



FCM II (Flow Control Module)



Installation Guide

Part # 2307

April 26, 2013

EC Declaration Of Conformity (Valid until April 20, 2016)

The signatory, representing the manufacturer, declares that the products listed below are in conformity with the essential requirements of the following EC Directive(s) when installed in accordance with the product installation instructions:

2004/22/EC	The Measuring Instruments Directive (and its amending directives)
2004/108/EC	The Electromagnetic Compatibility Directive (and its amending directives)
2006/95/EC	The Low Voltage Directive (and its amending directives)

Product: Distributed I/O Control System

Model name/number: FCM II

Notified Body(ies)

NMi Certin B.V., Number 0122
Hugo de Grootplein 1
3314 EG Dordrecht
The Netherlands

Conformity has been demonstrated with reference to the following documentation:

(MID) EC type-examination certificate TC7311

Compliance with the Essential Health and Safety Requirements has been assessed by reference to the following standards:

WELMEC guide 8.8	General and Administrative Aspects of the Voluntary System of Modular Evaluation of Measuring instruments under MID
OIML R117-1:2007(E)	Dynamic measuring systems for liquids other than water
EN 61000-6-4: 2007	Generic emissions for industrial operating environments
EN 61000-6-2: 2005	Generic immunity for industrial operating environments
IEC 61010-1: 2004	Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements

Year of CE Marking: 2007

Name: William J. Porthouse

Position: Director of Engineering & Production

Date: 31-Oct-2012

EC Declaration Of Conformity

The signatory, representing the manufacturer, declares that the products listed below are in conformity with the essential requirements of the following EC Directive(s) when installed in accordance with the product installation instructions:

2014/32/EU	The Measuring Instruments Directive (and its amending directives)
2014/30/EU	The Electromagnetic Compatibility Directive (and its amending directives)
2014/35/EU	The Low Voltage Directive (and its amending directives)

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Year of CE Marking: 2007

Name: William J. Porthouse

Position: Director of Engineering & Production

Date: 19-April-2016

ELECTRICAL CONSIDERATIONS AND REGULATORY REQUIREMENTS



Equipment Operation. If the equipment is used in a manner not specified in this installation guide, the protection provided by the equipment may be impaired..



This equipment is suitable for use in Class I, Division 2, Groups C and D hazardous locations OR non-hazardous locations only.



WARNING: EXPLOSION HAZARD, Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous.



WARNING: EXPLOSION HAZARD, Substitution of components may impair suitability for use in Class I, Division 2 environments.



WARNING: EXPLOSION HAZARD, The area must be known to be non-hazardous before servicing/replacing the unit and before installing.



CAUTION: Use supply wires suitable for 5°C above surrounding ambient.

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CHAPTER 1 GENERAL

1.1 WHO SHOULD USE THIS GUIDE

This guide is intended for individuals installing FCM II panels, engineering firms fabricating FCM II panels, and users troubleshooting system operation such as managers, system administrators, technicians, and meter proving personnel.

1.2 INFORMATION ALERTS:

	Important information to enhance understanding and make better use of the product.
	Indicates potential damage to hardware or loss of data.
	Potential for property damage or that personal injury may occur. Pay close attention and follow instructions when you see this symbol.

1.3 RECEIVING AND/OR RETURNING EQUIPMENT:

The FCM II should be immediately inspected after opening the packaging case. If any damage is visible notify the carrier at once to establish liability. Contact Toptech Account Management to initiate timely repair or replacement of the unit.

Account Management will issue a Return Materials Authorization (RMA) to return the product or parts requiring repair. Do not return any material to Toptech without an RMA.

Account Management contact information:

Account Management
Toptech Systems
1124 Florida central Pkwy
Longwood, FL
(407) 332-1774

1.4 OPERATING CHARACTERISTICS:

FCM II is available in six varieties (see Figures 1.1 and 1.2 below). This modular construction simplifies the process of FCM mapping to field devices by appropriating each FCM II model with just the right amount of I/O for its designated purpose. In addition, FCM IIs are DIN rail (35mm) mountable and require no wiring between units; 24Vdc and serial communications are bussed. This substantially simplifies installation and wiring.

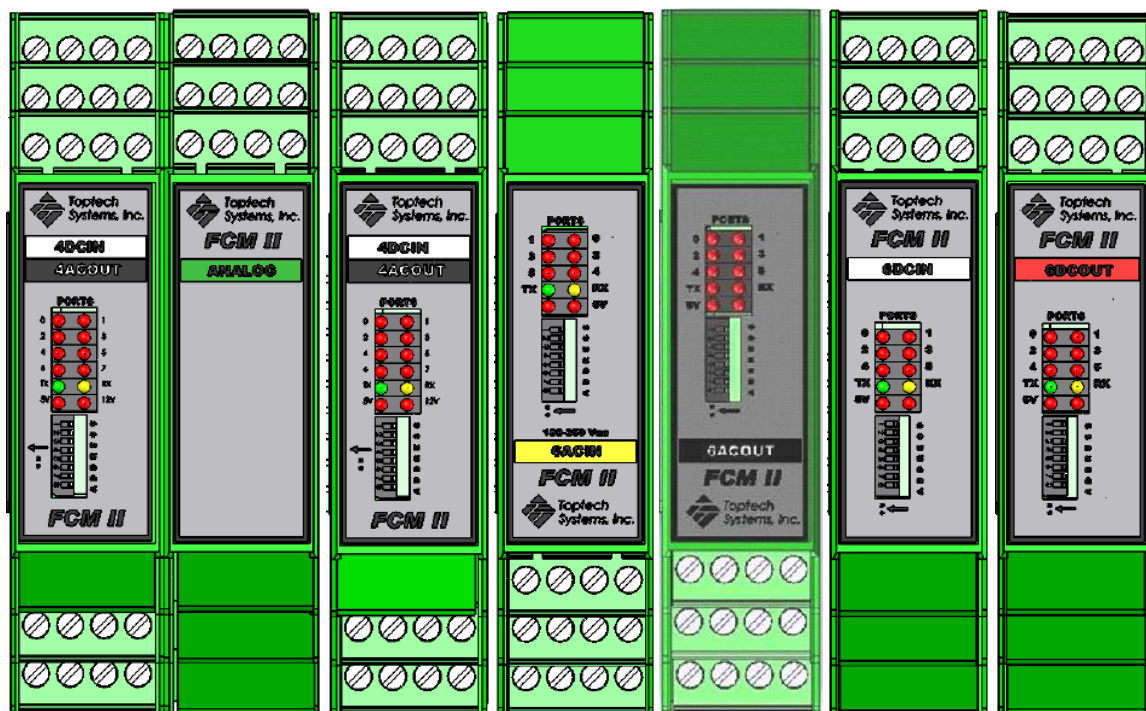


Figure 1.1 FCM II Module Comparison

1.4.1 ELECTRICAL RATINGS:

Module	Supply Voltage	Electrical Ratings		
		Auxiliary Power Supply	Outputs	Inputs
FCM II 4DC IN/ 4AC OUT	Min. 19 Vdc Max. 36 Vdc 100mA Max	12 Vdc 167 mA Max	250 Vac 350 mA max. 6K Cycles, Pilot Duty	30 Vdc SELV Limited Energy
FCM II Analog	Min. 19 Vdc Max. 36 Vdc 100mA Max	--	4-20 mA SELV Limited Energy	RTD, 4-20 mA SELV Limited Energy
FCM II 6 AC IN	Min. 19 Vdc Max. 36 Vdc 100mA Max	--	--	250 Vac max. Optically Isolated Contact Closure
FCM II 6 AC OUT	Min. 19 Vdc Max. 36 Vdc 100mA Max	--	250 Vac 350 mA max. 6K Cycles, Pilot Duty	--
FCM II DC IN	Min. 19 Vdc Max. 36 Vdc 100mA Max	--	--	30 Vdc SELV Limited Energy
FCM II DC OUT	Min. 19 Vdc Max. 36 Vdc 100mA Max	--	30 Vdc 250mA max. 6K Cycles, Pilot Duty	

Figure 1.2 FCM II Module Electrical Ratings

1.4.2 OPERATING CONDITIONS:

- Operating temperature (surrounding air temperature) -40°F to 140°F (-40°C to 60°C).
- Environmental Ratings: None. FCM II modules are classified as open equipment must be placed in a suitable Type 4 (or IP 65) or better enclosure.

For product outline and dimensions see [Figure 6.1](#) and [Figure 6.2](#).

1.5 ELECTROSTATIC DISCHARGE (ESD) PROTECTION:

The FCM II contains electronic components and assemblies subject to damage by ESD. The FCM II was designed to protect against ESD while the unit is mounted on an electrical panel and in normal operation. Proper handling procedures must be observed during the removal, installation, repair and other handling of FCM II modules summarized below.

- 1) Service must be performed by authorized personnel only.
- 2) The person performing the service must be grounded by an ESD grounding strap and connected to ground.
- 3) The plastic enclosures offer a degree of protection of the inner printed circuit board assemblies against ESD. However, the heat venting slots and the wiring terminals blocks do allow a possible path for ESD when not fastened to the electrical panel. Therefore, a servicing technician is advised to touch unpainted metal of the electrical panel prior to installing or replacing FCM II modules.
- 4) FCM II modules must be placed in and transported in conductive bags or other conductive containers.
- 5) FCM II modules must not be removed from the conductive container until time of use.
- 6) All other “best” practices for protecting devices from ESD must be observed.

CHAPTER 2 INSTALLATION

2.1 MODULE INSTALLATION

FCM II modules are easily attached to 35mm DIN rails by tilting the top edge toward the panel and catching the top edge on the rail (see Figure 2.1 below). Then the module is swung back down until the spring loaded metal foot catches on the bottom edge of the rail (see Figure 2.2 below). The 24 Vdc power and RS-485 communication is connected by sliding adjacent FCM II's together until the bus connectors click into place (see Figure 2.3 below).

2.2 MODULE REMOVAL

Module removal is the reverse of installation. Power must be removed from the modules. Then, spread the module to be removed from adjacent modules on either side. Disengage the spring loaded bottom catch by inserting a 1/4" Flat Head screwdriver and sliding the catch away from the rail and tilting the module top toward the panel. With the bottom edge disconnected, the top foot may be moved off of the rail to free the module. Do not attempt to open the module's plastic housing.



Figure 2.1 Engage Top Foot on Rail



Figure 2.2 Snap Metal Foot to Rail

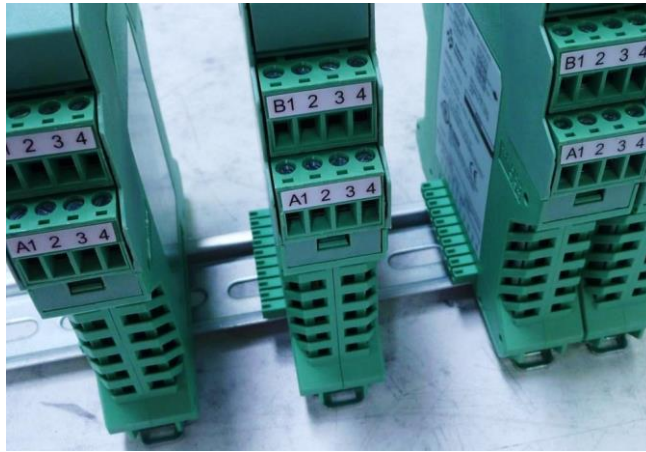


Figure 2.3 Slide Modules Together

2.3 FCM II PANELS AND ENCLOSURES:

2.3.1 *PANEL LAYOUTS:*

Toptech Systems assembles standard panel layouts which are shown in Chapter 6. These include a 20 inch by 20 inch panel with a single DIN rail of FCM IIs or a 30 inch by 30 inch panel with two DIN rails of FCM IIs. Exterior dimensions of the panel's associated enclosures are also shown in Chapter 6.

2.3.2 *PANEL WIRING*

The following guidelines are recommended when installing panels at a facility and making field connections.

1. Connect a safety ground to the panel. A copper post is provided for this.
2. Wiring must enter the enclosure through conduit entries. All conduits must be terminated at the enclosure by use of appropriately rated conduit hubs or glands.
3. Avoid routing AC and DC wiring in the same conduit in order to minimize the disruption of DC and analog voltage circuits by line voltage transients and surges.
4. Wiring must comply with all local electrical codes.

2.3.3 *ENCLOSURE MOUNTING*

Mounting instructions are provided with all panel assemblies shipped by Toptech. Whether installing a Toptech supplied FCM II enclosure, or installing a customer sourced enclosure, follow the manufacturer's mounting instructions in order not to invalidate regulatory requirements.

2.4 ELECTRICAL SUPPLY CONNECTIONS

FCM IIs require a supply of 19 – 36 Vdc, 100mA to power each module (200mA for a double). The power must be from an isolated, SELV (Safety Extra Low Voltage) power supply, rated 36 VDC max.

Although the ten position power/communication bus terminal block is rated for solid or stranded copper wire 14 to 30 AWG [2.1 to 0.05 mm²], Toplech recommends using stranded 16 to 18 AWG [1.3 to 0.8 mm²] for power. See section 2.5 regarding the choice of communication wire. The required screw tightening torque is 2 to 4 Lb-in. [0.2 to 0.5 Nm]. For terminal assignments, see Figure 2.4 below. Wires must be stripped ¼" and inserted into terminal block leaving no bare conductor exposed. Only one of each of the three possible 24 VDC+/DC COMMON pairs need be used; the rest are provided for bus capacity.

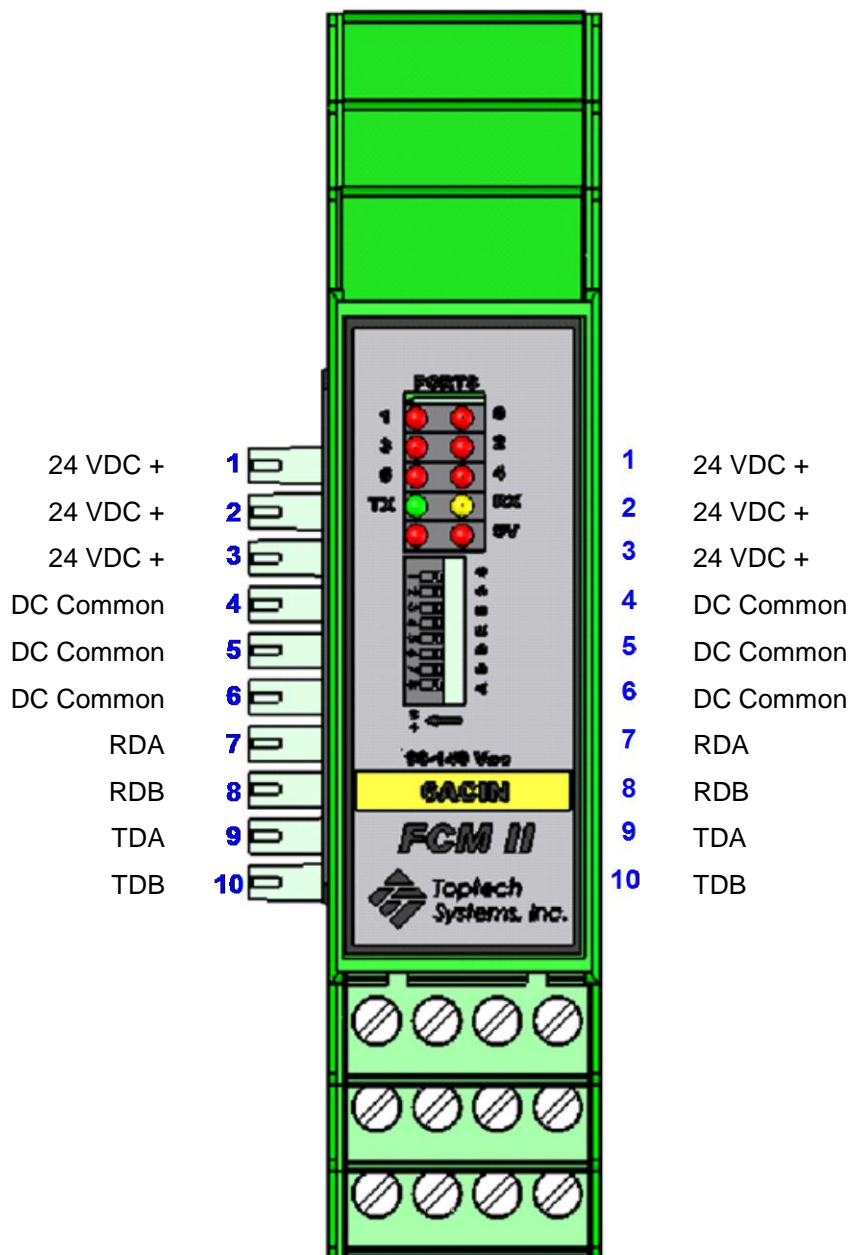




Figure 2.4 Power / Com Connection Bus

The installer should provide over current protection between the branch circuit and the supply according to the power supply manufacturer's recommendations; usually either an appropriately sized slow-blow fuse or a characteristic B thermal magnetic circuit breaker. Because the primary side of the power supply is overcurrent protected, it is not necessary to fuse the 24 Vdc output, unless it is used to supply power to field devices located outside of the panel housing the FCM IIs.

