD. The decimal equivalent is 1-253. Refer to Section 8, which shows the decimal equivalent of hexadecimal numbers. Set a unique Network ID by inserting a small Phillips screwdriver into the two *identical* switches. **Note:** The CsCAN Baud Rate for SmartStix I/O is fixed at 125KBaud



5 LEDs

a. Diagnostic LED Indicators

Diagnostic LED	State	Meaning
MS: (indicates fault status of Module)	Solid Red	RAM or ROM test failed
	Blinking Red	I/O test failed
	Blinking Green	Module is in power-up state
	Solid Green	Module is running normally
NS: (indicates fault status of Network)	Solid Red	Network Ack or Dup ID test failed
	Blinking Red	Network ID test failed
	Blinking Green	Module is in Life Expectancy default state
	Solid Green	Network is running normally

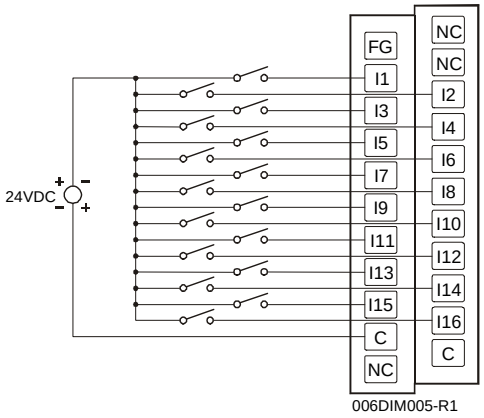
b. Status LED Indicators

The Power Status LED illuminates Red when power is applied to the module. There are I/O Status LED indicators for each of the Digital I/O points, which illuminate Red when an I/O point is ON.

6 WIRING

a. 16 DC IN, Positive Logic / Negative Logic

DIM610 Specifications			
Number of input points	16	**OFF to ON Response**	0 - 3ms. or less
Rated Input Current	7mA	**ON to OFF Response**	0 - 3ms. or less
ON Voltage Level	19VDC or less	**Common Terminal**	16 points / COM
OFF Voltage Level	6VDC or less	**Operating Indicator**	LED turns on during ON state of input
Input Characteristics	Bidirectional	**External Connections**	Terminal block connector (M3 x 6 screws)
Isolation Method	Photo Coupler		
Rated Voltage	11 – 25 VDC	**Altitude for use**	Up to 2,000m
Internal power Consumption (mA)	200mA	**Weight**	5.6 oz. (159 g)

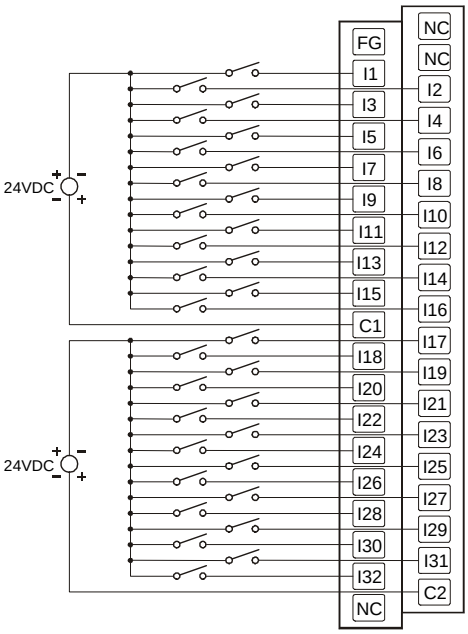


006DIM005-R1

Pin	Signal DIM610
NC*	No Connection (*Do not Connect)
FG	Frame Ground
NC*	No Connection (*Do not Connect)
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
I9	Input 9
I10	Input 10
I11	Input 11
I12	Input 12
I13	Input 13
I14	Input 14
I15	Input 15
I16	Input 16
C	Common
C	Common
NC	No Connection

b. 32VDC IN, Positive Logic / Negative Logic

DIM710 INPUTS			
Number of input points	32	**OFF to ON Response**	0 - 3ms. or less
Rated Input Current	7mA	**ON to OFF Response**	0 - 3ms. or less
ON Voltage Level	19VDC or less	**Common Terminal**	16 points / COM
OFF Voltage Level	6VDC or less	**Operating Indicator**	LED turns on during ON state of input
Isolation Method	Photo Coupler		
Input Characteristics	Bidirectional	*External Connections*	Terminal block connector (M3 x 6 screws)
Rated Voltage	11 – 25 VDC	**Weight**	8.36oz. (237 g)
Internal power Consumption (mA)	300		

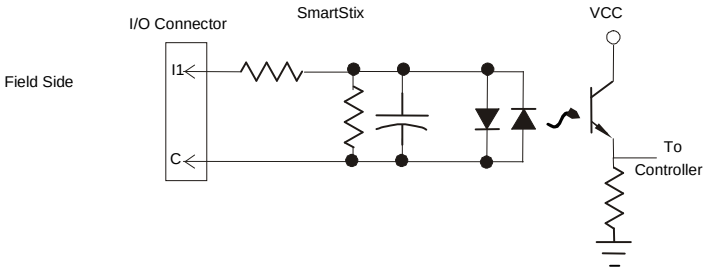


006DIM006-R1

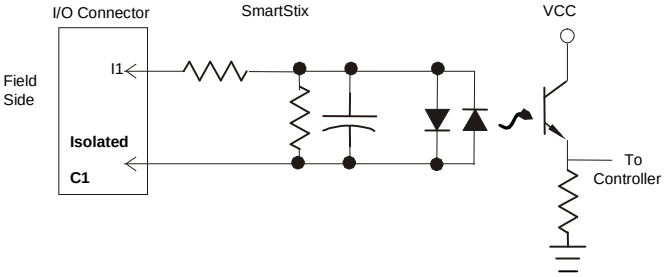
Pin	Signal DIM710
NC*	No Connection (*Do not Connect)
FG	Frame Ground
NC*	No Connection (*Do not Connect)
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
I9	Input 9
I10	Input 10
I11	Input 11
I12	Input 12
I13	Input 13
I14	Input 14
I15	Input 15
I16	Input 16
C1	Isolated Common 1
I17	Input 17
I18	Input 18
I19	Input 19
I20	Input 20
I21	Input 21
I22	Input 22
I23	Input 23
I24	Input 24
I25	Input 25
I26	Input 26
I27	Input 27
I28	Input 28
I29	Input 29
I30	Input 30
I31	Input 31
I32	Input 32
C2	Isolated Common 2
NC	No Connection

7 INTERNAL WIRING

a. DIM610



b. DIM710



8 DECIMAL (DEC) TO HEXADECIMAL (HEX) CONVERSION TABLE

Dec	Hex		Dec	Hex		Dec	Hex	
	HI	LO		HI	LO		HI	LO
0	0	0	**86**	5	6	**172**	A	C
1	0	1	**87**	5	7	**173**	A	D
2	0	2	**88**	5	8	**174**	A	E
3	0	3	**89**	5	9	**175**	A	F
4	0	4	**90**	5	A	**176**	B	0
5	0	5	**91**	5	B	**177**	B	1
6	0	6	**92**	5	C	**178**	B	2
7	0	7	**93**	5	D	**179**	B	3
8	0	8	**94**	5	E	**180**	B	4
9	0	9	**95**	5	F	**181**	B	5
10	0	A	**96**	6	0	**182**	B	6
11	0	B	**97**	6	1	**183**	B	7
12	0	C	**98**	6	2	**184**	B	8
13	0	D	**99**	6	3	**185**	B	9
14	0	E	**100**	6	4	**186**	B	A
15	0	F	**101**	6	5	**187**	B	B
16	1	0	**102**	6	6	**188**	B	C
17	1	1	**103**	6	7	**189**	B	D
18	1	2	**104**	6	8	**190**	B	E
19	1	3	**105**	6	9	**191**	B	F
20	1	4	**106**	6	A	**192**	C	0
21	1	5	**107**	6	B	**193**	C	1
22	1	6	**108**	6	C	**194**	C	2
23	1	7	**109**	6	D	**195**	C	3
24	1	8	**110**	6	E	**196**	C	4
25	1	9	**111**	6	F	**197**	C	5
26	1	A	**112**	7	0	**198**	C	6
27	1	B	**113**	7	1	**199**	C	7
28	1	C	**114**	7	2	**200**	C	8
29	1	D	**115**	7	3	**201**	C	9
30	1	E	**116**	7	4	**202**	C	A
31	1	F	**117**	7	5	**203**	C	B
32	2	0	**118**	7	6	**204**	C	C
33	2	1	**119**	7	7	**205**	C	D
34	2	2	**120**	7	8	**206**	C	E
35	2	3	**121**	7	9	**207**	C	F
36	2	4	**122**	7	A	**208**	D	0
37	2	5	**123**	7	B	**209**	D	1
38	2	6	**124**	7	C	**210**	D	2
39	2	7	**125**	7	D	**211**	D	3
40	2	8	**126**	7	E	**212**	D	4
41	2	9	**127**	7	F	**213**	D	5
42	2	A	**128**	8	0	**214**	D	6
43	2	B	**129**	8	1	**215**	D	7
44	2	C	**130**	8	2	**216**	D	8
45	2	D	**131**	8	3	**217**	D	9
46	2	E	**132**	8	4	**218**	D	A
47	2	F	**133**	8	5	**219**	D	B
48	3	0	**134**	8	6	**220**	D	C
49	3	1	**135**	8	7	**221**	D	D
50	3	2	**136**	8	8	**222**	D	E
51	3	3	**137**	8	9	**223**	D	F
52	3	4	**138**	8	A	**224**	E	0
53	3	5	**139**	8	B	**225**	E	1
54	3	6	**140**	8	C	**226**	E	2
55	3	7	**141**	8	D	**227**	E	3
56	3	8	**142**	8	E	**228**	E	4
57	3	9	**143**	8	F	**229**	E	5
58	3	A	**144**	9	0	**230**	E	6
59	3	B	**145**	9	1	**231**	E	7
60	3	C	**146**	9	2	**232**	E	8
61	3	D	**147**	9	3	**233**	E	9
62	3	E	**148**	9	4	**234**	E	A
63	3	F	**149**	9	5	**235**	E	B
64	4	0	**150**	9	6	**236**	E	C
65	4	1	**151**	9	7	**237**	E	D
66	4	2	**152**	9	8	**238**	E	E
67	4	3	**153**	9	9	**239**	E	F
68	4	4	**154**	9	A	**240**	F	0
69	4	5	**155**	9	B	**241**	F	1
70	4	6	**156**	9	C	**242**	F	2
71	4	7	**157**	9	D	**243**	F	3
72	4	8	**158**	9	E	**244**	F	4
73	4	9	**159**	9	F	**245**	F	5
74	4	A	**160**	A	0	**246**	F	6
75	4	B	**161**	A	1	**247**	F	7
76	4	C	**162**	A	2	**248**	F	8
77	4	D	**163**	A	3	**249**	F	9
78	4	E	**164**	A	4	**250**	F	A
79	4	F	**165**	A	5	**251**	F	B
80	5	0	**166**	A	6	**252**	F	C
81	5	1	**167**	A	7	**253**	F	D
82	5	2	**168**	A	8	**254**	F	E
83	5	3	**169**	A	9	**255**	F	F
84	5	4	**170**	A	A			
85	5	5	**171**	A	B			

9 INSTALLATION / SAFETY

a. All applicable codes and standards need to be followed in the installation of this product.

b. For I/O wiring (discrete), use the following wire type or equivalent: Belden 8441 or equivalent.

c. 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.

Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

Warning: To protect the module and associated wiring from load faults, use external fuse **(5 A)**.

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 0 through 15 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.

10 TECHNICAL ASSISTANCE

For assistance and manual updates, contact 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:
Tel: +353-21-4321266
Fax: +353-21-4321826
Web: http://www.horner-apg.com
Email: tech.support@horner-apg.com

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SmartStix™ HE559DIQ816

Remote I/O for the OCS/RCS Family

16 DC Inputs (24VDC, positive logic), 16 DC Outputs (24VDC, positive logic, 0.5A)

1 GENERAL SPECIFICATIONS

General Specifications			
Storage Temperature	-25° to 70° C	**Operating and Storage Humidity**	5 to 95% Non-condensing
Operating Temperature	0° to 55° C	**Pollution degree**	2 or lower
Atmosphere	Free from corrosive gases and excessive dust	**Cooling method**	Self-cooling

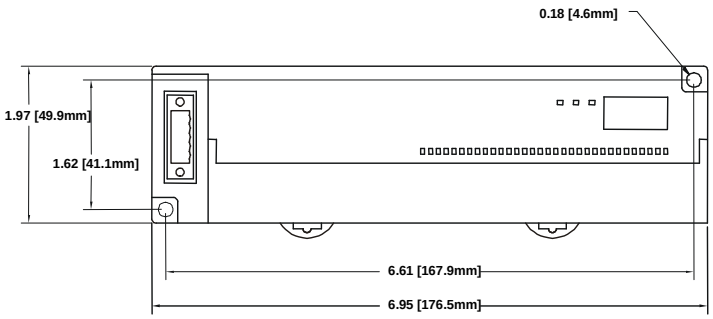
Vibration			
Occasional Vibration			
Frequency	**Acceleration**	**Amplitude**	**Sweep Count**
10 ≤ f < 57 Hz	-	0.075 mm	10 times in each direction for X,Y,Z
57 ≤ f ≤ 150 Hz	9.8 m/s^2 {1G}	-	
Continuous Vibration			
Frequency	**Acceleration**	**Amplitude**	**Sweep Count**
10 ≤ f < 57 Hz	-	0.035 mm	10 times in each direction for X,Y,Z
57≤ f ≤ 150 Hz	4.9 m/s^2 {0.5G}	-	

Shocks	
Maximum shock acceleration	147 m/s^2 {15G}
Duration Time	11 ms.
Pulse Wave	Half sine wave pulse (3 times in each of X, Y, Z directions)

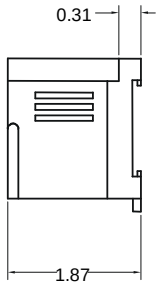
Noise Immunity				
Square wave impulse noise	AC: ± 1,500VDC DC: ± 900VDC			
Electrostatic Discharge	Voltage: 4kV (contact discharge)			
Radiated electromagnetic field	27 – 500MHz, 10V/m			
Fast Transient Burst Noise	**Severity level**	All power modules	Digital I/Os (Ue < 24 V) Analog I/Os Communication I/Os	Digital I/Os (Ue ≥24V)
	Voltage	2 kV	1 kV	0.25 kV

2 DIMENSIONS

a. DIQ816



b. Terminal Strips



HE559-With Removable Strip

3 NETWORK CABLE

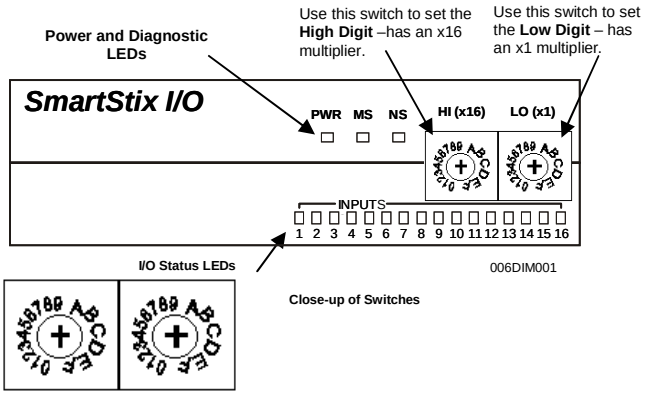
For detailed wiring information, refer to the Control Station Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances. **See Section 10 for our web address.**

		Pin	Description
⊘	**RED**	1	V+
⊘	**WHT**	2	CAN_H
⊘	**NC**	3	No Connection
⊘	**BLU**	4	CAN_L
⊘	**BLK**	5	V-

Recommended Cable	
Thick: (Max Distance = 500m)	Belden 3082A
Thin: (Max Distance = 100m)	Belden 3084A

4 ID SWITCHES (SETTING CSCAN NETWORK IDs)

CsCAN Network IDs are set using the hexadecimal number system from 01 to FD. The decimal equivalent is 1-253. Refer to Section 8, which shows the decimal equivalent of hexadecimal numbers. Set a unique Network ID by inserting a small Phillips screwdriver into the two *identical* switches. **Note:** The CsCAN Baud Rate for SmartStix I/O is fixed at 125KBaud.



5 LEDs

a. Diagnostic LED Indicators

Diagnostic LED	State	Meaning
MS: (indicates fault status of Module)	Solid Red	RAM or ROM test failed
	Blinking Red	I/O test failed
	Blinking Green	Module is in power-up state
	Solid Green	Module is running normally
NS: (indicates fault status of Network)	Solid Red	Network Ack or Dup ID test failed
	Blinking Red	Network ID test failed
	Blinking Green	Module is in Life Expectancy default state
	Solid Green	Network is running normally

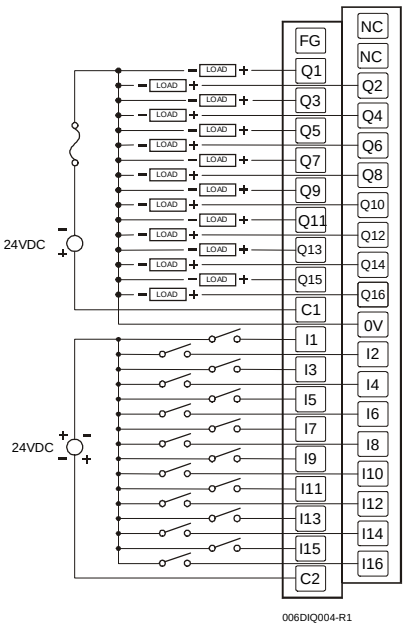
b. Status LED Indicators

The Power Status LED illuminates Red when power is applied to the module. There are I/O Status LED indicators for each of the Digital I/O points, which illuminate Red when an I/O point is ON.

6 WIRING

a. 16 DC IN, Positive Logic/16 DC OUT, Positive Logic

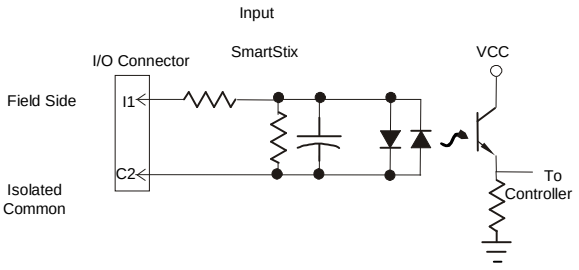
DIQ816 IN				
Number of input points	16	**OFF to ON Response**		0 - 3ms. or less
Rated Input Current	7mA	**ON to OFF Response**		0 - 3ms. or less
ON Voltage Level	19VDC or less	**Common Terminal**		16 points / COM
OFF Voltage Level	6VDC or less	**Operating Indicator**		LED turns on during ON state of input
Input Characteristics	Bidirectional	**External Connections**		Terminal block connector (M3 x 6 screws)
Isolation Method	Photo Coupler			
DIQ816 OUT				
Number of output points	16	**External Power Supply**	**Voltage**	24VDC ± 10%(ripple voltage: 4Vp-p or less)
Commons per Module	1		**Current**	30mA (TYP, All points ON)
Operating Voltage	24VDC	**OFF to ON Response**		2ms.
Rated Load Voltage	24VDC	**ON to OFF Response**		2ms.
OFF Leakage Current	0.1mA or less	**Max. Inrush Current per channel**		1A, 10ms
Rated Voltage	11 – 25 VDC	**Max. Load Current per channel**		0.5A Max. per output 3A per common
Internal power Consumption (mA)	350	**Output Type**		Sourcing
Common Method	16 points / COM	**Weight**		10.16 oz. (288 g)

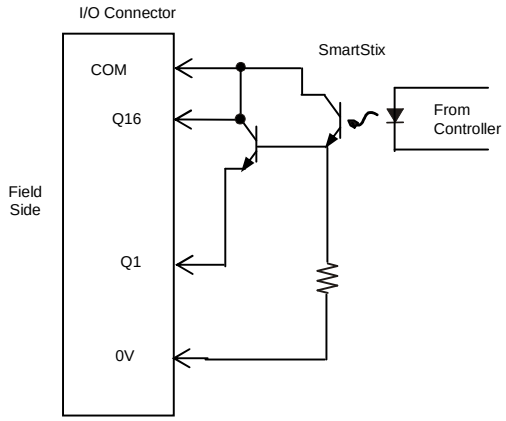


DIQ816	
FG*	Frame Ground
Q1	Output 1
Q3	Output 3
Q5	Output 5
Q7	Output 7
Q9	Output 9
Q11	Output 11
Q13	Output 13
Q15	Output 15
C1	Isolated Common Power
I1	Input 1
I3	Input 3
I5	Input 5
I7	Input 7
I9	Input 9
I11	Input 11
I13	Input 13
I15	Input 15
C2	Isolated Common

DIQ816	
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
Q2	Output 2
Q4	Output 4
Q6	Output 6
Q8	Output 8
Q10	Output 10
Q12	Output 12
Q14	Output 14
Q16	Output 16
0V	Isolated Ground
I2	Input 2
I4	Input 4
I6	Input 6
I8	Input 8
I10	Input 10
I12	Input 12
I14	Input 14
I16	Input 16

