

# Introduction to SmartMod

Step by Step Guide 1 Setting up and connecting an HE359DIQ512 to an XLt MJ2 port

#### Cscape:

- 1. Open **Cscape** and create a new program file.
- 2. Select: Program/Protocol Configuration (Fig.1)



Fig.1

3. Select **Modbus Master** protocol from the dropdown list (Fig.2)

IJ1/Com Option	None	Network	Devices	Scan List
MJ2	- None	Network	Devices	Scan List
	CT RTU Modbus CMP v 1.07 Danfoss VLT5000 Drive v 1.02 Eurotherro590 Master v 1.00	Network	Devices	Scan List
	GE SNP (Series 90 Protocol) v 1.01 GPS Protocol v 1.03 KEB DIN660191//I protocol v 1.15	Swa	p Serial Port Se	ttings
Ethernet	Modbus Master v 1.11 Toshiba Computer Link v 1.02 Tosvert VF-S7 Master v 0.00	Network	Devices	Scan List

Fig.2

4. Select **Network** button and setup (Fig.3).

Port Configuration	1-	Update Scan
Baud Rate: Parity:	9600 <b>•</b>	Automatic     Update Interval: 0     mSec
Data Bits:	8	C Manual
Stop Bits:	1 💌	Trigger:
Handshake:	Multidrop Half 💌	ID Select:
Protocol:	Modbus RTU 💌	Status
Mode:	RS-485	Register:         % R1000         4 x         32-807           Name:
Retries:	2 (0-255)	
Timeout:	10000 mSec	Address:
Slave Speed:	Fast 💌	OK Cancel

Fig.3

5. Select **Ok** and then Select **Device** button

6. Setup the device (Fig.4).

Device	
1 Name:	SmartMod
2 ID:	(Slave Address)
Device Opt	ions
☐ Swap	) Words on 32-bit data
🗖 Targe	et returns 32-bits on single register request
3 Device T	ype: Modicon PLC 5-Digit Addressing 🗸 🗸
Status	-
Example	e <mark>4</mark>
I♥ Enable	
I♥ Enable	AP1000 0 000
Address:	<mark>%R1008 2 х т⊶вит</mark>
Address: Name:	<sup>%</sup> R1008 2 х т⊶вит ▼
Address: Name: C Sto	%R1008     2 x     16-BIT       Image: second seco



- 1. A descriptive name for the attached device
- 2. Modbus ID for Smartmod. 1 is correct for initial communication
- 3. 5-digit Addressing for SmartMod
- 4. Enabling the Status register provides feedback (see troubleshooting the connection below).
- 7. Select Ok and then select Scan List button

8. Click Add and setup (Fig. 5).

ata Mapping	×
Target 1 Device Name: SmartMod (1)	•
Device Register: 40006	2 T 32-bit access
3 Length: 8	Device Register Help
Local 4 Register:  %R0006 Name:	00001 to 09999 = Output Bits 10001 to 19999 = Input Bits 30001 to 39999 = Input Registers 40001 to 49999 = Holding Registers
Update Type	
C Polled Read	Triggered Read
5    Polled Read/Write   C 1	Friggered Write
C Polled Read/Write Init	Trigger Register:
	OK Cancel

Fig. 5

- 1. Select device from drop down list. Bracketed number indicates Node ID.
- 2. Starting register. (Holding registers are appropriate)
- 3. Up to 8 registers are required for the HE359DIQ512
- 4. The starting register (%R) in the XLt where the data will be mapped.
- 5. Polled Read/Write as changes can be made to settings in the SmartMod
- 9. Select OK, OK, OK to return to Cscape main window

10. Select Screens/View edit Screens (Figs. 6&7).



Fig.6



## Fig.7

11. Select Numeric Data button <sup>123</sup> then click and drag an area on the XLt screen. Double click the field and set up the data (Fig.8)

	Numeric Data Properties
40006(SmartMod)	Controller Register Address: %R0006 16-bit
####################################	Data Format Data Format Usublication Font: C Left © Center © Right 5x7 Font
Text:     Justification       40006(SmartMod)     C C C C       Insert Special Char >>>     Vertical Text	Digits:       Decimal Pos.       Format         16       ①       ①         Image: Constraint of the second
OK Cancel	Data Color >>> OK Cancel

Fig.8

12. Add a second similar data field to the screen. Use **Controller Register** %R0007 (40007 SmartMod) and use 3 digits, Decimal Format/Editable (Fig. 9).