	Note 1: If a disconnecting device is used, ensure that it is not blocked by FCMs or any other device which would make it difficult to operate. If used, do not place the disconnect in a Class I, Division 2 location.
	Note 2: Do not place a thermal magnetic circuit breaker in a Class I, Division 2 location.

2.5 SERIAL COMMUNICATION CONNECTION

RS-422/485 communications protocol is designed for multi-point (i.e. computer to multiple devices, also called multi-dropped) communications up to 4,000 feet (1,220 Meters).

RS-422 requires 4-wires (2 twisted pair) for full duplex communications and utilizes a transmit pair of wires (TDA & TDB) and a receive pair of wires (RDA & RDB).

Figure 2.4 shows the terminal assignments for the bus RS-485 serial connection. Either end may be connected to a MultiLoad or other serial device as the bus supplies the serial connection to all modules that are joined together. The TD and RD pairs are swapped at the MultiLoad II. Although the ten position terminal block is rated for 14 to 30 AWG [2.1 to 0.05 mm²], a reliable serial connection will be achieved by the use of cable meeting the following:

- 24 AWG [0.2 mm²] stranded.
- 4-wire, two twisted pair with overall shield.
- 30 pF maximum between conductors.
- 1,000 ohm impedance.
- Maximum length: 4,000 feet (1,220 Meters)
- Maximum stub length: 15 feet.

All exposed shields must be properly insulated to prevent short circuits.

All shields must be continuous, soldered and properly insulated.

2.6 DEVICE ADDRESS CONFIGURATION

Figure 2.5 shows the locations of I/O, power, and communication status indicators and the location of DIP switches used to set the module’s serial address. The table below provides the settings for FCM addresses 0 – 31.

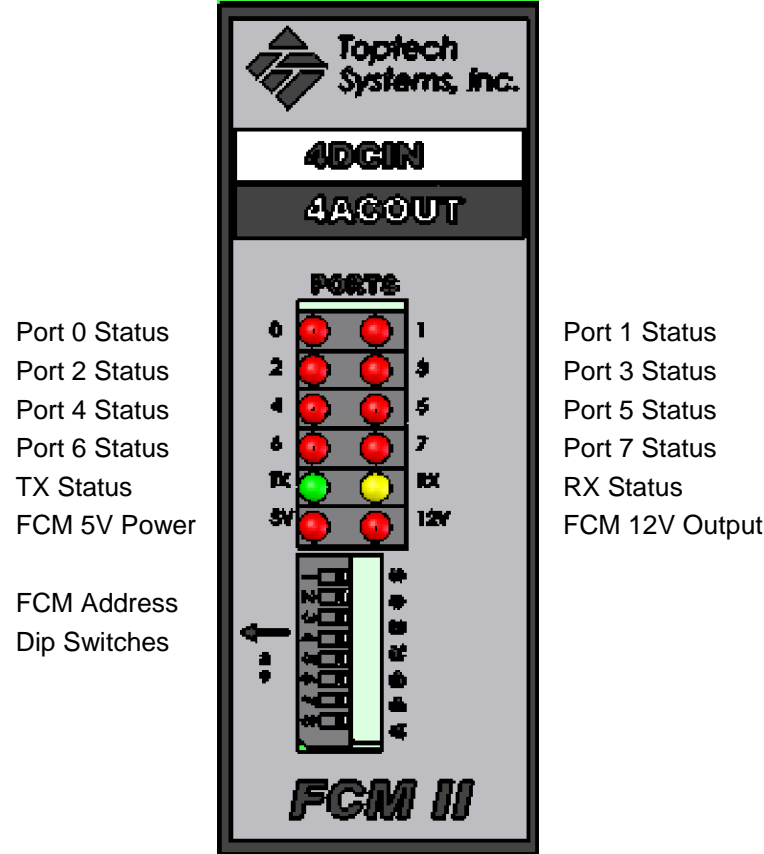


Figure 2.5 Module Status, Configuration Setting and Identification

0=Off (switch to the right), 1=On (switch to the left)




FCM Address	Dip Switch Settings							
	8	7	6	5	4	3	2	1
0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	1	0
3	0	0	0	0	0	0	1	1
4	0	0	0	0	0	1	0	0
5	0	0	0	0	0	1	0	1
6	0	0	0	0	0	1	1	0
7	0	0	0	0	0	1	1	1
8	0	0	0	0	1	0	0	0
9	0	0	0	0	1	0	0	1
10	0	0	0	0	1	0	1	0
11	0	0	0	0	1	0	1	1
12	0	0	0	0	1	1	0	0
13	0	0	0	0	1	1	0	1
14	0	0	0	0	1	1	1	0
15	0	0	0	0	1	1	1	1
16	0	0	0	1	0	0	0	0
17	0	0	0	1	0	0	0	1
18	0	0	0	1	0	0	1	0
19	0	0	0	1	0	0	1	1
20	0	0	0	1	0	1	0	0
21	0	0	0	1	0	1	0	1
22	0	0	0	1	0	1	1	0
23	0	0	0	1	0	1	1	1
24	0	0	0	1	1	0	0	0
25	0	0	0	1	1	0	0	1
26	0	0	0	1	1	0	1	0
27	0	0	0	1	1	0	1	1
28	0	0	0	1	1	1	0	0
29	0	0	0	1	1	1	0	1
30	0	0	0	1	1	1	1	0
31	0	0	0	1	1	1	1	1

Figure 2.6 DIP Switch Configuration Settings

2.7 SWING ARMS

An industry practice of sharing loading equipment between two adjacent lanes is termed a “swing arm.” The reference indicates the actual practice in which one load arm can be swung from one side of a loading bay to another. To achieve this, the FCM II controlling the I/O associated with that field equipment must have its communication switched between the MutliLoad II on each lane, depending on which lane the load arm resides when in use. This communication is switched via a four pole relay and the ring switch attached to the swing arm

is used to energize or de-energize that relay. Figure 2.7 shows the wiring required to achieve this. The following guidelines are suggested.

	Be aware of device addressing and ensure that duplicate addresses do not exist. The addresses of shared FCM IIs must not be duplicated in either bay.
	Control of the relay coils is to be wired by the customer to the arm ring switch. Note the voltage available and match it to the relay coil voltage rating. If DC voltage is used, a reverse biased diode is recommended to snub ringing voltage when the coil opens.
	Although star wiring of FCM IIs is discouraged, star wiring of the shared modules is necessary since switching of shared upstream modules would remove the connectivity of one of the communication lines from the downstream modules in a daisy chain configuration.

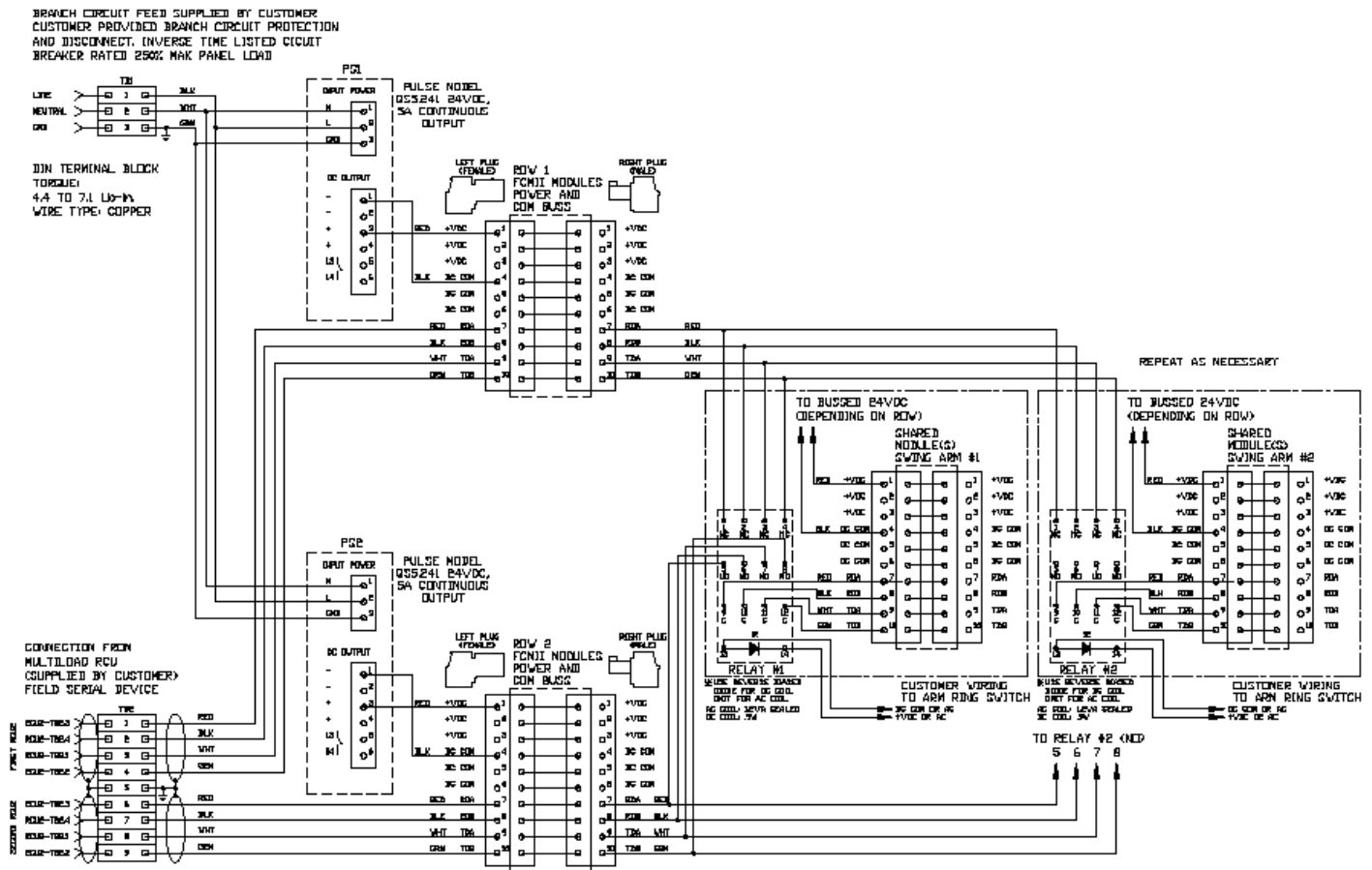


Figure 2.7 Swing Arm Wiring of Shared FCM IIs

CHAPTER 3 FIELD WIRING

3.1 CONNECTION REQUIREMENTS

Although each right angle, four position terminal block is rated for the use of solid or stranded copper 12 to 30 AWG [3.3 to 0.05 mm²], Toptech recommends using stranded copper wire 12 AWG to 24 AWG [3.3 to 0.2 mm²] depending on the type of field device. The required screw tightening torque is 5 to 7 Lb-in. [0.6 to 0.8 Nm]. Wires must be stripped ¼" and inserted into terminal block. Details concerning field wiring terminal assignments are given later in this chapter.

3.2 FCM II FIELD DEVICE CONNECTIONS

FCM II consists of 6 different module types (see Electrical Ratings in section 1.1.1):

1. **4DCIN/4ACOUT:** 4 DC Inputs (5-30 VDC), 4 AC Outputs (12-250 VAC),
12 Vdc Power Supply, 167 mA Max
2. **6ACIN:** 6 AC Input (90-140 VAC) or (180-250 VAC)
3. **6ACOUT:** 6 AC Outputs (12-250VAC)
4. **6DCIN:** 6 DC Inputs (5-30 VDC)
5. **6DCOUT:** 6 DC Outputs (0-30 VDC)
6. **ANALOG/4DCIN/4ACOUT:** RTD Input, 4-20mA Input, 4-20mA Out,
4 DC Inputs (5-30 VDC), 4 AC Outputs (12-250 VAC)



Note that the ANALOG board is factory assembled with a 4DCIN/4ACOUT module into a double wide configuration. It is not possible to use the analog module as a single module, nor should the analog board be disconnected from its attached 4DCIN/4ACOUT module.

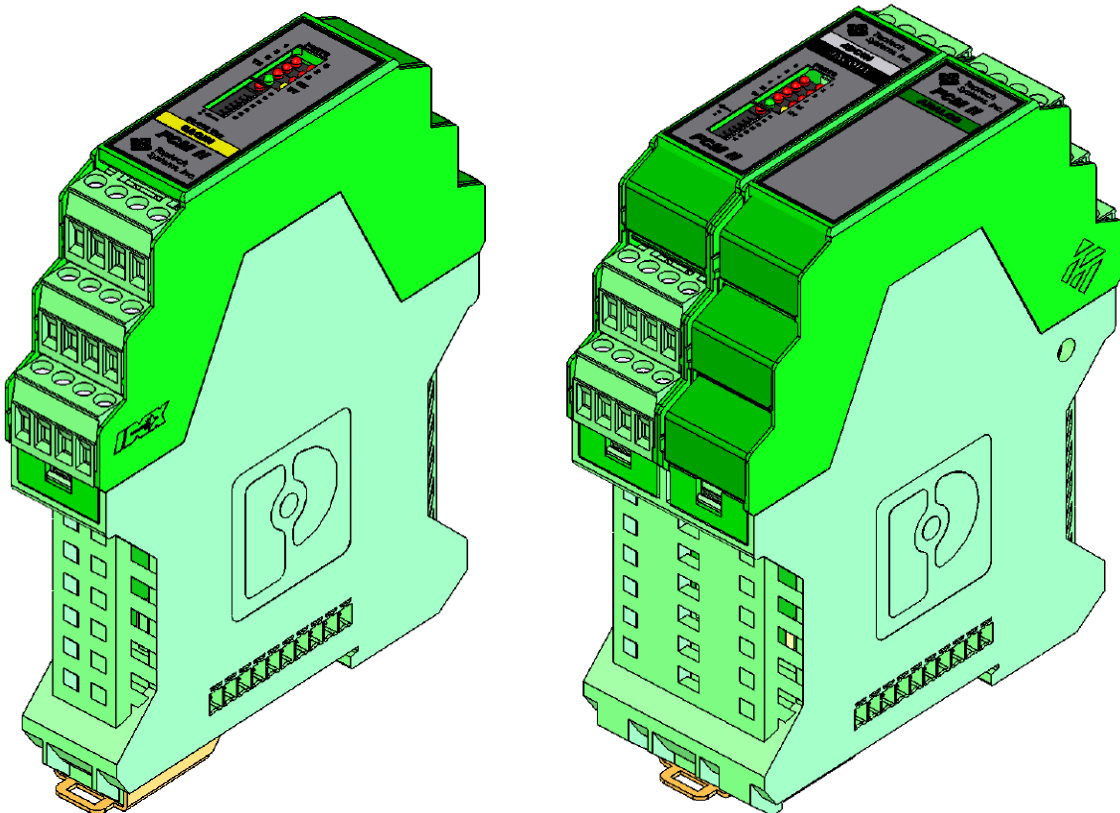
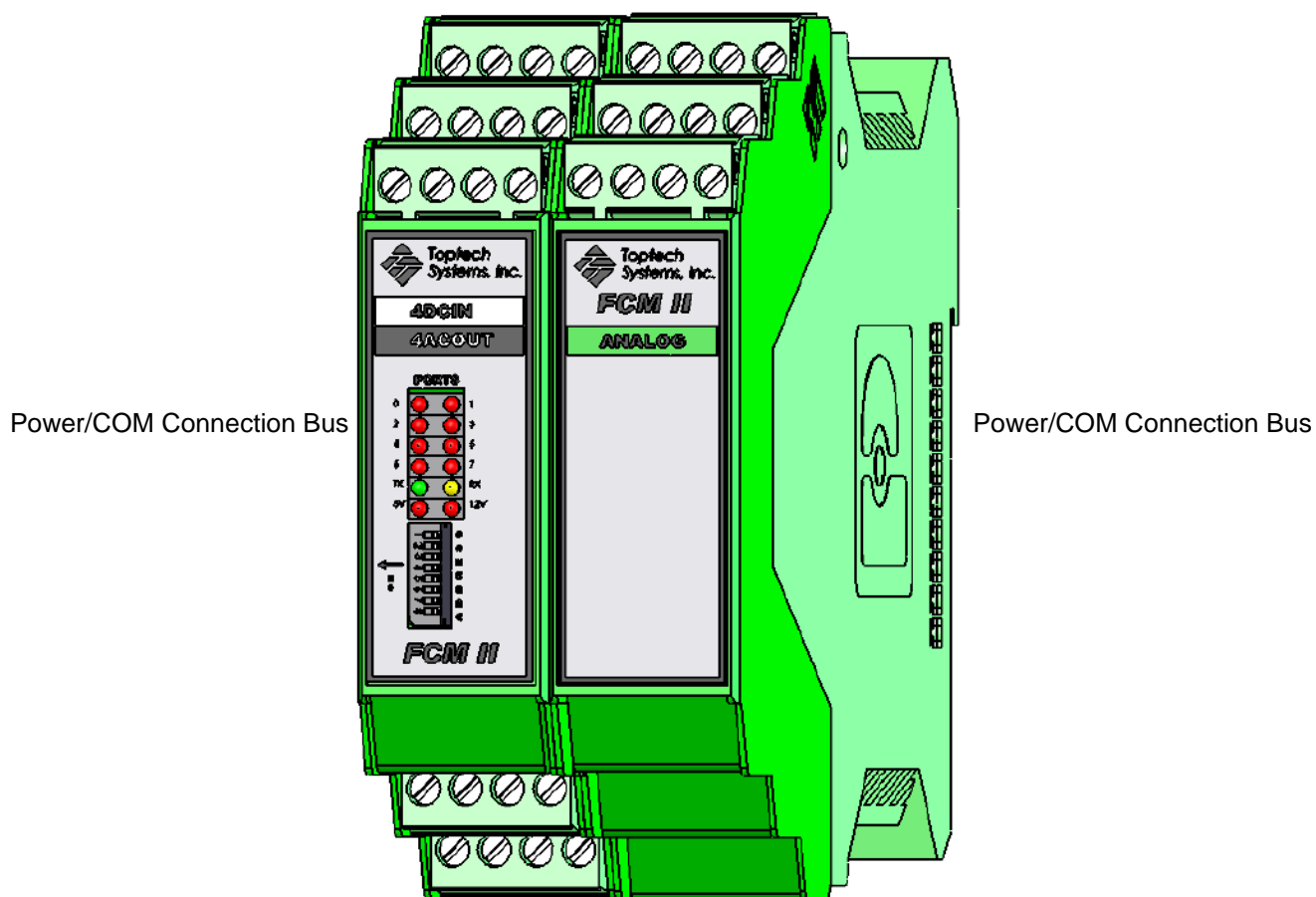