7 INTERNAL WIRING





8 DECIMAL (DEC) TO HEXADECIMAL (HEX) CONVERSION TABLE

Dec	Hex		Dec	Hex		Dec	Hex	
	HI	LO		HI	LO		HI	LO
0	0	0	**86**	5	6	**172**	A	C
1	0	1	**87**	5	7	**173**	A	D
2	0	2	**88**	5	8	**174**	A	E
3	0	3	**89**	5	9	**175**	A	F
4	0	4	**90**	5	A	**176**	B	0
5	0	5	**91**	5	B	**177**	B	1
6	0	6	**92**	5	C	**178**	B	2
7	0	7	**93**	5	D	**179**	B	3
8	0	8	**94**	5	E	**180**	B	4
9	0	9	**95**	5	F	**181**	B	5
10	0	A	**96**	6	0	**182**	B	6
11	0	B	**97**	6	1	**183**	B	7
12	0	C	**98**	6	2	**184**	B	8
13	0	D	**99**	6	3	**185**	B	9
14	0	E	**100**	6	4	**186**	B	A
15	0	F	**101**	6	5	**187**	B	B
16	1	0	**102**	6	6	**188**	B	C
17	1	1	**103**	6	7	**189**	B	D
18	1	2	**104**	6	8	**190**	B	E
19	1	3	**105**	6	9	**191**	B	F
20	1	4	**106**	6	A	**192**	C	0
21	1	5	**107**	6	B	**193**	C	1
22	1	6	**108**	6	C	**194**	C	2
23	1	7	**109**	6	D	**195**	C	3
24	1	8	**110**	6	E	**196**	C	4
25	1	9	**111**	6	F	**197**	C	5
26	1	A	**112**	7	0	**198**	C	6
27	1	B	**113**	7	1	**199**	C	7
28	1	C	**114**	7	2	**200**	C	8
29	1	D	**115**	7	3	**201**	C	9
30	1	E	**116**	7	4	**202**	C	A
31	1	F	**117**	7	5	**203**	C	B
32	2	0	**118**	7	6	**204**	C	C
33	2	1	**119**	7	7	**205**	C	D
34	2	2	**120**	7	8	**206**	C	E
35	2	3	**121**	7	9	**207**	C	F
36	2	4	**122**	7	A	**208**	D	0
37	2	5	**123**	7	B	**209**	D	1
38	2	6	**124**	7	C	**210**	D	2
39	2	7	**125**	7	D	**211**	D	3
40	2	8	**126**	7	E	**212**	D	4

41	2	9	**127**	7	F	**213**	D	5
42	2	A	**128**	8	0	**214**	D	6
43	2	B	**129**	8	1	**215**	D	7
44	2	C	**130**	8	2	**216**	D	8
45	2	D	**131**	8	3	**217**	D	9
46	2	E	**132**	8	4	**218**	D	A
47	2	F	**133**	8	5	**219**	D	B
48	3	0	**134**	8	6	**220**	D	C
49	3	1	**135**	8	7	**221**	D	D
50	3	2	**136**	8	8	**222**	D	E
51	3	3	**137**	8	9	**223**	D	F
52	3	4	**138**	8	A	**224**	E	0
53	3	5	**139**	8	B	**225**	E	1
54	3	6	**140**	8	C	**226**	E	2
55	3	7	**141**	8	D	**227**	E	3
56	3	8	**142**	8	E	**228**	E	4
57	3	9	**143**	8	F	**229**	E	5
58	3	A	**144**	9	0	**230**	E	6
59	3	B	**145**	9	1	**231**	E	7
60	3	C	**146**	9	2	**232**	E	8
61	3	D	**147**	9	3	**233**	E	9
62	3	E	**148**	9	4	**234**	E	A
63	3	F	**149**	9	5	**235**	E	B
64	4	0	**150**	9	6	**236**	E	C
65	4	1	**151**	9	7	**237**	E	D
66	4	2	**152**	9	8	**238**	E	E
67	4	3	**153**	9	9	**239**	E	F
68	4	4	**154**	9	A	**240**	F	0
69	4	5	**155**	9	B	**241**	F	1
70	4	6	**156**	9	C	**242**	F	2
71	4	7	**157**	9	D	**243**	F	3
72	4	8	**158**	9	E	**244**	F	4
73	4	9	**159**	9	F	**245**	F	5
74	4	A	**160**	A	0	**246**	F	6
75	4	B	**161**	A	1	**247**	F	7
76	4	C	**162**	A	2	**248**	F	8
77	4	D	**163**	A	3	**249**	F	9
78	4	E	**164**	A	4	**250**	F	A
79	4	F	**165**	A	5	**251**	F	B
80	5	0	**166**	A	6	**252**	F	C
81	5	1	**167**	A	7	**253**	F	D
82	5	2	**168**	A	8	**254**	F	E
83	5	3	**169**	A	9	**255**	F	F
84	5	4	**170**	A	A			
85	5	5	**171**	A	B			

9 INSTALLATION / SAFETY

a. All applicable codes and standards need to be followed in the installation of this product.

b. For I/O wiring (discrete), use the following wire type or equivalent: Belden 8441 or equivalent.

c. 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.

Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

Warning: To protect the module and associated wiring from load faults, use external fuse **(5 A)**.

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 0 through 15 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.

10 TECHNICAL ASSISTANCE

For assistance and manual updates, contact 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:
Tel: +353-21-4321266
Fax: +353-21-4321826
Web: http://www.horner-apg.com
Email: tech.support@horner-apg.com

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SmartStix™ HE559DQM602

Remote I/O for the OCS/RCS Family

16 Relay Outputs (250VAC, 30VDC, 2.0A)

1 GENERAL SPECIFICATIONS

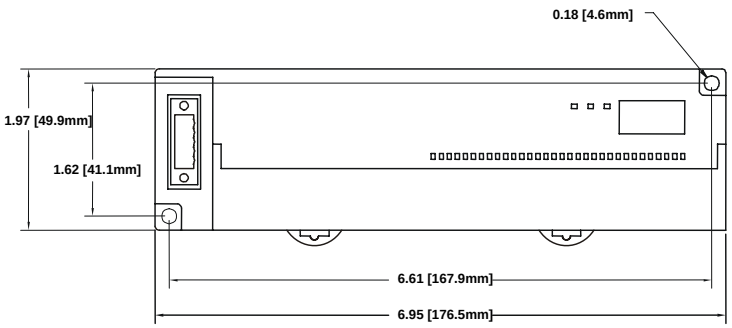
General Specifications			
Storage Temperature	-25° to 70° C	**Operating and Storage Humidity**	5 to 95% Non-condensing
Operating Temperature	0° to 55° C	**Pollution degree**	2 or lower
Atmosphere	Free from corrosive gases and excessive dust	**Cooling method**	Self-cooling

Vibration			
Occasional Vibration			
Frequency	**Acceleration**	**Amplitude**	**Sweep Count**
10 ≤ f < 57 Hz	-	0.075 mm	10 times in each direction for X,Y,Z
57 ≤ f ≤ 150 Hz	9.8 m/s^2{1G}	-	
Continuous Vibration			
Frequency	**Acceleration**	**Amplitude**	**Sweep Count**
10 ≤ f < 57 Hz	-	0.035 mm	10 times in each direction for X,Y,Z
57≤ f ≤ 150 Hz	4.9 m/s^2{0.5G}	-	

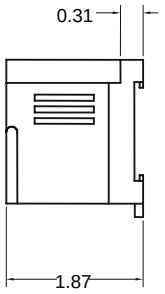
Shocks				
Maximum shock acceleration	147 m/s^2{15G}			
Duration Time	11 ms.			
Pulse Wave	Half sine wave pulse (3 times in each of X, Y, Z directions)			
Noise Immunity				
Square wave impulse noise	AC: ± 1,500VDC DC: ± 900VDC			
Electrostatic Discharge	Voltage: 4kV (contact discharge)			
Radiated electromagnetic field	27 – 500MHz, 10V/m			
Fast Transient Burst Noise	**Severity level**	All power modules	Digital I/Os (Ue < 24 V) Analog I/Os Communication I/Os	Digital I/Os (Ue ≥24V)
	Voltage	2 kV	1 kV	0.25 kV

2 DIMENSIONS

a. DQM602



b. Terminal Strips



HE559-With Removable Strip

3 NETWORK CABLE

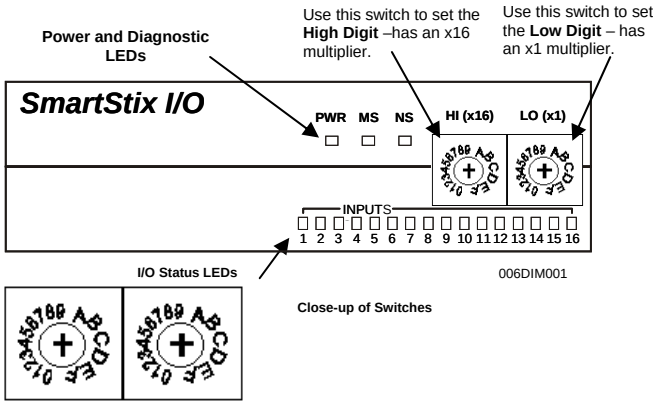
For detailed wiring information, refer to the Control Station Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances. **See Section 10 for our web address.**

		Pin	Description
⊘	**RED**	1	V+
⊘	**WHT**	2	CAN_H
⊘	**NC**	3	No Connection
⊘	**BLU**	4	CAN_L
⊘	**BLK**	5	V-

Recommended Cable	
Thick: (Max Distance = 500m)	Belden 3082A
Thin: (Max Distance = 100m)	Belden 3084A

4 ID SWITCHES (SETTING CSCAN NETWORK IDs)

CsCAN Network IDs are set using the hexadecimal number system from 01 to FD. The decimal equivalent is 1-253. Refer to Section 8, which shows the decimal equivalent of hexadecimal numbers. Set a unique Network ID by inserting a small Phillips screwdriver into the two *identical* switches. **Note:** The CsCAN Baud Rate for SmartStix I/O is fixed at 125KBaud.



