



Model 10C

MODEL 10 FACILITIES MODULE (FM)



Operator's Installation and Instruction Manual

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1.0 Description

The Detcon Model 10 Facilities Module is designed to be used primarily for gathering data from multiple Model 10 series Single Sensor Control Modules (SSC Modules). With the data from a group of sensors being made available through the Facilities Module, a Modbus™ Master (Host) need only communicate with the FM in order to retrieve the data from the group of sensors. Another important function of the FM is to provide a final output for alarms, to represent the alarms for the whole group. These alarms are provided as output through the relays on the FM module.

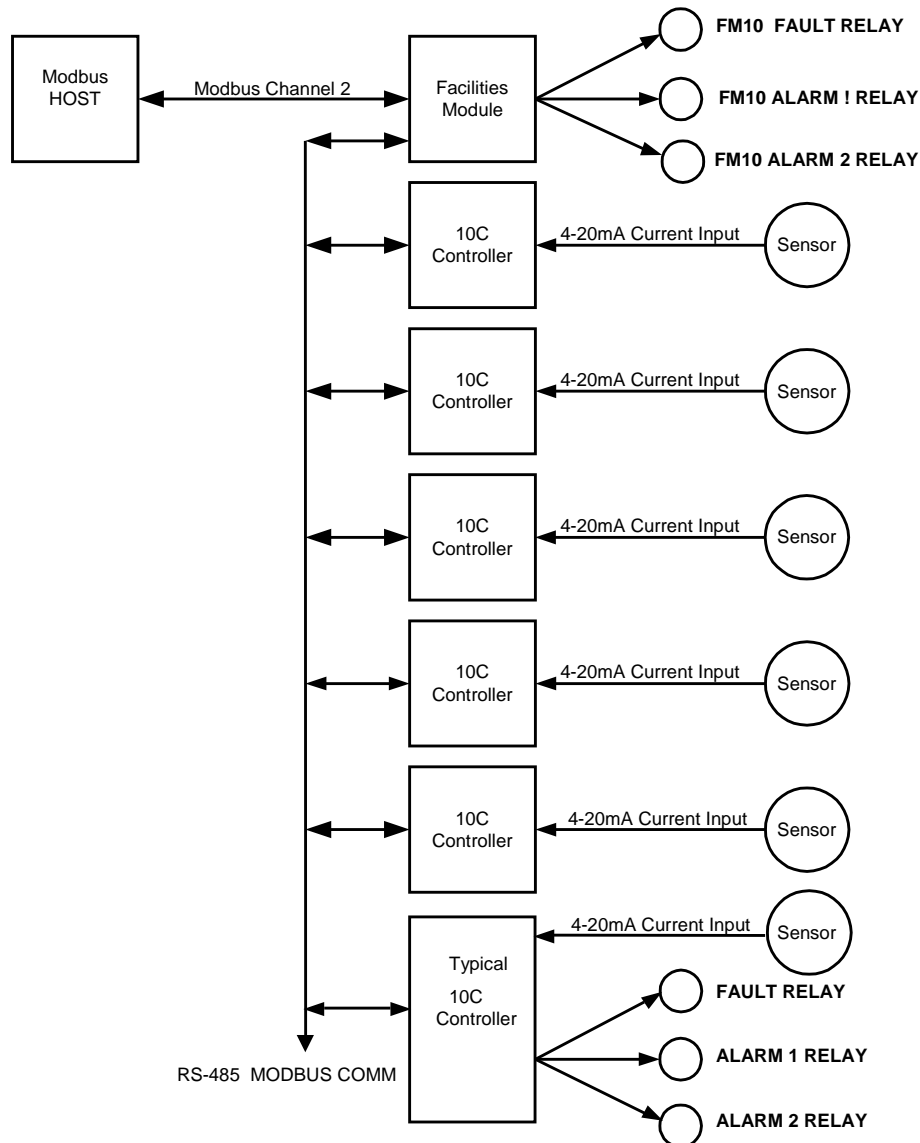


Figure 1 System Application Diagram

Error! Reference source not found. System Application Diagram exemplifies how the Facilities Module is used to connect to a group of SSC Modules. The FM communicates with the SSC Modules via RS-485 Modbus™ that runs through the motherboard (or Backplane). The FM is limited to polling 32 Modbus™ devices and so a maximum installation might appear as: the FM board seated in the first slot of one card rack with the rest of the slots occupied by 15 SSC Modules with the Modbus™ jumped to a second card rack filled with 16 SSC Modules.

