Installation of ModLon II Gateway Kit 541−1149

GENERAL INFORMATION

This instruction sheet describes the installation of a ModLon II Gateway kit in FT-10 and TP/XF-78* networks.

* The ModLon unit is an FT-10 Device. When connecting to a TP/XF-78 network, there are some special requirements. See the Template 5 section, starting on page 14.

The following parts are included in this kit.

Part Description	Qty
ModLon II Gateway Control	1
Straight-Through Cable	1
LonWorks Support CD	1

In addition to physical connections, this instruction sheet also includes information on binding and register mapping of the following modules to a ModLon II Gateway.

- Controls Communications Module − Genset (CCM-G)
- Controls Communications Module − ATS (CCM-T)
- Digital I/O Module (DIM)
- PCC 3100 Genset Communications Module (GCM)
- PCC 3200 Genset LONWORKS® Card (GLC)
- PCC 2100 Network Communications Module (NCM)
- PowerCommand® Automatic Transfer Switch (ATS) Network Communications Module (NCM)

REQUIRED SOFTWARE

The following software is required to incorporate this kit into your network.

- LonMaker™ for Windows®
- Device Monitoring Software − The communication parameters of the ModLon II Gateway are configurable through LonMaker for Windows. Choose appropriate software that will communicate with user's chosen parameters.

  If ModScan® software is selected to monitor devices, see the "Optional Software" listed below and the information included under "Using ModScan Software," starting on page 16.
- WinZip® − Software used to decompress downloaded files.

OPTIONAL SOFTWARE

- ModScan Software − Used to verify communications between the PCC network devices and the ModLon.

  A fully functional demo version of ModScan software can be downloaded from the Internet at http://www.Win-Tech.com. Click on the "Free Trial Demos" button. Under "Win32 ModBus® Applications," click on the ModScan32.zip file and select an appropriate file location to store the software.

DESCRIPTION

The ModLon II Gateway provides a direct Echelon LonWorks network interface to any device that can communicate:

- ModBus RTU

  OR
- ModBus ASCII

PowerCommand is a registered trademark of Cummins Inc.
LonWorks is a registered trademark and LonMaker is a trademark of Echelon Corporation.
Windows is a registered trademark of Microsoft Corporation.
ModBus and ModScan are registered trademarks of Schneider Electric.
WinZip is a registered trademark of WinZip Computing, Inc.

This module translates LonWorks network protocol into ModLon ASCII or RTU. Figure 1 is a block diagram of the ModLon II Gateway.

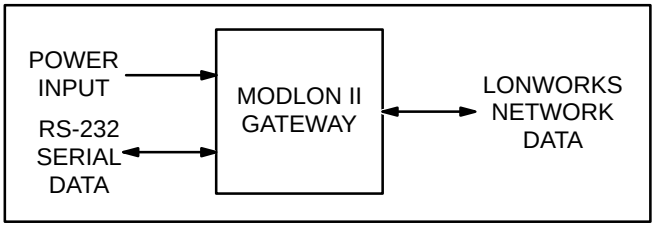


FIGURE 1. MODLON II GATEWAY BLOCK DIAGRAM

Refer to the *PowerCommand Network Installation and Operation Manual* (900−0529) for instructions on network topology, wiring, and software installation.

The ModLon II Gateway (see Figure 2) has a network connector on the front for connection to network data and a DB9 connector on the top for connection to an RS-232 port.

Externally the ModLon II Gateway has a DC power connector input, a Service (SVC) pushbutton, Service (SVC) LED, Reset (RST) pushbutton, MODBUS LED, OK LED, LON LED, Termination Switch, and a Template Selection Dipswitch.

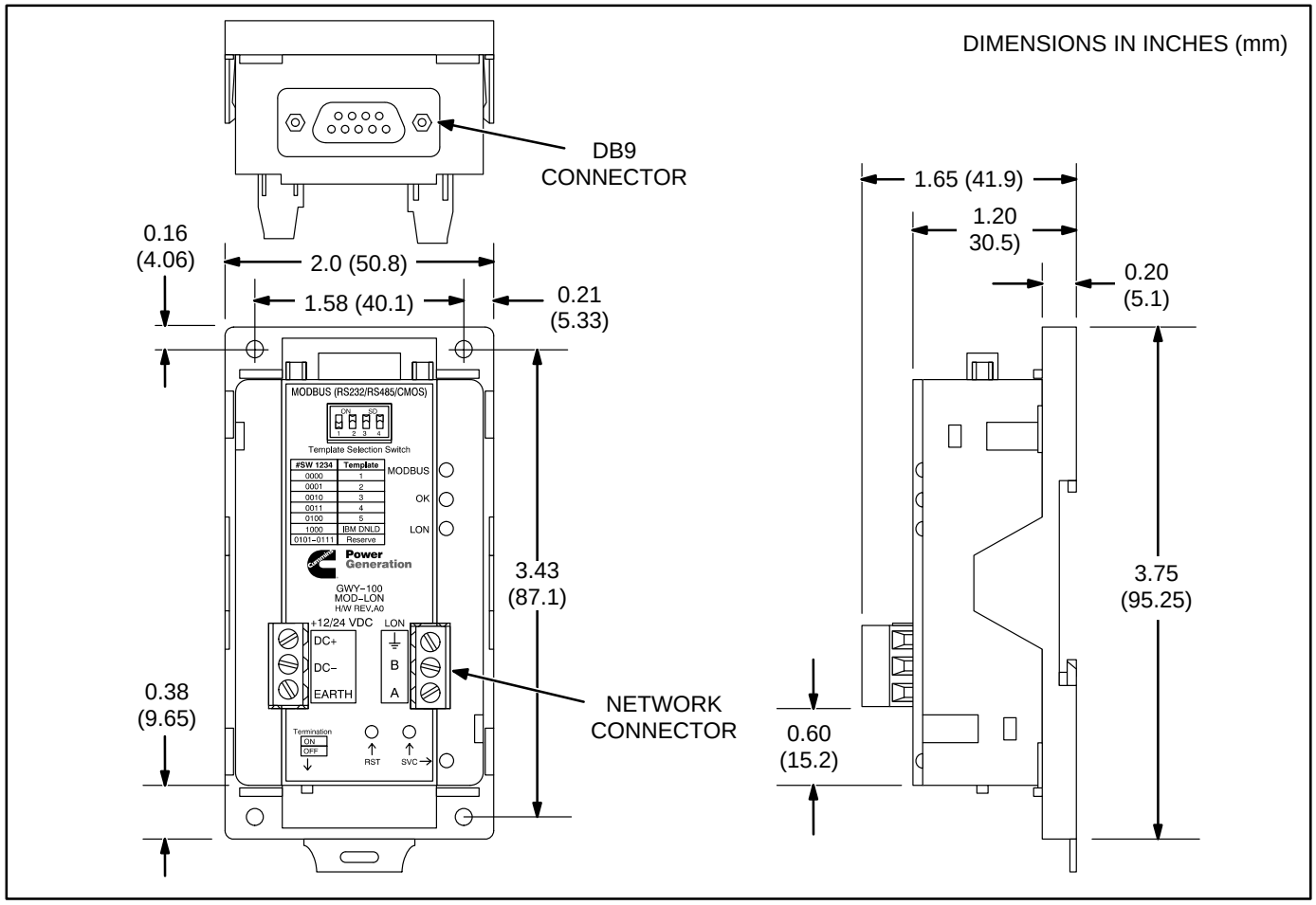


FIGURE 2. MODLON II GATEWAY OUTLINE DRAWING

Termination Switch

The termination switch is located on the bottom of the ModLon II Gateway (see Figure 3). The termination switch is a doubly terminated bus topology termination circuit.

FT-10 Networks can be configured as either multi-drop bus topology (as TP/XF-78 networks are configured) or free topology. Networks configured as a multi-drop bus must be terminated at each end of the bus with a multi-drop bus terminator circuit. Free topology networks must have one free topology type terminator somewhere in the network. The ModLon II has a multi-drop bus terminator. Place the terminator in the “On” position to use this terminator in a multi-drop bus network. If the ModLon II is installed in a free topology network, place the terminator in the “Off” position.

NOTE: Power Command FT-10 devices (CCMs, DIMs, NCMs, GCMs) have free topology terminators. If an FT-10 network is used in a multi-drop bus topology network, use the bus topology terminator (300−5729) to terminate the network. Refer to *FT-10 PowerCommand Network Installation and Operation Manual* (900−0529) for more information on network topology termination.

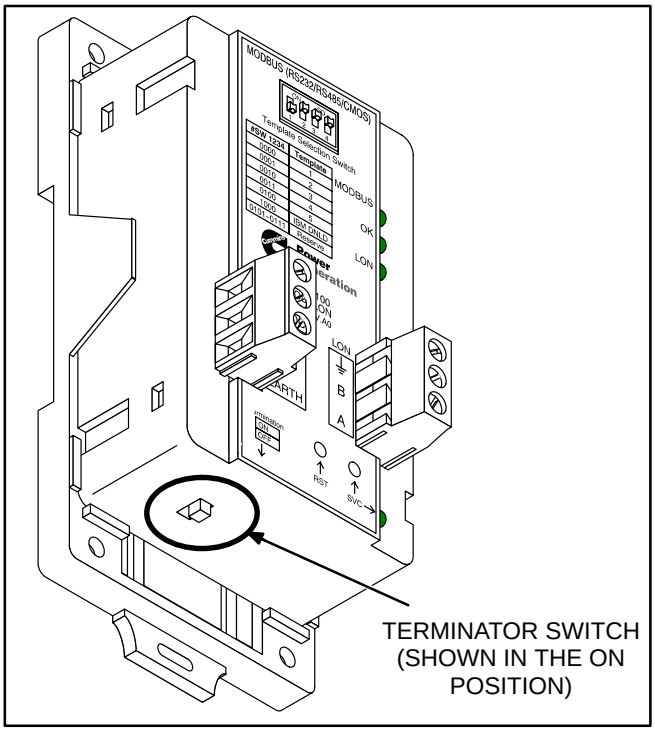


FIGURE 3. MODLON II GATEWAY TERMINATOR SWITCH

MODLON II GATEWAY INSTALLATION

If there is a site network installation drawing, refer to it for the ModLon II Gateway location. If a site network installation drawing is not available, refer to the *PowerCommand Network Installation and Operation Manual* (900−0529) for network topology and maximum network length. **All wiring must follow a specific network topology and must fall within distance limits.** Refer to individual instruction sheets for information on installing additional network devices.

Choose a clean, flat, vibration-free mounting surface. Avoid locations that are hot, damp, or dusty. The temperature range must not exceed −4°F (−20°C) to 140°F (60°C).

Power Supply

The ModLon II Gateway has a DC power connector (see Figure 5) that connects to a power supply from one of the network devices. The ModLon must have a 9−32 VDC power input to function properly.

Locate the ModLon II Gateway near a network device. If the ModLon II Gateway must remain powered during an electrical power failure, use an uninterruptable power supply (UPS). Refer to the *PowerCommand Network Installation and Operation Manual* (900−0529) for UPS information. If more than one device will be connected to the UPS, purchase a multi-outlet adapter or multi-outlet extension cord.

NETWORK TOPOLOGY AND DATA MEDIA

Refer to the “Network Hardware and Wiring” section of the PowerCommand Network Installation and Operation Manual for information on the network topology and data transmission media.

⚠WARNING ***AC voltages and currents present an electrical shock hazard that can cause severe personal injury or death. Only trained, experienced personnel are to perform the following procedures.***

Connections

Network data connections are made at the network connector (LON connector) for LonWorks network data and at a DB9 connector for connection to an RS-232 port. (Connectors and the cable supplied with the ModLon II Gateway are shown in Figure 5.)

Template Selection Dipswitch

The Template Selection Dipswitch (see Figure 4) sets the state for the ModLon. Dipswitch settings are listed in Table 1.

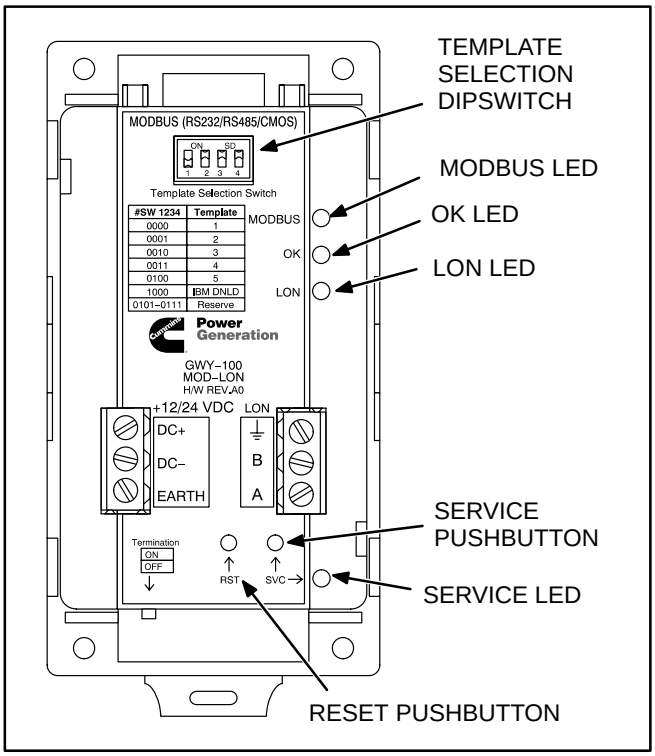


FIGURE 4. MODLON II GATEWAY DIPSWITCH, PUSHBUTTONS, AND LEDS

TABLE 1. DIPSWITCH SETTINGS

#SW 1 2 3 4	Template	Figure Ref.
0 0 0 0	1 (FT-10)	9
0 0 0 1	2 (FT-10)	10
0 0 1 0	3a (FT-10)	11
0 0 1 1	3b (FT-10)	12
0 1 0 0	5 (TP/XF-78)	13
1 0 0 0	Download	–

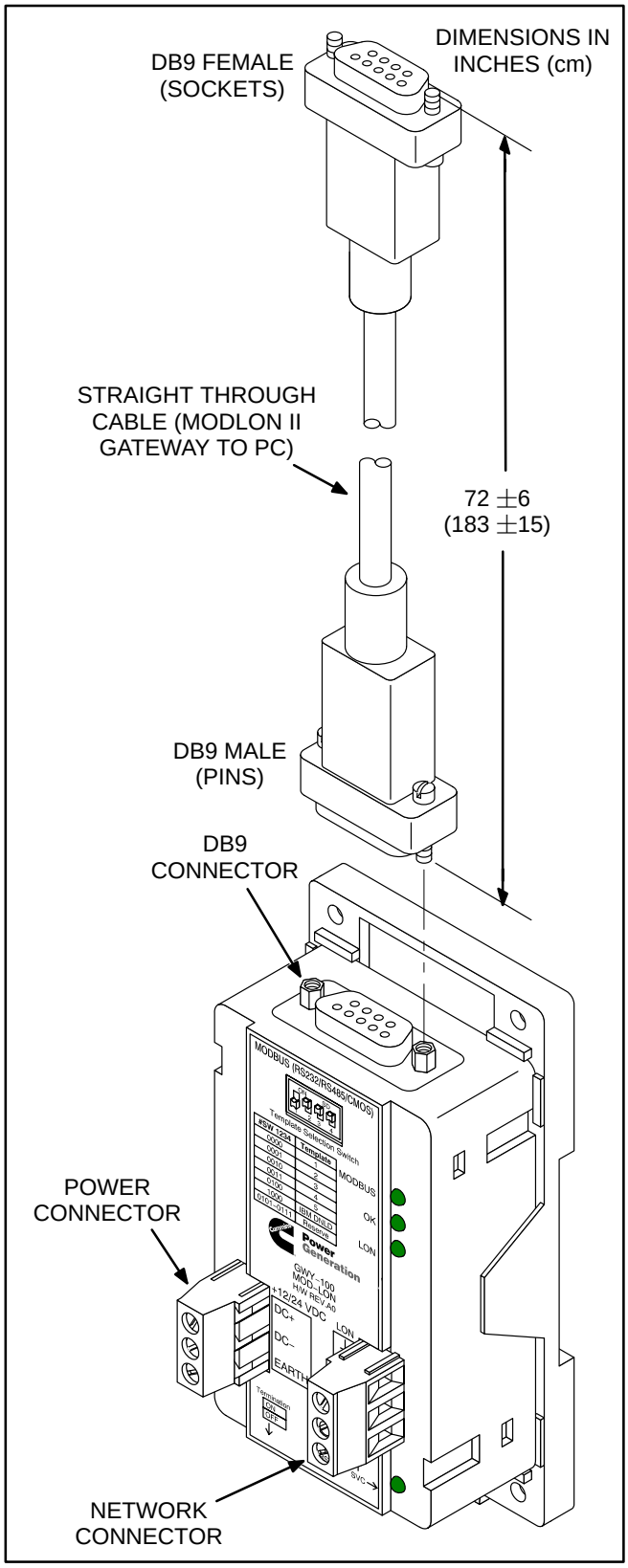


FIGURE 5. MODLON II CONNECTIONS

SWITCH AND LEDs

The ModLon II Gateway includes two pushbuttons and four status LEDs (see Figure 4).