Figure 3.1 FCM II Single And Double Module Comparison

3.2.1 TERMINAL IDENTIFICATION

All DC Field Wiring Connections



All AC Field Wiring Connections

Figure 3.2 FCM II Field Wiring Terminal Locations

3.2.2 FLOW METER AND CONTROL VALVE WIRING

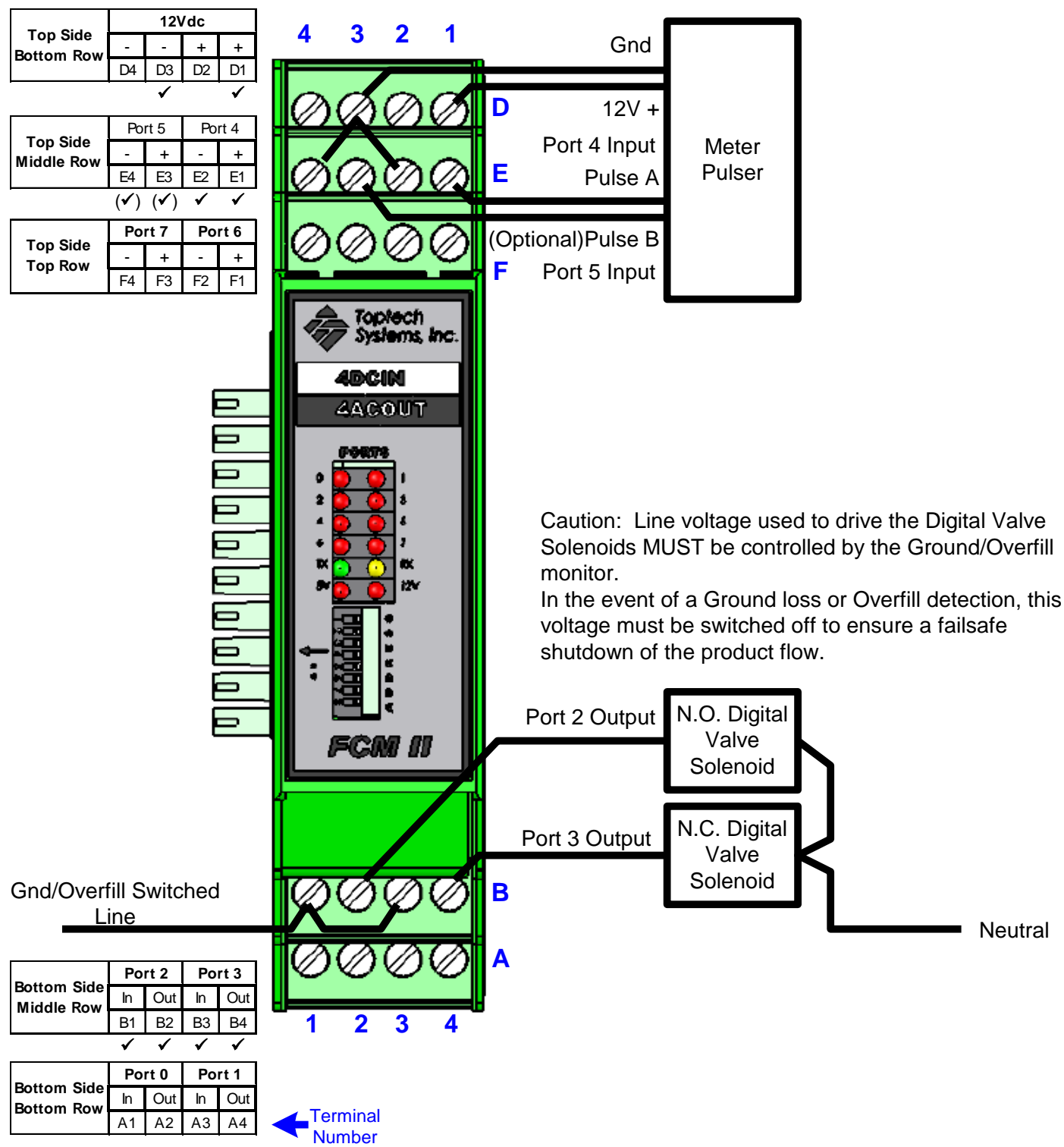


Figure 3.3 FCM II Field Wiring: Flow Meter and Control Valve

3.2.3 ADDITIVE WIRING

Note: Most additive injection meters only provide an Open-Collector (pull down) type output. Typically a 1,000 Ohm, ¼ watt pull-up resistor needs to be added in the pulser junction box to pull this output to 12V+ when the output is off.

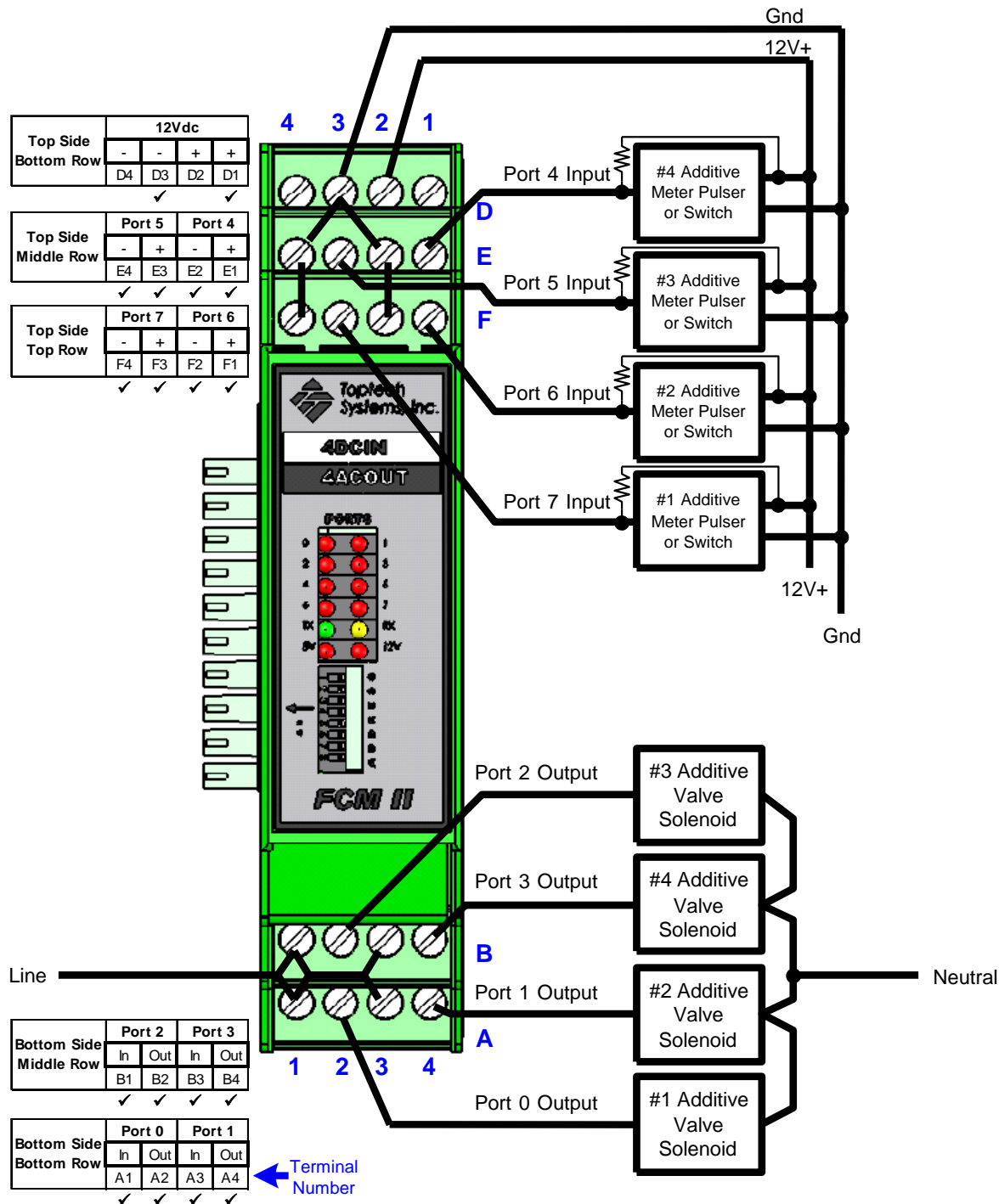


Figure 3.4 FCM II Field Wiring: Additive Meters and Injection Valves

3.2.4 RTD TEMPERATURE PROBE WIRING

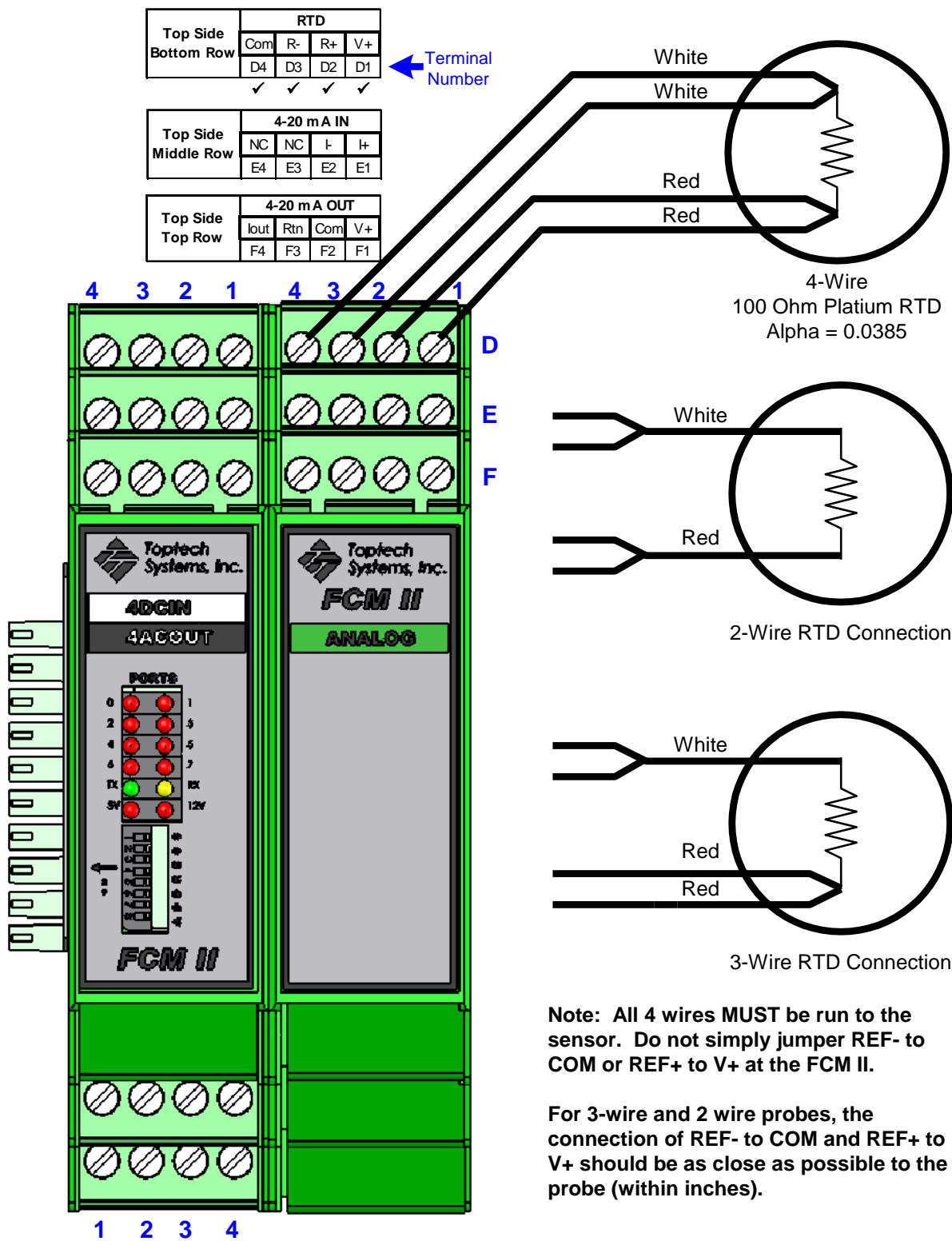


Figure 3.5 FCM II Field Wiring: RTD

3.2.5 4-20mA INPUT WIRING: LOOP CURRENT PROVIDED BY EXTERNAL POWER SUPPLY

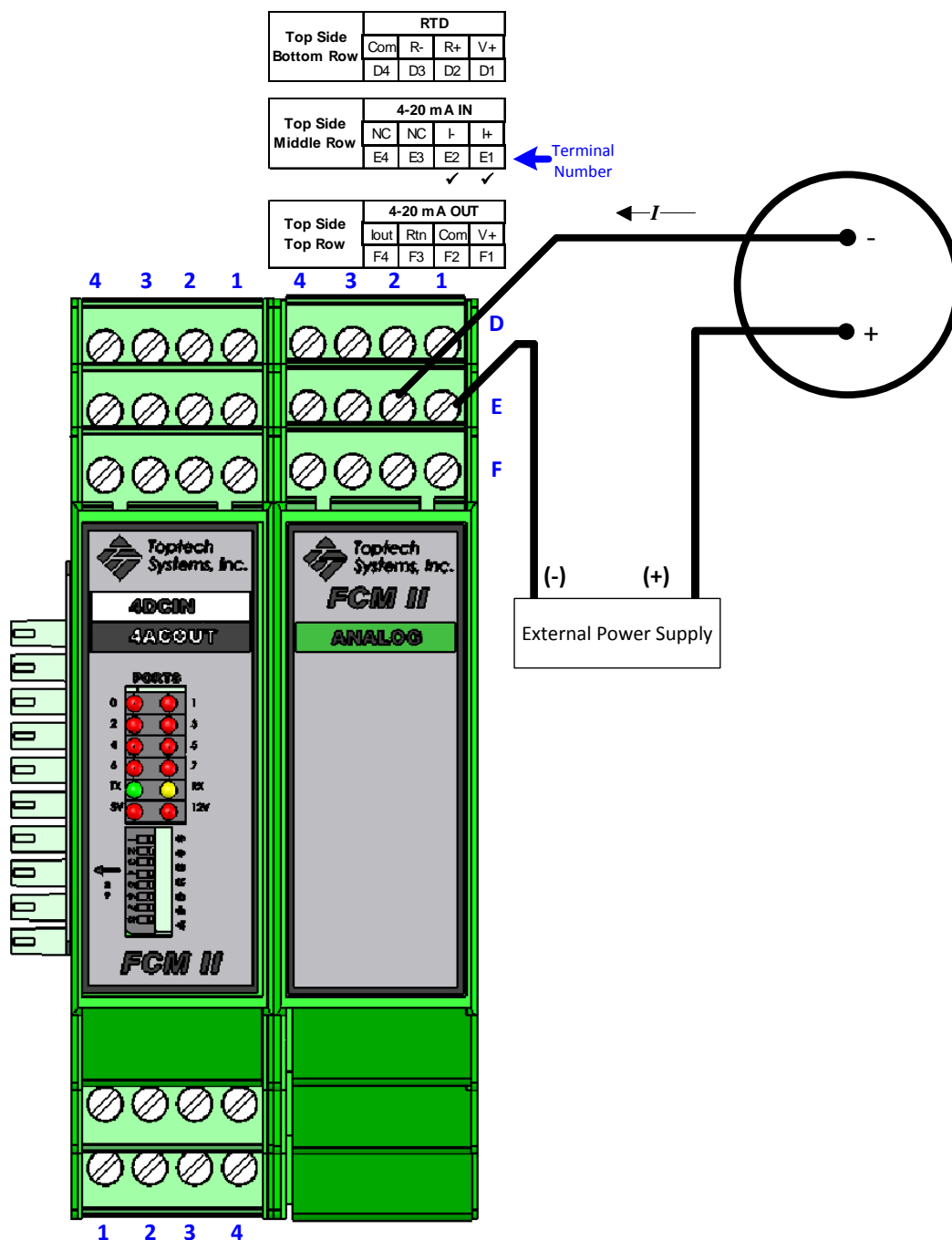


Figure 3.6 FCM II Field Wiring: 4-20mA Input

NOTE: The receiver does not contain a voltage source. The loop must be powered either by the transmitter or by an external power supply. The I/O Board adds 75 Ohms to the loop.