The Facilities Module utilizes a second RS485 port (Modbus™ Channel 2) for the purpose of interfacing to a Modbus™ Master (or Host). Since analog inputs and outputs are not used on the Facilities Module, the analog signal terminations on the backplane or motherboard of the FM slot are utilized by the FM for RS485 communication with the Host. The Motherboard (or Backplane) terminal labeled “SENSOR MA” is used for the RS485+ signal (or “A” signal) and the terminal labeled “4-20 OUT +” is used for the RS485- signal (or “B” signal), these being the two signal wires needed for RS485 communication with the Modbus™ Master (Host).

1.1 Front Panel/Operator Interface

The default state of the 4 character display is called “Normal Operation” and displays the Facilities Module’s Modbus™ Address on serial channel 2. The display on the front panel is also used to view and modify the configuration settings of the Facilities Module and to view the status of communications between the FM and SSC modules. The user can quickly see if a prevailing Fault alarm is due to communications faults with any one or more SSC Modules through this display. The FM’s display does not allow the user to see individual SSC Module data; for that information, the user should go to the specific SSC Module and access the data directly from the respective module.

Three LED’s on the front panel provide visual indication of alarm and fault conditions. These LED’s are labeled “ALM 1”, “ALM 2”, and “FAULT”.

Pushbuttons located on the Front Panel provide access to view and set parameters within the Facilities Module and to provide “Alarm Reset”, “Alarm Silence”, “Communication Faults” and Program Status” functions. The pushbuttons also allow navigation through an interactive menu to access programming of the Facilities Module’s configuration. The interactive menu allows the user to set parameters associated with the number of SSC Modules to be polled, Alarm settings, and the FM’s Channel 2 Modbus™ ID. Navigation through the menu system is accomplished by use of the Front Panel Pushbuttons: the Enter key “ENT”, the Escape key “ESC”, the Up key “↑” (or “RESET”), and the Down key “↓” (or “SLNC”).

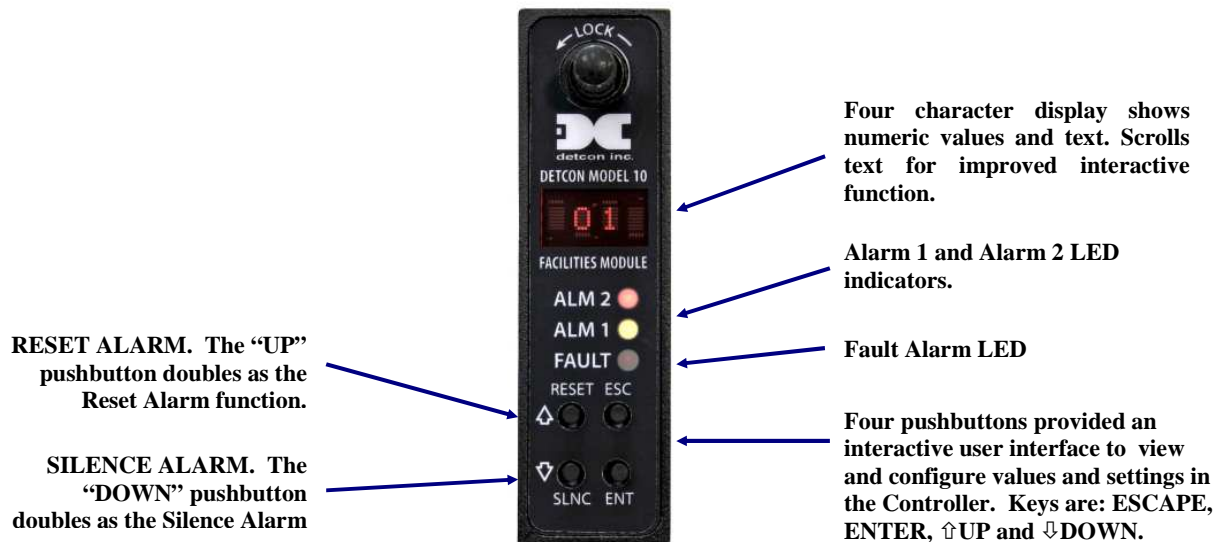


Figure 2 Front Panel Face Plate

1.2 Alarm Functions

There are three types of alarms utilized by the Model 10 series SSC Modules and the Facilities Module. These alarms are Alarm 1, Alarm 2 and Fault. The alarm configurations for each SSC Module are individually set via the SSC module and are not covered here. Instructions for settings of the Mod10 SSC Module Alarms are in the Instruction Manual for the SSC Modules.

The Facilities Module utilizes its own Alarm configurations. The SSC Module settings are not monitored by and cannot be changed by the Facilities Module. The FM simply monitors the state of Alarms 1, 2, and Fault of each SSC Module, and when an alarm occurs the Facilities Module echoes that alarm condition by illuminating the appropriate Alarm LED on the front panel and initiating the appropriate relay function according to the programmed parameters for that alarm.