40006	6(Sma	rtMod	)	
#####	####	+####	ŧ#	
40001	7(Sma	rtMod	)	
	###			22
	Fig.	9		1

13. Download to XLt.

14. Assemble the communications cable. Port details as per Fig 10.



**Note:** These are the onboard MJ2 connections and not the cable connector.

Fig.10

#### Connect:

XLt MJ2 port (Half Duplex Mode)	SmartMod Comm. Port
Pin 1 (Tx+/Rx+)	B (D+)
Pin 2 (Tx-/Rx-)	A (D-)
Pin 6 (0V)	C (GND)

For Initialisation settings connect:

SmartMod Comm. Port	SmartMod Comm. Port
C(GND)	D(INIT)

- 15. When the cable is assembled connect the RJ45 end to MJ2 on the XLt. Connect the Smartmod 4-way terminal block to the HE359DIQ512 comm. port.
- 16. Power-up the HE359DIQ512 SmartMod. The Initialisation settings (INIT connected to GND at power-up) will cause the SmartMod to start in the following mode: Baud Rate 9600, No parity, 1 Stop Bit and as Modbus Node ID 1. This is to allow communications so the SmartMod can be configured for alternative settings, if necessary. See Fig. 3 above for Cscape/XLt equivalent settings.

- 17. If communications is established then the green Power LED on the front of the HE359DIQ512 will flash (may not be visible at higher baud rates) and the XLt screen will display a binary sequence of 0's and 1's in the first data field '40006(SmartMod)' and a decimal value of between 1 and 247 in the second data field '40007 (SmartMod)'.
- 18. Take note of the value displayed at 40006 and compare it to the following table (Fig. 11) to discern the actual communication settings in the unit.

	Regi	ster 40006 (	Communicati	ons Paramet	ers) Bit Defir	nition	
Bits 7-15	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Unused	Mode	Pa	arity	Data Bits		Baud Rate	
		Value	Meaning	0 = 7 Doto	Value	Mea	ning
	U - ASCII Modo	0	Mark	U - 7 Dala Bite	0	1200	baud
	INIOUE	1	Even	Dits	1	2400	baud
		2	Odd		2	4800	baud
	I - KIU Modo	3	Space	Data Bito	3	9600	baud
	wode			DILS	4	19200	) baud
					5-7	38400	) baud

#### Fig. 11

- 19. For example, a displayed value of: 000000001011111 would indicate the following: Bits 0-2 added to give Baud Rate:
  - Bit 0 On = decimal 1 Bit 1 On = decimal 2 Bit 2 On = decimal 4

The sum of these three bits gives a value of 7 indicating a Baud Rate of 38400

### Bit 3 On = 8 Data Bits

Bit 4 On = decimal 1 Bit 5 Off = decimal 0

The sum of these two bits gives a value of 1 indicating Even Parity

#### Bit 6 On = Modbus RTU Mode

Bits 7-15 are unused.

20. The second data field, 40007 will indicate the Node ID of the attached SmartMod.

- 21. Using the XLt touchscreen/keypad, edit the fields to suitable values for your application.
- 22. Any changes that are made to the SmartMod settings MUST also be reflected in the Cscape/XLt setup. Otherwise communications may be lost when the INIT to GND connection is disconnected and the SmartMod reset.

#### TROUBLESHOOTING THE CONNECTION

- 1. There are several status registers that can be assigned to give an indication of the health of the Network and of individual Modbus Nodes (SmartMods)
- 2. In **Cscape/Protocol Configuration/Network settings**, assign a register as in Fig. 12. The registers are defined below.

Port Configuration	F <del>r</del>	Update Scan		
Baud Rate: Parity:	9600 <u>•</u>	Automatic     Update Interval:	0	mSec
Data Bits:	8 <u>×</u>	I Reacquire lime:	100000	mbec
Stop Bits:	1 -	] Trigger:		
Handshake:	Multidrop Half 🖉		1	Te-BIL
Protocol: Mode:	Modbus RTU -	Status Register: %R1	000 4 x	32-BIT
Retries:	2 (0-255)			-
Timeout:	10000 mSec	Address:		
Slave Speed:	Fast 💌	]	ок	Cancel



**Update interval Exceeded Count [%R1000+%R1001] (32 bit)** – Number of times that the actual transaction scan time to complete all transactions exceeded specified update interval. Generally used as an indicator that an excessive number of triggered transfers or failed communication retries are occurring that is lengthening the expected transaction scan time. If the Update interval is set to zero (update as fast as possible), this 32-bit register alternately specifies the actual transaction scan time in mSec resolution.