3.2.6 4-20mA INPUT WIRING: LOOP CURRENT PROVIDED BY TRANSMITTER

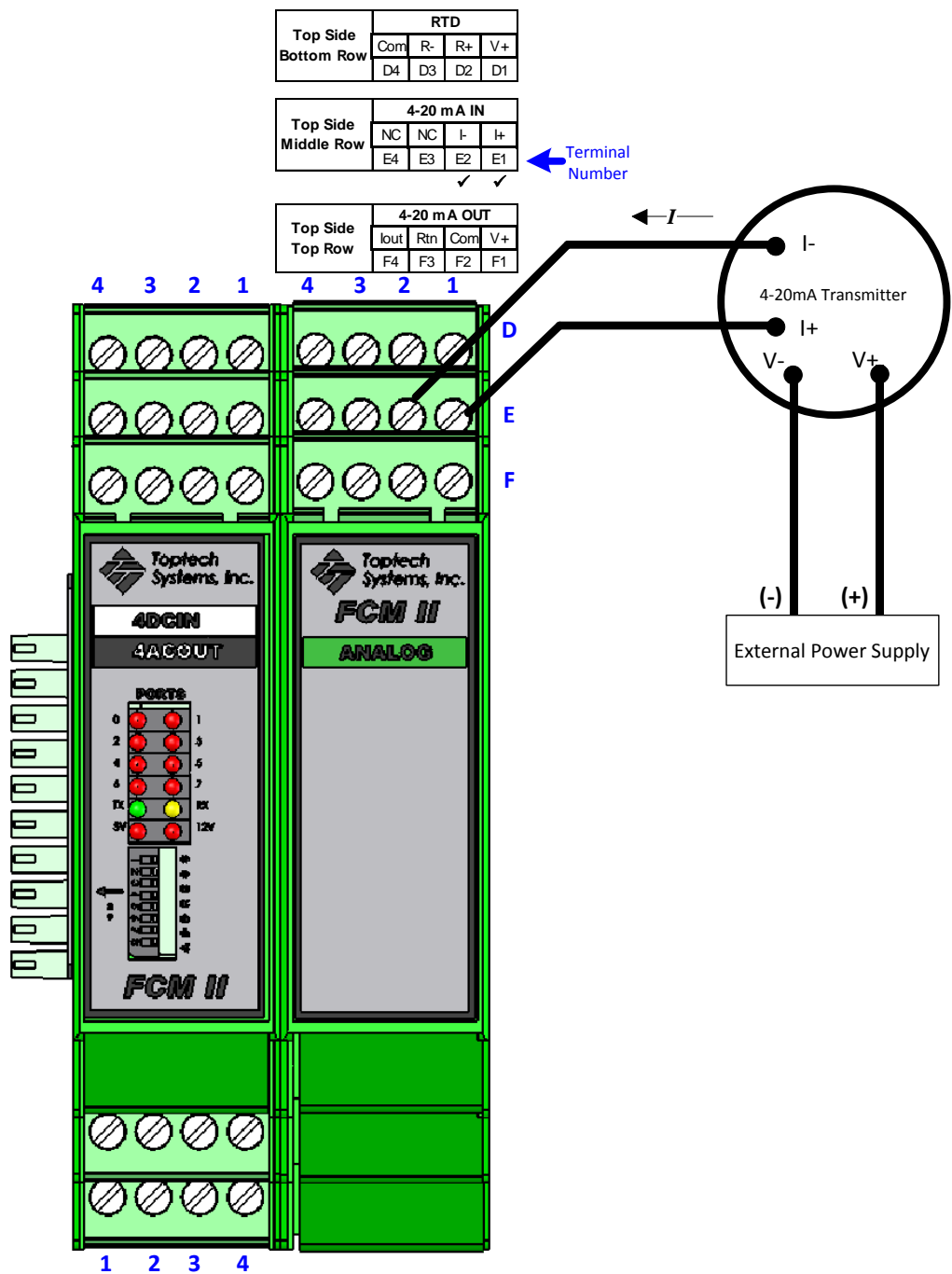


Figure 3.7 FCM II Field Wiring: 4-20mA Input

NOTE: The receiver does not contain a voltage source. The loop must be powered either by the transmitter or by an external power supply. The I/O Board adds 75 Ohms to the loop.

3.2.7 4-20mA OUTPUT WIRING

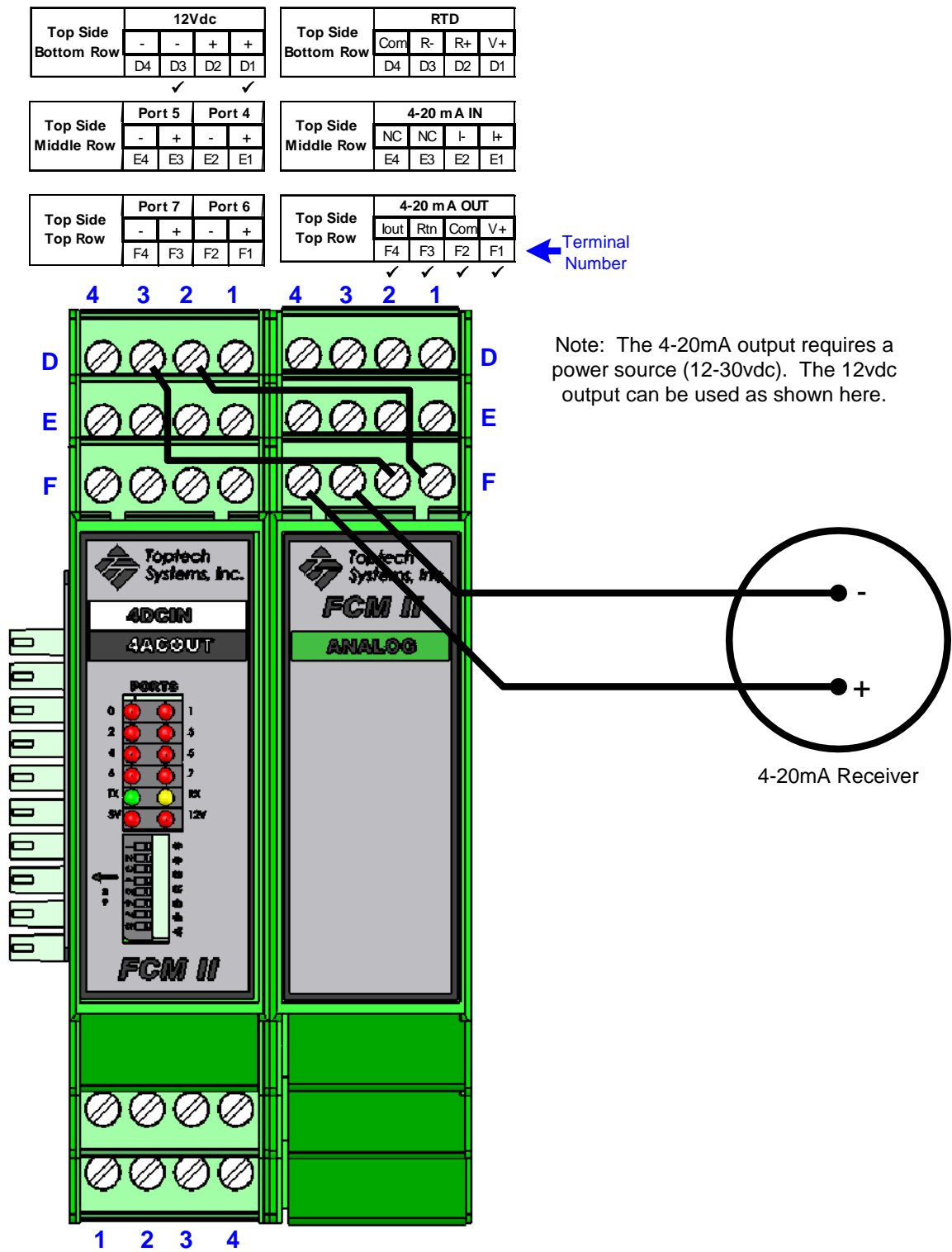


Figure 3.8 FCM II Field Wiring: 4-20mA Output

3.2.8 AC PERMISSIVE/STATUS WIRING (6ACIN)

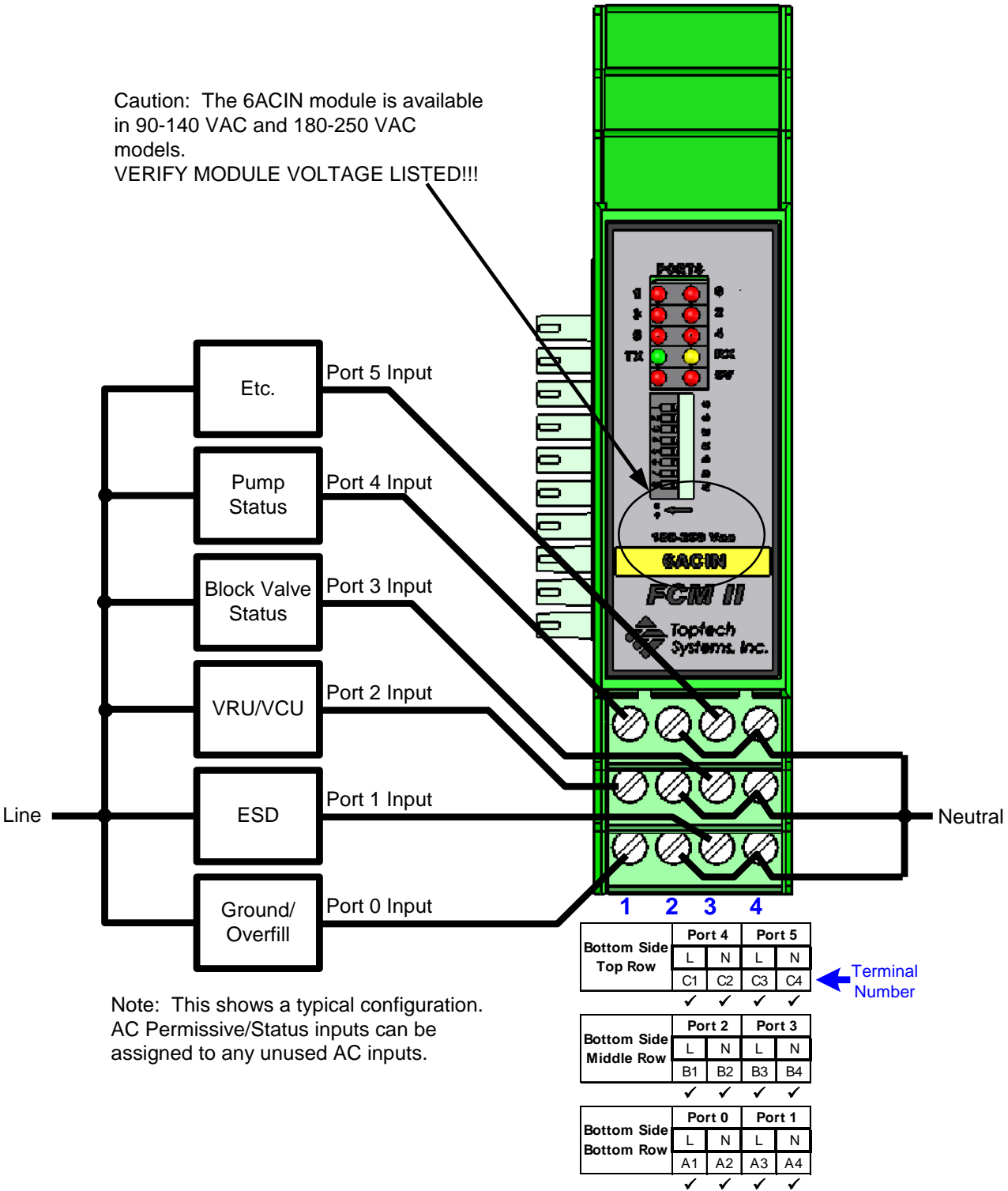


Figure 3.9 FCM II Field Wiring: AC Permissive/Status (6ACIN)

3.2.9 AC OUTPUT WIRING (6ACOUT)

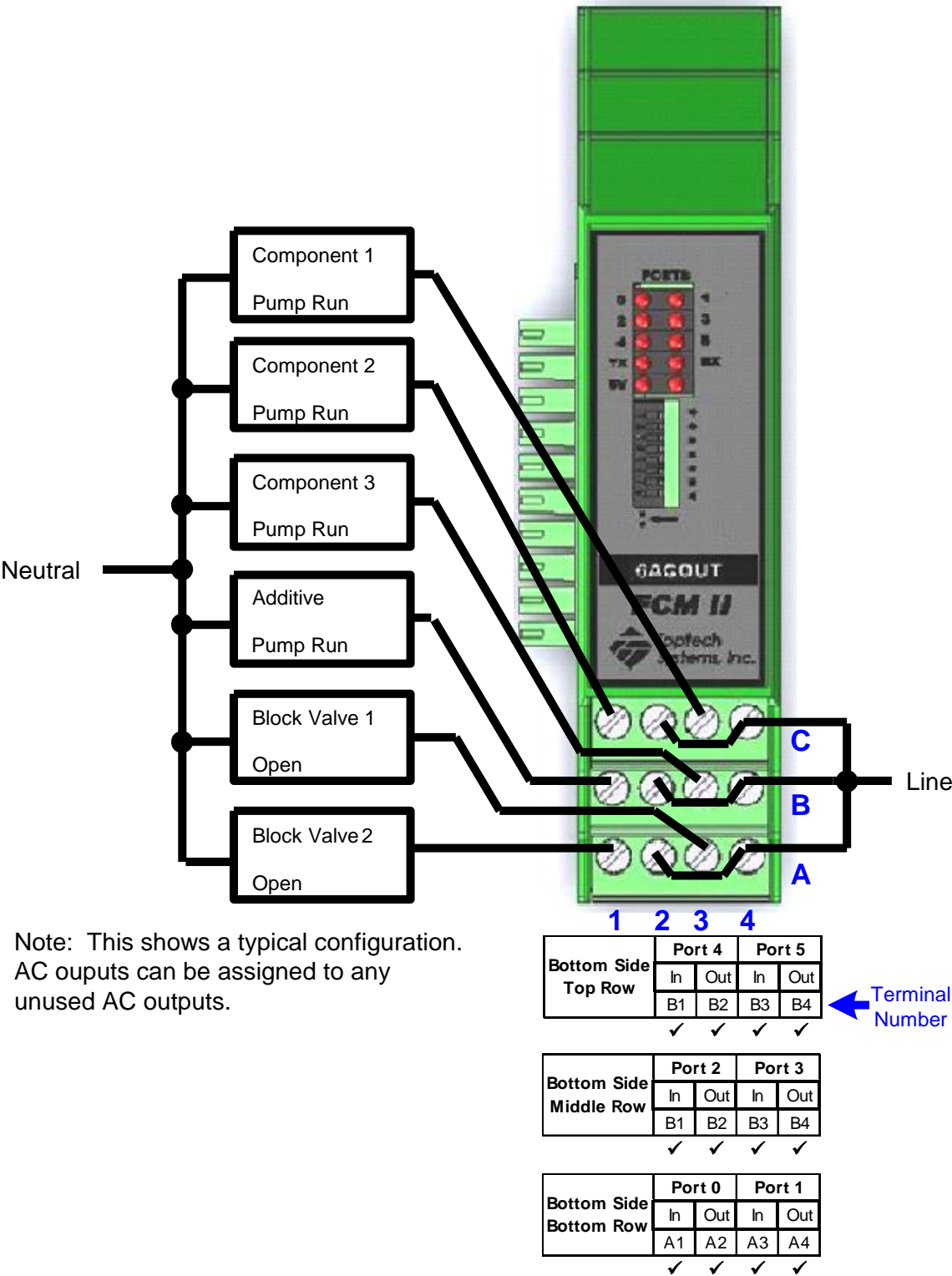


Figure 3.10 FCM II Field Wiring: AC Pump and Valve Control (6ACOUT)