Alarm configurations for the Facilities Module can be programmed as Latching or Non-Latching, Energized or De-Energized, and Silenceable or Non-Silenceable operation. Any combination of these settings can be programmed to provide a setup for most any contingency. Prior planning is needed to determine the best configuration for the application.

1.2.1 Latching or Non-Latching Relays

Alarm 1, Alarm 2, and Fault, can be programmed as Latching or Non-latching. If an alarm is programmed as Latching, its corresponding relay and LED Indicator, once activated, will stay activate until reset, even if the alarm report from the SSC Module “clears”. If an alarm is programmed as Non-Latching, the alarm will return to the inactive state once the alarm report from the SSC Module “clears”.

A “RESET” pushbutton on the front of the 10C Control Module allows the alarms to be reset if the alarms are set as Latched. In response to the front panel reset switch, the display will scroll the text: “**Reset Alarms?**” If the “ENT” pushbutton is pressed the alarms will be cleared, and the display will scroll the text: “**Reset DONE**”.

An external momentary reset switch may be wired to the backplane of the control unit. The external reset does not have an acknowledge feature, and when the Control Module senses that the external reset, the 10C Control Module will reset the alarms and the display will scroll the text: “**Ext Alm Rst**”.

1.2.2 Energized or Non-Energized Relays

All alarm relays (Alarm 1, Alarm 2, and Fault) can be programmed as normally Energized or De-Energized. The standard setting for alarms is De-energized; however, a relay can be programmed as Energized to provide application specific features. For De-Energized relays, the coil will energize in an alarm state so that a N.O. (Normally Open) contact on the relay will close upon an alarm. For Normally Energized relays, the coil will de-energize in an alarm state.

The advantage of a Normally Energized relay coil is that if power is lost, the normally closed contact having been held open by the energized coil, will close. Therefore, loss of power or an unplugged card is distinguishable from lack of alarm. A typical application of an Energized relay could be the use of the Fault Relay in a Fail-Safe Fault Circuit. The loss of functionality or other fault of the Controller would cause the coil to De-Energize, thus creating a Fault output to annunciators or other equipment. For instance: if power is lost to the Facilities Module, or if the Facilities module is unplugged from the live controller.

1.2.3 Silenceable or Non-Silenceable (Alarm Acknowledge)

The terminology “to acknowledge an alarm” is synonymous with the terminology “to silence an alarm”. All Alarms (Alarm1, Alarm 2, and Fault) can be programmed as Silenceable or Non-Silenceable. When an alarm is programmed as Silenceable, the setting allows the alarm(s) to be silenced even during an alarm condition. To silence an alarm the Facilities Module’s alarm must be programmed as Silenceable.

When an alarm occurs, the alarm can be silenced by pressing the “SLNC” pushbutton. When the “SLNC” pushbutton is pressed during an alarm the display will scroll the text: “**Silence Alarms?**” Pressing the “ENT” pushbutton will silence the alarms, and the display will scroll the text: “**Silence DONE**”.

An example where this feature might be used is a Strobe connected to Alarm 1 and a Horn connected to Alarm 2. If Alarm 1 is set as Non-silencable, and Alarm 2 is set as Silenceable, in the event of an alarm where both the Strobe and Horn were activated, the Horn could be silenced while the Strobe would remain activated. The silenced state is reset if and when the alarm condition clears and then exceeds alarm set-point again. The Horn would be reactivated upon the return of the alarm condition.

The “Remote Reset” signal that resets latched alarms also functions as a signal to silence active Silenceable Alarms.

NOTE: There is a minimum alarm time before acknowledge. When a silenceable alarm triggers, a minimum-time timer starts. A silenceable alarm cannot be silenced until this timer has run out. This guarantees that the alarm has a minimum activity time.

1.2.4 Alarm Reset

An alarm “RESET” pushbutton is located on the front panel of the Facilities Module. This switch is used to reset alarms that have been programmed as latching. Once alarm conditions clear, alarms that have been set as latching can be reset by use of this switch. . If an alarm is set as latching, and the alarm condition has passed, pressing the “RESET” pushbutton will cause the display to scroll the text: “**Reset Alarms?**” Pressing the “ENT” pushbutton will reset the alarms and the display will scroll the text: “**Reset DONE**”.

An externally mounted Normally-Open Momentary Switch may be wired to the backplane of the control unit as a ‘Remote Reset’ Switch. The external reset switch performs the same function as the “RESET” pushbutton, but does not have an acknowledge feature. When the Facilities Module senses that the external reset signal is activated, the FM will reset the alarms and the display will scroll the text: “**Ext Alm Rst**”.

