

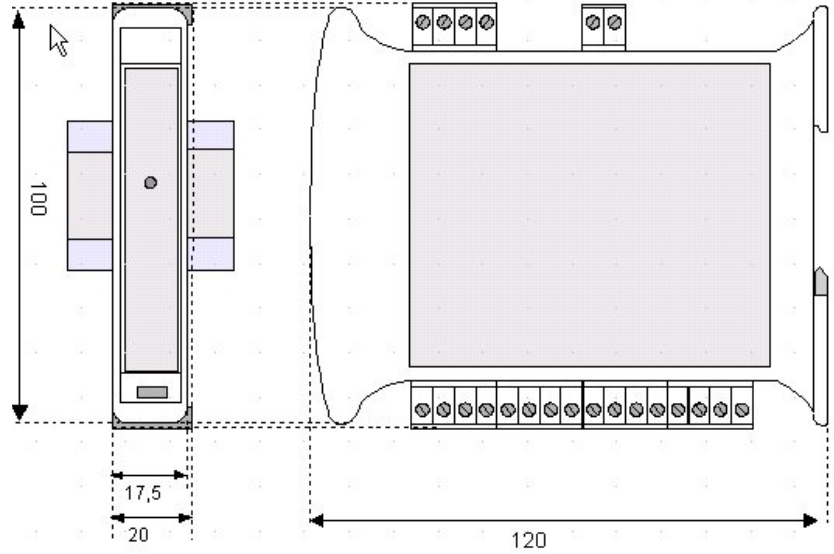


# SmartMod DC Digital Input Module HE359DIM610 12/24VDC Negative Logic



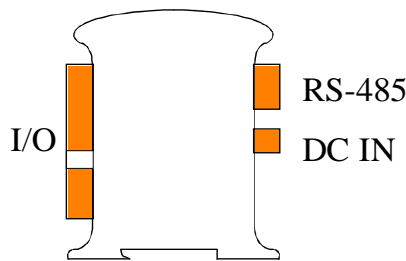
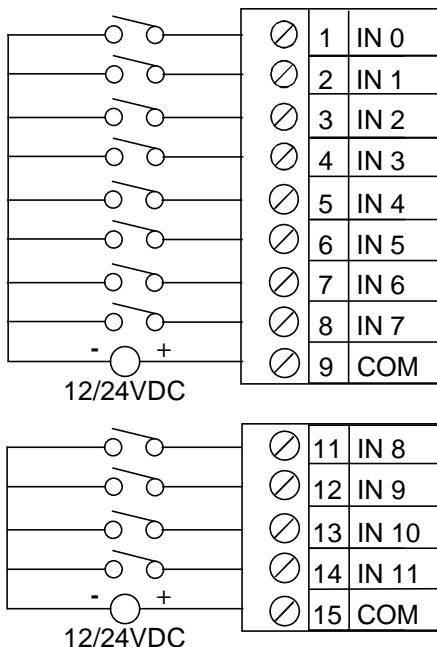
**1 Specifications**

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
Input Impedance	4.7Kohm	Relative Humidity	0 to 90% Non-condensing
		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	Factory Default Communications 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 <a href="http://www.heapg.com/Pages/TechSupport/ProductCert.html">http://www.heapg.com/Pages/TechSupport/ProductCert.html</a>		



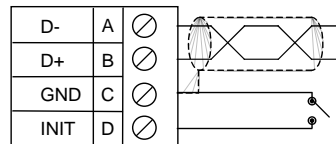
Dimensions in inches are 0.69"W x 3.95"H x 4.72"D  
Note: Number of I/O terminal connections varies from model to model

**2 Wiring – I/O**

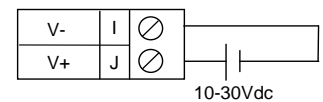


Pin #	DIM610	Pin #	DIM610
1	INPUT 0	11	INPUT 8
2	INPUT 1	12	INPUT 9
3	INPUT 2	13	INPUT 10
4	INPUT 3	14	INPUT 11
5	INPUT 4	15	INPUT COMMON 2
6	INPUT 5		
7	INPUT 6		
8	INPUT 7		
9	INPUT COMMON 1		

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



Wiring RS-485



Wiring DC IN

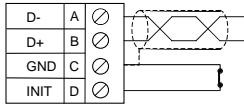
**Notes:**

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.