**No Response Count [%R1002+%R1003] (32 bit)** – Number of times that a device(s) did <u>not</u> respond to a transaction. This includes ALL failed transaction, not just those after the retry count is exceeded.

**Corrupt Response Count [%R1004+%R1005] (32 bit)** – Number of times that a device(s) returned an invalid or failed response to a transaction. This includes ALL failed transaction, not just those after the retry count is exceeded.

Valid Response Count [%R1006+%R1007] (32 bit) – Total number of valid responses.

- 3. If communications is established and good then expect to see the value in %R1006(7) increase.
- If communications is established and bad then expect to see the value in %R1004(5) increase. Check the cable connections and or register addressing in Cscape/Protocol Configuratiuon/Scanlist
- If there is no communications then %R1002 will increment. Check cable is connected/XLt and SmartMod are powered and configured and that the XLt is in RUN mode
- 6. For individual Modbus Nodes (SmartMods) another register can be enabled at **Cscape/Protocol Configuration/Device settings** as per Fig. 13

SmartMod	
ID: 1	(Slave Address)
Device Options	
Swap Words on 32	?-bit data
Target returns 32-b	its on single register request
Device Type:  Modic	on PLC 5-Digit Addressing
Status Enable	
Address: 2/81008	2 v 16-BIT
Mamo:	
Name:	

Fig. 13

- 7. This register value gives feedback for the specific Modbus Node.
  - 129 Slave Timeout
  - 130 Bad Checksum (corrupted incoming data)
  - 131 No response
  - 197 Slave does not support this function.
  - 198 PLC Reference type doesn't match data type
  - 200 Specified data length exceeds Modbus frame size
- 8. All of the appropriate registers can be added and their values viewed live in Cscape when the XLt is connected by using the **Controller/Datawatch** window (Fig. 14).

Memory	Value		Туре	Name	
(B0006	2#00000	00001111101	BIN 16		
80007	2	50001111101	INI		
R1000	50		DINT		
R1002	1		DINT	Select an Element	
R1004	0	N	DINT		
R1006	10459		DINT	Address Conserves	
R1008	0 _		DINT	Address: %R0006	
				Name:	
		1			
				Lype: BINARY	
				Lype: BINARY	
					Canad
				Lype: BINARY	Cancel
				Lype: BINARY	Cancel
				Lype: BINARY  CK Select an Element	Cancel
				Lype: BINARY	Cancel
				Lype: BINARY   OK  Select an Element  Address: %R1000-1008	Cancel
				Lype: BINARY → OK Select an Element Address: %R1000-1008	Cancel
				Lype: BINARY OK Select an Element Address: %R1000-1008 Name:  ▼	Cancel
				Lype: BINARY → OK Select an Element Address: %R1000-1008 → Name: ↓	Cancel
				Iype:       BINARY         OK         OK         Select an Element         Address:       %R1000-1008         Name:       ▼         Type:       DINT	Cancel
				Iype:       BINARY         OK         OK         Select an Element         Address:       %R1000-1008         Name:       ▼         Type:       DINT	Cancel

Fig. 14

Other Checks	
SmartMod PWR LED Off	Check power to SmartMod
SmartMod PWR LED not flashing	Has communication been established? Is
	the Baud rate set for 9600 or lower?
Cannot edit data on XIt screen	Ensure Editable box is ticked for Data
	Field.
SmartMod does not retain settings and will	Ensure GND and INIT jumper is
only communicate at 9600 baud	disconnected.
No Communications between XLt and	Check cable. Check SmartMod GND and
SmartMod	INIT Pins are connected? Power cycle
	SmartMod. Check that Network Settings in
	Cscape/Protocol configuration are
	appropriate. Check program is
	downloaded to XLt. Check cable is
	connected to MJ2
No communications between Cscape and	Check PC serial connection to MJ1. Check
XLt	Cscape Local and Target addresses are
	identical. Ensure protocol configuration is
	loaded to MJ2