3.2.10 DC PERMISSIVE/STATUS WIRING (6DCIN)

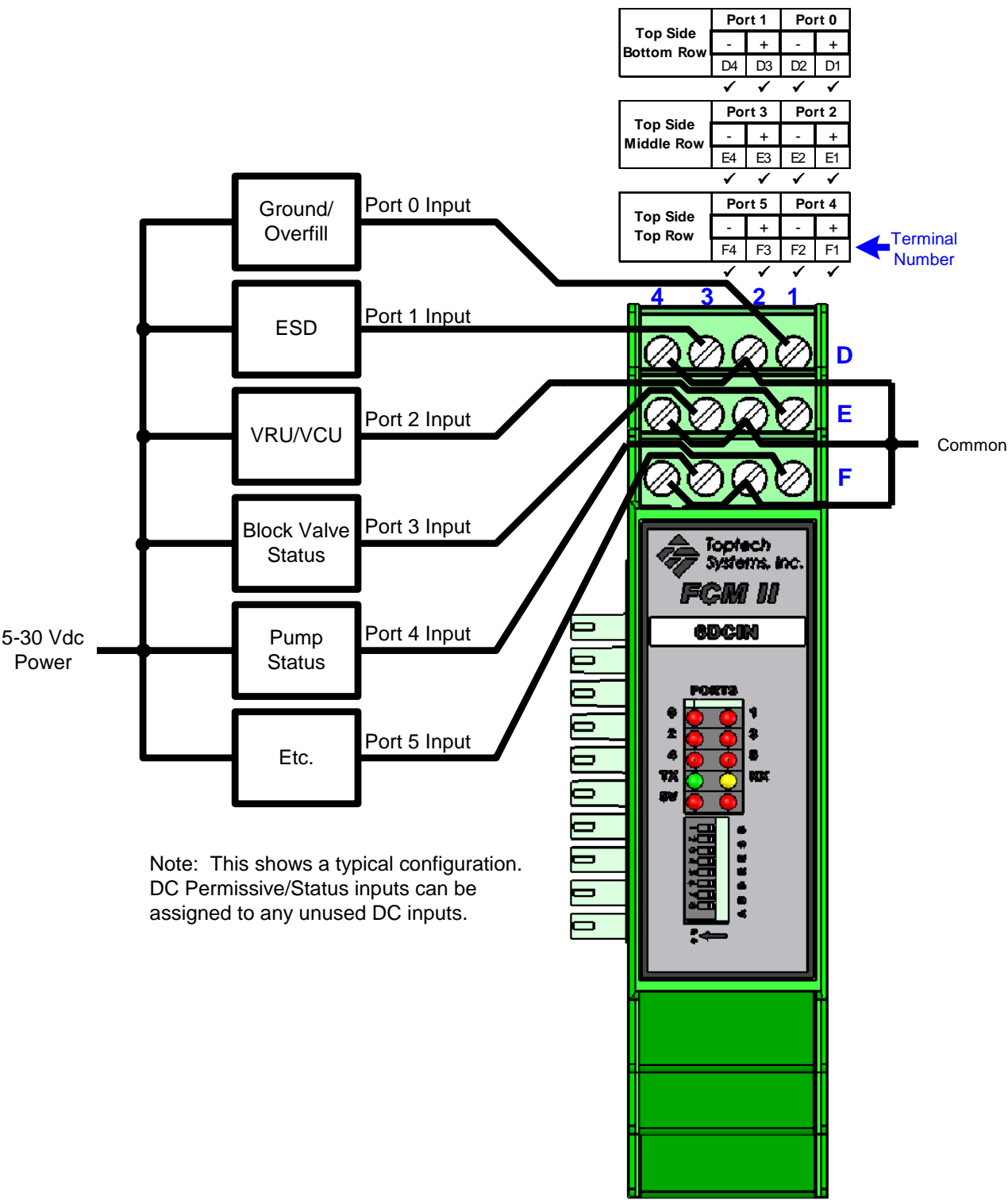
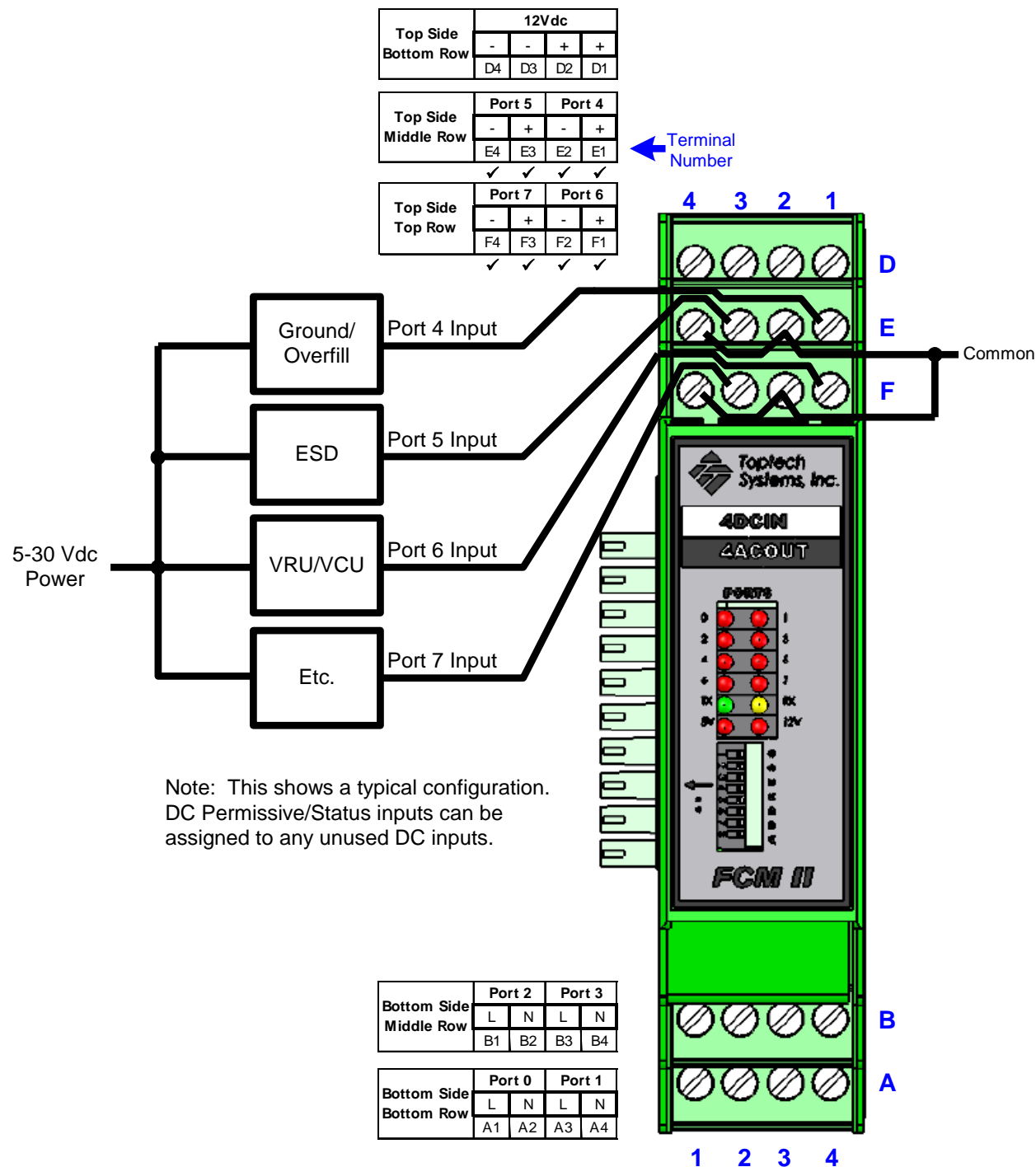


Figure 3.11 FCM II Field Wiring: DC Permissive/Status (6DCIN)

3.2.11 DC PERMISSIVE/STATUS WIRING (4DCIN/4ACOUT)



Note: Ports 4-7 can be used for general DC inputs when not configured for additive or component meter input.

Figure 3.12 FCM II Field Wiring: DC Input (4DCIN/4ACOUT)

3.2.12 AC OUTPUT WIRING (4DCIN/4ACOUT)

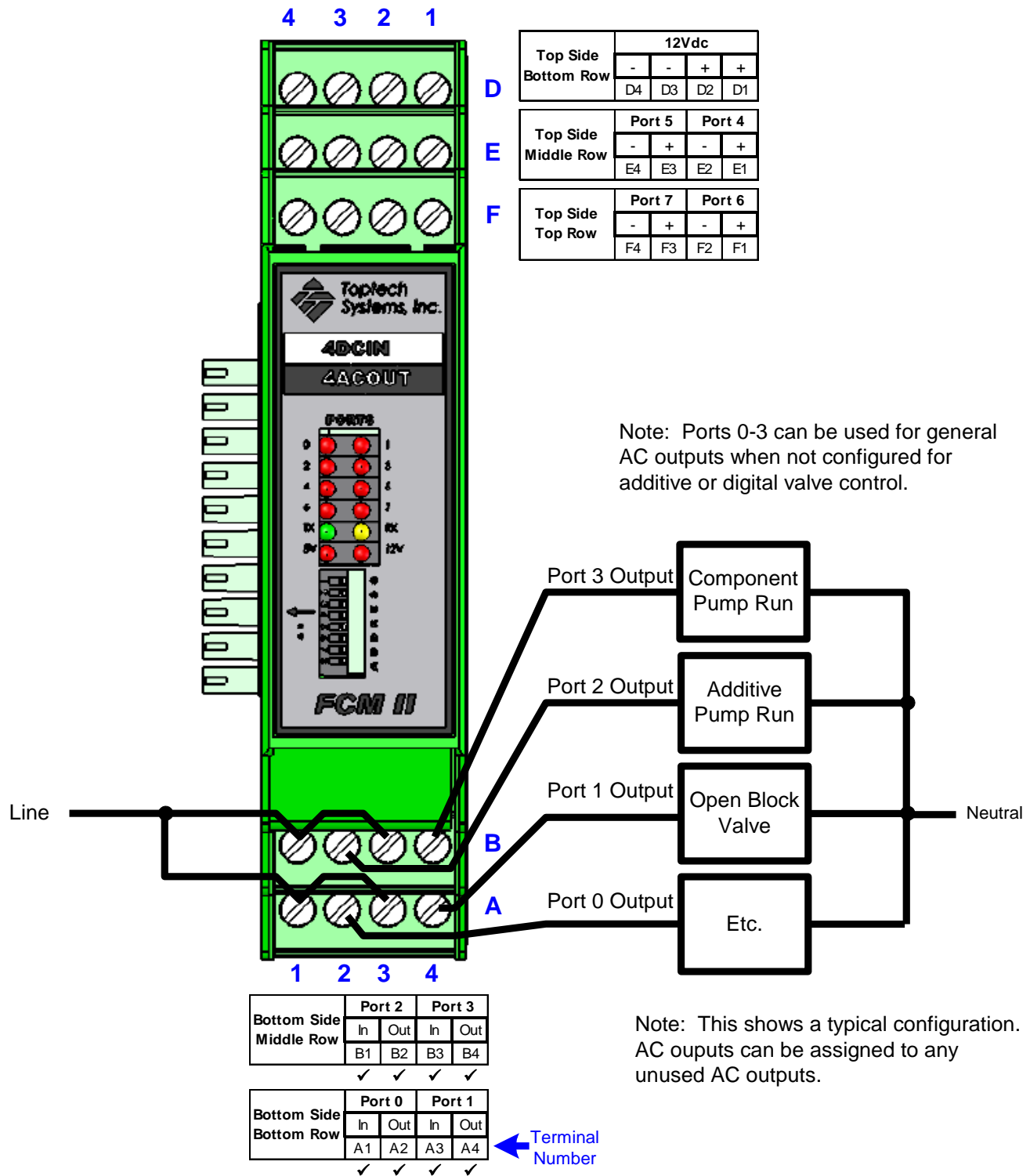
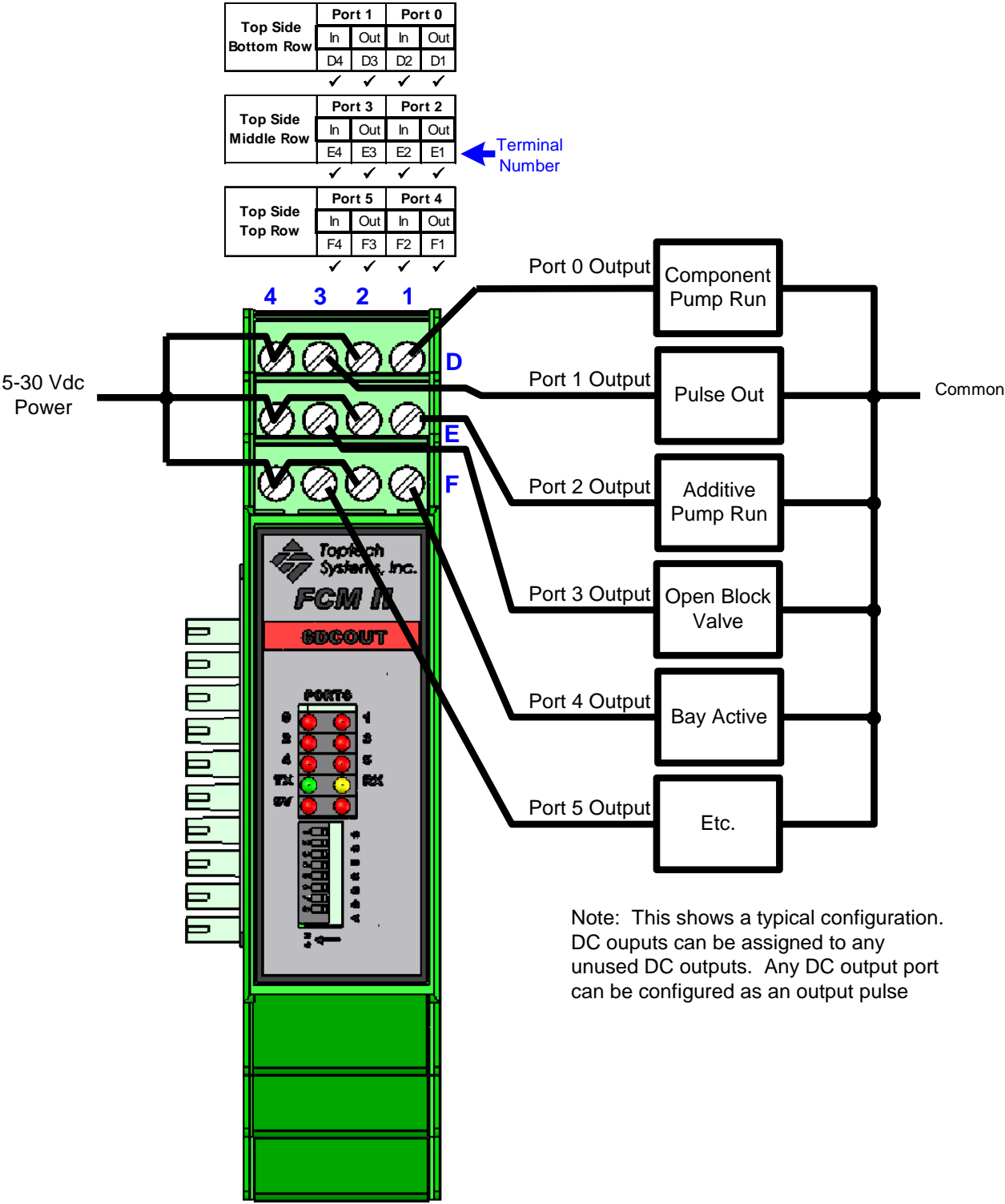
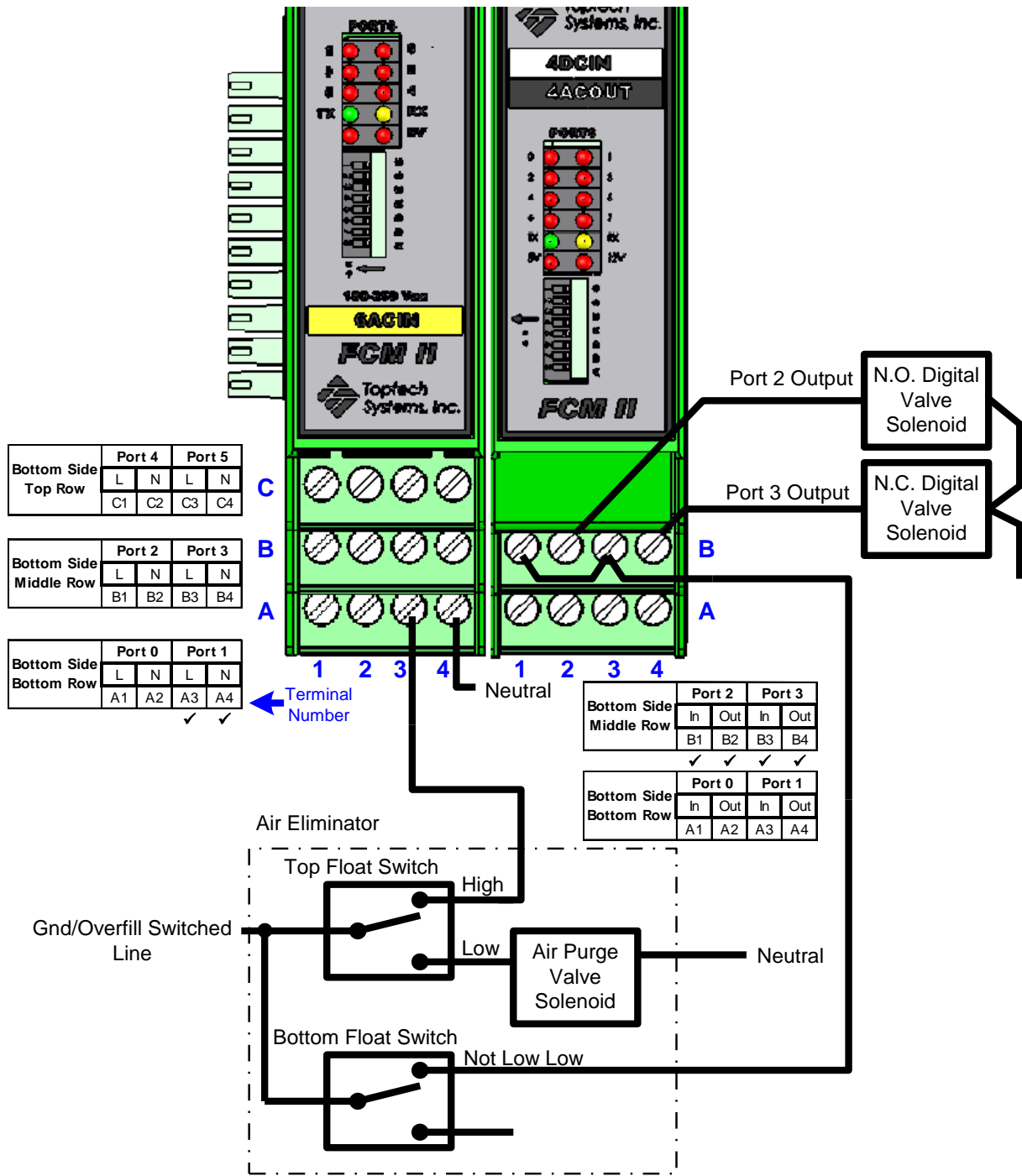