1.3 Fault Circuit Functions

The Facilities Module Fault relay output is, as are the FM Alarm relay outputs, independent of the individual SSC Module alarm outputs. The FM Module monitors the SSC Module Fault Status and when a Fault is generated from any SSC Module that fault is echoed by the FM Module. Modbus™ Communications between the Facilities Module and each SSC Module is also monitored by the Facilities Module, and must be valid or a Communications Fault will result. When a communication fault or an SSC Module fault is detected the FM will illuminate the Fault LED and initiate ‘Fault’ may be programmed as latching or non-latching, energized or de-energized, and silenceable or non-silenceable operation.

When Communication Fault occurs, the FM will generate a list of the modules that are not communicating with the FM. This list can be viewed by pressing the “ESC” pushbutton momentarily. The FM will display a list of the SSC modules that are not communicating, if any. This display will scroll “**Comm Faults:**” followed either by the word “**None**” or by a list of SSC Modules ID numbers (Modbus™ address), in Hexadecimal, one

at a time, for each non-reporting SSC Module. The end of the list is indicated by “*****” on the display before it returns to showing the Modbus™ Address of the Facilities Module.

1.4 RS-485 Modbus™ to Host

The Modbus™ Register assignment available to the Modbus™ Master (Host) communicating with the Facilities Module on serial channel 2 is provided below. The first 64 registers provide the concentration reading and current status of each SSC Module (Slave) connected to the FM (refer to Table 1). The Host can read the whole group of data by polling the Facilities Module and reading registers 40000 through 40063.

Table 1 Modbus™ Register Assignment

Register	FC	Name	Description
40000	3	Concentration	Slave 1: Concentration and Status
40001		Status bits	(Fault, Alarm 1, Alarm 2 status)
40002	3	Concentration	Slave 2: Concentration and Status
40003		Status bits	(Fault, Alarm 1, Alarm 2 status)
40004	3	Concentration	Slave 3: Concentration and Status
40005		Status bits	(Fault, Alarm 1, Alarm 2 status)
40006	3	Concentration	Slave 4: Concentration and Status
40007		Status bits	(Fault, Alarm 1, Alarm 2 status)
40008	3	Concentration	Slave 5: Concentration and Status
40009		Status bits	(Fault, Alarm 1, Alarm 2 status)
40010	3	Concentration	Slave 6: Concentration and Status
40011		Status bits	(Fault, Alarm 1, Alarm 2 status)
40012	3	Concentration	Slave 7: Concentration and Status
40013		Status bits	(Fault, Alarm 1, Alarm 2 status)
40014	3	Concentration	Slave 8: Concentration and Status
40015		Status bits	(Fault, Alarm 1, Alarm 2 status)
40016	3	Concentration	Slave 9: Concentration and Status
40017		Status bits	(Fault, Alarm 1, Alarm 2 status)
40018	3	Concentration	Slave 10: Concentration and Status
40019		Status bits	(Fault, Alarm 1, Alarm 2 status)
40020	3	Concentration	Slave 11: Concentration and Status
40021		Status bits	(Fault, Alarm 1, Alarm 2 status)
40022	3	Concentration	Slave 12: Concentration and Status
40023		Status bits	(Fault, Alarm 1, Alarm 2 status)
40024	3	Concentration	Slave 13: Concentration and Status
40025		Status bits	(Fault, Alarm 1, Alarm 2 status)
40026	3	Concentration	Slave 14: Concentration and Status
40027		Status bits	(Fault, Alarm 1, Alarm 2 status)
40028	3	Concentration	Slave 15: Concentration and Status
40029		Status bits	(Fault, Alarm 1, Alarm 2 status)
40030	3	Concentration	Slave 16: Concentration and Status
40031		Status bits	(Fault, Alarm 1, Alarm 2 status)
40032	3	Concentration	Slave 17: Concentration and Status
40033		Status bits	(Fault, Alarm 1, Alarm 2 status)
40034	3	Concentration	Slave 18: Concentration and Status
40035		Status bits	(Fault, Alarm 1, Alarm 2 status)
40036	3	Concentration	Slave 19: Concentration and Status
40037		Status bits	(Fault, Alarm 1, Alarm 2 status)
40038	3	Concentration	Slave 20: Concentration and Status
40039		Status bits	(Fault, Alarm 1, Alarm 2 status)