Service Pushbutton and Service LED

The Service (SVC) pushbutton is used during installation (when prompted by the LonMaker program). **It is important to press the service switch on the ModLon II Gateway that is part of the permanent site. The service switch should only be pressed during installation.**

The green Service LED lights when the service push button is pressed. The LED blinks when the ModLon II Gateway is unconfigured and is off if the ModLon II Gateway is configured. The LED remains on if an unrecoverable error is detected.

Reset Pushbutton

The Reset (RST) pushbutton should not be used during or after installation for any reason.

Status LEDs

The ModLon has three status LEDs (MODBUS, OK, and LON) on the front panel. The MODBUS and LON LEDs indicate communication status on the two ports, whereas the OK LED indicates the ModLon mode.

TABLE 2. LED FUNCTIONS

MODBUS LED	
Status	**Description**
Momentary Flashing while communicating with Network/Software	Communication occurring with the MODBUS port
Off	No Communication on the MODBUS port
OK LED	
Status	**Description**
Off	No Power to ModLon
Fast Blinking	ModLon is waiting for download
Steady on	ModLon is On
LON LED	
Status	**Description**
Off	No communication on LON
Momentary Flashing while communicating with Network/Software	Communication occurring with the network and the LON

NETWORK INSTALLATION

Read the “Introduction” and “Network Hardware and Wiring” sections of the *PowerCommand Network Installation and Operation Manual* (900−0529) before constructing the network.

ModLon Configuration

Configuration variable nciNodeCfg allows the user to set the ModLon variables baud rate, parity, data bits, stop bits, mode selection, and device ID through LonMaker for Windows (see Table 3). This variable has to be set according to the specifications of the FT-10 or TP/XF-78 network.

TABLE 3. VARIABLE SETTINGS

Byte	Variable	Setting
8−6	Baud Rate	1200 − 115200
5	Parity	0 − None 1 − Odd 2 − Even
4	Data Bits	7 or 8
3	Stop Bits	1 or 2
2	Mode Selection	0 − ASCII 1 − RTU
1	Device ID	1
0	Not used	Not used

STANDARD BAUD RATES	B_8	B_7	B_6
1200	0	12	0
2400	0	24	0
9600	0	96	0
14400	1	44	0
19200	1	92	0
38400	3	84	0
57600	5	76	0
115200	11	52	0

The two settings shown below are the default settings, FT-10 and TP-78, for the first ModLon unit.

For example, the old ModLon unit setup in FT-10 configurations would be:

Baud Rate: 38,400
Parity: 0
Data Bits: 8
Stop Bit: 1
Mode Selection: 1 (RTU)
Device ID: 1

B_8	B_7	B_6	B_5	B_4	B_3	B_2	B_1	B_0
3	84	0	0	8	1	1	1	0
0	96	0	2	7	1	0	1	0

Refer to Figure 6 and Figure 7 for examples of the ModLon II unit being configured as the default parameters of the first ModLon in LonMaker.

To set *nciModLonCfg*, right click on the ModLon stencil and select Browse. Change the values of the nciModLonCfg in the Browse window accordingly and click on Set Value. You will get an error message (see Figure 8) that can be ignored; click Close and refresh the Browse screen to confirm the new values. Make sure to note that the ModLon is configured the same as in the ”Using ModScan Software” section (starting on page 15).

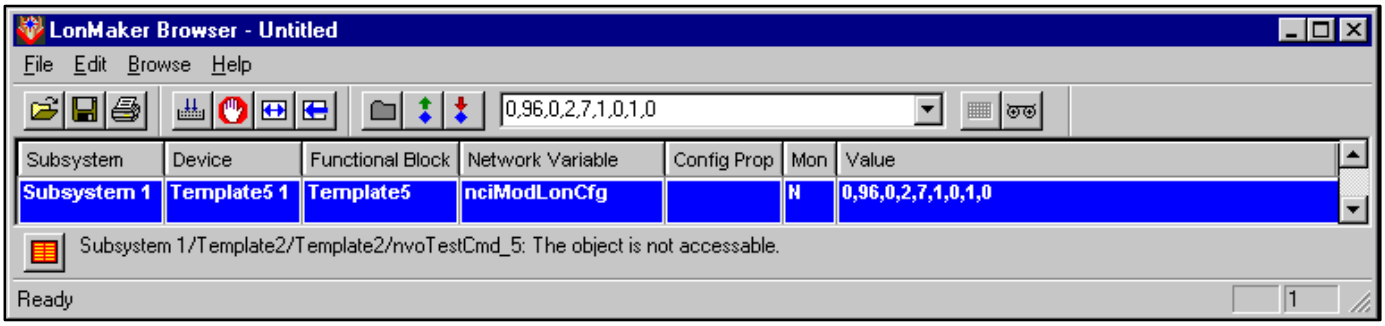


FIGURE 6. nciModLonCfg Settings for FT-10 Network

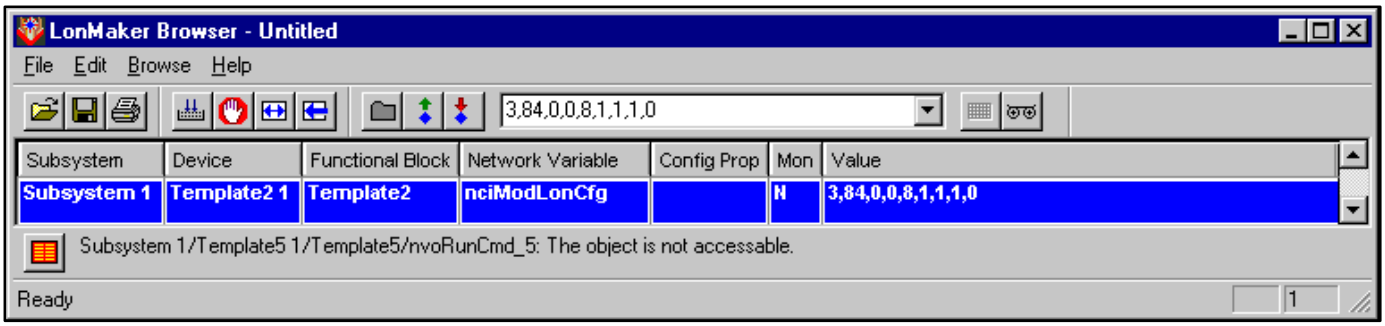


FIGURE 7. nciModLonCfg Settings for TP/XF-78 Network

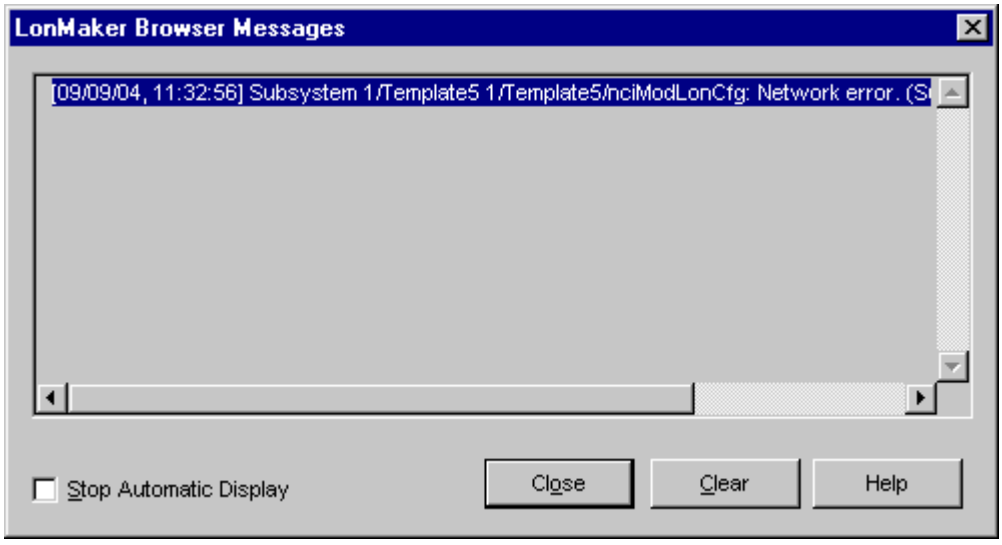


FIGURE 8. ERROR MESSAGE WHEN CHANGING THE MODLON II CONFIGURATION

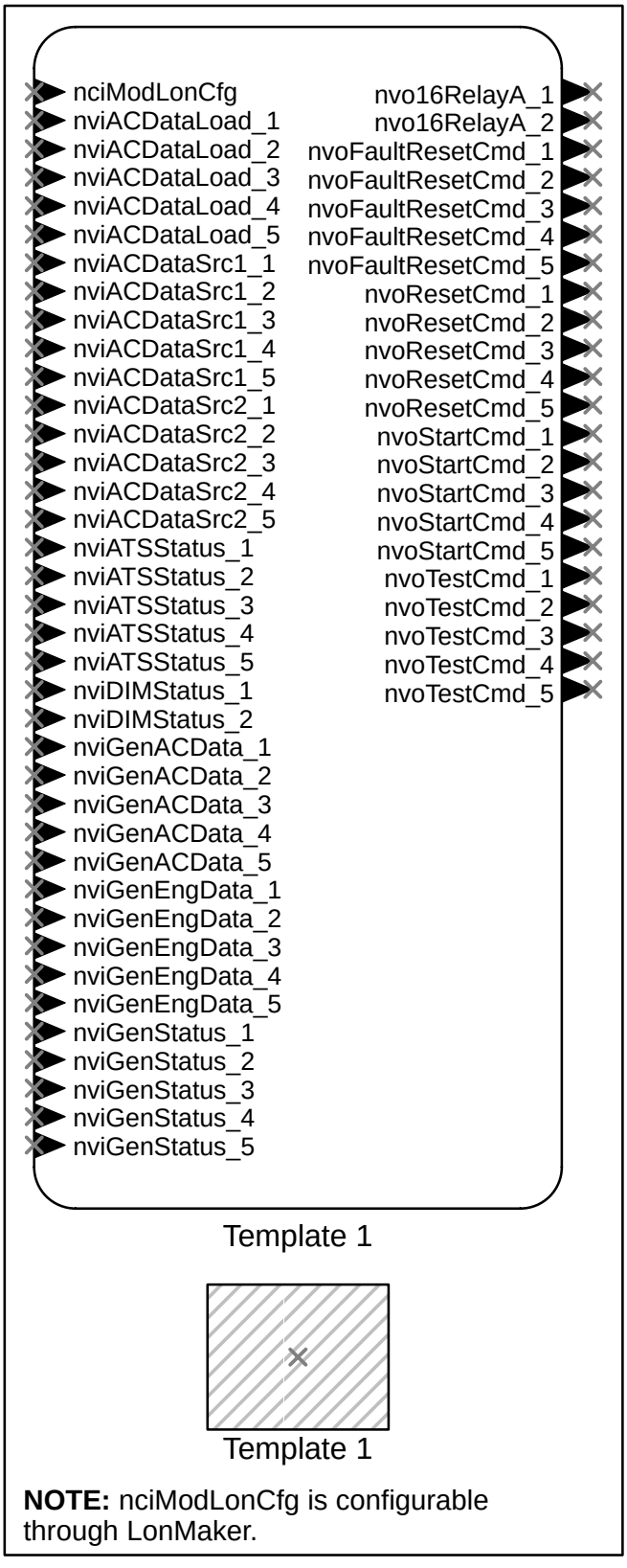
FT-10 Networks

The “Using LonMaker for Windows” section of the *FT-10 PowerCommand Network Installation and Operation Manual* (900−0529) provides a detailed description of the network installation process, including the following step-by-step installation procedures:

1. Setting up Network Installation Tools
2. Registering Plug-Ins
3. Using LonMaker for Windows Software
4. LonMaker for Windows Network Setup
5. Adding Devices with LonMaker for Windows
6. Installing Bindings with LonMaker for Windows
7. Installing Software Upgrades to an Existing Network

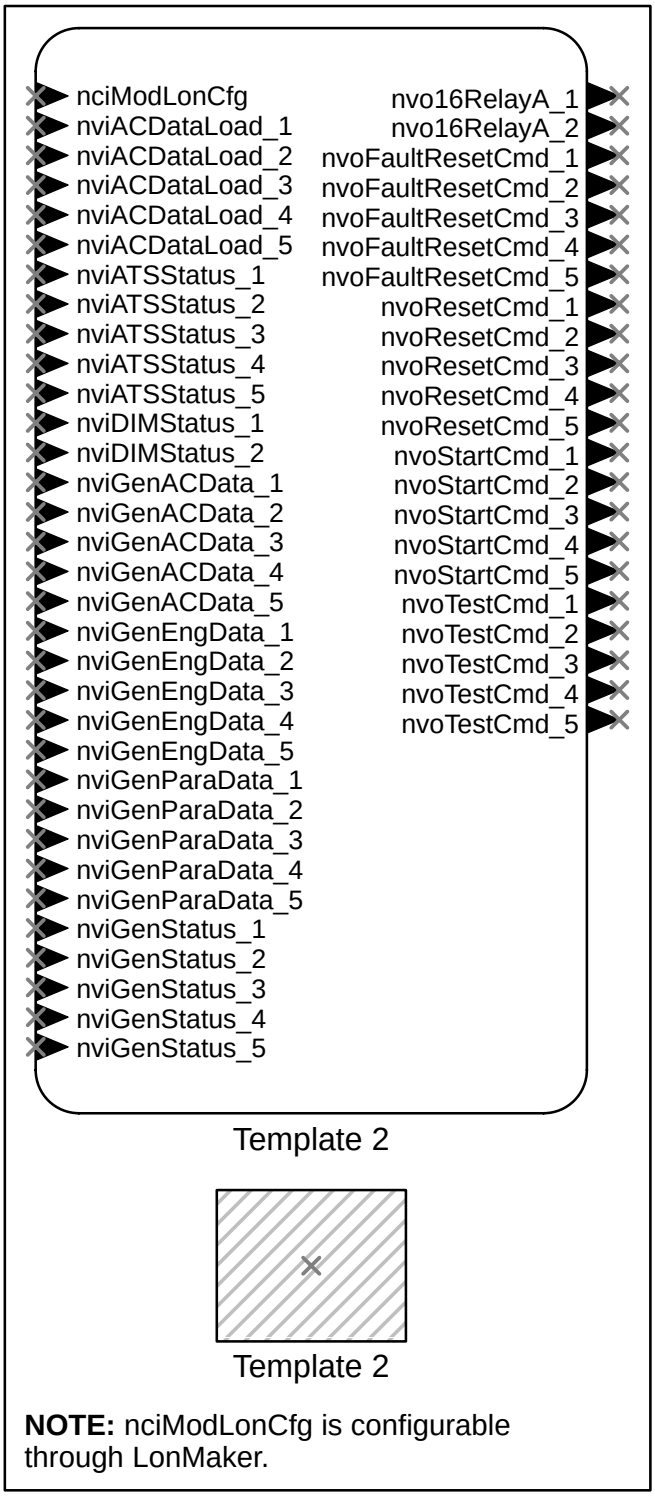
The Modlon II includes five possible ModLon options, four that are the same as the old FT-10 ModLon and the fifth option mimics the TP/XF-78 register maps. A device template is available in LonMaker for Windows for each of these templates.