5 LEDs

a. Diagnostic LED Indicators

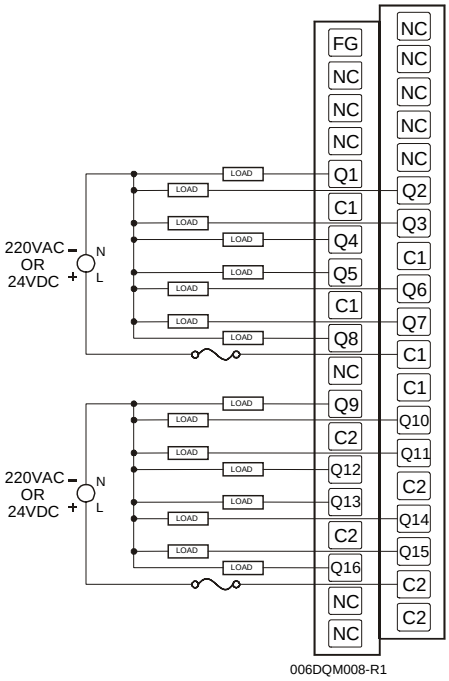
Diagnostic LED	State	Meaning
MS: (indicates fault status of Module)	Solid Red	RAM or ROM test failed
	Blinking Red	I/O test failed
	Blinking Green	Module is in power-up state
	Solid Green	Module is running normally
NS: (indicates fault status of Network)	Solid Red	Network Ack or Dup ID test failed
	Blinking Red	Network ID test failed
	Blinking Green	Module is in Life Expectancy default state
	Solid Green	Network is running normally

b. Status LED Indicators

The Power Status LED illuminates Red when power is applied to the module. There are I/O Status LED indicators for each of the Digital I/O points, which illuminate Red when an I/O point is ON.

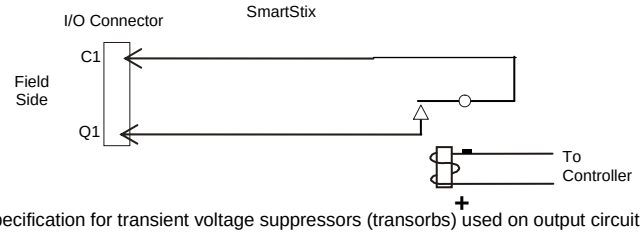
6 WIRING

DQM602 Relay Outputs			
Number of output points	**16**	**Minimum load voltage / current**	5VDC / 1mA
Commons per Module	**2**	**Maximum Load Current (resistive)**	2.0A per channel 5.0A per common
Rated Load Voltage	24VDC, 220VAC	**OFF to ON Response**	10ms. Max.
Rated Voltage	11 – 25 VDC	**ON to OFF Response**	12ms. Max.
Internal power Consumption (mA)	550mA	**Output Type**	N.O.
		Weight	9.91oz. (281 g)



Pin	Signal DQM602
NC*	No Connection (*Do not Connect)
FG	Frame Ground
NC*	No Connection (*Do not Connect)
NC	No Connection
NC	No Connection
NC	No Connection
NC	No Connection
NC	No Connection
NC	No Connection
Q1	Output 1
Q2	Output 2
C1	Common 1
Q3	Output 3
Q4	Output 4
C1	Common 1
Q5	Output 5
Q6	Output 6
C1	Common 1
Q7	Output 7
Q8	Output 8
C1	Common 1
NC	No Connection
C1	Common 1
Q9	Output 9
Q10	Output 10
C2	Common 2
Q11	Output 11
Q12	Output 12
C2	Common 2
Q13	Output 13
Q14	Output 14
C2	Common 3
Q15	Output 15
Q16	Output 16
C2	Common 2
NC	No Connection
C2	Common 2
NC	No Connection

7 INTERNAL WIRING



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

Electro-mechanical relays comply with IEC1131-2.

8 DECIMAL (DEC) TO HEXADECIMAL (HEX) CONVERSION TABLE

Dec	Hex		Dec	Hex		Dec	Hex	
	HI	LO		HI	LO		HI	LO
0	0	0	**86**	5	6	**172**	A	C
1	0	1	**87**	5	7	**173**	A	D
2	0	2	**88**	5	8	**174**	A	E
3	0	3	**89**	5	9	**175**	A	F
4	0	4	**90**	5	A	**176**	B	0
5	0	5	**91**	5	B	**177**	B	1
6	0	6	**92**	5	C	**178**	B	2
7	0	7	**93**	5	D	**179**	B	3
8	0	8	**94**	5	E	**180**	B	4
9	0	9	**95**	5	F	**181**	B	5
10	0	A	**96**	6	0	**182**	B	6
11	0	B	**97**	6	1	**183**	B	7
12	0	C	**98**	6	2	**184**	B	8
13	0	D	**99**	6	3	**185**	B	9
14	0	E	**100**	6	4	**186**	B	A
15	0	F	**101**	6	5	**187**	B	B
16	1	0	**102**	6	6	**188**	B	C
17	1	1	**103**	6	7	**189**	B	D
18	1	2	**104**	6	8	**190**	B	E
19	1	3	**105**	6	9	**191**	B	F
20	1	4	**106**	6	A	**192**	C	0
21	1	5	**107**	6	B	**193**	C	1
22	1	6	**108**	6	C	**194**	C	2
23	1	7	**109**	6	D	**195**	C	3
24	1	8	**110**	6	E	**196**	C	4
25	1	9	**111**	6	F	**197**	C	5
26	1	A	**112**	7	0	**198**	C	6
27	1	B	**113**	7	1	**199**	C	7
28	1	C	**114**	7	2	**200**	C	8
29	1	D	**115**	7	3	**201**	C	9
30	1	E	**116**	7	4	**202**	C	A
31	1	F	**117**	7	5	**203**	C	B
32	2	0	**118**	7	6	**204**	C	C
33	2	1	**119**	7	7	**205**	C	D
34	2	2	**120**	7	8	**206**	C	E
35	2	3	**121**	7	9	**207**	C	F
36	2	4	**122**	7	A	**208**	D	0
37	2	5	**123**	7	B	**209**	D	1
38	2	6	**124**	7	C	**210**	D	2
39	2	7	**125**	7	D	**211**	D	3
40	2	8	**126**	7	E	**212**	D	4
41	2	9	**127**	7	F	**213**	D	5
42	2	A	**128**	8	0	**214**	D	6
43	2	B	**129**	8	1	**215**	D	7
44	2	C	**130**	8	2	**216**	D	8
45	2	D	**131**	8	3	**217**	D	9
46	2	E	**132**	8	4	**218**	D	A
47	2	F	**133**	8	5	**219**	D	B
48	3	0	**134**	8	6	**220**	D	C
49	3	1	**135**	8	7	**221**	D	D
50	3	2	**136**	8	8	**222**	D	E
51	3	3	**137**	8	9	**223**	D	F
52	3	4	**138**	8	A	**224**	E	0
53	3	5	**139**	8	B	**225**	E	1
54	3	6	**140**	8	C	**226**	E	2
55	3	7	**141**	8	D	**227**	E	3
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59	3	B	**145**	9	1	**231**	E	7
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65	4	1	**151**	9	7	**237**	E	D
66	4	2	**152**	9	8	**238**	E	E
67	4	3	**153**	9	9	**239**	E	F
68	4	4	**154**	9	A	**240**	F	0
69	4	5	**155**	9	B	**241**	F	1
70	4	6	**156**	9	C	**242**	F	2
71	4	7	**157**	9	D	**243**	F	3
72	4	8	**158**	9	E	**244**	F	4
73	4	9	**159**	9	F	**245**	F	5
74	4	A	**160**	A	0	**246**	F	6
75	4	B	**161**	A	1	**247**	F	7
76	4	C	**162**	A	2	**248**	F	8
77	4	D	**163**	A	3	**249**	F	9
78	4	E	**164**	A	4	**250**	F	A
79	4	F	**165**	A	5	**251**	F	B
80	5	0	**166**	A	6	**252**	F	C
81	5	1	**167**	A	7	**253**	F	D
82	5	2	**168**	A	8	**254**	F	E
83	5	3	**169**	A	9	**255**	F	F
84	5	4	**170**	A	A			
85	5	5	**171**	A	B			

9 INSTALLATION / SAFETY

a. All applicable codes and standards need to be followed in the installation of this product.

b. For I/O wiring (discrete), use the following wire type or equivalent: Belden 8441 or equivalent.

c. 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.

Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

Warning: To protect the module and associated wiring from load faults, use external fuse **(5 A)**.

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 0 through 15 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.

10 TECHNICAL ASSISTANCE

For assistance and manual updates, contact 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:
Tel: +353-21-4321266
Fax: +353-21-4321826
Web: http://www.horner-apg.com
Email: tech.support@horner-apg.com

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SmartStix™ HE559DQM606/HE559DQM706

Remote I/O for the OCS/RCS Family

16 DC Outputs (24VDC, positive logic, 0.5A) / 32 DC Outputs (24VDC, positive logic, 0.5A)

1 GENERAL SPECIFICATIONS

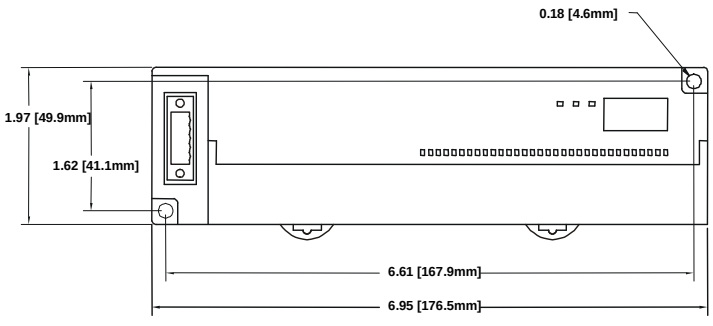
General Specifications			
Storage Temperature	-25° to 70° C	**Operating and Storage Humidity**	5 to 95% Non-condensing
Operating Temperature	0° to 55° C	**Pollution degree**	2 or lower
Atmosphere	Free from corrosive gases and excessive dust	**Cooling method**	Self-cooling

Vibration			
Occasional Vibration			
Frequency	**Acceleration**	**Amplitude**	**Sweep Count**
10 ≤ f < 57 Hz	-	0.075 mm	10 times in each direction for X,Y,Z
57 ≤ f ≤ 150 Hz	9.8 m/s^2 {1G}	-	
Continuous Vibration			
Frequency	**Acceleration**	**Amplitude**	**Sweep Count**
10 ≤ f < 57 Hz	-	0.035 mm	10 times in each direction for X,Y,Z
57≤ f ≤ 150 Hz	4.9 m/s^2 {0.5G}	-	

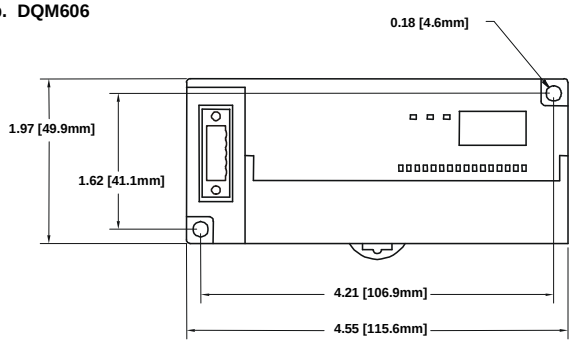
Shocks				
Maximum shock acceleration	147 m/s^2 {15G}			
Duration Time	11 ms.			
Pulse Wave	Half sine wave pulse (3 times in each of X, Y, Z directions)			
Noise Immunity				
Square wave impulse noise	AC: ± 1,500VDC DC: ± 900VDC			
Electrostatic Discharge	Voltage: 4kV (contact discharge)			
Radiated electromagnetic field	27 – 500MHz, 10V/m			
Fast Transient Burst Noise	**Severity level**	All power modules	Digital I/Os (Ue ≥24V)	Digital I/Os (Ue < 24 V) Analog I/Os Communication I/Os
	Voltage	2 kV	1 kV	0.25 kV