Register	FC	Name	Description
40040 40041	3	Concentration Status bits	Slave 21: Concentration and Status (Fault, Alarm 1, Alarm 2 status)
40042 40043	3	Concentration Status bits	Slave 22: Concentration and Status (Fault, Alarm 1, Alarm 2 status)
40044 40045	3	Concentration Status bits	Slave 23: Concentration and Status (Fault, Alarm 1, Alarm 2 status)
40046 40047	3	Concentration Status bits	Slave 24: Concentration and Status (Fault, Alarm 1, Alarm 2 status)
40048 40049	3	Concentration Status bits	Slave 25: Concentration and Status (Fault, Alarm 1, Alarm 2 status)
40050 40051	3	Concentration Status bits	Slave 26: Concentration and Status (Fault, Alarm 1, Alarm 2 status)
40052 40053	3	Concentration Status bits	Slave 27: Concentration and Status (Fault, Alarm 1, Alarm 2 status)
40054 40055	3	Concentration Status bits	Slave 28: Concentration and Status (Fault, Alarm 1, Alarm 2 status)
40056 40057	3	Concentration Status bits	Slave 29: Concentration and Status (Fault, Alarm 1, Alarm 2 status)
40058 40059	3	Concentration Status bits	Slave 30: Concentration and Status (Fault, Alarm 1, Alarm 2 status)
40060 40061	3	Concentration Status bits	Slave 31: Concentration and Status (Fault, Alarm 1, Alarm 2 status)
40062 40063	3	Concentration Status bits	Slave 32: Concentration and Status (Fault, Alarm 1, Alarm 2 status)

Register 41001 contains the number of SSC Modules connected to the Facilities Module. The Modbus™ Master (Host) should obtain the Number of SSC Module ‘Slaves’ from register 41001 so that it only polls registers up to the last ‘Slave’ SSC Module in the FM’s group.

In large configurations, to get the best reporting time at the expense of more complex programming in the Host, the FM offers a Report by Exception (RBE) scheme. The RBE scheme does not have to be implemented or it can be implemented at a couple of complexity levels. The least complex RBE scheme is to poll Change of Status (COS) registers 41002 and 41003 and only poll registers at 40000 if the COS registers indicate a change, and then poll for all the 40000 data registers required. Then write zero to the COS registers.

A more complex RBE scheme is to only poll the registers in response to Change of Status (COS) bit indications that have changed. Then reset the COS bits by writing a ‘1’ to the bit positions that have the COS bit set.

This method reduces the Modbus™ traffic between the Host and a Facilities Module to be only a request for Change of Status (COS) registers and occasional read and acknowledge of changed data values. It is important that the Deadband value is set reasonably. If set to 1, any change in concentration will register a COS bit =1. If set to 3, the concentration will have to change by 3 counts to cause a COS bit = 1.

Table 2 Extended Register Assignment

41001	3	Number Of Slaves	Read the number of Mod10 SSC Module Slaves (0 – 32) (set through Operator Interface)
41002	3/6	COS Word 1-16	Read Change of State on first 16 slaves. Acknowledge COS on first 16 slaves.
41003	3/6	COS Word 17-32	Change of State on next 16 slaves. Acknowledge COS on next 16 slaves

41004	3/6	Global Deadband	Concentration change from Last Reported Value for COS, global for all 32 slaves.
41005	3	Local Alarm/Fault Status	The FM produces a Logical-OR of the alarm/fault status of each slave for the FM relays and annunciators except from those in Test Mode.

REGISTER 41005 STATUS BITS							
15	14	13	12	11	10	9	8
N/U	N/U	N/U	N/U	N/U	N/U	N/U	N/U
7	6	5	4	3	2	1	0
N/U	A2=Latchg	Alarm2	N/U	A1=Latchg	Alarm1	F=Latchg	Fault

1.5 Normal Operation

The default state of the 4 character display is called “Normal Operation” and consists only of indicating the Facilities Module’s Modbus™ Address on serial channel 2. Modbus™ Channel 2 is used for communication with the Modbus™ Master (Host).

1.6 Communication Faults

Prompted by a momentary press of the ESC pushbutton, the FM will display which SSC modules are not communicating, if any. This display will show “**Comm Faults:**” followed either by the word “**None**” or by a list of SSD Modules ID numbers in Hexadecimal, one at a time, for each non-reporting SSC Module. The end of the list is indicated by “****” on the display before it returns to showing the Modbus™ Address of the Facilities Module.