Possible bindings to a ModLon II Gateway are shown in Tables 4 (Template 1), 5 (Template 2), 6 (Template 3A), 7 (Template 3B), and 8 (Template 5).



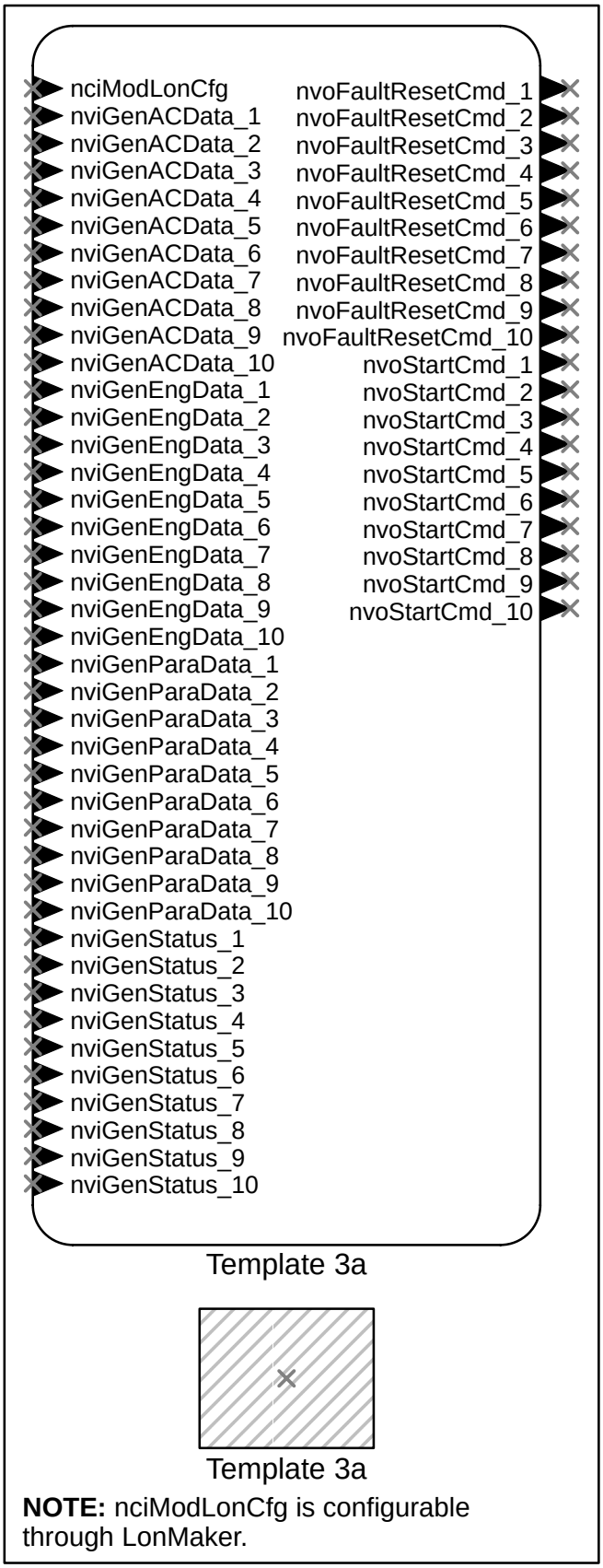
NOTE: nciModLonCfg is configurable through LonMaker.

FIGURE 9. MODLON TEMPLATE 1



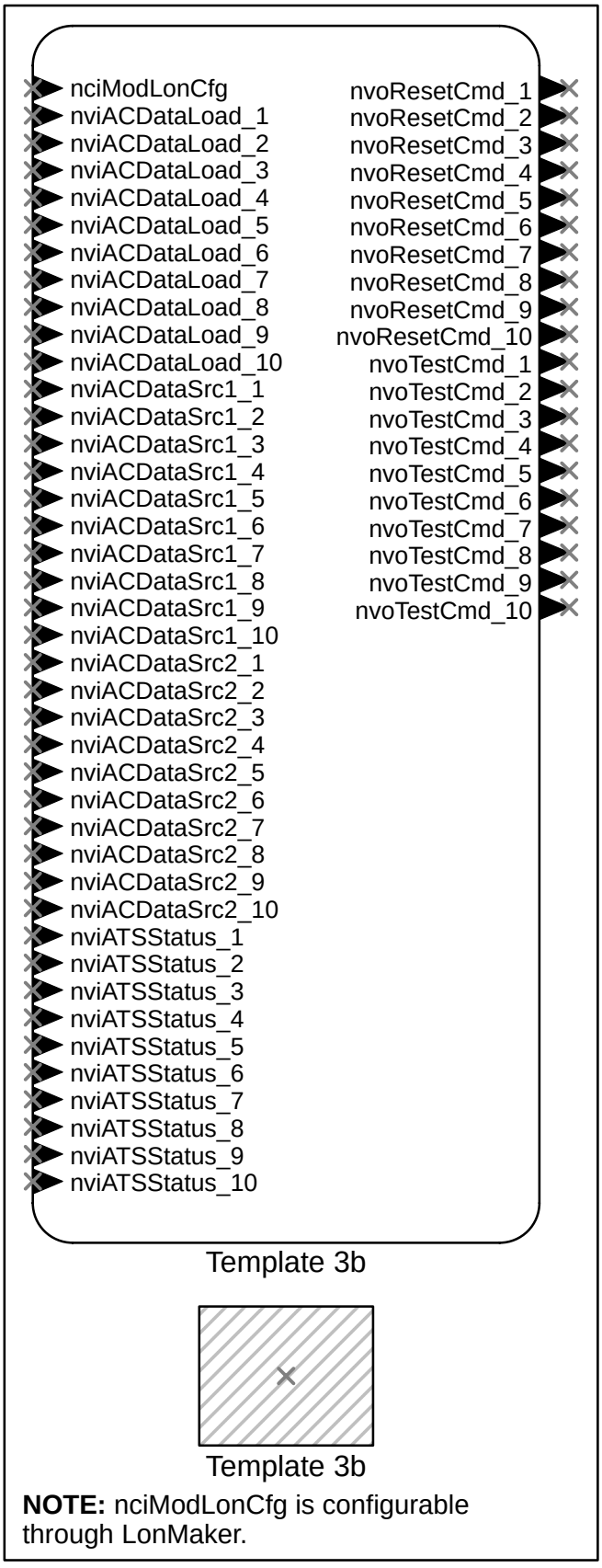
NOTE: nciModLonCfg is configurable through LonMaker.

FIGURE 10. MODLON TEMPLATE 2



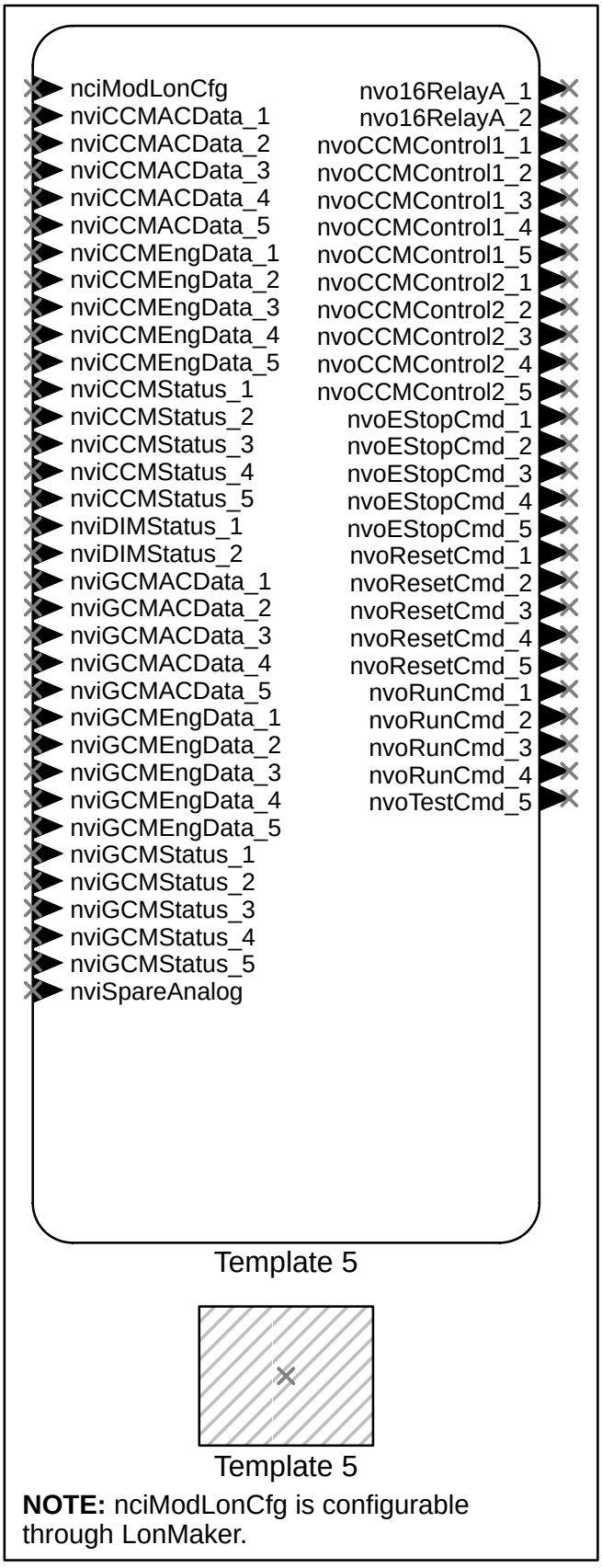
NOTE: nciModLonCfg is configurable through LonMaker.

FIGURE 11. MODLON TEMPLATE 3a



NOTE: nciModLonCfg is configurable through LonMaker.

FIGURE 12. MODLON TEMPLATE 3b



NOTE: nciModLonCfg is configurable through LonMaker.

FIGURE 13. MODLON TEMPLATE 5

TABLE 4. FT-10 NETWORK MODLON BINDINGS − TEMPLATE 1

CCM-G ModBus Interface:

Possible bindings to a ModLon Interface:

PCC w/CCM-G		ModLon		
nviStartCmd	←	*nvoStartCmd[..]*	*General*	**Control**
nviFaultResetCmd	←	*nvoFaultResetCmd[..]*		
nvoGenStatus	→	*nviGenStatus[..]*	*General*	**Monitor**
nvoGenACData	→	*nviGenACData[..]*		
nvoGenEngData	→	*nviGenEngData[..]*		

CCM-T ModBus Interface (ModLon):

Possible bindings to the ModLon Interface:

CCM-T		ModLon		
nviTestCmd	←	*nvoTestCmd[..]*	*"Load Shed"* *"Test"* *"Transfer Inhibit"*	**Control**
nvoACDataLoad	→	*nviACDataLoad[..]*	*General*	**Monitor**
nvoATSStatus	→	*nviATSStatus[..]*		

DIM ModBus Interface (ModLon):

Possible bindings to a ModLon Interface:

ModLon		DIM		
nvo16RelayA[..]	→	*nvi16RelayA*	*16 Relays*	**Control**
nviDIMStatus[..]	←	*nvoIOStatus*	*Node*	**Status**

TABLE 5. FT-10 NETWORK MODLON BINDINGS − TEMPLATE 2

CCM-G ModBus Interface (ModLon):

Possible bindings to a ModLon Interface:

PCC w/CCM-G		ModLon		
nviStartCmd	←	*nvoStartCmd[..]*	*General*	**Control**
nviFaultResetCmd	←	*nvoFaultResetCmd[..]*		
nvoGenStatus	→	*nviGenStatus[..]*	*General*	**Monitor**
nvoGenACData	→	*nviGenACData[..]*		
nvoGenEngData	→	*nviGenEngData[..]*		
nvoGenParaData	→	*nviGenParaData[..]*		

CCM-T ModBus Interface (ModLon):

Possible bindings to the ModLon Interface:

CCM-T		ModLon		
nviTestCmd	←	*nvoTestCmd[..]*	*"Load Shed"* *"Test"* *"Transfer Inhibit"*	**Control**
nvoATSStatus	→	*nviATSStatus[..]*		
nvoACDataLoad	→	*nviACDataLoad[..]*		

DIM ModBus Interface (ModBus):

Possible bindings to a ModLon Interface:

ModLon		DIM		
nvo16RelayA[..]	→	*nvi16RelayA*	*16 Relays*	**Control**
nviDIMStatus[..]	←	*nvoIOStatus*	*Node*	**Status**

TABLE 6. FT-10 NETWORK MODLON BINDINGS − TEMPLATE 3A

CCM-G ModBus Interface (ModLon):

Possible bindings to a ModLon Interface:

PCC w/CCM-G		ModLon		
nviStartCmd	←	*nvoStartCmd[..]*	*General*	**Control**
nviFaultResetCmd	←	*nvoFaultResetCmd[..]*		
nvoGenStatus	→	*nviGenStatus[..]*	*General*	**Monitor**
nvoGenACData	→	*nviGenACData[..]*		
nvoGenEngData	→	*nviGenEngData[..]*		
nvoGenParaData	→	*nviGenParaData[..]*		

TABLE 7. FT-10 NETWORK MODLON BINDINGS − TEMPLATE 3B

CCM-T ModBus Interface (ModLon):

Possible bindings to the ModLon Interface:

CCM-T		ModLon		
nviTestCmd	←	*nvoTestCmd[..]*	*"Load Shed"* *"Test"* *"Transfer Inhibit"*	**Control**
nvoACDataLoad	→	*nviACDataLoad[..]*	*General*	**Monitor**
nvoATSStatus	→	*nviATSStatus[..]*		

Template 5

This template uses the same register map as the TP-78 devices. This will allow for upgrading from TP-78 Networks with FT-10 devices with out having to change the monitoring software. The “Network Installation − LonMaker” section of the *FT-10 PowerCommand Network Installation and Operation Manual* (900−0529) provides a detailed description of the network installation process, including the following step-by-step installation procedures:

1. Setting up Network Installation Tools
2. Starting LonMaker Software
3. Using LonMaker Software
4. LonMaker Network Setup
5. Connecting Devices with LonMaker
6. Installing Devices with LonMaker
7. Testing Devices and Verifying Installation

Possible bindings to a ModLon II Gateway are shown in Table 8.

The ModLon is an FT-10 Device. Therefore when it is connected to a TP/XF-78 device or network, it must be separated by a router. However, if you are using just the topology of the TP/XF-78 template for an FT-10 network, there is no need to separate the ModLon with a router.