2 DIMENSIONS

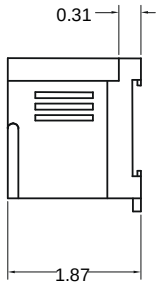
a. DQM706



b. DQM606



c. Terminal Strips



HE559-With Removable Strip

3 NETWORK CABLE

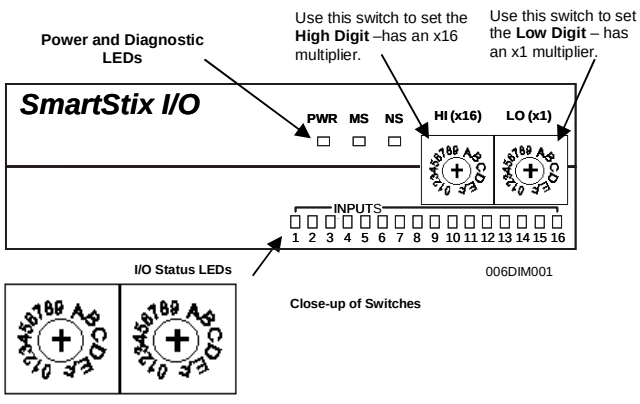
For detailed wiring information, refer to the Control Station Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances. **See Section 10 for our web address.**

		Pin	Description
⊘	**RED**	1	V+
⊘	**WHT**	2	CAN_H
⊘	**NC**	3	No Connection
⊘	**BLU**	4	CAN_L
⊘	**BLK**	5	V-

Recommended Cable	
Thick: (Max Distance = 500m)	Belden 3082A
Thin: (Max Distance = 100m)	Belden 3084A

4 ID SWITCHES (SETTING CSCAN NETWORK IDs)

CsCAN Network IDs are set using the hexadecimal number system from 01 to FD. The decimal equivalent is 1-253. Refer to Section 8, which shows the decimal equivalent of hexadecimal numbers. Set a unique Network ID by inserting a small Phillips screwdriver into the two *identical* switches. **Note:** The CsCAN Baud Rate for SmartStix I/O is fixed at 125KBaud



5 LEDs

a. Diagnostic LED Indicators

Diagnostic LED	State	Meaning
MS: (indicates fault status of Module)	Solid Red	RAM or ROM test failed
	Blinking Red	I/O test failed
	Blinking Green	Module is in power-up state
	Solid Green	Module is running normally
NS: (indicates fault status of Network)	Solid Red	Network Ack or Dup ID test failed
	Blinking Red	Network ID test failed
	Blinking Green	Module is in Life Expectancy default state
	Solid Green	Network is running normally

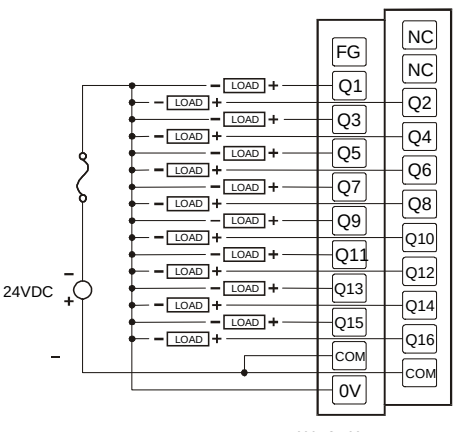
b. Status LED Indicators

The Power Status LED illuminates Red when power is applied to the module. There are I/O Status LED indicators for each of the Digital I/O points, which illuminate Red when an I/O point is ON.

6 WIRING

a. 16 DC OUT, Positive Logic

DQM606 Outputs				
Number of output points	16	**External Power Supply**	*Voltage*	24VDC ± 10% (ripple voltage: 4Vp-p or less)
Commons per Module	1		**Current**	30mA (TYP, All points ON)
Operating Voltage	24VDC	**OFF to ON Response**		2ms.
Rated Load Voltage	24VDC	**ON to OFF Response**		2ms.
Max. Load Current per channel	0.5A Max. per output 3A per common	**Output Type**		Sourcing
OFF Leakage Current	0.1mA or less	**Common Method**		16 points / COM
Max. Inrush Current per channel	1A, 10ms	*Operating Indicator*		LED turns on during ON state of output
		External connections		Terminal block connector (M3 x 6 screws)
Maximum Voltage Drop during ON circuit	1.5VDC(0.5A)	**Isolation methods**		Photo Coupler
Rated Voltage	11 – 25 VDC			
Internal power Consumption (mA)	280	**Weight**	6.7 oz. (191g)	

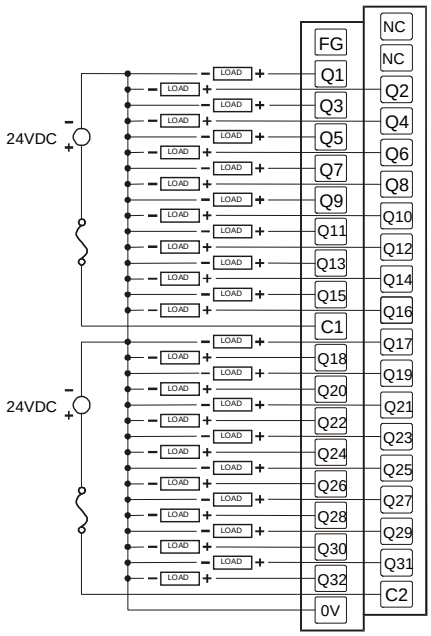


006DQM007-R1

Pin	Signal DQM606
NC*	No Connection (*Do not Connect)
FG	Frame Ground
NC*	No Connection (*Do not Connect)
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
Q9	Output 9
Q10	Output 10
Q11	Output 11
Q12	Output 12
Q13	Output 13
Q14	Output 14
Q15	Output 15
Q16	Output 16
COM	Isolated Common
COM	Isolated Common
0V	Isolated Power Negative

b. 32 DC OUT, Positive Logic

DQM706 Outputs				
Number of output points	32	**External Power Supply**	**Voltage**	24VDC ± 10%(ripple voltage: 4Vp-p or less)
Commons per Module	2		**Current**	30mA (TYP, All points ON)
Operating Voltage	24VDC	**OFF to ON Response**		2ms.
Rated Load Voltage	24VDC	**ON to OFF Response**		2ms.
Max. Load Current per channel	0.5A Max. per output 3A per common	**Output Type**		Sourcing
OFF Leakage Current	0.1mA or less	**Common Method**		16 points / COM
Max. Inrush Current per channel	1A, 10ms	**Operating Indicator**		LED turns on during ON state of output
		External connections		Terminal block connector (M3 x 6 screws)
Maximum Voltage Drop during ON circuit	1.5VDC(0.5A)	**Isolation methods**		Photo Coupler
Rated Voltage	11 – 25 VDC			
Internal power Consumption (mA)	380	**Weight**	10.22 (290g)	



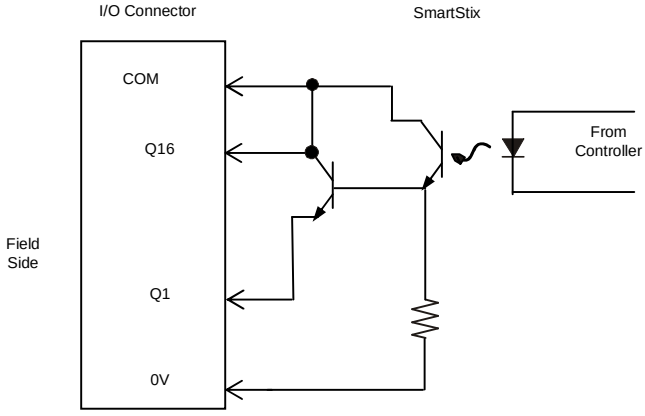
006DQM008-R2

Note: If desired, C1 and C2 can use a single supply.

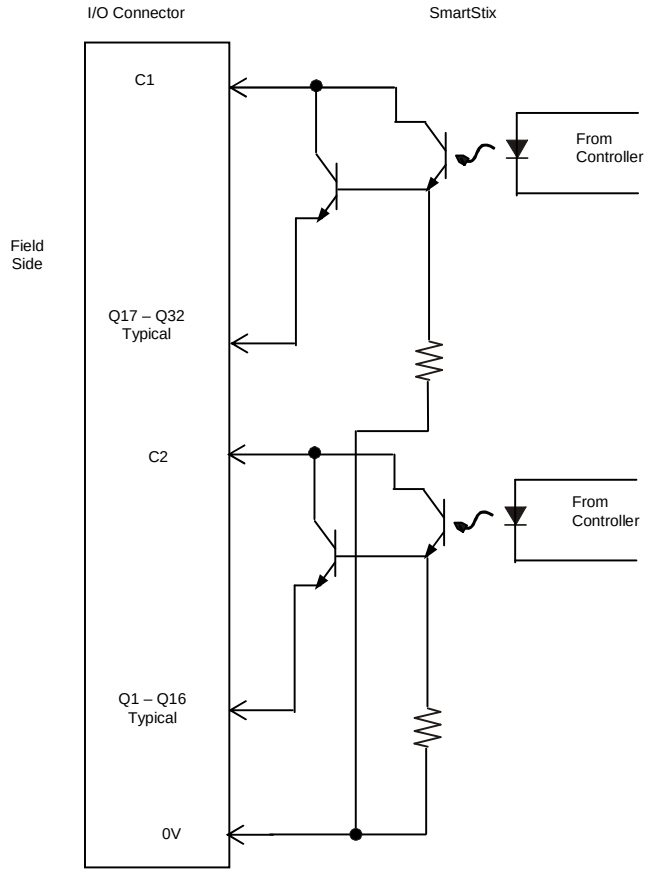
Pin	Signal DQM706
NC*	No Connection (*Do not Connect)
FG*	Frame Ground
NC*	No Connection (*Do not Connect)
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
Q9	Output 9
Q10	Output 10
Q11	Output 11
Q12	Output 12
Q13	Output 13
Q14	Output 14
Q15	Output 15
Q16	Output 16
C1	Isolated Common 1
Q17	Output 17
Q18	Output 18
Q19	Output 19
Q20	Output 20
Q21	Output 21
Q22	Output 22
Q23	Output 23
Q24	Output 24
Q25	Output 25
Q26	Output 26
Q27	Output 27
Q28	Output 28
Q29	Output 29
Q30	Output 30
Q31	Output 31
Q32	Output 32
C2	Isolated Common 2
0V	Isolated Power Negative