**3 Init Default Setup**

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

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



**The INIT Default RS485 Settings Are:**

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

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

**4 Configuration DATA**

SmartMod Configuration settings are mapped into Modbus Register space. This configuration data may be modified with any Modbus/RTU Master device. For convenience, Horner APG has developed a variety of Cscape application files which allow an OCS (Xle, NX, LX, QX) to act as a SmartMod Configuration device. 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. This 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 (in 2mS steps)	0	255	0mS
40009	Watchdog Timer (in 0.5s steps)	0	255	10 (5s)
40010	Watchdog Data	I/O Watchdog Data – See Table Below		
40011	Input Type	I/O Data – See Table Below		
40012-40014	Reserved			

Register 40011 (Mirror of Digital Input Coils) Bit Definition																
This register show digital inputs state (0 = OFF, 1 = ON). The same values can be read by the coils table below, of which this register is a mirror.																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Input	#7	#6	#5	#4	#3	#2	#1	#0	-	-	-	-	#11	#10	#9	#8
Coil	24	23	22	21	20	19	18	17	-	-	-	-	28	27	26	25

**5 Input/Output DATA**

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

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

Modbus Coil	Description	Access	Watchdog Event & Power-up Event Operation
00001	Watchdog Enabled	Read/Write	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.
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	The Power-up Event (Coil 3) is set every time the power is applied. It can be cleared by the controller if desired.
00026	Digital Input 9	Read-only	
00027	Digital Input 10	Read-only	
00028	Digital Input 11	Read-only	

**6 Implemented Modbus Functions**

Function	Code
01	Read multiple coils (0xxxx bank)
02	Read multiple coils (1xxxx bank)
03	Read multiple registers (4xxxx bank)
04	Read multiple registers (3xxxx bank)
05	Write single coil
06	Write single register
15	Write multiple coils
16	Write multiple registers
08	Diagnostic

For DIM 610 SmartMod modules, bank 0xxxx is a mirror of bank 1xxxx, as 3xxxx is a mirror of 4xxxx i.e. the first register can be read independently as 30001 (with the function 04) or 40001 (with the function 03)

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 = RTU Mode	1	Even	1 = 8 Data Bits	1	2400 baud	
		2	Odd		2	4800 baud	
		3	Space		3	9600 baud	
					4	19200 baud	
				5	38400 baud		
				6, 7	Unused		

**NOTE:**  
 Data bits number is ignored, in ASCII mode it is fixed at 7 and in RTU mode it is fixed to 8. In RTU mode the parity bit is ignored (parity is fixed at NONE).

Register 40010 (Mirror of Coils) Bit Definition																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Coil	8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9

**7 Watchdog**

The module has been provided with a Host Watchdog timer which, when it is enabled, issues an alarm event each time the communication between the module and the host is inactive for a period time greater than the programmed one (40009).

When the alarm is activated, the values of the outputs are automatically converted to the preset safety values to avoid damage to the system in case of a fault occurring. Also, under the alarm condition the green LED on the front of the module blinks and the "Watchdog Event" coil is forced to 1. There is also a Module Watchdog timer that monitors the internal CPU work and activates when the CPU doesn't function correctly.

After the reset, all outputs will assume their initial default value ("power up value"), this may be different to the output value after the reset.

Register 40009 Definition		
The Watchdog Timeout value is set in Modbus register 40009 (Resolution of 0.5s)		
Coil 00009	Coil 00010	Coil 00011
Watchdog Enabled	Watchdog Event	Power-up Event
0 = Input Disabled		
1 = Input Enabled		
If Coil 9 (Watchdog Enabled) is set, Coil 10 (Watchdog Event) will set if the Watchdog Timeout value is exceeded.		
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.		