TABLE 8. TP/XF-78 NETWORK MODLON BINDINGS − TEMPLATE 5

GCM ModBus Interface (ModLon):

Possible bindings to a ModLon Interface:

PCC w/GCM		ModLon		
nviRunCmd	←	*nvoRunCmd[..]*	*General*	**Control**
nviResetCmd	←	*nvoResetCmd[..]*		
nviEmerStopCmd	←	*nvoEStopCmd[..]*		
nvoStatus	→	*nviGCMStatus[..]*	*General*	**Monitor**
nvoGenData	→	*nviGCMACData[..]*		
nvoGenEngData	→	*nviGCMEngData[..]*		

CCM ModBus Interface (ModLon):

Possible bindings to the ModLon Interface:

CCM		ModLon		
nviRelayControl4	←	*nvoCCMControl1[..]*	*“Load Shed”*	**Control**
nviRelayControl5		*nvoCCMControl2[..]*	*“Test”*	
nviRelayControl6			*“Transfer Inhibit”*	
nvoACDataLoad (CCM-T) *nvoGenACData (CCM-G)*	→	*nviCCMACData[..]*	*General*	**Monitor**
nvoNodeStatus	→	*nviCCMStatus[..]*		
nvoSensorData	→	*nviCCMEngData[..]*		
nvoSpareAnalog	→	*nviSpareAnalog*		

DIM ModBus Interface (ModBus):

Possible bindings to a ModLon Interface:

ModLon		DIM		
nvo16RelayA[..]	→	*nvi16RelayA*	*16 Relays*	**Control**
nviDIMStatus[..]	←	*nvoNodeStatus*	*Node*	**Status**

USING MODSCAN SOFTWARE

ModScan is a tool that can help you verify communications between the PowerCommand Network devices you have installed and the ModLon.

Notes

The following notes apply to using ModScan with FT-10 and TP/XF-78 networks.

Genset Control

- Start/Stop − When this register is set to “1,” the genset starts, synchronizes, and closes its breaker. As long as this register remains a “1,” the genset will continue to run. When this register is set to “0,” the genset stops.
- Fault Reset − This should be a momentary signal of about 2 seconds duration. Entering a “1” in the fault reset register resets any non-active warning and, If there is not a remote start on the genset, it resets any non-active shutdown except the Emergency Stop.
- Emergency Stop (TP/XF-78 networks only) − When this register is set to “1,” the emergency stop is active at the PowerCommand control. The emergency stop cannot be rest until this register is set to “0.” After the register is reset to “0,” the emergency stop must be reset at the PowerCommand control. It cannot be reset remotely.

Miscellaneous

- Fault State − As part of Gen Status State, digital value 4 (Fault State 1) = shutdown with an active run command (cannot be remotely reset) and digital value 5 (Fault State 2) = shutdown with no active run command (can be remotely reset).
- Fault Text (TP/XF-78 networks only) − These are 8 words (16 ASCII characters, 2 characters per word) that spell out the actual active fault.
- Genset Status Error − This a value that is not supported by the genset and therefore, has no meaning or function.

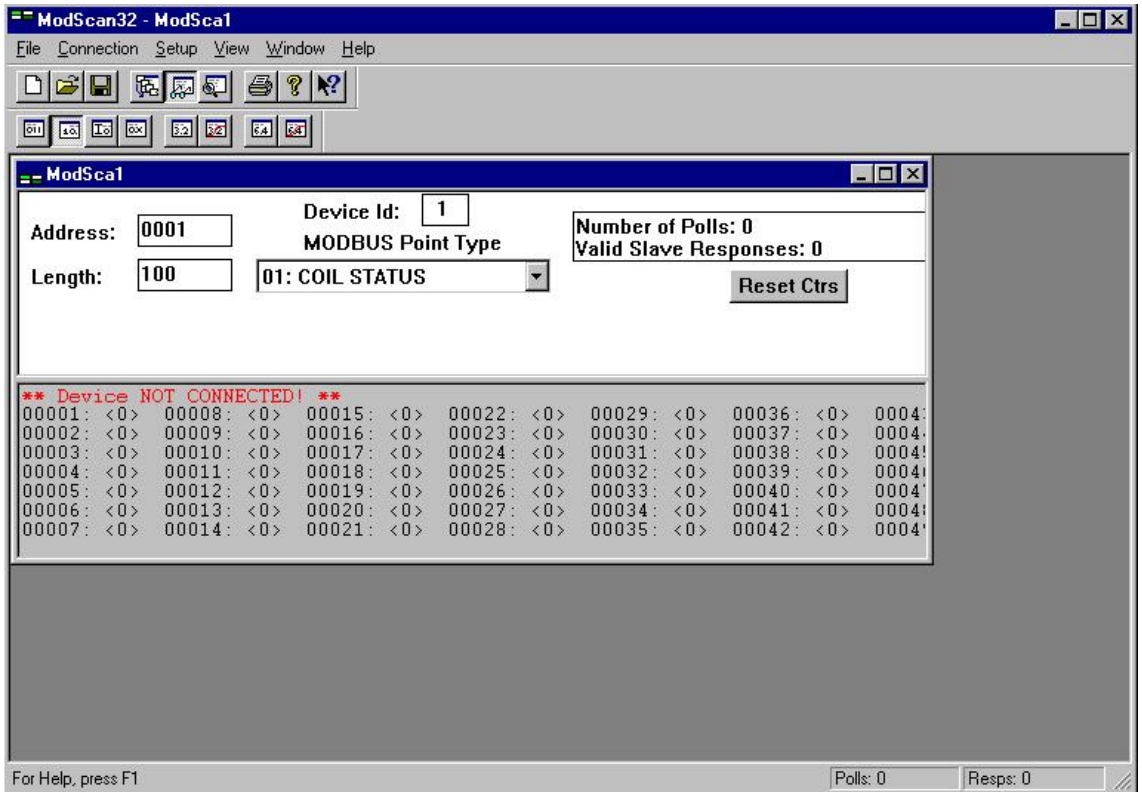


FIGURE 14. MAIN MODSCAN SCREEN

Use ModScan software after this kit has been incorporated into your network. An RS-232 straight-through cable must be installed between the PC serial port and the RS-232 connector on the ModLon II Gateway. Figure 15 shows the initial screen displayed upon launching the program.

1. From the tool bar, select Connection → Connect. The Connection Details dialog box is displayed (see Figure 16). The Device ID is 1.

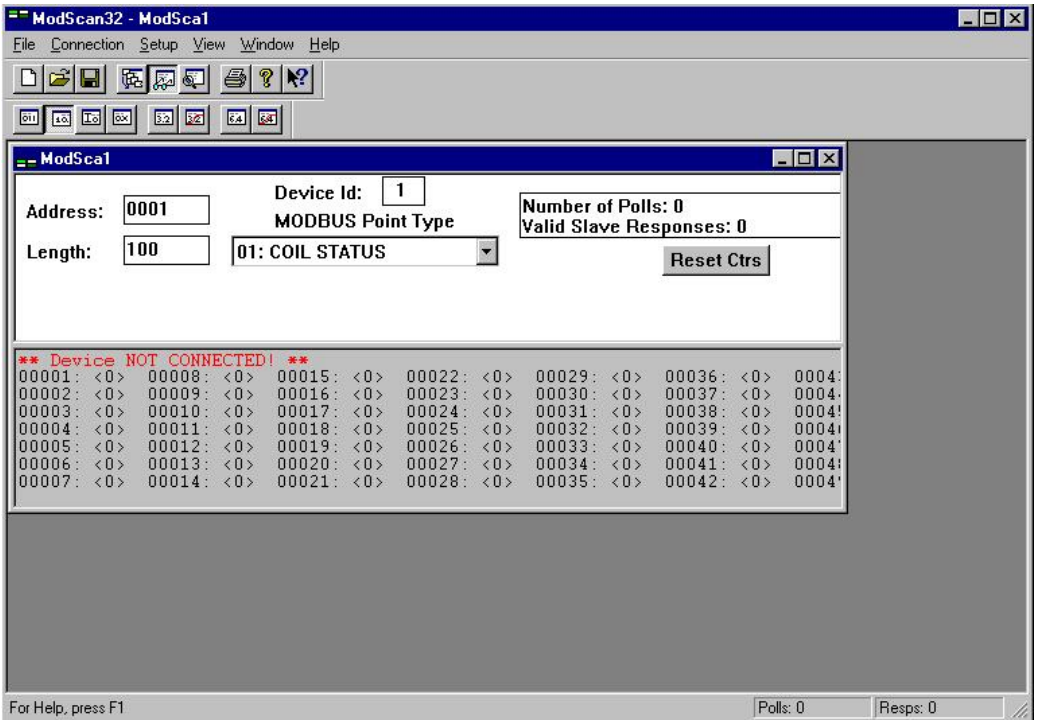


FIGURE 15. MAIN MODSCAN SCREEN

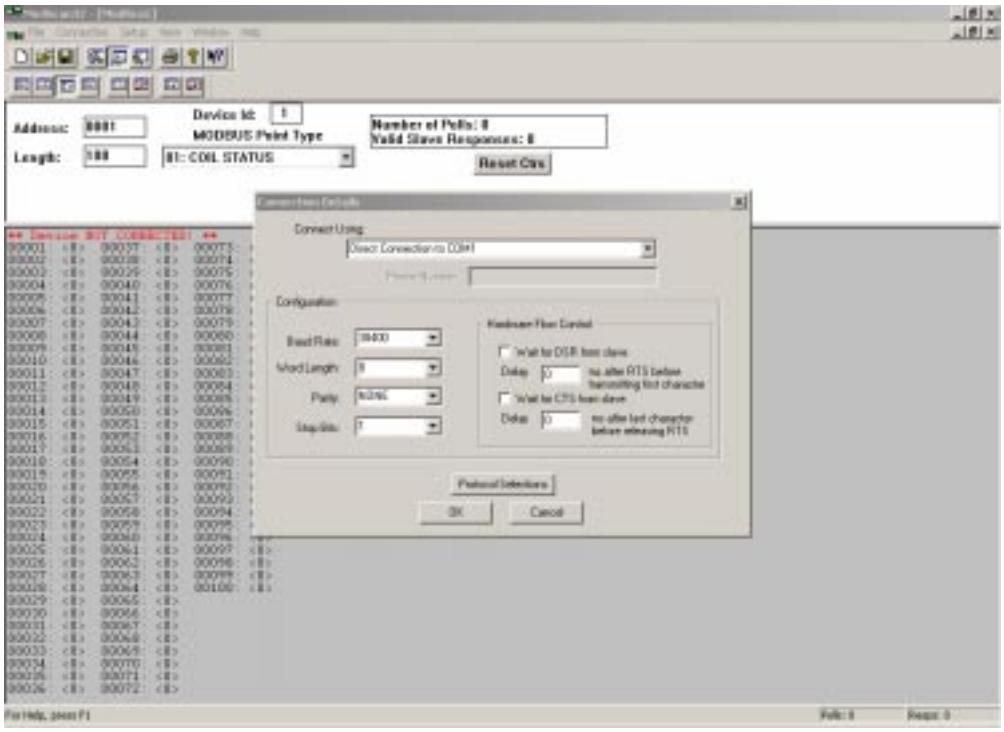


FIGURE 16. FT-10 NETWORK CONNECTION DETAILS DIALOG BOX

2. Use the pull down menu under “Connect Using” to select the comm port you wish to use.

   For FT-10 networks, a typical configuration would be set to Baud Rate: 38400, Word Length: 8, Parity: None,and Stop Bits: 1, as shown in Figure 16. Use the pull down menus to change these settings as necessary.

3. Click on the “Protocol Selections” button and change the Transmission Mode to “RTU” (see Figure 17). Click “OK.”

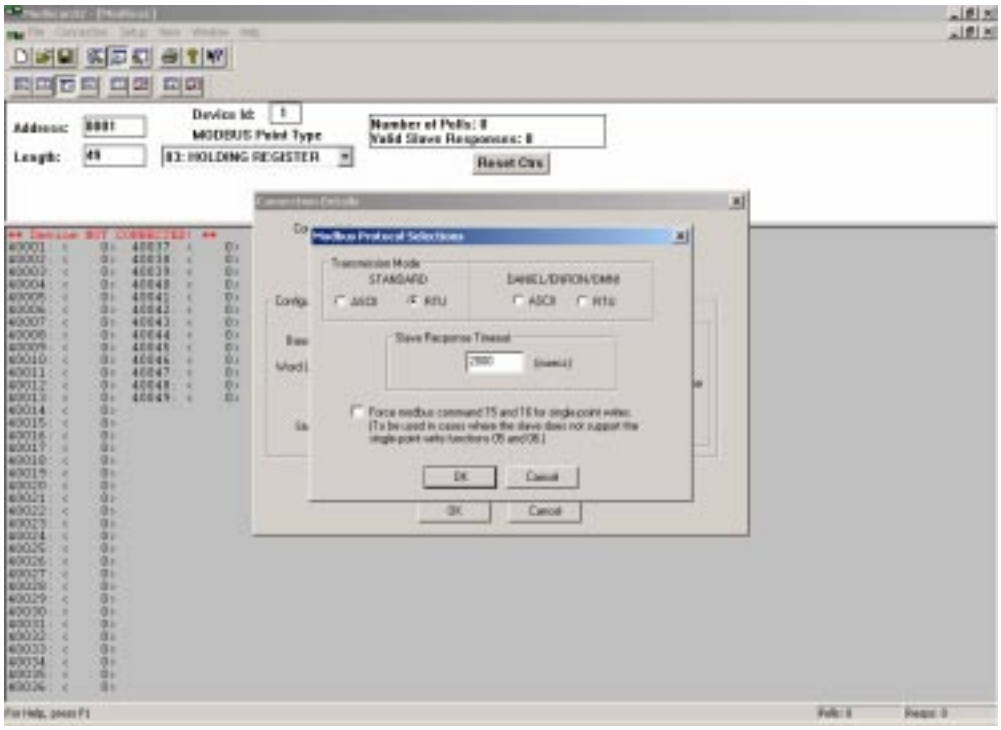


FIGURE 17. MODBUS PROTOCOL SELECTION DIALOG BOX

4. Click “OK” on the two open dialog boxes.

   You should notice in the upper right of the dialog box, the “Number of Polls” counter incrementing.

5. On the main ModScan screen (see Figure 18), Change the Address to 1001, the Length to 49 (ModLon Mapping Template 1 or 65 (ModLon Mapping Template 2, ModLon Mapping Template 3), and the Device ID to 1. From the MODBUS Point Type pull down menu, select “03: HOLDING REGISTER.”

   The “Valid Slave Responses” should now be incrementing as the data on the screen is updated. The following are register addresses for Genset #1.

   40036 is Oil Pressure

   40037 is Oil Temp.

   40038 is Coolant Temp. (L)

   40039 is Misc. Temp 1

   40040 is Misc. Temp 2

   40041 is Fuel Rate

   40042 is Engine RPM

   40043 is Engine Starts

   40044 is Eng Runtime (high)

   40045 is Eng Runtime (low)

   40046 is Total kwh (high)

   Refer to the register mapping information (Tables 9 thru 16) to view different pieces of data.