7 INTERNAL WIRING

a. DQM606



b. DQM706



8 DECIMAL (DEC) TO HEXADECIMAL (HEX) CONVERSION TABLE

Dec	Hex		Dec	Hex		Dec	Hex	
	HI	LO		HI	LO		HI	LO
0	0	0	**86**	5	6	**172**	A	C
1	0	1	**87**	5	7	**173**	A	D
2	0	2	**88**	5	8	**174**	A	E
3	0	3	**89**	5	9	**175**	A	F
4	0	4	**90**	5	A	**176**	B	0
5	0	5	**91**	5	B	**177**	B	1
6	0	6	**92**	5	C	**178**	B	2
7	0	7	**93**	5	D	**179**	B	3
8	0	8	**94**	5	E	**180**	B	4
9	0	9	**95**	5	F	**181**	B	5
10	0	A	**96**	6	0	**182**	B	6
11	0	B	**97**	6	1	**183**	B	7
12	0	C	**98**	6	2	**184**	B	8
13	0	D	**99**	6	3	**185**	B	9
14	0	E	**100**	6	4	**186**	B	A
15	0	F	**101**	6	5	**187**	B	B
16	1	0	**102**	6	6	**188**	B	C
17	1	1	**103**	6	7	**189**	B	D
18	1	2	**104**	6	8	**190**	B	E
19	1	3	**105**	6	9	**191**	B	F
20	1	4	**106**	6	A	**192**	C	0
21	1	5	**107**	6	B	**193**	C	1
22	1	6	**108**	6	C	**194**	C	2
23	1	7	**109**	6	D	**195**	C	3
24	1	8	**110**	6	E	**196**	C	4
25	1	9	**111**	6	F	**197**	C	5
26	1	A	**112**	7	0	**198**	C	6
27	1	B	**113**	7	1	**199**	C	7
28	1	C	**114**	7	2	**200**	C	8
29	1	D	**115**	7	3	**201**	C	9
30	1	E	**116**	7	4	**202**	C	A
31	1	F	**117**	7	5	**203**	C	B
32	2	0	**118**	7	6	**204**	C	C
33	2	1	**119**	7	7	**205**	C	D
34	2	2	**120**	7	8	**206**	C	E
35	2	3	**121**	7	9	**207**	C	F
36	2	4	**122**	7	A	**208**	D	0
37	2	5	**123**	7	B	**209**	D	1
38	2	6	**124**	7	C	**210**	D	2
39	2	7	**125**	7	D	**211**	D	3
40	2	8	**126**	7	E	**212**	D	4
41	2	9	**127**	7	F	**213**	D	5
42	2	A	**128**	8	0	**214**	D	6
43	2	B	**129**	8	1	**215**	D	7
44	2	C	**130**	8	2	**216**	D	8
45	2	D	**131**	8	3	**217**	D	9
46	2	E	**132**	8	4	**218**	D	A
47	2	F	**133**	8	5	**219**	D	B
48	3	0	**134**	8	6	**220**	D	C
49	3	1	**135**	8	7	**221**	D	D
50	3	2	**136**	8	8	**222**	D	E
51	3	3	**137**	8	9	**223**	D	F
52	3	4	**138**	8	A	**224**	E	0
53	3	5	**139**	8	B	**225**	E	1
54	3	6	**140**	8	C	**226**	E	2
55	3	7	**141**	8	D	**227**	E	3
56	3	8	**142**	8	E	**228**	E	4
57	3	9	**143**	8	F	**229**	E	5
58	3	A	**144**	9	0	**230**	E	6
59	3	B	**145**	9	1	**231**	E	7
60	3	C	**146**	9	2	**232**	E	8
61	3	D	**147**	9	3	**233**	E	9
62	3	E	**148**	9	4	**234**	E	A
63	3	F	**149**	9	5	**235**	E	B
64	4	0	**150**	9	6	**236**	E	C
65	4	1	**151**	9	7	**237**	E	D
66	4	2	**152**	9	8	**238**	E	E
67	4	3	**153**	9	9	**239**	E	F
68	4	4	**154**	9	A	**240**	F	0
69	4	5	**155**	9	B	**241**	F	1
70	4	6	**156**	9	C	**242**	F	2
71	4	7	**157**	9	D	**243**	F	3
72	4	8	**158**	9	E	**244**	F	4
73	4	9	**159**	9	F	**245**	F	5
74	4	A	**160**	A	0	**246**	F	6
75	4	B	**161**	A	1	**247**	F	7
76	4	C	**162**	A	2	**248**	F	8
77	4	D	**163**	A	3	**249**	F	9
78	4	E	**164**	A	4	**250**	F	A
79	4	F	**165**	A	5	**251**	F	B
80	5	0	**166**	A	6	**252**	F	C
81	5	1	**167**	A	7	**253**	F	D
82	5	2	**168**	A	8	**254**	F	E
83	5	3	**169**	A	9	**255**	F	F
84	5	4	**170**	A	A			
85	5	5	**171**	A	B			

9 INSTALLATION / SAFETY

a. All applicable codes and standards need to be followed in the installation of this product.

b. For I/O wiring (discrete), use the following wire type or equivalent: Belden 8441 or equivalent.

c. 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.

Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

Warning: To protect the module and associated wiring from load faults, use external fuse **(5 A)**.

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 0 through 15 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.

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Europe:
Tel: +353-21-4321266
Fax: +353-21-4321826
Web: http://www.horner-apg.com
Email: tech.support@horner-apg.com

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Analog I/O Module

HE559MIX577

4 Input Channels
2 Output Channels
±5V / ±10V / 4-20mA / ±20mA
CsCAN

SmartStix

Refer to SmartStix Analog Programming Guide (MAN0703) at **www.HornerOCS.com**.

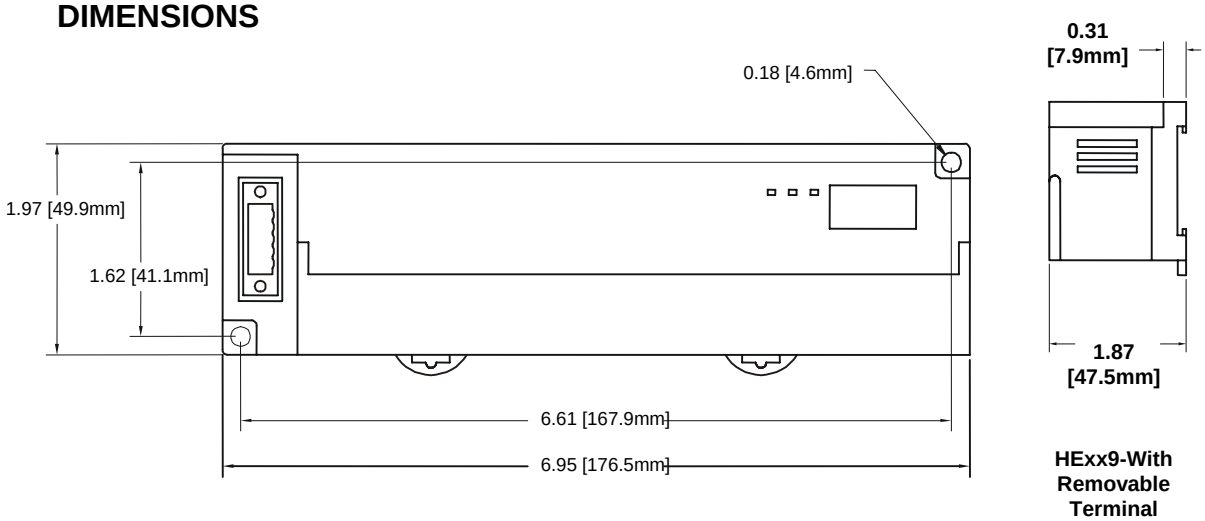
1 SPECIFICATIONS

ANALOG IN			
Number of input points	4	**Conversion Time**	5mS for all Channels
Input Ranges	±5V, ±10V DC 4-20mA, ±20mA DC	**Isolation**	1000V DC IEC61010-1 300V RMS
Resolution	14 bits	**Isolation Method**	Magnetic
Accuracy, 25°C	0.3%	**Maximum Continuous Overload**	±10V: 150VAC ±20mA: ±30mA, Clamped at ±6V
Input Impedance	V: 1 Megohm mA: 150 Ohms	**Programmable Filter Time Constants**	0.01 to 1.28 Seconds
Register Value for Nominal Full Scale	32000	**Filter Modes**	Running Average or Adaptive
ANALOG OUT			
Number of output points	2	**Isolation**	1000V DC IEC61010-1 300V RMS
Input Ranges	±5, ±10V DC 4-20mA, ±20mA DC	**Isolation Method**	Magnetic
Resolution	14 bits	**Output Clamp**	±12V, 600Wpk
Accuracy, 25°C	0.3%	**Register Value for Nominal Full Scale**	32000
Load Resistance	V: 600 Min mA: 500 Max		
GENERAL			
Required Power (Steady State)	3.6W (150ma @ 24VDC)	**Operating Temperature**	0° to 55° C
Required Power (Inrush)	8A @ 24VDC for 1ms	**Operating and Storage Humidity**	5 to 95% Non-condensing
		Altitude for use	Up to 2,000m
Storage Temperature	-25° to 70° C	**Pollution degree**	2 or lower
Atmosphere	Free from corrosive gases and excessive dust	**Cooling method**	Self-cooling
		Weight	8.40 oz. (238 g)

Vibration			
Occasional Vibration			
Frequency	**Acceleration**	**Amplitude**	**Sweep Count**
10 ≤ f < 57 Hz	-	0.075 mm	10 times in each direction for X,Y,Z
57 ≤ f ≤ 150 Hz	9.8 m/s^2 {1G}	-	
Continuous Vibration			
Frequency	**Acceleration**	**Amplitude**	**Sweep Count**
10 ≤ f < 57 Hz	-	0.035 mm	10 times in each direction for X,Y,Z
57≤ f ≤ 150 Hz	4.9 m/s^2 {0.5G}	-	