1.7 Program Status

While in Normal Operation, the ability to view the configuration or “Program Status” is available to the operator. To view the Program Status, momentarily press the “ENT” pushbutton, the display will scroll “**PR STATUS**”. To view the Program Status press the “ENT” pushbutton again. Upon entering the Program Status the Lamp Test function will light up all display light elements, the Facilities Module will then display the current settings of each of the configuration parameters starting with the Number of Sensors:

```

Number of Sensors=X
Alarm 1
  LT= 0/1
  EN=0/1
  SL=0/1
Alarm 2
  LT= 0/1
  EN=0/1
  SL=0/1
Fault
  LT= 0/1
  EN=0/1
  SL=0/1
Modbus™ Address = 01 – FF
F/W Version  Vx.xx
Checksum CS=xxxx
Code Top  CT=xxxx
  
```

2.0 Program Mode

Program Mode is only accessible with the “ACCESS/NORM” Switch (SW1) in the “ACCESS” position. With the switch in the “NORM” position, only the Program Status and the Comm Faults Functions are available, and only the reading of configuration values is possible. The “ACCESS/NORM” switch is located in the lower left-hand corner on the PCA just behind the faceplate (refer to Figure 3), and can be accessed by removing the PCA from the card rack.

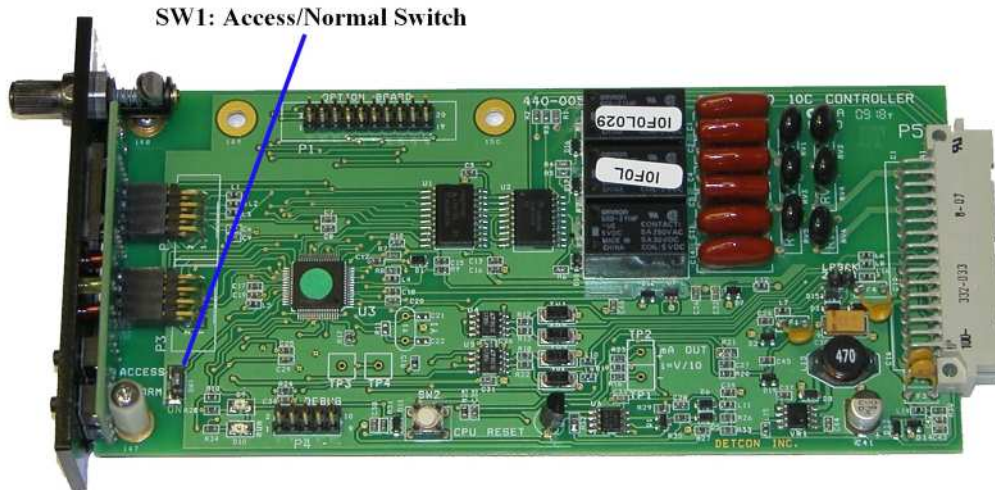


Figure 3 Access Switch Location

From Normal Operation, with the “ACCESS/NORM” Switch (SW1) in the “ACCESS” position, pressing the “ENT” pushbutton and holding it for about three seconds will enter Program Mode. The display will scroll the first item in the list of programmable items: “**NUM SENSOR SET**”. Navigation through the Program Mode is achieved through use of the ENT pushbutton, the ESC pushbutton, and the “↑” (UP) and “↓” (DOWN) pushbuttons. When the selected menu item is reached, the “ENT” pushbutton is used to enter the selected menu item. The Programming Mode allows the setting of multiple parameters within the Module:

- NUM SENSOR SET
- ALM 1 SET
 - LT=X
 - EN=X
 - SL=X
- ALM 2 SET
 - LT=X
 - EN=X
 - SL=X
- FAULT SET
 - LT=X
 - EN=X
 - SL=X
- MODBUS SET

The Facilities Module settings are saved in non-volatile flash memory. The default value of each parameter is set to the following values.

Number of Sensors = 1

Alarm 1, Alarm2	=	Non-Latching, Non-Silenceable, Non-Energized
Fault	=	Non-Latching, Non-Silenceable, Energized
Modbus ID	=	01
Channel 1 Settings	=	9600 Baud, 8, N, 1 (not adjustable)
Channel 2 Settings	=	9600 Baud, 8, N, 1 (not adjustable)

2.1 Set Number of Single Sensor Control Modules

The display scrolls “NUM SENSOR SET” to indicate it is ready to show or change the setting. Press ENT again and the display will flash a number indicating a value between 01 and 32. The flashing indicates the value can be changed using the “↑” UP and “↓” DOWN pushbuttons. Using the “↑” and “↓” pushbuttons, a value can be set between 1 and 32. If the “ESC” pushbutton is pressed or if too much time goes by before pressing the “ENT” pushbutton, the value is not changed. To change the value, the “ENT” pushbutton must be pressed while the value is flashing.

The Number of Sensors should be equal to the number of Single Sensor Control Modules to be scanned by the Facilities Module. The FM polls the Slave SSC modules from 01 up to Number of Sensors in ascending order and any SSC Module that does not properly respond will cause a Fault indication on the FM. The individual Modbus™ Address of each SSC Module must be uniquely set within this range of numbers. No Modbus™ address should be skipped, as this will result in a ‘Communication Fault’

After setting the number of single sensors parameter, another Program Mode Menu item can be selected by use of the “↑” and “↓” pushbuttons, or use of the “ESC” pushbutton to leave Program Mode.