6. On the main ModScan menu (see Figure 19), change the Length to 49.

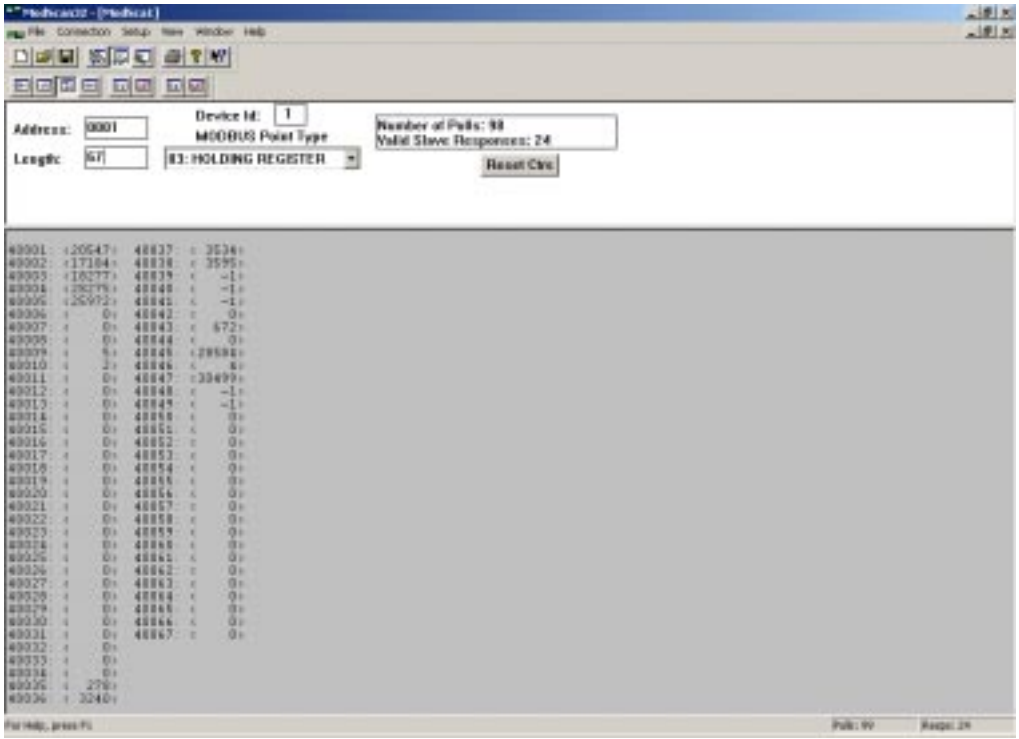


FIGURE 18. MODBUS POINT TYPE = HOLDING REGISTER

⚠WARNING ***Accidental starting of the generator set can cause severe personal injury or death. During step 7, a "start" command is sent to the genset. If the genset Run/Off/Auto switch is in the Auto position, the genset WILL start.***

7. To output a value from the ModLon to a network device, double click on register 40050. The Write Register dialog box is displayed.

   If you enter a value of "1" and select "Update," Genset #1 starts and runs. If you double click on register 40050 again, enter a value of "0," and selecting "Update;" the Genset stops.

8. Review the mapping register information for other coils that you can manipulate.

   By changing the Length on the main ModScan screen back to 49, the data registers will again update.

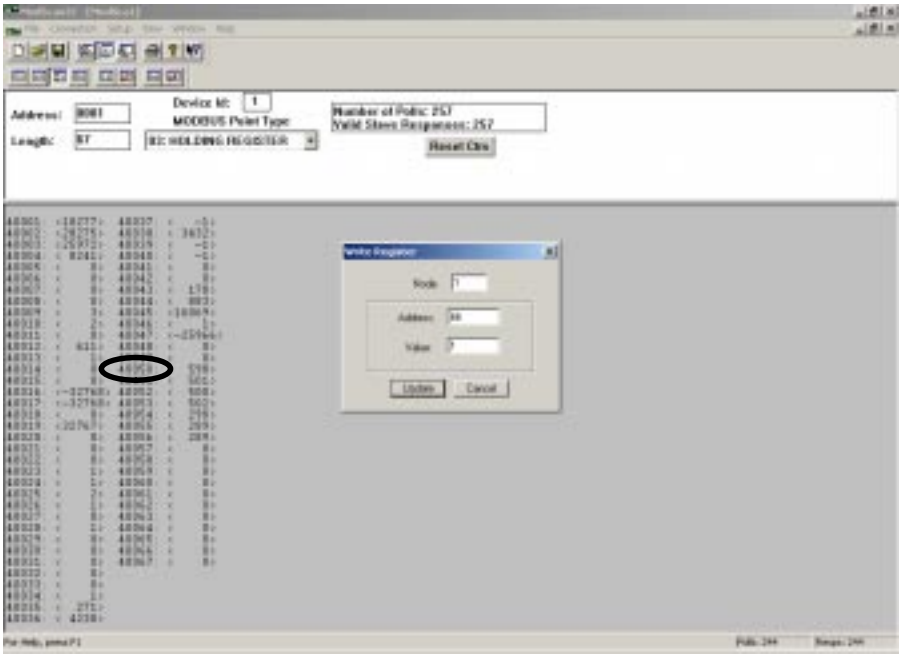


FIGURE 19. WRITE COIL DIALOG BOX

TABLE 9. MODLON REGISTER MAPPING INFORMATION − FT-10 NETWORK (TEMPLATE 1)
SINGLE POWERCOMMAND GENSET (CCM-G) (SHEET 1 OF 2)

Structure	Data Point	ModBus Registers					Scaling		
		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	Multiplier	Offset	Units
nvoGenStatus	Name [0,1]	40001	40101	40201	40301	40401			
	Name [2,3]	40002	40102	40202	40302	40402			
	Name [4,5]	40003	40103	40203	40303	40403			
	Name [6,7]	40004	40104	40204	40304	40404			
	Name [8,9]	40005	40105	40205	40305	40405			
	Name [10,11]	40006	40106	40206	40306	40406			
	Name [12,13]	40007	40107	40207	40307	40407			
	Name [14,15]	40008	40108	40208	40308	40408			
	Device Type	40009	40109	40209	40309	40409			
	Control Switch	40010	40110	40210	40310	40410			
	State[1]	40011	40111	40211	40311	40411			
	Fault Code*	40012	40112	40212	40312	40412			
	Fault Type[2]	40013	40113	40213	40313	40413			
	Percent kW	40014	40114	40214	40314	40414	0.5		%
	Total kW	40015	40115	40215	40315	40415			
	NFPA 110[3]	40016	40116	40216	40316	40416			
	Extended[4]	40017	40117	40217	40317	40417			
nvoGenACData	Frequency	40018	40118	40218	40318	40418	0.1		Hz
	Total pf	40019	40119	40219	40319	40419	0.00005		PF
	Total kva	40020	40120	40220	40320	40420	1.0		KVA
	Total kW	40021	40121	40221	40321	40421	1.0		KW
	Total kvar	40022	40122	40222	40322	40422	1.0		KVAR
	Volts ab	40023	40123	40223	40323	40423	1.0		Volts
	Volts bc	40024	40124	40224	40324	40424	1.0		Volts
	Volts ca	40025	40125	40225	40325	40425	1.0		Volts
	Volts a	40026	40126	40226	40326	40426	1.0		Volts
	Volts b	40027	40127	40227	40327	40427	1.0		Volts
	Volts c	40028	40128	40228	40328	40428	1.0		Volts
	Amps a	40029	40129	40229	40329	40429	1.0		Amps
	Amps b	40030	40130	40230	40330	40430	1.0		Amps
	Amps c	40031	40131	40231	40331	40431	1.0		Amps
	Percent Amps a	40032	40132	40232	40332	40432	0.5		%
	Percent Amps b	40033	40133	40233	40333	40433	0.5		%
	Percent Amps c	40034	40134	40234	40334	40434	0.5		%
* Fault codes are listed in the genset Operator's/Service Manuals.							Data = Multiplier x (Register + Offset)		

TABLE 9. MODLON REGISTER MAPPING INFORMATION − FT-10 NETWORK (TEMPLATE 1) SINGLE POWERCOMMAND GENSET (CCM-G) (SHEET 2 OF 2)

Structure	Data Point	ModBus Registers					Scaling		
		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	Multiplier	Offset	Units
nvoGenEngData	Battery Voltage	40035	40135	40235	40335	40435	0.1		Volts DC
	Oil Pressure	40036	40136	40236	40336	40436	0.1		KPA
	Oil Temp (see Note 2)	40037	40137	40237	40337	40437	0.1		Deg Kelvin
	Coolant Temp	40038	40138	40238	40338	40438	0.1		Deg Kelvin
	Misc Temp 1 (see Note 4)	40039	40139	40239	40339	40439	0.1		Deg Kelvin
	Misc Temp 2 (see Note 4)	40040	40140	40240	40340	40440	0.1		Deg Kelvin
	Fuel Rate (see Note 3)	40041	40141	40241	40341	40441	0.01		GPH
	Engine RPM	40042	40142	40242	40342	40442	1.0		RPM
	Engine Starts	40043	40143	40243	40343	40443	1.0		starts
	Eng Runtime (High) (see Notes 1 and 5)	40044	40144	40244	40344	40444			
	Eng Runtime (Low)	40045	40145	40245	40345	40445	0.1		Sec
	Total kwh (High) (see Note 1)	40046	40146	40246	40346	40446			
	Total kwh (Low)	40047	40147	40247	40347	40447	1.0		kwh
	Total Fuel (High) (see Notes 1 and 3)	40048	40148	40248	40348	40448			
	Total Fuel (Low)	40049	40149	40249	40349	40449	0.01		Gal
Genset Control	Start/Stop	40050	40150	40250	40350	40450			
	Reset	40051	40151	40251	40351	40451			
* Fault codes are listed in the genset Operator's/Service Manuals.							Data = Multiplier x (Register + Offset)		

NOTES:

1. For the Data Points Engine Runtime, the Total kwh and Total Fuel for the two registers designated as high and low are put together as an unsigned double integer. This is accomplished by multiplying the value in the high register by 65536 and adding it to the value in the low register. Most software packages automatically perform this calculation if the value is simply identified as an unsigned double integer.
2. Value not supported in the 3200 controller.
3. Value not supported in the 3100 controller.
4. Value not supported.
5. With 3100 and 2100 controllers, the units are hours. With the 3200 controller, the units are seconds. The multiplier is always 0.1

For all 3100 controllers, the values given are based on using EEPROM firmware, version 2.0 or greater. The values for Engine Runtime and Total kwh are not available on QST-30 gensets.

[1]State	
Digital Value	**Description**
0	Stopped
1	Start Pending
2	Warmup at Idle
3	Running
4	Cooldown at Rated
5	Cooldown at Idle

[2]Fault Type	
Digital Value	**Description**
0	Normal
1	Warning
2	Derate
3	Shutdown with Cooldown
4	Shutdown

[3]NFPA110	
Description	**Bit**
Normal Power	0 (MSB)
Genset Supplying Load	1
Genset Running	2
Not in Auto	3
High Battery Voltage	4
Low Battery Voltage	5
Charger AC Failure	6
Fail to Start	7
Low Coolant Temperature	8
Pre-High Engine Temperature	9
High Engine Temperature	10
Pre-Low Oil Pressure	11
Low Oil Pressure	12
Overspeed	13
Low Coolant Level	14
Low Fuel Level	15 (LSB)

[4]Extended	
Description	**Bit**
Check Genset	0 (MSB)
Ground Fault	1
High AC Voltage	2
Low AC Voltage	3
Under Frequency	4
Overload	5
Overcurrent	6
Short Circuit	7
Reverse KW	8
Reverse KVAR	9
Fail to Sync	10
Fail to Close	11
Load Demand	12
Genset Circuit Breaker Tripped	13
Utility Circuit Breaker Tripped	14
Emergency Stop	15 (LSB)

TABLE 10. MODLON REGISTER MAPPING INFORMATION − FT-10 NETWORK (TEMPLATE 1)
AUTOMATIC TRANSFER SWITCH CONTROL COMMUNICATIONS MODULE (CCM-T) (SHEET 1 OF 2)

Structure	Data Point	ModBus Registers					Scaling		
		NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	Multiplier	Offset	Units
nvoATSStatus	Name [0,1]	41001	41101	41201	41301	41401			
	Name [2,3]	41002	41102	41202	41302	41402			
	Name [4,5]	41003	41103	41203	41303	41403			
	Name [6,7]	41004	41104	41204	41304	41404			
	Name [8,9]	41005	41105	41205	41305	41405			
	Name [10,11]	41006	41106	41206	41306	41406			
	Name [12,13]	41007	41107	41207	41307	41407			
	Name [14,15]	41008	41108	41208	41308	41408			
	Device Type	41009	41109	41209	41309	41409			
	Mode[1]	41010	41110	41210	41310	41410			
	State[2]	41011	41111	41211	41311	41411			
	Fault Code	41012	41112	41212	41312	41412			
	Fault Type[3]	41013	41113	41213	41313	41413			
	Percent Amps	41014	41114	41214	41314	41414	0.5		%
	Total kW	41015	41115	41215	41315	41415			
	NFPA 110[4]	41016	41116	41216	41316	41416			
	Extended[5]	41017	41117	41217	41317	41417			
nvoACDataLoad	Frequency	41018	41118	41218	41318	41418	0.1		Hz
	Total pf	41019	41119	41219	41319	41419	0.00005		PF
	Total kva	41020	41120	41220	41320	41420	1.0		KVA
	Total kW	41021	41121	41221	41321	41421	1.0		KW
	Total kvar	41022	41122	41222	41322	41422	1.0		KVAR
	Volts ab	41023	41123	41223	41323	41423	1.0		Volts
	Volts bc	41024	41124	41224	41324	41424	1.0		Volts
	Volts ca	41025	41125	41225	41325	41425	1.0		Volts
	Volts a	41026	41126	41226	41326	41426	1.0		Volts
	Volts b	41027	41127	41227	41327	41427	1.0		Volts
	Volts c	41028	41128	41228	41328	41428	1.0		Volts
	Amps a	41029	41129	41229	41329	41429	1.0		Amps
	Amps b	41030	41130	41230	41330	41430	1.0		Amps
	Amps c	41031	41131	41231	41331	41431	1.0		Amps
	Percent Amps a	41032	41132	41232	41332	41432	0.5		%
	Percent Amps b	41033	41133	41233	41333	41433	0.5		%
	Percent Amps c	41034	41134	41234	41334	41434	0.5		%
							Data = Multiplier x (Register + Offset)		

TABLE 10. MODLON REGISTER MAPPING INFORMATION − FT-10 NETWORK (TEMPLATE 1)
AUTOMATIC TRANSFER SWITCH CONTROL COMMUNICATIONS MODULE (CCM-T) (SHEET 2 OF 2)