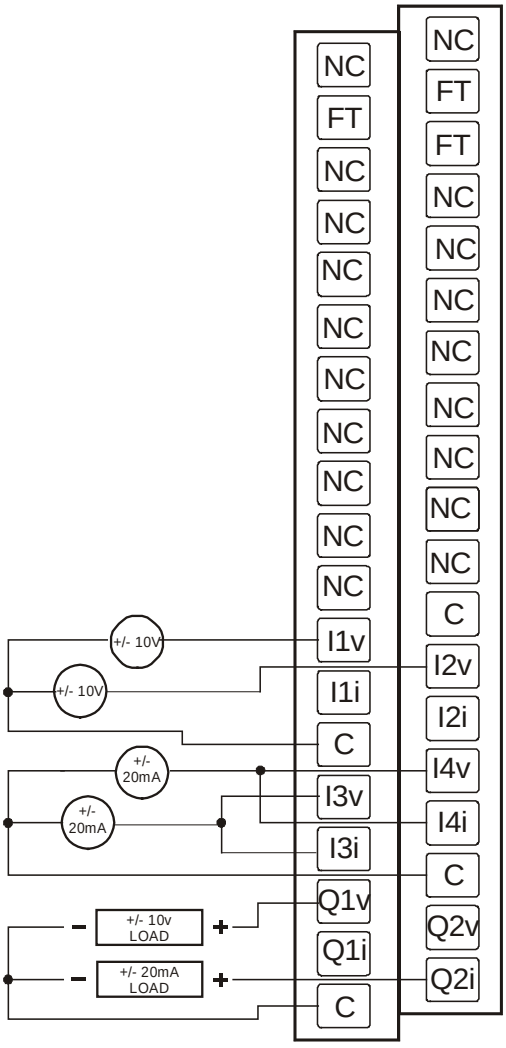
Shocks				
Maximum shock acceleration	147 m/s^2 {15G}			
Duration Time	11 ms.			
Pulse Wave	Half sine wave pulse (3 times in each of X, Y, Z directions)			
Noise Immunity				
Square wave impulse noise	AC: ± 1,500VDC DC: ± 900VDC			
Electrostatic Discharge	Voltage: 4kV (contact discharge)			
Radiated electromagnetic field	27 – 500MHz, 10V/m			
Fast Transient Burst Noise	**Severity level**	All power modules	Digital I/Os (Ue ≥24V)	Digital I/Os (Ue < 24 V) Analog I/Os Communication I/Os
	Voltage	2 kV	1 kV	0.25 kV

2 DIMENSIONS



HExx9-With Removable Terminal

3 WIRING



006MIX003-R1

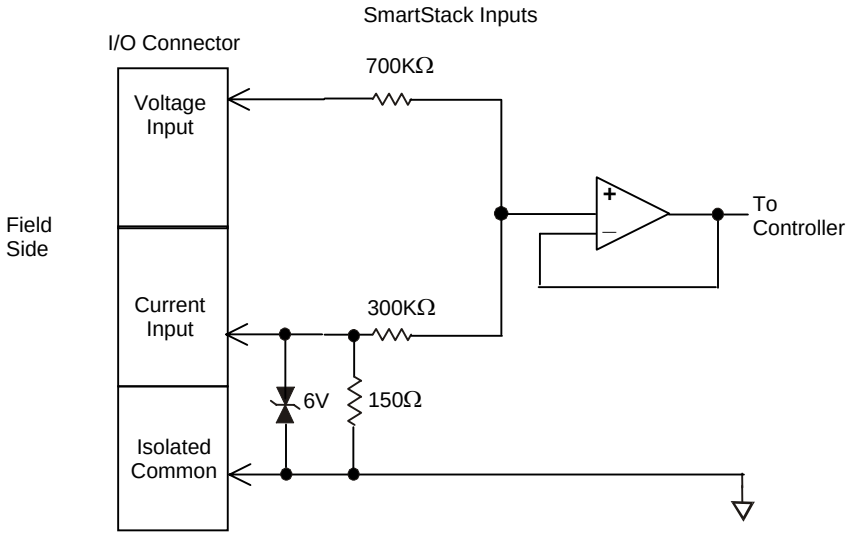
MIX577	
2	NC
4	FT
6	NC
8	NC
10	NC
12	NC
14	NC
16	NC
18	NC
20	NC
22	NC
24	I1v
26	I1i
28	C
30	I3v
32	I3i
34	Q1v
36	Q1i
38	C

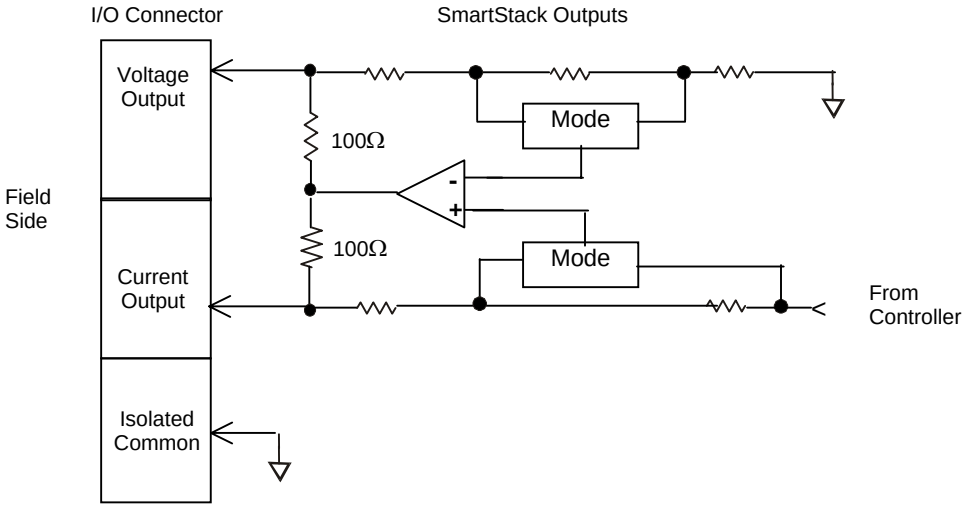
MIX577	
1	NC
3	FT
5	FT
7	NC
9	NC
11	NC
13	NC
15	NC
17	NC
19	NC
21	NC
23	C
25	I2v
27	I2i
29	I4v
31	I4i
33	C
35	Q2v
37	Q2i

FT: Factory Test, Do Not Connect

C terminals are connected together internally but isolated from bus and power circuits.

4 INTERNAL WIRING





5 CHANNEL MODE, PROGRAMMABLE FILTER, AND OUTPUT DEFAULT CONFIGURATION

The network supplies configuration information to the HE550MIX577 in the Consumed Directed Digital Data Words sent to the HE550MIX577. In the first word, the low 12 bits, 1 through 12, are channel mode bits. A low mode bit selects ±10V and a high mode bit selects ±20mA. The next three bits, 13 through 15, are input digital filter time constant codes and the high bit, 16, is an adaptive filter enable bit. In the second word, the low 12 bits are channel scale bits. A low scale bit selects ±10V or ±20mA for the corresponding channel. A high scale bit selects ±5V or 4-20mA. The upper four bits are unused.

Bit	Channel
1	AI1
2	AI2
3	AI3
4	AI4
5	Not used
6	Not used
7	Not used
8	Not used
9	AQ1
10	AQ2
11	Not used
12	Not used

Each analog input on the HE550MIX577 has a single pole 345Hz (461uS) cutoff high frequency noise filter. In addition a second digital filter may be specified in the first configuration word with the following time constants.

Bit			Time Constant
15	14	13	
0	0	0	10 milliseconds (Nominal hardware scan rate)
0	0	1	15 milliseconds
0	1	0	35 milliseconds
0	1	1	75 milliseconds
1	0	0	155 milliseconds
1	0	1	315 milliseconds
1	1	0	635 milliseconds
1	1	1	1.275 seconds

This digital filter is useful for applications with significant amounts of random noise. The slower time constants, while yielding better noise suppression, take a longer time to settle after step changes and are also sensitive to impulse noise which is treated like Gaussian noise and averaged.

Bit 16 of the first configuration word may be set to specify an adaptive filter algorithm that:

1. Responds much more quickly to large step changes at slower time constants with full filtering of low level noise.
2. Suppresses impulse noise at the expense of slightly slower response at the shortest time constant settings. (Approximately 10 additional milliseconds)

Note that actual system response time is network dependent.

Bits 9 through 12 of the 5th configuration word control the behavior of the analog outputs when network communication is lost. The bit to channel correspondence is the same as for the mode and scale bits. If the corresponding bit is set, the outputs hold the last state. If the corresponding bit is cleared, the outputs are set to the respective value supplied to the HE550MIX577 in the second four words of the Consumed Directed Analog Data sent by the OCS. The other bits of the 5th configuration word are unused.

Refer to SmartStix Analog Programming Guide.

6 INPUT AND OUTPUT CONVERSION FACTORS

The following table describes how real-world values are scaled in the controller. For a given physical voltage or current, the register data value may be calculated by using the conversion factor from the table. The following formula is used: **Data = Voltage or Current / Conversion Factor**

Example: The user selects a voltage range of ±10V:

1. The physical voltage is 6 Volts.
2. Using the table, the conversion factor for the voltage range of ±10V is .0003125.
3. To determine the data value, the formula is used: Data = V / Conversion Factor
   19200 = 6 VDC / 0.0003125

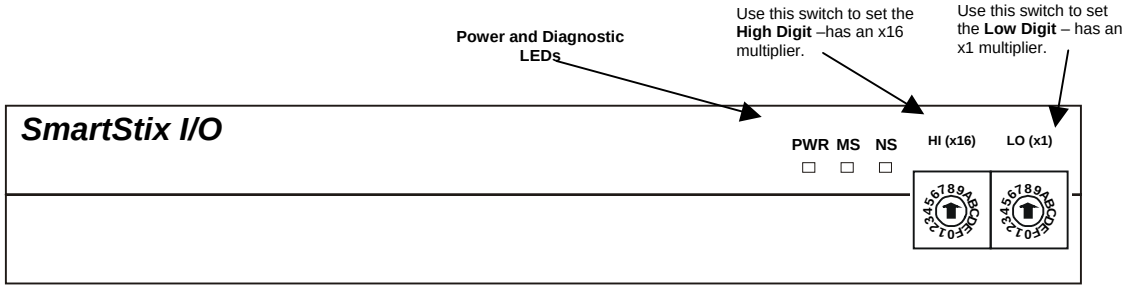
4. For the 4 to 20mA range, the offset, 4mA, must first be subtracted from the physical output value before dividing by the scale factor to yield the register data value.

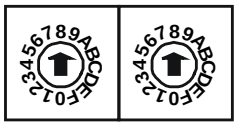
Conversion between Physical Values and Register Values			
Selected Range	**Volts / mA**	**Register Data**	**Conversion Factor**
±5.00 V	> +5.11	32767	0.00015625
	+5.00	32000	
	0.00	0	
	-5.00	-32000	
	< -5.11	-32768	
±10.00 V	> +10.23	32767	0.0003125
	+10.00	32000	
	0.00	0	
	-10.00	-32000	
	< -10.23	-32768	
4..20 mA	< +20.37	32767	0.0005
	+20.00	32000	
	+4.00	0	
	-12.00	-32000	
	> -12.38	-32768	
±20.00 mA	> +20.47	32767	0.0006250
	+20.00	32000	
	0	0	
	-20.00	-32000	
	< -20.47	-32768	

7 SETTING ID SWITCHES

CsCAN Network IDs are set using the hexadecimal number system from 01 to FD. The decimal equivalent is 1-253. Refer to following Conversion Table, which shows the decimal equivalent of hexadecimal numbers. Set a unique Network ID by inserting a small Phillips screwdriver into the two *identical* switches.

