



# SmartMod

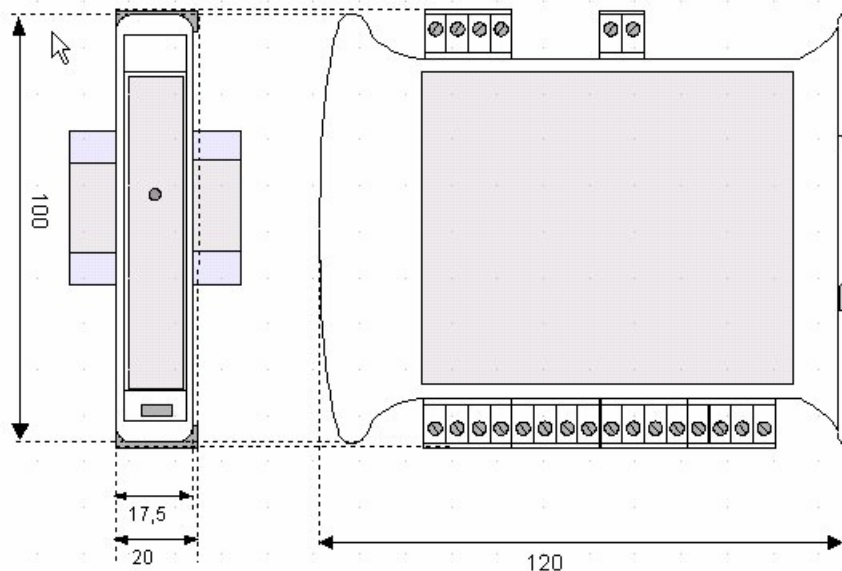
## Digital Input/Output Module

HE359DIQ512  
Four 12/24V DC Inputs (neg. logic)  
Four Relay Outputs (2A, max)



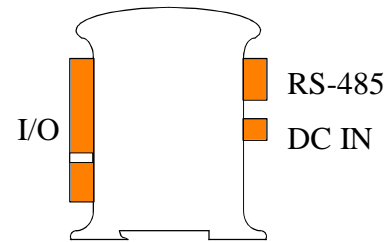
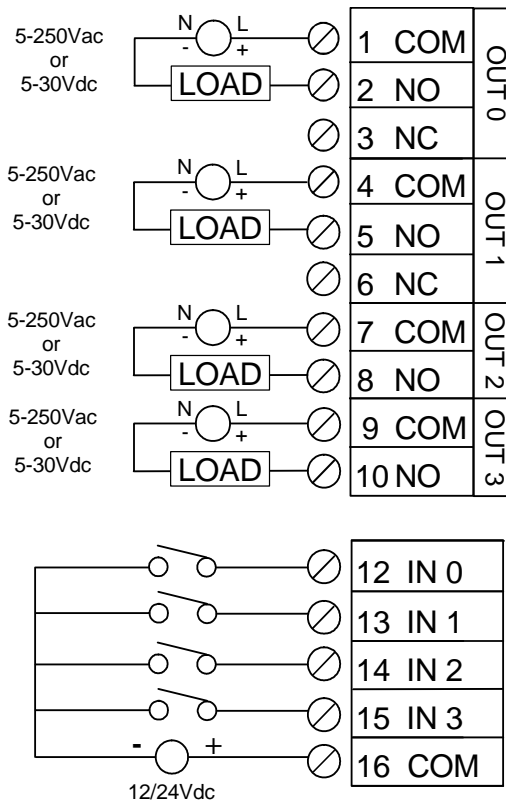
### 1 SPECIFICATIONS

	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	Storage Temp.	-40° to 85° Celsius
Peak Voltage	30 VDC	Operating Temp.	-10° to 60° Celsius
ON voltage level	10 VDC	Relative Humidity	5 to 95% Non-condensing
OFF voltage level	0-3 VDC	Dimensions WxHxD	17.5mm x 100mm x 120mm 0.69" x 3.94" x 4.72"
Outputs per Module	4 (2 SPDT, 2 SPST)	Weight	210g (8.4 oz.)
Max Switching Power	2A @ 250 VDC 2A @ 30 VDC	Communications	Modbus/RTU (binary) RS-485 half duplex
Minimum Load	5 VDC, 10mA	Default Comms. Parameters	38400 baud, N, 8, 1, no h/s Default Modbus ID 1
Maximum Voltage	250VAC, 110 VDC	Supported Modbus Commands	1,2,3,4,5,6,8,15,16
Required Power (Steady State)	45mA @ 24Vdc, typical		
Required Power (Inrush)	Negligible		
Isolation	2000Vac for 60 seconds (Input/Power & Input/Comms)		
CE & UL Compliance	See Compliance Table at <a href="http://www.heapg.com/Support/compliance.htm">http://www.heapg.com/Support/compliance.htm</a>		



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**

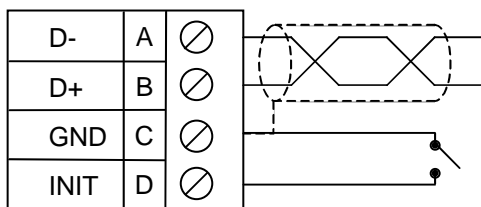


Pin #	DIQ512	
1	COM	OUT 0
2	N. O.	
3	N. C.	
4	COM	OUT 1
5	N. O.	
6	N. C.	
7	COM	OUT 2
8	N.O.	
9	COM	OUT 3
10	N.O.	

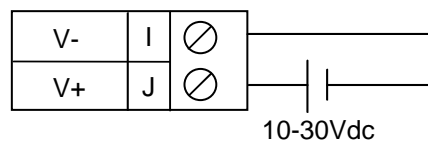
12	INPUT 0
13	INPUT 1
14	INPUT 2
15	INPUT 3
16	COM

Note:  
Each  
Output  
COM  
isolated

**WIRING – RS-485**



**WIRING – DC IN**

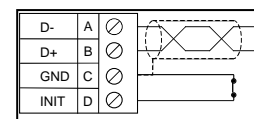


**Notes:**

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 3	Bit 2	Bit 1	Bit 0
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.* Enbl'd

\*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](http://www.heapg.com)

**Europe:**  
(+) 353-21-4321-266  
[www.horner-apg.com](http://www.horner-apg.com)

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