Structure	Data Point	ModBus Registers					Scaling		
		NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	Multiplier	Offset	Units
nvoACDataSrc1	Frequency	41035	41135	41235	41335	41435	0.1		Hz
	Total pf	41036	41136	41236	41336	41436	0.00005		PF
	Total kva	41037	41137	41237	41337	41437	1.0		KVA
	Total kW	41038	41138	41238	41338	41438	1.0		KW
	Total kvar	41039	41139	41239	41339	41439	1.0		KVAR
	Volts ab	41040	41140	41240	41340	41440	1.0		Volts
	Volts bc	41041	41141	41241	41341	41441	1.0		Volts
	Volts ca	41042	41142	41242	41342	41442	1.0		Volts
	Volts a	41043	41143	41243	41343	41443	1.0		Volts
	Volts b	41044	41144	41244	41344	41444	1.0		Volts
	Volts c	41045	41145	41245	41345	41445	1.0		Volts
	Amps a	41046	41146	41246	41346	41446	1.0		Amps
	Amps b	41047	41147	41247	41347	41447	1.0		Amps
	Amps c	41048	41148	41248	41348	41448	1.0		Amps
	Percent Amps a	41049	41149	41249	41349	41449	0.5		%
	Percent Amps b	41050	41150	41250	41350	41450	0.5		%
	Percent Amps c	41051	41151	41251	41351	41451	0.5		%
nvoACDataSrc2	Frequency	41052	41152	41252	41352	41452	0.1		Hz
	Total pf	41053	41153	41253	41353	41453	0.00005		PF
	Total kva	41054	41154	41254	41354	41454	1.0		KVA
	Total kW	41055	41155	41255	41355	41455	1.0		KW
	Total kvar	41056	41156	41256	41356	41456	1.0		KVAR
	Volts ab	41057	41157	41257	41357	41457	1.0		Volts
	Volts bc	41058	41158	41258	41358	41458	1.0		Volts
	Volts ca	41059	41159	41259	41359	41459	1.0		Volts
	Volts a	41060	41160	41260	41360	41460	1.0		Volts
	Volts b	41061	41161	41261	41361	41461	1.0		Volts
	Volts c	41062	41162	41262	41362	41462	1.0		Volts
	Amps a	41063	41163	41263	41363	41463	1.0		Amps
	Amps b	41064	41164	41264	41364	41464	1.0		Amps
	Amps c	41065	41165	41265	41365	41465	1.0		Amps
	Percent Amps a	41066	41166	41266	41366	41466	0.5		%
	Percent Amps b	41067	41167	41267	41367	41467	0.5		%
	Percent Amps c	41068	41168	41268	41368	41468	0.5		%
Control	Test	41069	41169	41269	41369	41469			
	Reset	41070	41170	41270	41370	41470			
							Data = Multiplier x (Register + Offset)		

[1]Mode	
Digital Value	**Description**
0	Test
1	Utility/Genset
2	Utility/Utility
3	Genset/Genset

[2]State	
Digital Value	**Description**
0	Neutral Position
1	Source 1 Connected
2	Source 2 Connected
3	Source 1 and 2 Connected

[3]Fault Type	
Digital Value	**Description**
0	No Faults
1	Warning

[4]NFPA 110	
Description	**Bit**
Source 1 Connected	0 (MSB)
Source 2 Connected	1
N/A	2
Not In Auto	3
N/A	4
N/A	5
Charger AC Failure	6
N/A	7
N/A	8
N/A	9
N/A	10
N/A	11
N/A	12
N/A	13
N/A	14
N/A	15 (LSB)

[5]Extended	
Description	**Bit**
Source 1 Available	0 (MSB)
Source 2 Available	1
Source 1 Connected	2
Source 2 Connected	3
ATS Common Alarm	4
Not In Auto	5
Test / Exercise in Progress	6
Low Battery Voltage	7
Load Shed	8
Transfer Inhibit	9
Retransfer Inhibit	10
Fail to Close	11
Fail to Disconnect	12
Fail to Synchronize	13
Bypass to Source 1	14
Bypass to Source 2	15 (LSB)

TABLE 11. MODLON REGISTER MAPPING INFORMATION − FT-10 NETWORK (TEMPLATE 1)
DIGITAL INPUT/OUTPUT MODULE (DIM)

Structure	Data Point	ModBus Register	
		DIM[0]	DIM[1]
nvoNodeStatus	Relay 1	41501	41601
	Relay 2	41502	41602
	Relay 3	41503	41603
	Relay 4	41504	41604
	Relay 5	41505	41605
	Relay 6	41506	41606
	Relay 7	41507	41607
	Relay 8	41508	41608
	Relay 9	41509	41609
	Relay 10	41510	41610
	Relay 11	41511	41611
	Relay 12	41512	41612
	Relay 13	41513	41613
	Relay 14	41514	41614
	Relay 15	41515	41615
	Relay 16	41516	41616
	Input 1	41517	41617
	Input 2	41518	41618
	Input 3	41519	41619
	Input 4	41520	41620
	Input 5	41521	41621
	Input 6	41522	41622
	Input 7	41523	41623
	Input 8	41524	41624
Control	nvi16RelayA	41525	41625

TABLE 12. MODLON REGISTER MAPPING INFORMATION − FT-10 NETWORK (TEMPLATE 2) PARALLELING POWERCOMMAND GENSET (CCM-G) (SHEET 1 OF 2)

Structure	Data Point	ModBus Registers					Scaling		
		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	Multiplier	Offset	Units
nvoGenStatus	Name [0,1]	40001	40101	40201	40301	40401			
	Name [2,3]	40002	40102	40202	40302	40402			
	Name [4,5]	40003	40103	40203	40303	40403			
	Name [6,7]	40004	40104	40204	40304	40404			
	Name [8,9]	40005	40105	40205	40305	40405			
	Name [10,11]	40006	40106	40206	40306	40406			
	Name [12,13]	40007	40107	40207	40307	40407			
	Name [14,15]	40008	40108	40208	40308	40408			
	Device Type	40009	40109	40209	40309	40409			
	Control Switch	40010	40110	40210	40310	40410			
	State[1]	40011	40111	40211	40311	40411			
	Fault Code*	40012	40112	40212	40312	40412			
	Fault Type[2]	40013	40113	40213	40313	40413			
	Percent kW	40014	40114	40214	40314	40414	0.5		%
	Total kW	40015	40115	40215	40315	40415			
	NFPA 110[3]	40016	40116	40216	40316	40416			
	Extended[4]	40017	40117	40217	40317	40417			
nvoGenACData	Frequency	40018	40118	40218	40318	40418	0.1		Hz
	Total pf	40019	40119	40219	40319	40419	0.00005		PF
	Total kva	40020	40120	40220	40320	40420	1.0		KVA
	Total kW	40021	40121	40221	40321	40421	1.0		KW
	Total kvar	40022	40122	40222	40322	40422	1.0		KVAR
	Volts ab	40023	40123	40223	40323	40423	1.0		Volts
	Volts bc	40024	40124	40224	40324	40424	1.0		Volts
	Volts ca	40025	40125	40225	40325	40425	1.0		Volts
	Volts a	40026	40126	40226	40326	40426	1.0		Volts
	Volts b	40027	40127	40227	40327	40427	1.0		Volts
	Volts c	40028	40128	40228	40328	40428	1.0		Volts
	Amps a	40029	40129	40229	40329	40429	1.0		Amps
	Amps b	40030	40130	40230	40330	40430	1.0		Amps
	Amps c	40031	40131	40231	40331	40431	1.0		Amps
	Percent Amps a	40032	40132	40232	40332	40432	0.5		%
	Percent Amps b	40033	40133	40233	40333	40433	0.5		%
	Percent Amps c	40034	40134	40234	40334	40434	0.5		%
* Fault codes are listed in the genset Operator's/Service Manuals.							Data = Multiplier x (Register + Offset)		

TABLE 12. MODLON REGISTER MAPPING INFORMATION − FT-10 NETWORK (TEMPLATE 2) PARALLELING POWERCOMMAND GENSET (CCM-G) (SHEET 2 OF 2)

Structure	Data Point	ModBus Registers					Scaling		
		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	Multiplier	Offset	Units
nvoGenEngData	Battery Voltage	40035	40135	40235	40335	40435	0.1		Volts DC
	Oil Pressure	40036	40136	40236	40336	40436	0.1		KPA
	Oil Temp (see Note 2)	40037	40137	40237	40337	40437	0.1		Deg Kelvin
	Coolant Temp	40038	40138	40238	40338	40438	0.1		Deg Kelvin
	Misc Temp 1 (see Note 4)	40039	40139	40239	40339	40439	0.1		Deg Kelvin
	Misc Temp 2 (see Note 4)	40040	40140	40240	40340	40440	0.1		Deg Kelvin
	Fuel Rate (see Note 3)	40041	40141	40241	40341	40441	0.01		GPH
	Engine RPM	40042	40142	40242	40342	40442	1.0		RPM
	Engine Starts	40043	40143	40243	40343	40443	1.0		Starts
	Eng Runtime (High) (see Notes 1 and 5)	40044	40144	40244	40344	40444			
	Eng Runtime (Low)	40045	40145	40245	40345	40445	0.1		Sec
	Total kwh (High) (see Note 1)	40046	40146	40246	40346	40446			
	Total kwh (Low)	40047	40147	40247	40347	40447	1.0		KWH
	Total Fuel (High) (see Notes 1 and 3)	40048	40148	40248	40348	40448			
	Total Fuel (Low)	40049	40149	40249	40349	40449	0.01		Gal
nvoGenParaData	Frequency	40050	40150	40250	40350	40450	0.1		Hz
	Volts ab	40051	40151	40251	40351	40451	1.0		Volts
	Volts bc	40052	40152	40252	40352	40452	1.0		Volts
	Volts ca	40053	40153	40253	40353	40453	1.0		Volts
	Volts a	40054	40154	40254	40354	40454	1.0		Volts
	Volts b	40055	40155	40255	40355	40455	1.0		Volts
	Volts c	40056	40156	40256	40356	40456	1.0		Volts
	Customer Faults	40057	40157	40257	40357	40457			
	Network Faults	40058	40158	40258	40358	40458			
	Custom	40059	40159	40259	40359	40459			
	ES State[5]	40060	40160	40260	40360	40460			
	Load Share State[6]	40061	40161	40261	40361	40461			
	Load Govern State kw[7]	40062	40162	40262	40362	40462			
	Load Govern State kvar[8]	40063	40163	40263	40363	40463			
	Genset CB Position[9]	40064	40164	40264	40364	40464			
	Utility CB Position[10]	40065	40165	40265	40365	40465			
Genset Control	Start/Stop	40066	40166	40266	40366	40466			
	Reset	40067	40167	40267	40367	40467			
* Fault codes are listed in the genset Operator's/Service Manuals.							Data = Multiplr x (Reg + Offset)		

NOTES:

1. For the Data Points Engine Runtime, the Total kwh and Total Fuel for the two registers designated as high and low are put together as an unsigned double integer. This is accomplished by multiplying the value in the high register by 65536 and adding it to the value in the low register. Most software packages automatically perform this calculation if the value is simply identified as an unsigned double integer.
2. Value not supported in the 3200 controller.
3. Value not supported in the 3100 controller.
4. Value not supported.
5. With 3100 and 2100 controllers, the units are hours. With the 3200 controller, the units are seconds. The multiplier is always 0.1. For all 3100 controllers, the values given are based on using EEPROM firmware, version 2.0 or greater. The values for Engine Runtime and Total kwh are not available on QST-30 gensets.

[1]State	
Digital Value	**Description**
0	Stopped
1	Start Pending
2	Warmup at Idle
3	Running
4	Cooldown at Rated
5	Cooldown at Idle

[2]Fault Type	
Digital Value	**Description**
0	Normal
1	Warning
2	Derate
3	Shutdown with Cooldown
4	Shutdown

[3]NFPA 110	
Description	**Bit**
Normal Power	0 (MSB)
Genset Supplying Load	1
Genset Running	2
Not in Auto	3
High Battery Voltage	4
Low Battery Voltage	5
Charger AC Failure	6
Fail to Start	7
Low Coolant Temperature	8
Pre-High Engine Temperature	9
High Engine Temperature	10
Pre-Low Oil Pressure	11
Low Oil Pressure	12
Overspeed	13
Low Coolant Level	14
Low Fuel Level	15 (LSB)

[4]Extended	
Description	**Bit**
Check Genset	0 (MSB)
Ground Fault	1
High AC Voltage	2
Low AC Voltage	3
Under Frequency	4
Overload	5
Overcurrent	6
Short Circuit	7
Reverse KW	8
Reverse KVAR	9
Fail to Sync	10
Fail to Close	11
Load Demand	12
Genset Circuit Breaker Tripped	13
Utility Circuit Breaker Tripped	14
Emergency Stop	15 (LSB)

[5]ES State	
Digital Value	**Description**
0	Standby
1	Dead Bus Close
2	Synchronizing
3	Load Share
4	Load Govern

[6]Load Share State	
Digital Value	**Description**
0	Not in Load Share
1	Track Load
2	Ramp Load
3	Ramp Unload
4	Load Demand Shutdown

[7]Load Govern State KW	
Digital Value	**Description**
0	Not Applicable
1	Ramp Load
2	Track Target Load
3	Ramp Unload
4	Ramp Unload Done

[8]Load Govern State KVAR	
Digital Value	**Description**
0	Not Applicable
1	Ramp Load
2	Track Target Load
3	Ramp Unload
4	Ramp Unload Done

[9]Genset CB Position	
Digital Value	**Description**
0	Open
1	Closed
2	Unavailable
3	Inhibit

[10]Utility CB Position	
Digital Value	**Description**
0	Open
1	Closed
2	Unavailable
3	Inhibit

TABLE 13. MODLON REGISTER MAPPING INFORMATION − FT-10 NETWORK (TEMPLATE 2)
AUTOMATIC TRANSFER SWITCH CONTROL COMMUNICATIONS MODULE (CCM-T)

Structure	Data Point	ModBus Registers					Scaling		
		NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	Multiplier	Offset	Units
nvoATSStatus	Name [0,1]	41001	41101	41201	41301	41401			
	Name [2,3]	41002	41102	41202	41302	41402			
	Name [4,5]	41003	41103	41203	41303	41403			
	Name [6,7]	41004	41104	41204	41304	41404			
	Name [8,9]	41005	41105	41205	41305	41405			
	Name [10,11]	41006	41106	41206	41306	41406			
	Name [12,13]	41007	41107	41207	41307	41407			
	Name [14,15]	41008	41108	41208	41308	41408			
	Device Type	41009	41109	41209	41309	41409			
	Mode[1]	41010	41110	41210	41310	41410			
	State[2]	41011	41111	41211	41311	41411			
	Fault Code	41012	41112	41212	41312	41412			
	Fault Type[3]	41013	41113	41213	41313	41413			
	Percent Amps	41014	41114	41214	41314	41414	0.5		%
	Total kW	41015	41115	41215	41315	41415			
	NFPA 110[4]	41016	41116	41216	41316	41416			
	Extended[5]	41017	41117	41217	41317	41417			
nvoACDataLoad	Frequency	41018	41118	41218	41318	41418	0.1		Hz
	Total pf	41019	41119	41219	41319	41419	0.00005		PF
	Total kva	41020	41120	41220	41320	41420	1.0		KVA
	Total kW	41021	41121	41221	41321	41421	1.0		KW
	Total kvar	41022	41122	41222	41322	41422	1.0		KVAR
	Volts ab	41023	41123	41223	41323	41423	1.0		Volts
	Volts bc	41024	41124	41224	41324	41424	1.0		Volts
	Volts ca	41025	41125	41225	41325	41425	1.0		Volts
	Volts a	41026	41126	41226	41326	41426	1.0		Volts
	Volts b	41027	41127	41227	41327	41427	1.0		Volts
	Volts c	41028	41128	41228	41328	41428	1.0		Volts
	Amps a	41029	41129	41229	41329	41429	1.0		Amps
	Amps b	41030	41130	41230	41330	41430	1.0		Amps
	Amps c	41031	41131	41231	41331	41431	1.0		Amps
	Percent Amps a	41032	41132	41232	41332	41432	0.5		%
	Percent Amps b	41033	41133	41233	41333	41433	0.5		%
	Percent Amps c	41034	41134	41234	41334	41434	0.5		%
Control	Test	41035	41135	41235	41335	41435			
	Reset	41036	41136	41236	41336	41436			
							Data = Multiplier x (Register + Offset)		

[1]Mode	
Digital Value	**Description**
0	Test
1	Utility/Genset
2	Utility/Utility
3	Genset/Genset

[2]State	
Digital Value	**Description**
0	Neutral Position
1	Source 1 Connected
2	Source 2 Connected
3	Source 1 and 2 Connected