Figure 3.13 FCM II Field Wiring: AC Output (4DCIN/4ACOUT)

3.2.13 DC OUTPUT WIRING (6DCOUT)



3.2.14 3 OUTPUT AIR ELIMINATOR WIRING

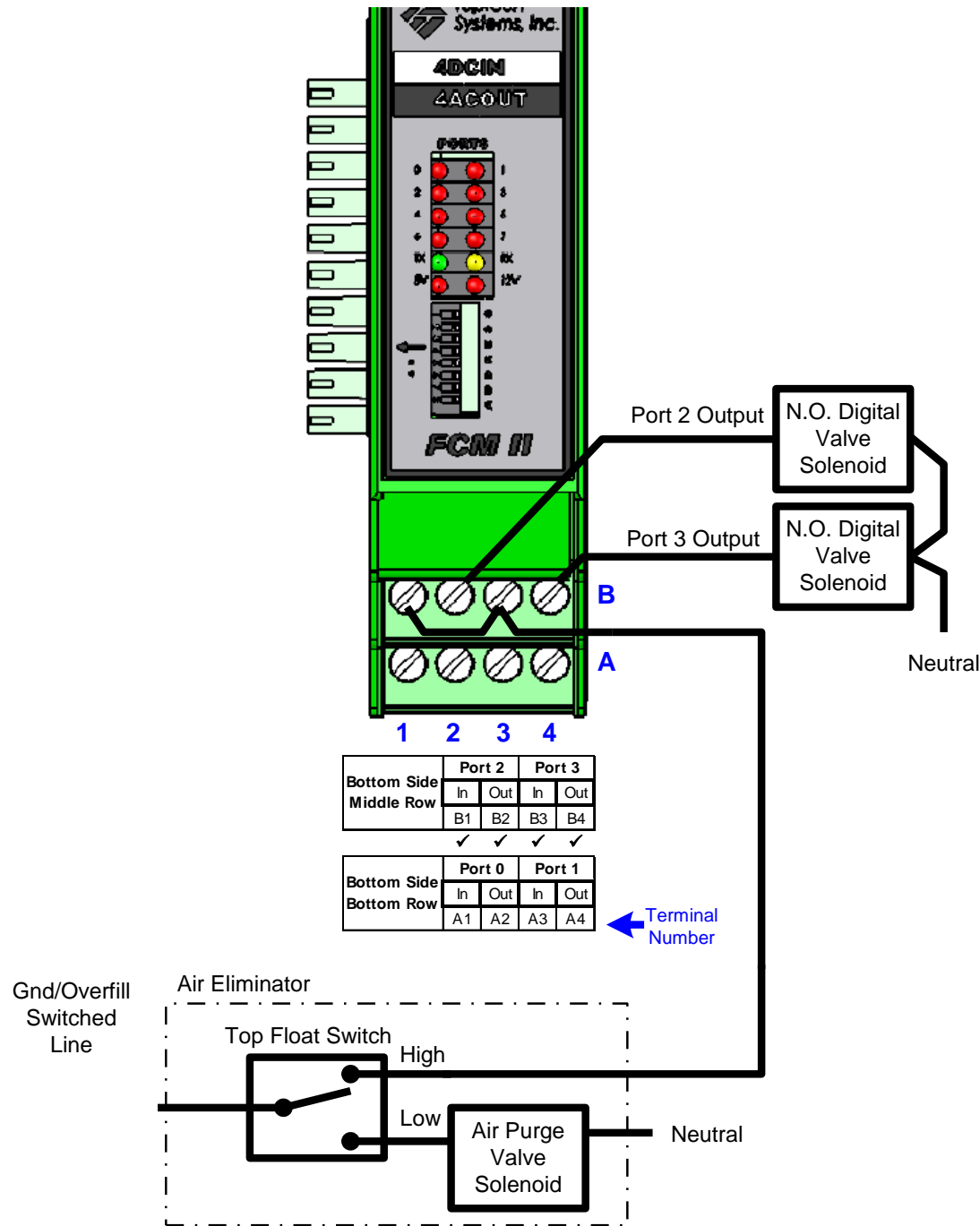


Note 1: When the level drops below Low Low, the power will be removed from the digital valves, stopping flow before the air eliminator is completely drained.

Note 2: Port 1 configured as Alt. High Flow Rate Inversed. When this signal is removed, the flow rate will drop to the Alt. High Flow Rate.

Figure 3.15 FCM II Field Wiring: 3 Output Air Eliminator

3.2.15 2 OUTPUT AIR ELIMINATOR WIRING



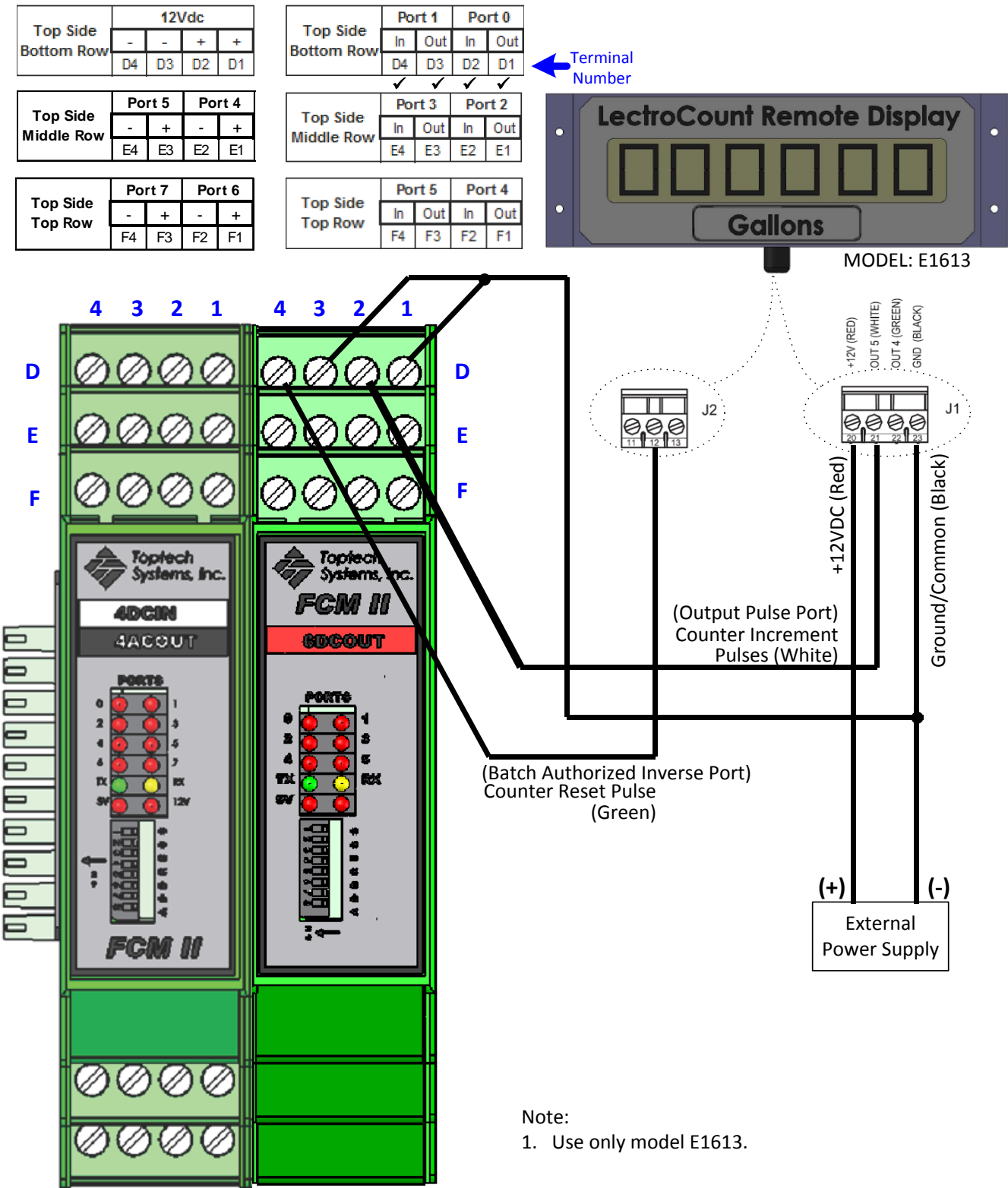
Note 1: When the level drops below Low, the power will be removed from the digital valves, stopping flow before the air eliminator is completely drained.

Note 2: With only two states returned from the air eliminator, flow must be completely stopped to purge air.

To purge air by only slowing the rate, a 3 output air eliminator head must be used.

Figure 3.16 FCM II Field Wiring: 2 Output Air Eliminator

3.2.16 LECTRO COUNT REMOTE DISPLAY WIRING



Terminal Number

MODEL: E1613

+12V (RED)
OUT 5 (WHITE)
OUT 4 (GREEN)
GND (BLACK)

J2

J1

+12VDC (Red)

Ground/Common (Black)

(+) (-)

External Power Supply

(Output Pulse Port)
Counter Increment
Pulses (White)

(Batch Authorized Inverse Port)
Counter Reset Pulse
(Green)

Note:
1. Use only model E1613.

Figure 3.17 FCM II Field Wiring: Lectro Count Remote Display

CHAPTER 4 SIMULATION

The FCM II simulator is a special version of an FCM II 4DCIN, 4ACOUT module. The FCM II simulator differs from an FCM 1 simulator in that it is configured entirely from MultiLoad (no keyboard or display required). This simulator is able to perform most all of the FCM I simulator functions with the exception of forcing error conditions and looping back outputs to inputs. Loopbacks may be wired externally however.

4.1 METER SIMULATION

Product flow control loops can be run in a demonstration mode by imitating a “virtual” flow meter (single or quadrature) and its associated “virtual” Digital Control Valve. Product flow simulation is automatically enabled when a meter is assigned to the simulator. Ports 2 and 3 will be automatically assigned and actuated to simulate the upstream and downstream solenoids of an associated Digital Control valve. Port 4 will be assigned as the primary meter pulser and the module will behave as if pulses were actually received on Port 4. A quadrature meter will be simulated if the 'Quad Check Enable' parameter is set in MultiLoad and the secondary meter channel will be assigned to Port 5.

When ports 2 & 3 are both activated product flow will ramp up. When port 2 is active and port 3 is inactive, flow will remain constant. When both ports are inactive, flow rate will ramp down to zero.

4.2 ADDITIVE SIMULATION

Up to 4 channels of additive control (Solenoid or Piston type) may also be simulated. If an additive meter is selected, it will be simulated with a 100 Hz pulser input.

4.3 ANALOG SIMULATION

If analog functions are enabled in MultiLoad such as RTD temperature input, or 4-20mA current input, the simulator places fixed analog values into these input registers. For the RTD, the fixed temperature is 28.5°C. For the 4-20mA current input the value is fixed at 12.800mA. The later input provides simulation of a density or pressure sensor input.

4.4 GENERIC I/O SIMULATION

I/O lines not used for Product or Additive simulation are available as general purpose DC inputs or AC outputs.



Do not make connections to field terminals. UNEXPECTED OPERATION MAY RESULT. The I/O is close looped in logic.

CHAPTER 5 TROUBLESHOOTING

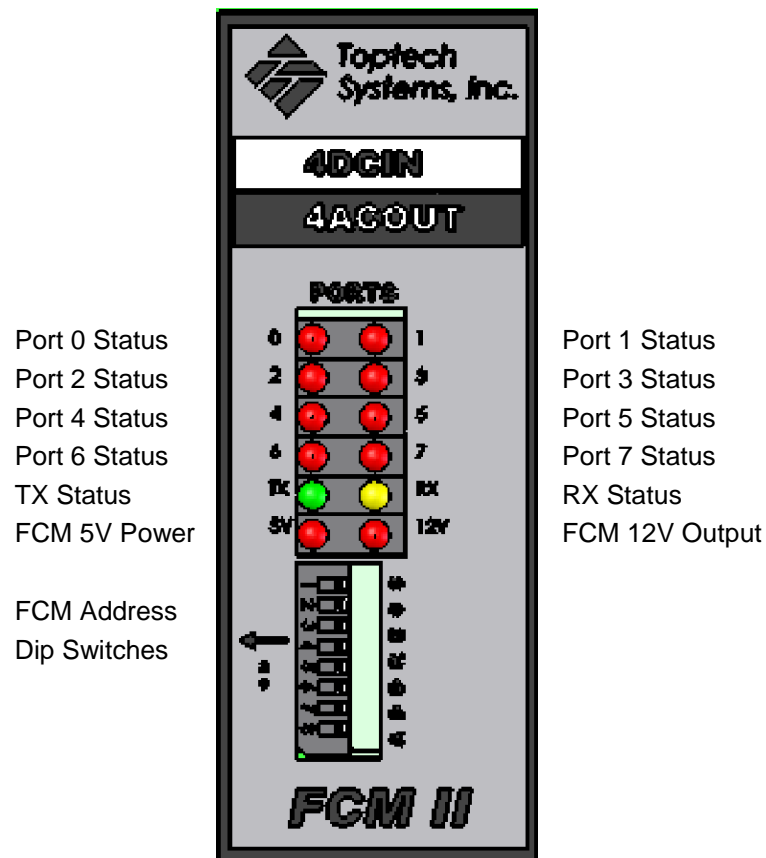


Figure 5.1 FCM II Module Front Panel

5.1 IS THE MODULE POWERED?

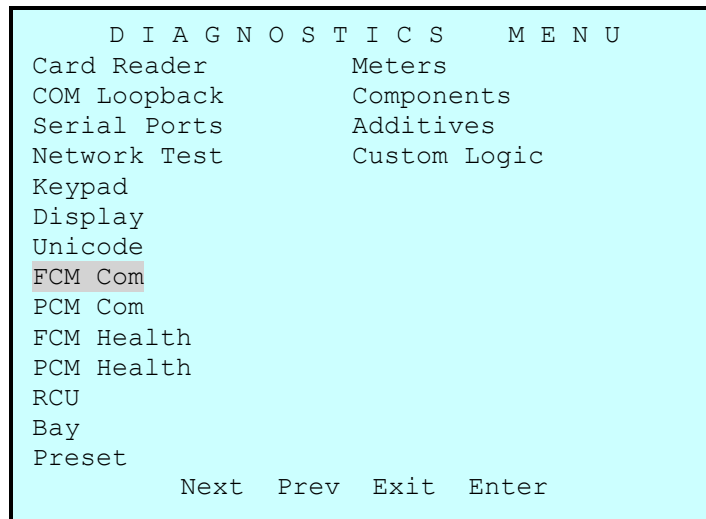
All standalone FCM II modules have a front panel LED that shows the power status of its 5V power. In addition, the **4DCIN/4ACOUT** module has a 12V indicator LED showing the status of its onboard 12 Vdc supply used to power field device dc inputs. The modules must be powered from the BUS rail with a DC voltage source of 19 – 36 Vdc. If required, verify the output voltage and current capacity of the power supply used to power the FCM IIs.