NOTE: Pushbutton inactivity of 15 seconds during any part of the above procedure will cause the displayed function to time out and return the controller to Normal Operation.

2.2 Alarm 1, 2 and Fault Set

Alarm 1 Set, Alarm 2 Set, and Fault Set are used to set the configuration parameters that will dictate the behavior of Alarm 1, Alarm 2, and Fault, respectively. Setting the configuration of Alarm 1, Alarm 2, and Fault are the same. The menu item appears as: “ALARM 1 SET”, “ALARM 2 SET”, or “FAULT SET”, depending upon which function is chosen.

From the “ALARM 1 SET”, “ALARM 2 SET” or “FAULT SET” display, use the “ENT” pushbutton to enter the function. Upon entering the function the choices of Latching, Energized, and Silenceable may be selected and with use of the arrow keys, the selection may be changed. The “ESC” pushbutton may be used to go back or abort and the “ENT” key is used to accept the flashing selection so that it is the new set value.

2.2.1 Latching / Non-Latching

The flashing display shows the currently set value of the Latching / Non-latching parameter. I.E. as “LT=0” for Non-Latching, and “LT=1” for Latching. Use the “↑” and “↓” pushbuttons to change the parameter, followed by the “ENT” pushbutton to accept the value. The display will stop flashing to signify the excepted value. Pressing the “ENT” pushbutton again will move to the next parameter in the list.

2.2.2 Energized / Non Energized

The alarm relay coil can be set as energized or non-energized in a no alarm condition. The flashing display will show the currently set value of the Energized / Non-energized parameter. I.E. “EN=0” for Non-energized, and “EN=1” for Energized. Use the “↑” and “↓” pushbuttons to change the parameter, followed by the

“ENT” pushbutton to accept the value. The display will stop flashing to signify the expected value. Pressing the “ENT” pushbutton again will move to the next parameter in the list.

2.2.3 Silenceable / Non-Silenceable

The flashing display will show the currently set value of the Silenceable / Non-silenceable Alarm parameter. I.E. “SL=0” for Non-silenceable, and “SL=1” for Silenceable. Use the “↑” and “↓” pushbuttons to change the parameter, followed by the “ENT” pushbutton to accept the value. The display will stop flashing to signify the expected value. Pressing the “ENT” pushbutton again will return to the appropriate “ALARM 1 SET”, “ALARM 2 SET”, or “FAULT SET” scrolling display.

After setting the alarm/Fault configuration parameters, another Program Mode Menu item can be selected by use of the “↑” and “↓” pushbuttons, or use of the “ESC” pushbutton to leave Program Mode.

NOTE: Pushbutton inactivity of 15 seconds during any part of the above procedure will cause the displayed function to time out and return the controller to Normal Operation.

2.3 Modbus™ Address Set

The Modbus™ Master communicates with the Facilities Module on serial channel 2 for which the FM needs to have assigned an RTU ID or Modbus™ Address. The display shows “MODBUS SET” for this item. If the “ENT” pushbutton is pressed, the display shows the current Modbus™ Address (IE: “_01_”). The current value will flash to indicate it may be changed. To change the value use the “↑” and “↓” pushbuttons followed by pressing the “ENT” pushbutton to accept the new value. Notice that the Modbus™ address is displayed in Hexadecimal format. For instance, address 15 in base 10 is indicated with “_0F_” in the display. The “ESC” pushbutton can be used to escape, backup, or abort, or with no further action the display will timeout.

The “↑” and “↓” pushbuttons can be used to move to another menu item, or the “ESC” pushbutton can be used to leave Program Mode.

NOTE: Pushbutton inactivity of 15 seconds during any part of the above procedure will cause the displayed function to time out and return the controller to Normal Operation.

3.0 Model 10 Facilities Module Connections

The Facilities Module utilizes 2 Modbus™ RS-485 channels. RS-485 Channel 1 is used by the Facilities Module to communicate to Modbus™ Slave devices: Model 10 Single Sensor Control Modules (SSC Modules). RS-485 Channel 2 is used by the Facilities Module for communication with the Modbus™ Master (Host), on which the FM is a Modbus™ Slave device.

When installing the Facilities Module in the 10 series controller it will be necessary to connect RS-485 Channel 2 to the Modbus™ Master (Host) for communication. To accomplish this, the RS-485 communications cable must be connected to the correct terminals on the Motherboard (or Backplane). Since analog inputs and outputs are not used on the Facilities Module, the analog signal terminations on the Motherboard (or Backplane) of the FM slot are utilized for RS485 communication with the Host. The Motherboard (or Backplane) terminal labeled “SENSOR MA” is used for the RS-485+ signal (or “A” signal) and the terminal labeled “4-20 OUT +” is used for the RS-485- signal (or “B” signal), these connections provide the two signals required for RS485 communication with the Modbus™ Master (Host).