[3]Fault Type	
Digital Value	**Description**
0	No Faults
1	Warning

[4]NFPA 110	
Description	**Bit**
Source 1 Connected	0 (MSB)
Source 2 Connected	1
N/A	2
Not In Auto	3
N/A	4
N/A	5
Charger AC Failure	6
N/A	7
N/A	8
N/A	9
N/A	10
N/A	11
N/A	12
N/A	13
N/A	14
N/A	15 (LSB)

[5]Extended	
Description	**Bit**
Source 1 Available	0 (MSB)
Source 2 Available	1
Source 1 Connected	2
Source 2 Connected	3
ATS Common Alarm	4
Not In Auto	5
Test / Exercise in Progress	6
Low Battery Voltage	7
Load Shed	8
Transfer Inhibit	9
Retransfer Inhibit	10
Fail to Close	11
Fail to Disconnect	12
Fail to Synchronize	13
Bypass to Source 1	14
Bypass to Source 2	15 (LSB)

TABLE 14. MODLON REGISTER MAPPING INFORMATION − FT-10 NETWORK (TEMPLATE 2)
DIGITAL INPUT/OUTPUT MODULE (DIM)

Structure	Data Point	ModBus Register	
		DIM[0]	DIM[1]
nvoNodeStatus	Relay 1	41501	41601
	Relay 2	41502	41602
	Relay 3	41503	41603
	Relay 4	41504	41604
	Relay 5	41505	41605
	Relay 6	41506	41606
	Relay 7	41507	41607
	Relay 8	41508	41608
	Relay 9	41509	41609
	Relay 10	41510	41610
	Relay 11	41511	41611
	Relay 12	41512	41612
	Relay 13	41513	41613
	Relay 14	41514	41614
	Relay 15	41515	41615
	Relay 16	41516	41616
	Input 1	41517	41617
	Input 2	41518	41618
	Input 3	41519	41619
	Input 4	41520	41620
	Input 5	41521	41621
	Input 6	41522	41622
	Input 7	41523	41623
	Input 8	41524	41624
Control	nvi16RelayA	41525	41625

TABLE 15. MODLON REGISTER MAPPING INFORMATION − FT-10 NETWORK (TEMPLATE 3) PARALLELING PCC GENSET (CCM-G) (SHEET 1 OF 3)

Structure	Data Point	ModBus Registers										Scaling		
		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	GEN[5]	GEN[6]	GEN[7]	GEN[8]	GEN[9]	Multiplier	Offset	Units
nvoGenStatus	Name [0,1]	40001	40101	40201	40301	40401	40501	40601	40701	40801	40901			
	Name [2,3]	40002	40102	40202	40302	40402	40502	40602	40702	40802	40902			
	Name [4,5]	40003	40103	40203	40303	40403	40503	40603	40703	40803	40903			
	Name [6,7]	40004	40104	40204	40304	40404	40504	40604	40704	40804	40904			
	Name [8,9]	40005	40105	40205	40305	40405	40505	40605	40705	40805	40905			
	Name [10,11]	40006	40106	40206	40306	40406	40506	40606	40706	40806	40906			
	Name [12,13]	40007	40107	40207	40307	40407	40507	40607	40707	40807	40907			
	Name [14,15]	40008	40108	40208	40308	40408	40508	40608	40708	40808	40908			
	Device Type	40009	40109	40209	40309	40409	40509	40609	40709	40809	40909			
	Control Switch	40010	40110	40210	40310	40410	40510	40610	40710	40810	40910			
	State[1]	40011	40111	40211	40311	40411	40511	40611	40711	40811	40911			
	Fault Code*	40012	40112	40212	40312	40412	40512	40612	40712	40812	40912			
	Fault Type[2]	40013	40113	40213	40313	40413	40513	40613	40713	40813	40913			
	Percent kW	40014	40114	40214	40314	40414	40514	40614	40714	40814	40914	0.5		%
	Total kW	40015	40115	40215	40315	40415	40515	40615	40715	40815	40915			
	NFPA 110[3]	40016	40116	40216	40316	40416	40516	40616	40716	40816	40916			
	Extended[4]	40017	40117	40217	40317	40417	40517	40617	40717	40817	40917			
nvoGenACData	Frequency	40018	40118	40218	40318	40418	40518	40618	40718	40818	40918	0.1		Hz
	Total pf	40019	40119	40219	40319	40419	40519	40619	40719	40819	40919	0.00005		PF
	Total kva	40020	40120	40220	40320	40420	40520	40620	40720	40820	40920	1.0		KVA
	Total kW	40021	40121	40221	40321	40421	40521	40621	40721	40821	40921	1.0		KW
	Total kvar	40022	40122	40222	40322	40422	40522	40622	40722	40822	40922	1.0		KVAR
	Volts ab	40023	40123	40223	40323	40423	40523	40623	40723	40823	40923	1.0		Volts
	Volts bc	40024	40124	40224	40324	40424	40524	40624	40724	40824	40924	1.0		Volts
	Volts ca	40025	40125	40225	40325	40425	40525	40625	40725	40825	40925	1.0		Volts
	Volts a	40026	40126	40226	40326	40426	40526	40626	40726	40826	40926	1.0		Volts
	Volts b	40027	40127	40227	40327	40427	40527	40627	40727	40827	40927	1.0		Volts
	Volts c	40028	40128	40228	40328	40428	40528	40628	40728	40828	40928	1.0		Volts
	Amps a	40029	40129	40229	40329	40429	40529	40629	40729	40829	40929	1.0		Amps
	Amps b	40030	40130	40230	40330	40430	40530	40630	40730	40830	40930	1.0		Amps
	Amps c	40031	40131	40231	40331	40431	40531	40631	40731	40831	40931	1.0		Amps
	Percent Amps a	40032	40132	40232	40332	40432	40532	40632	40732	40832	40932	0.5		%
	Percent Amps b	40033	40133	40233	40333	40433	40533	40633	40733	40833	40933	0.5		%
	Percent Amps c	40034	40134	40234	40334	40434	40534	40634	40734	40834	40934	0.5		%
* Fault codes are listed in the genset Operator's/Service Manuals.												Data = Multiplier x (Register + Offset)		

TABLE 15. MODLON REGISTER MAPPING INFORMATION − FT-10 NETWORK (TEMPLATE 3) PARALLELING PCC GENSET (CCM-G) (SHEET 2 OF 3)

Structure	Data Point	ModBus Registers										Scaling		
		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	GEN[5]	GEN[6]	GEN[7]	GEN[8]	GEN[9]	Multiplier	Offset	Units
nvoGen EngData	Battery Voltage	40035	40135	40235	40335	40435	40535	40635	40735	40835	40935	0.1		Volts DC
	Oil Pressure	40036	40136	40236	40336	40436	40536	40636	40736	40836	40936	0.1		KPA
	Oil Temp (see Note 2)	40037	40137	40237	40337	40437	40537	40637	40737	40837	40937	0.1		Deg Kelvin
	Coolant Temp	40038	40138	40238	40338	40438	40538	40638	40738	40838	40938	0.1		Deg Kelvin
	Misc Temp 1 (see Note 4)	40039	40139	40239	40339	40439	40539	40639	40739	40839	40939	0.1		Deg Kelvin
	Misc Temp 2 (see Note 4)	40040	40140	40240	40340	40440	40540	40640	40740	40840	40940	0.1		Deg Kelvin
	Fuel Rate (see Note 3)	40041	40141	40241	40341	40441	40541	40641	40741	40841	40941	0.01		GPH
	Engine RPM	40042	40142	40242	40342	40442	40542	40642	40742	40842	40942	1.0		RPM
	Engine Starts	40043	40143	40243	40343	40443	40543	40643	40743	40843	40943	1.0		Starts
	Eng Runtime (High) (see Notes 1 and 5)	40044	40144	40244	40344	40444	40544	40644	40744	40844	40944			
	Eng Runtime (Low)	40045	40145	40245	40345	40445	40545	40645	40745	40845	40945	0.1		Sec
	Total kwh (High) (see Note 1)	40046	40146	40246	40346	40446	40546	40646	40746	40846	40946			
	Total kwh (Low)	40047	40147	40247	40347	40447	40547	40647	40747	40847	40947	1.0		KWH
	Total Fuel (High)) (see Notes 1 and 3)	40048	40148	40248	40348	40448	40548	40648	40748	40848	40948			
	Total Fuel (Low)	40049	40149	40249	40349	40449	40549	40649	40749	40849	40949	0.01		Gal

NOTES:

1. For the Data Points Engine Runtime, the Total kwh and Total Fuel for the two registers designated as high and low are put together as an unsigned double integer. This is accomplished by multiplying the value in the high register by 65536 and adding it to the value in the low register. Most software packages automatically perform this calculation if the value is simply identified as an unsigned double integer.
2. Value not supported in the 3200 controller.
3. Value not supported in the 3100 controller.
4. Value not supported.
5. With 3100 and 2100 controllers, the units are hours. With the 3200 controller, the units are seconds. The multiplier is always 0.1

For all 3100 controllers, the values given are based on using EEPROM firmware, version 2.0 or greater. The values for Engine Runtime and Total kwh are not available on QST-30 gensets.

TABLE 15. MODLON REGISTER MAPPING INFORMATION − FT-10 NETWORK (TEMPLATE 3) PARALLELING PCC GENSET (CCM-G) (SHEET 3 OF 3)

Structure	Data Point	ModBus Registers										Scaling		
		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	GEN[5]	GEN[6]	GEN[7]	GEN[8]	GEN[9]	Multiplier	Offset	Units
nvoGenParaData	Frequency	40050	40150	40250	40350	40450	40550	40650	40750	40850	40950	0.1		Hz
	Volts ab	40051	40151	40251	40351	40451	40551	40651	40751	40851	40951	1.0		Volts
	Volts bc	40052	40152	40252	40352	40452	40552	40652	40752	40852	40952	1.0		Volts
	Volts ca	40053	40153	40253	40353	40453	40553	40653	40753	40853	40953	1.0		Volts
	Volts a	40054	40154	40254	40354	40454	40554	40654	40754	40854	40954	1.0		Volts
	Volts b	40055	40155	40255	40355	40455	40555	40655	40755	40855	40955	1.0		Volts
	Volts c	40056	40156	40256	40356	40456	40556	40656	40756	40856	40956	1.0		Volts
	Customer Faults	40057	40157	40257	40357	40457	40557	40657	40757	40857	40957			
	Network Faults	40058	40158	40258	40358	40458	40558	40658	40758	40858	40958			
	Custom	40059	40159	40259	40359	40459	40559	40659	40759	40859	40959			
	ES State[5]	40060	40160	40260	40360	40460	40560	40660	40760	40860	40960			
	Load Share State[6]	40061	40161	40261	40361	40461	40561	40661	40761	40861	40961			
	Load Govern State kw[7]	40062	40162	40262	40362	40462	40562	40662	40762	40862	40962			
	Load Govern State kvar[8]	40063	40163	40263	40363	40463	40563	40663	40763	40863	40963			
	Genset CB Position[9]	40064	40164	40264	40364	40464	40564	40664	40764	40864	40964			
	Utility CB Position[10]	40065	40165	40265	40365	40465	40565	40665	40765	40865	40965			
Genset Control	Start/Stop	40066	40166	40266	40366	40466	40566	40666	40766	40866	40966			
	Reset	40067	40167	40267	40367	40467	40567	40667	40767	40867	40967			
* Fault codes are listed in the genset Operator's/Service Manuals.												Data = Multiplr x (Reg + Offset)		

[1]State	
Digital Value	**Description**
0	Stopped
1	Start Pending
2	Warmup at Idle
3	Running
4	Cooldown at Rated
5	Cooldown at Idle

[2]Fault Type	
Digital Value	**Description**
0	Normal
1	Warning
2	Derate
3	Shutdown with Cooldown
4	Shutdown

[3]NFPA 110	
Description	**Bit**
Normal Power	0 (MSB)
Genset Supplying Load	1
Genset Running	2
Not in Auto	3
High Battery Voltage	4
Low Battery Voltage	5
Charger AC Failure	6
Fail to Start	7
Low Coolant Temperature	8
Pre-High Engine Temperature	9
High Engine Temperature	10
Pre-Low Oil Pressure	11
Low Oil Pressure	12
Overspeed	13
Low Coolant Level	14
Low Fuel Level	15 (LSB)

[4]Extended	
Description	**Bit**
Check Genset	0 (MSB)
Ground Fault	1
High AC Voltage	2
Low AC Voltage	3
Under Frequency	4
Overload	5
Overcurrent	6
Short Circuit	7
Reverse KW	8
Reverse KVAR	9
Fail to Sync	10
Fail to Close	11
Load Demand	12
Genset Circuit Breaker Tripped	13
Utility Circuit Breaker Tripped	14
Emergency Stop	15 (LSB)

[5]ES State	
Digital Value	**Description**
0	Standby
1	Dead Bus Close
2	Synchronizing
3	Load Share
4	Load Govern

[6]Load Share State	
Digital Value	**Description**
0	Not in Load Share
1	Track Load
2	Ramp Load
3	Ramp Unload
4	Load Demand Shutdown

[7]Load Govern State KW	
Digital Value	**Description**
0	Not Applicable
1	Ramp Load
2	Track Target Load
3	Ramp Unload
4	Ramp Unload Done

[8]Load Govern State KVAR	
Digital Value	**Description**
0	Not Applicable
1	Ramp Load
2	Track Target Load
3	Ramp Unload
4	Ramp Unload Done

[9]Genset CB Position	
Digital Value	**Description**
0	Open
1	Closed
2	Unavailable
3	Inhibit

[10]Utility CB Position	
Digital Value	**Description**
0	Open
1	Closed
2	Unavailable
3	Inhibit

TABLE 16. MODLON REGISTER MAPPING INFORMATION − FT-10 NETWORK (TEMPLATE 3)
AUTOMATIC TRANSFER SWITCH CONTROL COMMUNICATIONS MODULE (CCM-T) (SHEET 1 OF 2)