Note: The CsCAN Baud Rate for SmartStix I/O is fixed at 125KBaud





Close-up of Switches

Decimal (Dec) to Hexadecimal (Hex) Conversion														
Dec	**Hex**		**Dec**	**Hex**		**Dec**	**Hex**		**Dec**			**Dec**	**Hex**	
	HI	**LO**		**HI**	**LO**		**HI**	**LO**		**HI**	**LO**		**HI**	**LO**
			54	3	6	108	6	C	**162**	A	2	**216**	D	8
1	0	1	55	3	7	109	6	D	**163**	A	3	**217**	D	9
2	0	2	56	3	8	110	6	E	**164**	A	4	**218**	D	A
3	0	3	57	3	9	111	6	F	**165**	A	5	**219**	D	B
4	0	4	58	3	A	112	7	0	**166**	A	6	**220**	D	C
5	0	5	59	3	B	113	7	1	**167**	A	7	**221**	D	D
6	0	6	60	3	C	114	7	2	**168**	A	8	**222**	D	E
7	0	7	61	3	D	115	7	3	**169**	A	9	**223**	D	F
8	0	8	62	3	E	116	7	4	**170**	A	A	**224**	E	0
9	0	9	63	3	F	117	7	5	**171**	A	B	**225**	E	1
10	0	A	64	4	0	118	7	6	**172**	A	C	**226**	E	2
11	0	B	65	4	1	119	7	7	**173**	A	D	**227**	E	3
12	0	C	66	4	2	120	7	8	**174**	A	E	**228**	E	4
13	0	D	67	4	3	121	7	9	**175**	A	F	**229**	E	5
14	0	E	68	4	4	122	7	A	**176**	B	0	**230**	E	6
15	0	F	69	4	5	123	7	B	**177**	B	1	**231**	E	7
16	1	0	70	4	6	124	7	C	**178**	B	2	**232**	E	8
17	1	1	71	4	7	125	7	D	**179**	B	3	**233**	E	9
18	1	2	72	4	8	126	7	E	**180**	B	4	**234**	E	A
19	1	3	73	4	9	127	7	F	**181**	B	5	**235**	E	B
20	1	4	74	4	A	128	8	0	**182**	B	6	**236**	E	C
21	1	5	75	4	B	129	8	1	**183**	B	7	**237**	E	D
22	1	6	76	4	C	130	8	2	**184**	B	8	**238**	E	E
23	1	7	77	4	D	131	8	3	**185**	B	9	**239**	E	F
24	1	8	78	4	E	132	8	4	**186**	B	A	**240**	F	0
25	1	9	79	4	F	133	8	5	**187**	B	B	**241**	F	1
26	1	A	80	5	0	134	8	6	**188**	B	C	**242**	F	2
27	1	B	81	5	1	135	8	7	**189**	B	D	**243**	F	3
28	1	C	82	5	2	136	8	8	**190**	B	E	**244**	F	4
29	1	D	83	5	3	137	8	9	**191**	B	F	**245**	F	5
30	1	E	84	5	4	138	8	A	**192**	C	0	**246**	F	6
31	1	F	85	5	5	139	8	B	**193**	C	1	**247**	F	7
32	2	0	86	5	6	140	8	C	**194**	C	2	**248**	F	8
33	2	1	87	5	7	141	8	D	**195**	C	3	**249**	F	9
34	2	2	88	5	8	142	8	E	**196**	C	4	**250**	F	A
35	2	3	89	5	9	143	8	F	**197**	C	5	**251**	F	B
36	2	4	90	5	A	144	9	0	**198**	C	6	**252**	F	C
37	2	5	91	5	B	145	9	1	**199**	C	7	**253**	F	D
38	2	6	92	5	C	146	9	2	**200**	C	8			
39	2	7	93	5	D	147	9	3	**201**	C	9			
40	2	8	94	5	E	148	9	4	**202**	C	A			
41	2	9	95	5	F	149	9	5	**203**	C	B			
42	2	A	96	6	0	150	9	6	**204**	C	C			
43	2	B	97	6	1	151	9	7	**205**	C	D			
44	2	C	98	6	2	152	9	8	**206**	C	E			
45	2	D	99	6	3	153	9	9	**207**	C	F			
46	2	E	100	6	4	154	9	A	**208**	D	0			
47	2	F	101	6	5	155	9	B	**209**	D	1			
48	3	0	102	6	6	156	9	C	**210**	D	2			
49	3	1	103	6	7	157	9	D	**211**	D	3			
50	3	2	104	6	8	158	9	E	**212**	D	4			
51	3	3	105	6	9	159	9	F	**213**	D	5			
52	3	4	106	6	A	160	A	0	**214**	D	6			
53	3	5	107	6	B	161	A	1	**215**	D	7			

8 LEDS

SmartStix I/O Modules provide diagnostic and status LED indicators.

a. Diagnostic LED Indicators

Diagnostic LED	State	Meaning
MS (Module Status)	Solid Red	Initializing
	Blinking Red	I/O test failed, internal hardware fault
	Blinking Green	Module is in power-up state *
	Solid Green	Module is running normally
NS (Network Status)	Solid Red	Network Ack or Dup ID test failed **
	Blinking Red	Network ID test failed: ID not in the range of 1..253
	Blinking Green	Life Expectancy timeout, outputs are in default state ***
	Solid Green	Network is running normally

* If a blinking green Module Status persists for more than a few seconds the module has not received the expected configuration from the OCS. This may be due to no Network I/O configuration created in Cscape, not having downloaded the Network I/O configuration to the master OCS, an unpowered master OCS, or the wrong Network ID number set on the module's rotary switches.

** **Network Ack** means that no other node is active on the network. **Dup ID test failed** means that another node with the same ID switch setting is already on the network.

*** Life Expectancy timeout means that the module has not received a periodic message from the master OCS in the time specified in either the Life Expectancy directed data message or the Comm timeout of the Network I/O Configuration window in Cscape.

b. Status LED Indicators

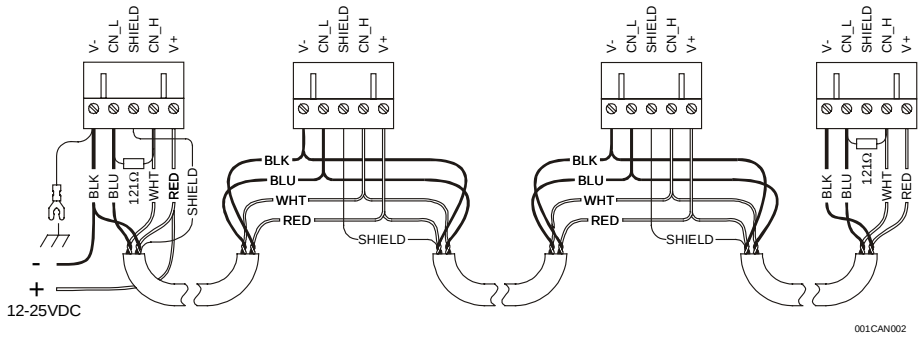
The Power Status LED illuminates Red when power is applied to the module. There are I/O Status LED indicators for each of the Digital I/O points, which illuminate Red when an I/O point is ON.

9 NETWORK CABLE

For detailed wiring information, refer to the applicable hardware manual listed in this datasheet under **Installation/Safety**. A handy checklist is provided that covers panel box layout requirements and minimum clearances.

	Pin	Description
RED	1	V+
WHT	2	CAN_H
SHD	3	Shield
BLU	4	CAN_L
BLK	5	V-

Recommended Cable	
Thick: (Max Distance = 500m)	Belden 3082A
Thin: (Max Distance = 100m)	Belden 3084A



CAN Wiring

Note: 12 - 24VDC must be supplied to the network.

10 INSTALLATION / SAFETY

When found on the product, the following symbols specify:

Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

WARNING: To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.

WARNING: To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse the voltage measurement inputs. Be sure to locate fuses as close to the source as possible.

WARNING: Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.

WARNING: In the event of repeated failure, do not replace the fuse again as a repeated failure indicates a defective condition that will not clear by replacing the fuse.

WARNING: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

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. (See the **Additional References** section in this document.)

- All applicable codes and standards need to be followed in the installation of this product.
- For I/O wiring (discrete), use the following wire type or equivalent: Belden 8441 or equivalent.

Adhere to the following safety precautions whenever any type of connection is made to the module.

- Connect the green safety (earth) ground first before making any other connections.
- When connecting to electric circuits or pulse-initiating equipment, open their related breakers. Do not make connections to live power lines.
- Make connections to the module first; then connect to the circuit to be monitored.
- Route power wires in a safe manner in accordance with good practice and local codes.
- Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.
- Ensure hands, shoes, and floor are dry before making any connection to a power line.
- Make sure the unit is turned OFF before making connection to terminals. Make sure all circuits are de-energized before making connections.
- Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.

11 ADDITIONAL REFERENCES

The following table indicates the hardware manual numbers for the controller you are using. Hardware manuals contain detailed installation, configuration and other pertinent information. See the **Technical Support** section in this document for the web site address to download references and obtain revised editions.

Additional References	
Controller	**Manual Number**
QX Series Hardware e.g. HEQX451, HEQX551, HEQX651	MAN0798
NX Series Hardware e.g. HENX220, HENX221, HENX250, HENX251	MAN0781
Operator Control Station Hardware (OCS, OCX) e.g., OCS1XX / 2XX; Graphic QCS250	MAN0227
Remote Control Station Hardware RCS (except RCS116), RCX (e.g., RCS210, RCS250)	
Color Touch QX Hardware e.g., OCS300, OCS 301, OCS 350, OCS 351 e.g., OCS 451, OCS 551, OCS 651	MAN0465
LX Series Hardware e.g., LX-280 / LX-300; RCS116	MAN0755
MiniQX / MiniRCS / MiniOCX / MiniRCX Hardware e.g., HE500QXxxx	MAN0305
Other Useful References	
CAN Networks	MAN0799
Cscape Programming and Reference	MAN0313
DeviceNet™ Implementation	SUP0326
Wiring Accessories and Spare Parts Manual	MAN0347

12 TECHNICAL SUPPORT

For assistance and manual updates, contact Technical Support at the following locations:

North America:
(317) 916-4274
www.heapg.com
email: techsppt@heapg.com

Europe:
(+) 353-21-4321-266
www.horner-apg.com
email: techsupport@hornerirl.ie