5.2 IS THE MODULE COMMUNICATING?

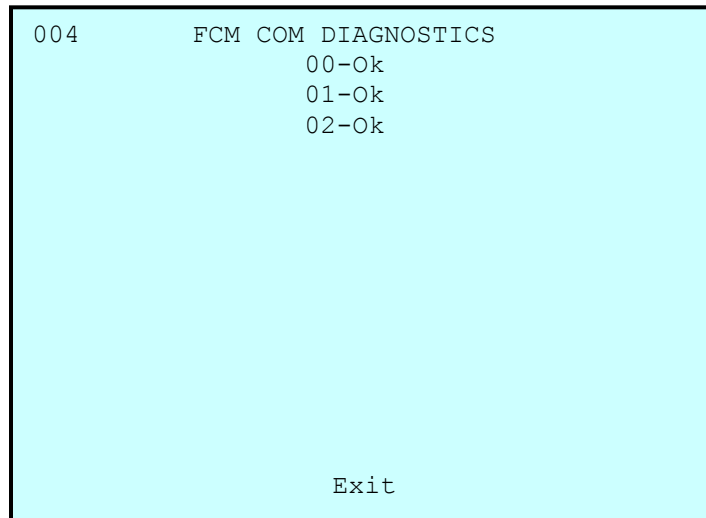
The quickest check that an FCM II module is communicating with a MultiLoad or other serial device is to look for the module's front panel TX LED to flash. The RX LED on all modules will flash when the MultiLoad or other line master sends a message to any multidropped FCM.

For a more in depth communication status indication, the MultiLoad's Diagnostic Menu may be used. This menu is accessible from within the MultiLoad's configuration mode.

- 1) Enter program mode by pressing 00000 on the keypad, then press Next key.
- 2) Select diagnostics from main menu.



3) Select FCM COM



- 4) If screen display is the same as above, the FCM IIs are communicating with the MultiLoad II.
- 5) If an FCM II is not communicating, the message XX-ERR appears where XX is the address of the FCM that is not communicating.
- 6) For a log of the occurrences of dropped communications (including the registration as com loss when the module has been powered down), select the menu option FCM HEALTH.

Should a module have a “ERR” state, double check that the device address has been set correctly and that two devices do not share a duplicate address. If all modules have an “ERR” state, check the bus communication wiring (see section 2.5).

5.3 ARE THE INPUTS FUNCTIONING?

An input LED will only illuminate when a voltage of 5 – 30 Vdc appears across the input’s terminal pair. If a problem occurs, verify the wiring shown in chapter 3.

5.4 ARE THE OUTPUTS FUNCTIONING?

The output LED will illuminate in response to an output commanded on. If necessary, check the output terminal with a voltmeter.

5.5 ARE RTD ERRORS PRESENT?

Selecting Temperature from the “Views and Inquiries” menu allows for viewing of each meter's temperature grouped by preset. At the meter level, the screen below is available. The normal message on the fifth line is “Status OK.” In event of an error, there are two messages:

Probe Error:	The probe is faulty, there is a wire break, or no cable connection.
Module Has Bad AD Converter:	Damage of the electronics within the RTD analog circuitry has occurred. The unit must be returned to Toptech for repair or replacement.

```
PRE #1 MTR #1 TEMPERATURE
Temperature Unadjusted:      -1.87C
[1]Temperature Offset:      +0.00C
[2]Temperature Adjusted:     -1.87C
      Status Ok

Next  Prev  Exit
```

5.6 ARE OTHER ERRORS PRESENT?

Please consult the MultiLoad User Manual for further errors that are not covered here. The MultiLoad User Manual describes in great detail how to configure an FCM II panel for most kinds of control applications as well as how to troubleshoot those setups.

5.7 IS TECHNICAL ASSISTANCE AVAILABLE?

Technical assistance may be obtained during business hours (or during extended hours by arrangement) from Toptech System's Support Department by dialing 407-332-1774 x381 or x382.

In Europe, assistance may be obtained during business hours (or during extended hours by arrangement) from Toptech Europe by dialing +32 (0)3 250 60 60.

CHAPTER 6 DIMENSIONS, PANEL LAYOUTS, WIRING SUGGESTIONS

6.1 MODULE DIMENSIONS

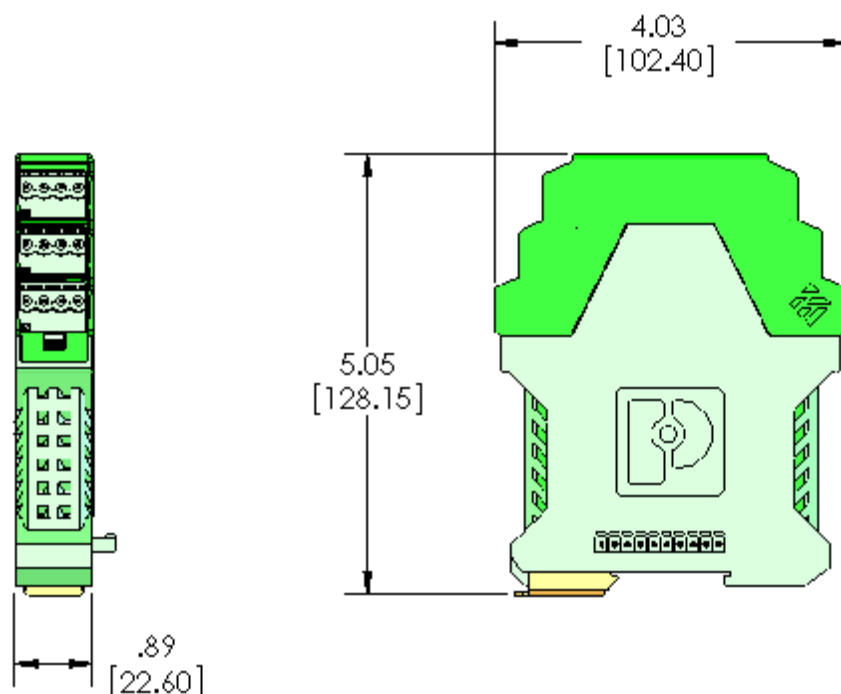


Figure 6.1 FCM II Single Module Dimensions

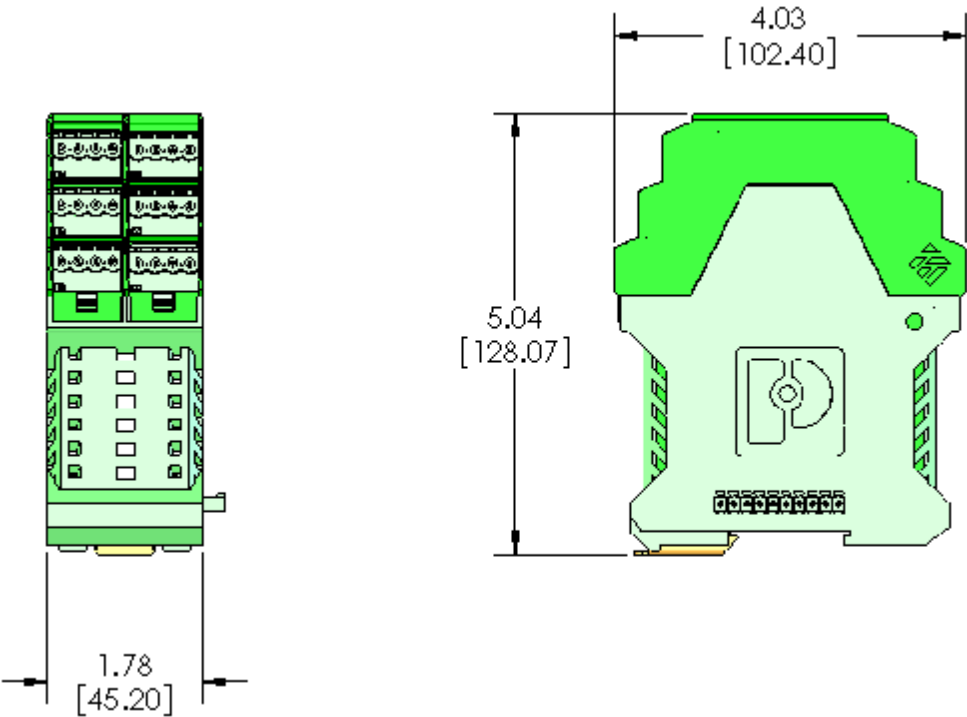


Figure 6.2 FCM II Double Module Dimensions

6.2 **STANDARD PANEL DIMENSIONS**

6.2.1 **20 INCH X 20 INCH PANEL**

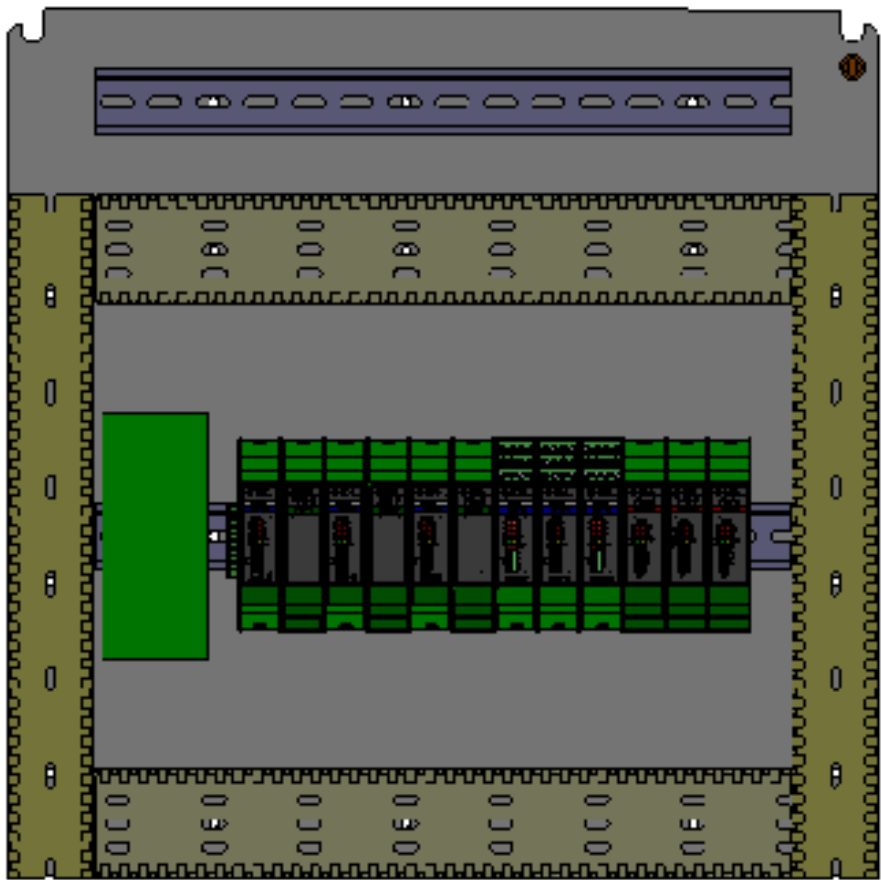




Figure 6.3 20 Inch x 20 Inch Panel Layout

	The maximum number of FCM IIs on this panel is the equivalent of 12 single wide modules.
	Toptech recommends mounting the power supply on the DIN rail with the FCM IIs as most DIN rail power supplies require vertical mounting and top/bottom clearance for proper cooling.

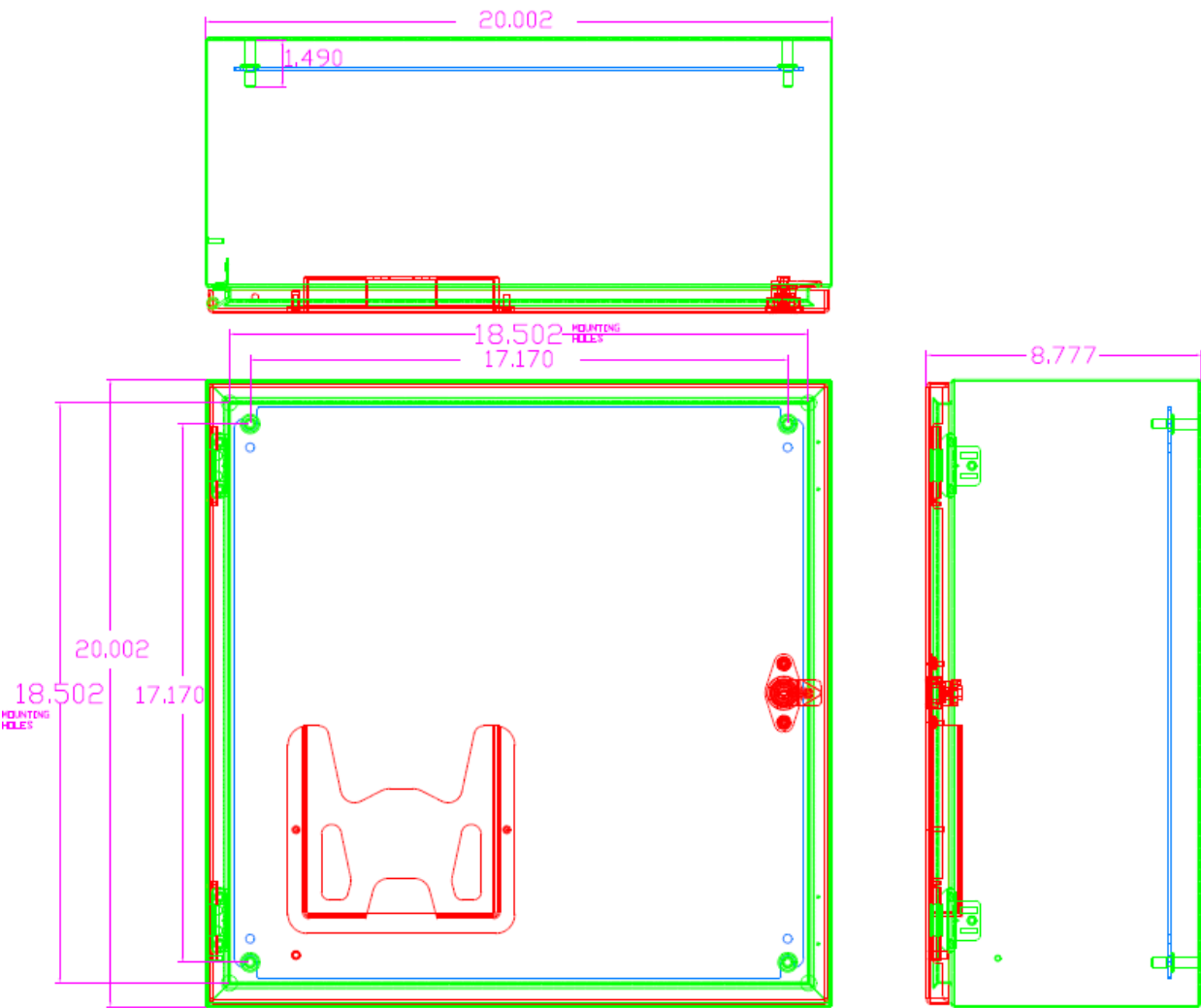


Figure 6.4 20 Inch x 20 Inch Enclosure Dimensions

6.2.2 30 INCH X 30 INCH PANEL

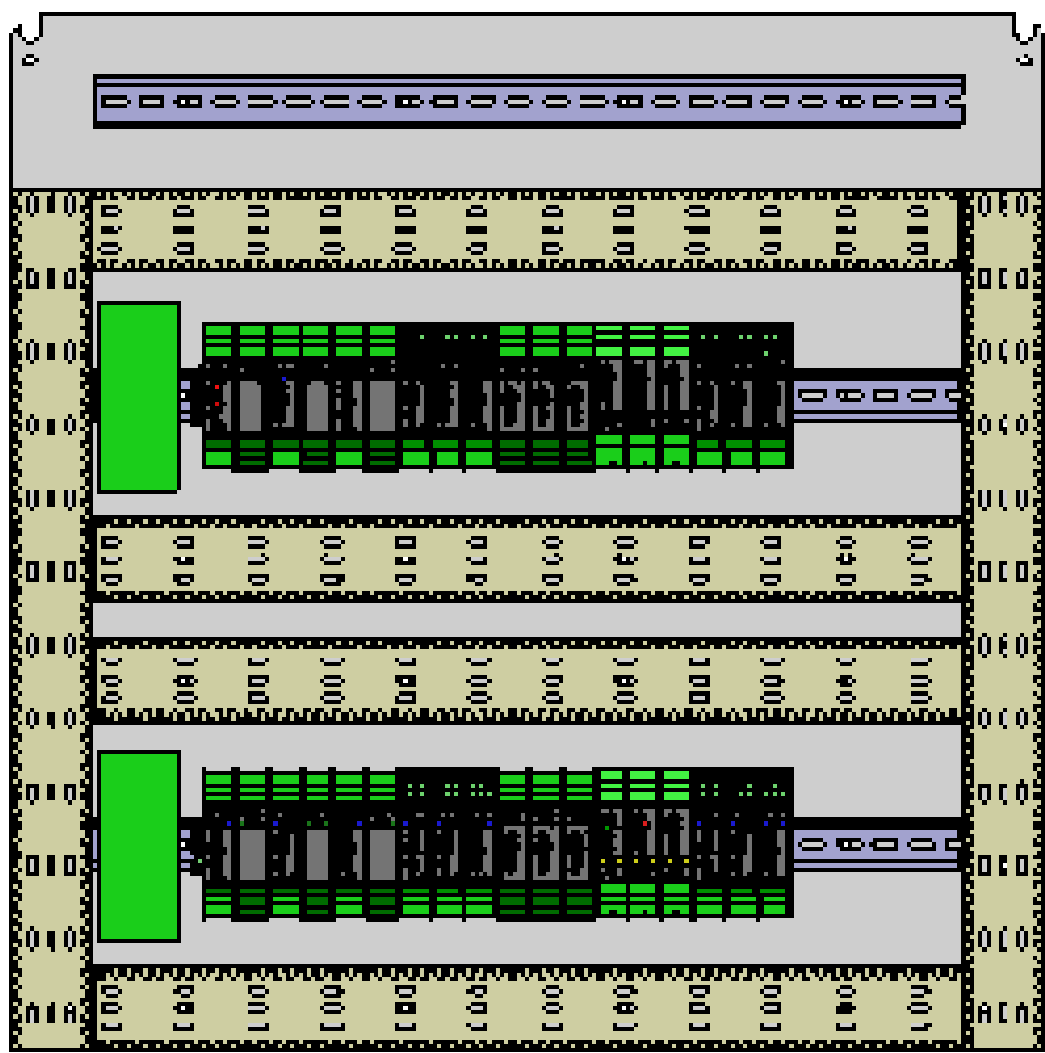


Figure 6.5 30 Inch x 30 Inch Panel Layout

	The maximum number of FCM IIs on this panel is the equivalent of 18 single wide modules per row (36 total).
	Toptech recommends mounting the power supply on the DIN rail with the FCM IIs as most DIN rail power supplies require vertical mounting and top/bottom clearance for proper cooling.
	Each row of FCM IIs requires its own power supply.