**8 Sync**

Register 40011 Definition				
Bit	Input		Bit	Input
0	# 8		8	# 0
1	# 9		9	# 1
2	# 10		10	# 2
3	# 11		11	# 3
4	-		12	# 4
5	-		13	# 5
6	-		14	# 6
7	-		15	# 7

The Sync function is performed by a command sent to all devices connected on the network. When the devices receive the Sync command, all Input states are saved in the relative register. Doing this, it is possible to read the value of all inputs at the Sync command time.

To send the Sync command, write the value 10 in the "Test" register (40001) and send to node ID 255

NOTE: The sync values are not saved in EPROM.

When the device receives the Sync command, the actual input values in the 40015-40018 registers are saved in this register, 40011, channel by channel, to be read at a following time.

**8 Digital Counter**

These registers show pulse count on the associated input. The format value is 16-bit non-signed integer (0 – 65535).

Registers 40015-40022 Definition	
40015	Digital Counter #0
40016	Digital Counter #1
40017	Digital Counter #2
40018	Digital Counter #3
40019	Digital Counter #4
40020	Digital Counter #5
40021	Digital Counter #6
40022	Digital Counter #7

At each input pulse (falling edge), the value of the "Counter" register will be incremented by 1.

If the "Automatic Reset" is enabled, at each reading of the counter register, it will be automatically cleared to 0.

If the "Automatic Reset" is not enabled, the counter register will be cleared only by writing it to the value 0.

NOTE: at the power-up, the counter value will be cleared and the automatic reset will be enabled.

**9 LED Indicator**

LED	COLOUR	STATE	DESCRIPTION
POWER	Green	ON	Device Powered
		OFF	Device Not Powered / Incorrect RS485 Cabling
		Fast Blink	Communication in progress/ (blink frequency depends on baud rate)
		1 Second Blink	Watch-dog Alarm Condition (See Section 6 above)

The LED is located on the front of the model.

**10 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.

- All applicable codes and standards should be followed in the installation of this product.
- Shielded, twisted-pair wiring should be used for best performance.
- Shields may be terminated at the module terminal strip.
- In severe applications, shields should be tied directly to the ground block within the panel.
- Use the following wire type or equivalent: Belden 8441.

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

When found on the product, the following symbols specify:



**11 Troubleshooting Tips**

If not communicating

- Verify that the wiring is correct
  - Pin 1 on the XL series serial ports is RS-485 positive (+) and is connected to positive (+)
  - Pin 2 on the XL series serial ports is RS-485 negative (-) and is connected to negative (-)
- If the ground pin is not being used, verify that only one device on the network is supplying bias. This is set from the system menu on the XL series controllers.
- Tie the INIT pin to GND then power cycle the SmartMod. Then attempt to communicate with it at the default parameters
- If using the INIT settings, verify with an ohm meter that the jumper is shorted to GND. Then try power cycling the SmartMod unit again.

If any I/O seems unresponsive

- Verify the Modbus address that you are polling e.g. 40010 (command of 3, 6, or 16 offset 00009)
- Verify any registers from the device that may affect the I/O. These will vary between modules. For example, enable, type selection or raw value.

**12 Technical support**

Technical Support at the following locations:

<b>North America:</b>	<b>Europe:</b>
Tel: 317 916-4274	Tel: +353-21-4321266
Fax: 317 639-4279	Fax: +353-21-4321826
Web: <a href="http://www.heapg.com">http://www.heapg.com</a>	Web: <a href="http://www.horner-apg.com">http://www.horner-apg.com</a>
Email: <a href="mailto:techspt@heapg.com">techspt@heapg.com</a>	Email: <a href="mailto:tech.support@horner-apg.com">tech.support@horner-apg.com</a>

No part of this publication may be reproduced without the prior agreement and written permission of Horner APG, Inc. Information in this document is subject to change without notice.