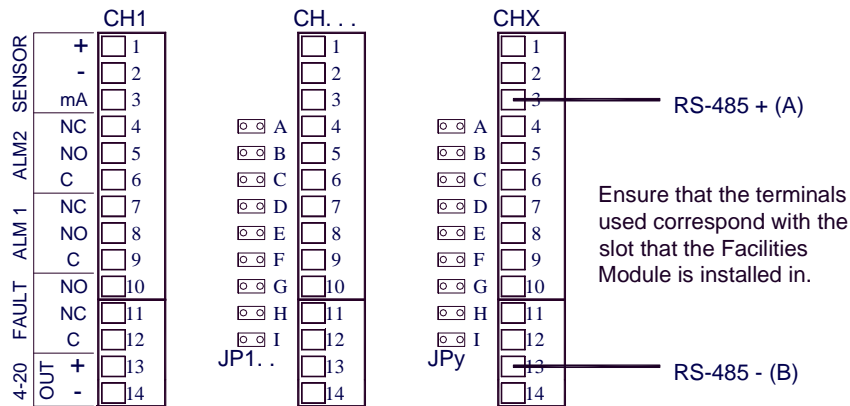


Figure 4 Modbus™ Channel 2 Connections NEMA 4 Motherboards

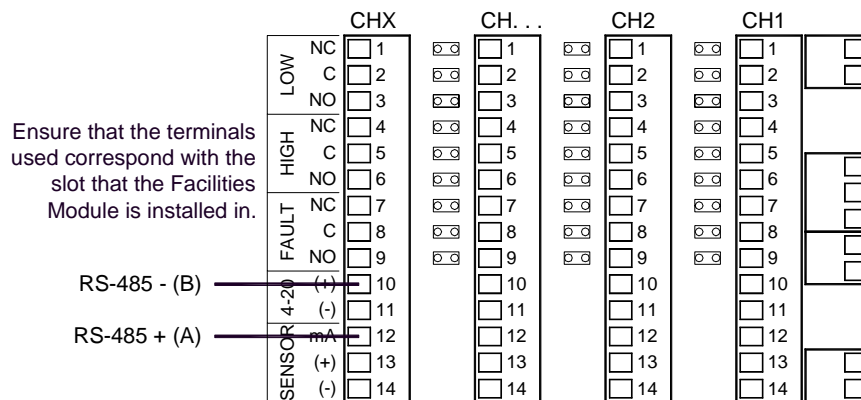


Figure 5 Modbus™ Channel 2 connections Rack Mount Backplanes

4.0 Specifications

Input Power	9VDC to 28VDC, 100mA maximum (TBD)
Operating Temperature	-40deg to +70degC
Humidity:	10 to 95% Non-condensing
Inputs/Outputs:	Channel 1 Serial Communications RS485 Modbus™ Channel 2 Serial Communications RS485 Modbus™
Relays	
Relay Contact Terminations:	Common, Normally Open, and Normally Closed Three Relays on board
Relay Contact	Specification per Manufacturer:
Resistive Load:	5A, 250VAC; 2A, 30VDC
Inductive Load:	2A, 250VAC; 2A, 30VDC
Maximum Operating Current:	5A
Alarm/Fault Alarm Timing:	Alarms are reported to relays and LED annunciators as soon as they appear over Modbus™ from the Slave SSCs. Report time for all Mod10C SSC Module slaves is about 32 Slaves per second.
Warranty:	One year. Five year fixed fee service policy.

5.0 Warranty and Service Policy

Detcon, Inc., as manufacturer, warrants each new Model 10 Facilities Module FM10 be free from defects in material and workmanship under intended normal use for a period of one year from date of shipment to the original purchaser. Detcon, Inc., additionally provides for a fixed fee repair/replace service policy which covers FM10 module for a period of five years. The fixed fee service policy shall affect any necessary factory repair for the period following the one-year warranty period and shall end five years after expiration of the warranty. The fixed policy rate is \$75.00 per control module, per transaction, during the period of the policy. The policy is FOB Detcon, Inc., The Woodlands, Texas.

6.0 Appendix

6.1 Hexadecimal Table

Table 3 Hexadecimal Conversion Table

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

6.2 Revision History

Revision	Date	Changes made	Approval
0.0	05/15/10	Original Release.	LU
1.0	07/04/15	Corrections and Updates	LU

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