Structure	Data Point	ModBus Registers										Scaling		
		NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	NCM[5]	NCM[6]	NCM[7]	NCM[8]	NCM[9]	Multiplier	Offset	Units
nvoATSStatus	Name [0,1]	40001	40101	40201	40301	40401	40501	40601	40701	40801	40901			
	Name [2,3]	40002	40102	40202	40302	40402	40502	40602	40702	40802	40902			
	Name [4,5]	40003	40103	40203	40303	40403	40503	40603	40703	40803	40903			
	Name [6,7]	40004	40104	40204	40304	40404	40504	40604	40704	40804	40904			
	Name [8,9]	40005	40105	40205	40305	40405	40505	40605	40705	40805	40905			
	Name [10,11]	40006	40106	40206	40306	40406	40506	40606	40706	40806	40906			
	Name [12,13]	40007	40107	40207	40307	40407	40507	40607	40707	40807	40907			
	Name [14,15]	40008	40108	40208	40308	40408	40508	40608	40708	40808	40908			
	Device Type	40009	40109	40209	40309	40409	40509	40609	40709	40809	40909			
	Mode[1]	40010	40110	40210	40310	40410	40510	40610	40710	40810	40910			
	State[2]	40011	40111	40211	40311	40411	40511	40611	40711	40811	40911			
	Fault Code	40012	40112	40212	40312	40412	40512	40612	40712	40812	40912			
	Fault Type[3]	40013	40113	40213	40313	40413	40513	40613	40713	40813	40913			
	Percent Amps	40014	40114	40214	40314	40414	40514	40614	40714	40814	40914	0.5		%
	Total kW	40015	40115	40215	40315	40415	40515	40615	40715	40815	40915			
	NFPA 110[4]	40016	40116	40216	40316	40416	40516	40616	40716	40816	40916			
	Extended[5]	40017	40117	40217	40317	40417	40517	40617	40717	40817	40917			
nvoACDataLoad	Frequency	40018	40118	40218	40318	40418	40518	40618	40718	40818	40918	0.1		Hz
	Total pf	40019	40119	40219	40319	40419	40519	40619	40719	40819	40919	0.00005		PF
	Total kva	40020	40120	40220	40320	40420	40520	40620	40720	40820	40920	1.0		KVA
	Total kW	40021	40121	40221	40321	40421	40521	40621	40721	40821	40921	1.0		KW
	Total kvar	40022	40122	40222	40322	40422	40522	40622	40722	40822	40922	1.0		KVAR
	Volts ab	40023	40123	40223	40323	40423	40523	40623	40723	40823	40923	1.0		Volts
	Volts bc	40024	40124	40224	40324	40424	40524	40624	40724	40824	40924	1.0		Volts
	Volts ca	40025	40125	40225	40325	40425	40525	40625	40725	40825	40925	1.0		Volts
	Volts a	40026	40126	40226	40326	40426	40526	40626	40726	40826	40926	1.0		Volts
	Volts b	40027	40127	40227	40327	40427	40527	40627	40727	40827	40927	1.0		Volts
	Volts c	40028	40128	40228	40328	40428	40528	40628	40728	40828	40928	1.0		Volts
	Amps a	40029	40129	40229	40329	40429	40529	40629	40729	40829	40929	1.0		Amps
	Amps b	40030	40130	40230	40330	40430	40530	40630	40730	40830	40930	1.0		Amps
	Amps c	40031	40131	40231	40331	40431	40531	40631	40731	40831	40931	1.0		Amps
	Percent Amps a	40032	40132	40232	40332	40432	40532	40632	40732	40832	40932	0.5		%
	Percent Amps b	40033	40133	40233	40333	40433	40533	40633	40733	40833	40933	0.5		%
	Percent Amps c	40034	40134	40234	40334	40434	40534	40634	40734	40834	40934	0.5		%
												Data = Multiplier x (Register + Offset)		

TABLE 16. MODLON REGISTER MAPPING INFORMATION − FT-10 NETWORK (TEMPLATE 3)
AUTOMATIC TRANSFER SWITCH CONTROL COMMUNICATIONS MODULE (CCM-T) (SHEET 2 OF 2)

Structure	Data Point	ModBus Registers										Scaling		
		NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	NCM[5]	NCM[6]	NCM[7]	NCM[8]	NCM[9]	Multiplier	Offset	Units
nvoACDataSrc1	Frequency	40035	40135	40235	40335	40435	40535	40635	40735	40835	40935	0.1		Hz
	Total pf	40036	40136	40236	40336	40436	40536	40636	40736	40836	40936	0.00005		PF
	Total kva	40037	40137	40237	40337	40437	40537	40637	40737	40837	40937	1.0		KVA
	Total kW	40038	40138	40238	40338	40438	40538	40638	40738	40838	40938	1.0		KW
	Total kvar	40039	40139	40239	40339	40439	40539	40639	40739	40839	40939	1.0		KVAR
	Volts ab	40040	40140	40240	40340	40440	40540	40640	40740	40840	40940	1.0		Volts
	Volts bc	40041	40141	40241	40341	40441	40541	40641	40741	40841	40941	1.0		Volts
	Volts ca	40042	40142	40242	40342	40442	40542	40642	40742	40842	40942	1.0		Volts
	Volts a	40043	40143	40243	40343	40443	40543	40643	40743	40843	40943	1.0		Volts
	Volts b	40044	40144	40244	40344	40444	40544	40644	40744	40844	40944	1.0		Volts
	Volts c	40045	40145	40245	40345	40445	40545	40645	40745	40845	40945	1.0		Volts
	Amps a	40046	40146	40246	40346	40446	40546	40646	40746	40846	40946	1.0		Amps
	Amps b	40047	40147	40247	40347	40447	40547	40647	40747	40847	40947	1.0		Amps
	Amps c	40048	40148	40248	40348	40448	40548	40648	40748	40848	40948	1.0		Amps
	Percent Amps a	40049	40149	40249	40349	40449	40549	40649	40749	40849	40949	0.5		%
	Percent Amps b	40050	40150	40250	40350	40450	40550	40650	40750	40850	40950	0.5		%
	Percent Amps c	40051	40151	40251	40351	40451	40551	40651	40751	40851	40951	0.5		%
nvoACDataSrc2	Frequency	40052	40152	40252	40352	40452	40552	40652	40752	40852	40952	0.1		Hz
	Total pf	40053	40153	40253	40353	40453	40553	40653	40753	40853	40953	0.00005		PF
	Total kva	40054	40154	40254	40354	40454	40554	40654	40754	40854	40954	1.0		KVA
	Total kW	40055	40155	40255	40355	40455	40555	40655	40755	40855	40955	1.0		KW
	Total kvar	40056	40156	40256	40356	40456	40556	40656	40756	40856	40956	1.0		KVAR
	Volts ab	40057	40157	40257	40357	40457	40557	40657	40757	40857	40957	1.0		Volts
	Volts bc	40058	40158	40258	40358	40458	40558	40658	40758	40858	40958	1.0		Volts
	Volts ca	40059	40159	40259	40359	40459	40559	40659	40759	40859	40959	1.0		Volts
	Volts a	40060	40160	40260	40360	40460	40560	40660	40760	40860	40960	1.0		Volts
	Volts b	40061	40161	40261	40361	40461	40561	40661	40761	40861	40961	1.0		Volts
	Volts c	40062	40162	40262	40362	40462	40562	40662	40762	40862	40962	1.0		Volts
	Amps a	40063	40163	40263	40363	40463	40563	40663	40763	40863	40963	1.0		Amps
	Amps b	40064	40164	40264	40364	40464	40564	40664	40764	40864	40964	1.0		Amps
	Amps c	40065	40165	40265	40365	40465	40565	40665	40765	40865	40965	1.0		Amps
	Percent Amps a	40066	40166	40266	40366	40466	40566	40666	40766	40866	40966	0.5		%
	Percent Amps b	40067	40167	40267	40367	40467	40567	40667	40767	40867	40967	0.5		%
	Percent Amps c	40068	40168	40268	40368	40468	40568	40668	40768	40868	40968	0.5		%
Control	Test	40069	40169	40269	40369	40469	40569	40669	40769	40869	40969			
	Reset	40070	40170	40270	40370	40470	40570	40670	40770	40870	40970			
												Data = Multiplr x (Reg + Offset)		

[1]Mode	
Digital Value	**Description**
0	Test
1	Utility/Genset
2	Utility/Utility
3	Genset/Genset

[2]State	
Digital Value	**Description**
0	Neutral Position
1	Source 1 Connected
2	Source 2 Connected
3	Source 1 and 2 Connected

[3]Fault Type	
Digital Value	**Description**
0	No Faults
1	Warning

[4]NFPA 110	
Description	**Bit**
Source 1 Connected	0 (MSB)
Source 2 Connected	1
N/A	2
Not In Auto	3
N/A	4
N/A	5
Charger AC Failure	6
N/A	7
N/A	8
N/A	9
N/A	10
N/A	11
N/A	12
N/A	13
N/A	14
N/A	15 (LSB)

[5]Extended	
Description	**Bit**
Source 1 Available	0 (MSB)
Source 2 Available	1
Source 1 Connected	2
Source 2 Connected	3
ATS Common Alarm	4
Not In Auto	5
Test / Exercise in Progress	6
Low Battery Voltage	7
Load Shed	8
Transfer Inhibit	9
Retransfer Inhibit	10
Fail to Close	11
Fail to Disconnect	12
Fail to Synchronize	13
Bypass to Source 1	14
Bypass to Source 2	15 (LSB)

TABLE 17. MODLON REGISTER MAPPING INFORMATION − TEMPLATE 5 (TP/XF-78 MAPPING) POWERCOMMAND GENSET

Structure	Data Point	ModBus Registers					Scaling		
		GCM[0]	GCM[1]	GCM[2]	GCM[3]	GCM[4]	Multiplier	Offset	Units
Status	state[1]	41001	41101	41201	41301	41401			
	Extended[4]	41002	41102	41202	41302	41402			
	fault_type[2]	41003	41103	41203	41303	41403			
	fault_code*	41012	41112	41212	41312	41412			
	Percent_kw	41026	41126	41226	41326	41426	0.5		&
AC Data (Load)	volts_a	41014	41114	41214	41314	41414			VAC
	volts_b	41015	41115	41215	41315	41415			VAC
	volts_c	41016	41116	41216	41316	41416			VAC
	freq	41017	41117	41217	41317	41417	0.1		Hz
	amps_a	41018	41118	41218	41318	41418			A
	amps_b	41019	41119	41219	41319	41419			A
	amps_c	41020	41120	41220	41320	41420			A
	total_pf	41024	41124	41224	41324	41424	0.00005		
	total_kw	41025	41125	41225	41325	41425			kW
Engine Data	oil_press	41029	41129	41229	41329	41429	0.1		KPA
	oil_temp (see Note 2)	41030	41130	41230	41330	41430	0.1		Deg Kelvin
	Coolant temp	41031	41131	41231	41331	41431	0.1		Deg Kelvin
	Misc Temp 1 (see Note 4)	41033	41133	41233	41333	41433	0.1		Deg Kelvin
	Misc Temp 2 (see Note 4)	41034	41134	41234	41334	41434	0.1		Deg Kelvin
	battery_volts	41035	41135	41235	41335	41435	0.1		VDC
	Engine runtime (low)	41036	41136	41236	41336	41436	0.1		h
	Engine runtime (high)	41037	41137	41237	41337	41437	1000		h
	engine_starts	41038	41138	41238	41338	41438			
	engine_rpm	41039	41139	41239	41339	41439	0.1		rpm
Genset Control	Start/Stop	41040	41140	41240	41340	41440			
	Reset	41041	41141	41241	41341	41441			
	Emergency Stop	41042	41142	41242	41342	41442			
* Fault codes are listed in the genset Operator's/Service Manuals.							*Data = Multiplier x (Register + Offset)*		

NOTES:

1. For the Data Points Engine Runtime, the Total kwh and Total Fuel for the two registers designated as high and low are put together as an unsigned double integer. This is accomplished by multiplying the value in the high register by 65536 and adding it to the value in the low register. Most software packages automatically perform this calculation if the value is simply identified as an unsigned double integer.
2. Value not supported in the 3200 controller.
3. Value not supported in the 3100 controller.
4. Value not supported.
5. With 3100 and 2100 controllers, the units are hours. With the 3200 controller, the units are seconds. The multiplier is always 0.1. For all 3100 controllers, the values given are based on using EEPROM firmware, version 2.0 or greater. The values for Engine Runtime and Total kwh are not available on QST-30 gensets.

[1]State	
Digital Value	**Description**
0	Power Up
1	Stopped
2	Cranking
3	Running
4	Shutdown with Run
5	Shutdown without Run

[2]Status				
Data Point	**Bit**	**PCC 2100**	**PCC 3100**	**PCC 3200**
Common Alarm	0 (LSB)	N/A	X	N/A
Load Dump	1	N/A	X	N/A
Genset CB Position	2	N/A	X	N/A
Leading Power Factor	3	X	X	X
Ready To Load	4	N/A	X	N/A
Control Switch − Run	5	X	X	X
Control Switch − Auto	6	X	X	X
Genset Start Delay	7	N/A	X	N/A
Genset Stop Delay	8	N/A	X	N/A
Load Demand	9	N/A	X	N/A
Paralleling Genset	10	N/A	X	N/A
Remote Start	11	N/A	N/A	N/A
Right Coolant Sensor	12	N/A	N/A	N/A
Exhaust 1 Installed	13	N/A	X	N/A
Exhaust 2 Installed	14	N/A	X	N/A
Genset CB Inhibit	15 (MSB)	N/A	X	N/A

[3]Fault Type	
Digital Value	**Description**
0	Normal
1	Warning
2	Shutdown

TABLE 18. MODLON REGISTER MAPPING INFORMATION − TEMPLATE 5 (TP/XF-78 MAPPING)
DIGITAL INPUT/OUTPUT MODULE

Structure	Data Point	ModBus Register	
		DIM[0]	DIM[1]
Node Status	relay 1, relay 2	42001	42101
	relay 3, relay 4	42002	42102
	relay 5, relay 6	42003	42103
	relay 7, relay 8	42004	42104
	relay 9, relay 10	42005	42105
	relay 11, relay 12	42006	42106
	relay 13, relay 14	42007	42107
	relay 15, relay 16	42008	42109
	input 1, input 2	42009	42109
	input 3, input 4	42010	42110
	input 5, input 6	42012	42112
	input 7, input 8	42013	42113
Relay Control	All 16 Relays	42011	42111

TABLE 19. MODLON REGISTER MAPPING INFORMATION − TEMPLATE 5 (TP/XF-78 MAPPING) CONTROLS COMMUNICATION MODULE

Structure	Data Point	ModBus Register					Scaling		
		CCM[0]	CCM[1]	CCM[2]	CCM[3]	CCM[4]	Multiplier	Offset	Units
Node Status	inputs 1..16	40001	40101	40201	40301	40401			
	inputs 17..32	40002	40102	40202	40302	40402			
	relay 1, relay 2	40003	40103	40203	40303	40403			
	relay 3, relay 4	40004	40104	40204	40304	40404			
AC Data (Load)	volts_a	40005	40105	40205	40305	40405			VAC
	volts_b	40006	40106	40206	40306	40406			VAC
	volts_c	40007	40107	40207	40307	40407			VAC
	freq	40008	40108	40208	40308	40408	0.1		Hz
	amps_a	40009	40109	40209	40309	40409			A
	amps_b	40010	40110	40210	40310	40410			A
	amps_c	40011	40111	40211	40311	40411			A
	percent_amps_a	40012	40112	40212	40312	40412	0.5		%
	percent_amps_b	40013	40113	40213	40313	40413	0.5		%
	percent_amps_c	40014	40114	40214	40314	40414	0.5		%
	total_pf	40015	40115	40215	40315	40415	0.00005		
	total_kw	40016	40116	40216	40316	40416			kW
	percent_kw	40017	40117	40217	40317	40417	0.005		%
	total_kvar	40018	40118	40218	40318	40418			kVAR
	total_mwh	40019	40119	40219	40319	40419			MWh
Engine Data (Genset Only)	Coolant temp	40020	40120	40220	40320	40420	0.1		Deg Kelvin
	Oil temp	40021	40121	40221	40321	40421	0.1		Deg Kelvin
	Misc temp1 (See Note 4)	40022	40122	40222	40322	40422	0.1		Deg Kelvin
	oil_press	40023	40123	40223	40323	40423	0.1		KPA
	battery_volts	40026	40126	40226	40326	40426	0.1		VDC
Spare Analog	spare2	40024	40124	40224	40324	40424	0.1		User-Defined
Relay Control	Control1	40027	40127	40227	40327	40427			
	Control2	40028	40128	40228	40328	40428			
							Data = Multiplier x (Register + Offset)		

NOTES:

1. For the Data Points Engine Runtime, the Total kwh and Total Fuel for the two registers designated as high and low are put together as an unsigned double integer. This is accomplished by multiplying the value in the high register by 65536 and adding it to the value in the low register. Most software packages automatically perform this calculation if the value is simply identified as an unsigned double integer.
2. Value not supported in the 3200 controller.
3. Value not supported in the 3100 controller.
4. Value not supported.
5. With 3100 and 2100 controllers, the units are hours. With the 3200 controller, the units are seconds. The multiplier is always 0.1. For all 3100 controllers, the values given are based on using EEPROM firmware, version 2.0 or greater. The values for Engine Runtime and Total kwh are not available on QST-30 gensets.