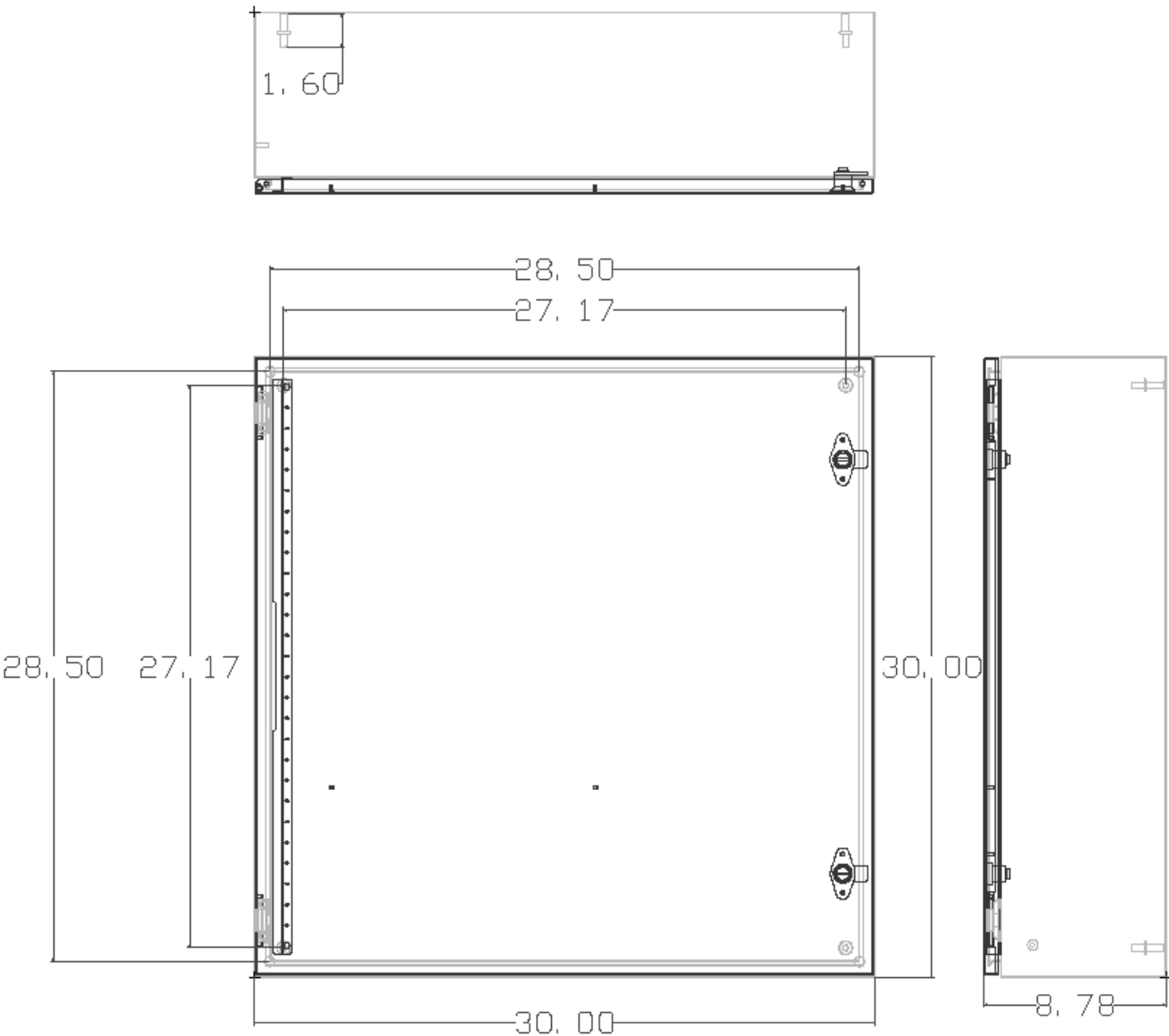


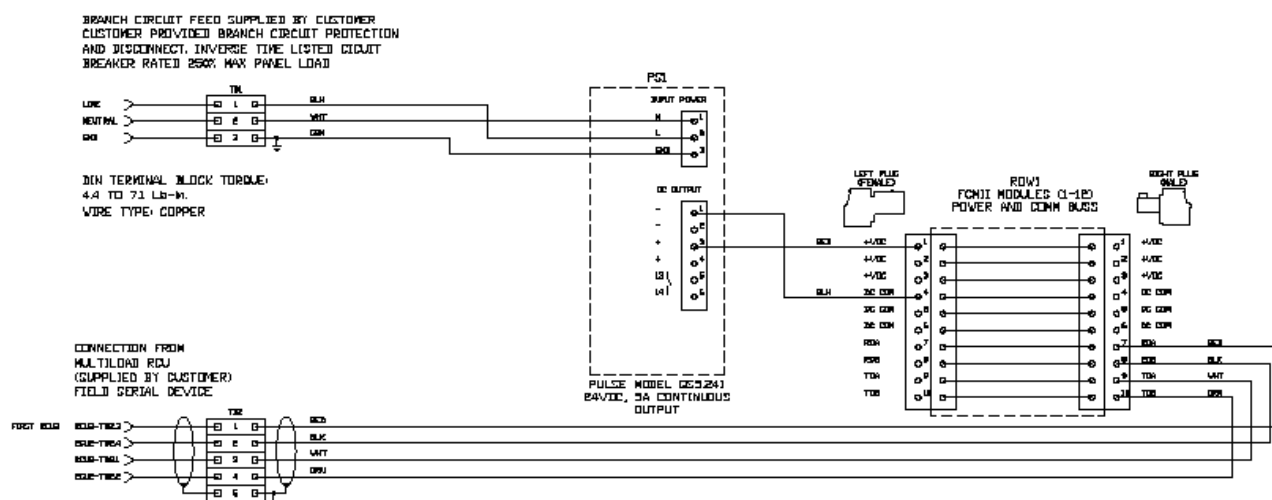
Figure 6.6 30 Inch x 30 Inch Enclosure Dimensions

6.3 PANEL ELECTRICAL WIRING SUGGESTIONS

6.3.1 POWER AND COMMUNICATION DISTRIBUTION

FCM II modules were designed to minimize 24 Vdc input power and serial communication wiring by employing a distribution buss in the base of the modules. Therefore, considerations only have to be made as to which side of a DIN rail assembly the power and communication cable should attach (left side female plug or right side male plug). Note also that star wiring should be avoided, so communication cable extension to adjacent rows ought to use the opposite end of the joined modules than the end from which communication enters.

Toptech also recommends using one power supply for each DIN rail assembly. See Figures 6.7 to 6.9 for the various configurations of FCM II power and serial communication wiring schematics.



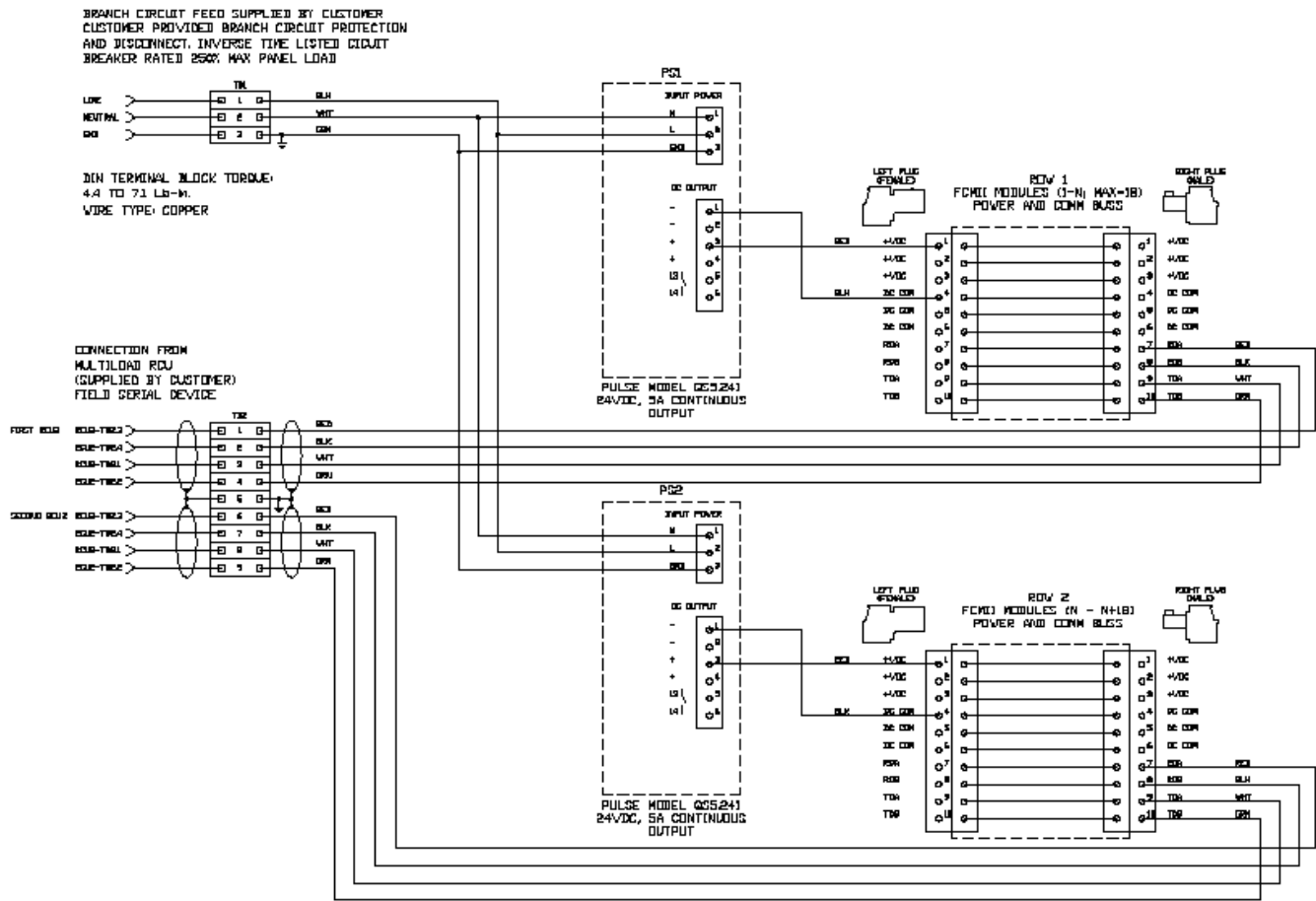


Figure 6.8 FCM II Power and Serial Communication Panel Wiring: Two Rows, Two Serial Ports



Figure 6.10 shows the terminal block labeling of field connections. All modules follow the convention of labeling bottom side plugs from A to C as the staircase to the top and D to F for the top side plugs as they staircase to the top. Numbers one through 4 are arranged from left to right when viewing the plug from its wire entry side. To differentiate terminals of different modules, Tiptech recommends a **module.slot.number** identification scheme where

slot is either 0 or 1 depending on whether the terminals are attached to the left or right board in a double wide housing, and

As an example, an ANALOG/4DCIN/4ACOUT module at address 0, would have its Port 0 line voltage terminal labeled 0.0.A1 and the loop voltage for the RTD would be labeled 0.1.D1. See Figure 3.5.

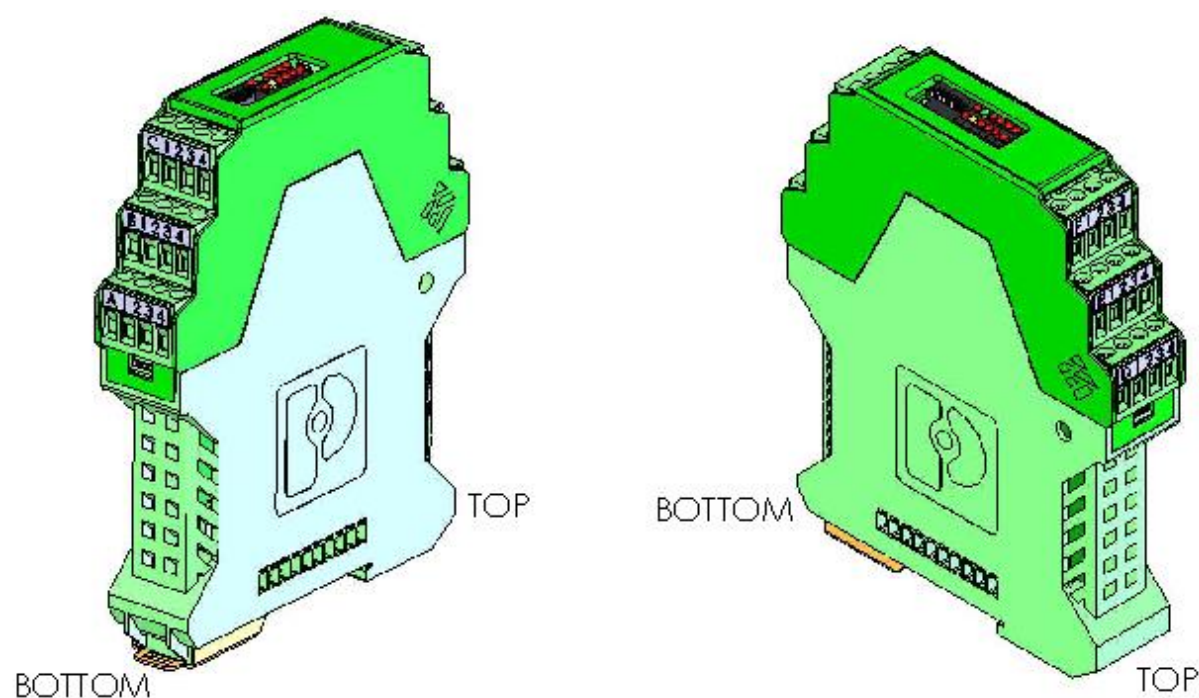


Figure 6.10 FCM II Field Terminal Block Labels

6.3.3 VOLTAGE DISTRIBUTION

The common practice of installing a MultiLoad panel usually involves bringing all field devices directly into the enclosure. But note that DC and AC output modules only switch the voltage and do not distribute Neutral or dc common voltages. For this reason, Toptech recommends the installation of bussed DIN mounted terminal blocks to distribute Neutrals and dc commons.

Two ac line voltages are also distributed through the panels. One is normal 120V line voltage switched to additive injectors, motor operated valves, VRU/VCOs, and pump run signals. The second line voltage to be distributed is the Ground/Overfill output required by digital control valves.



Note: Do not use FCM II ac outputs to directly run pumps. Use an interposing relay. The rated currents of the ac output modules should be sufficient for most types of solenoid valves but note the ratings as shown in Figure 1.2 and section 3.2.

CHAPTER 7 HARDWARE REVISION HISTORY

[illegible]

CHAPTER 8 MANUAL REVISION HISTORY

Revision	Date	Description
1.0	09/30/2009	Remove FCMII configuration from chapter 4 of MultiLoad II install guide to its own install guide.
1.1	06/23/2011	Added Swing Arm configuration.
	04/26/2013	Added LectroCount wiring
	04/26/2013	Dropped revision number control; control by release date
	04/26/2013	Added 12Vdc supply load rating
	04/26/2013	Updated European DOC
	04/19/2016	Revised Declaration of Conformity (new directive dates in effect 4/20/2016)