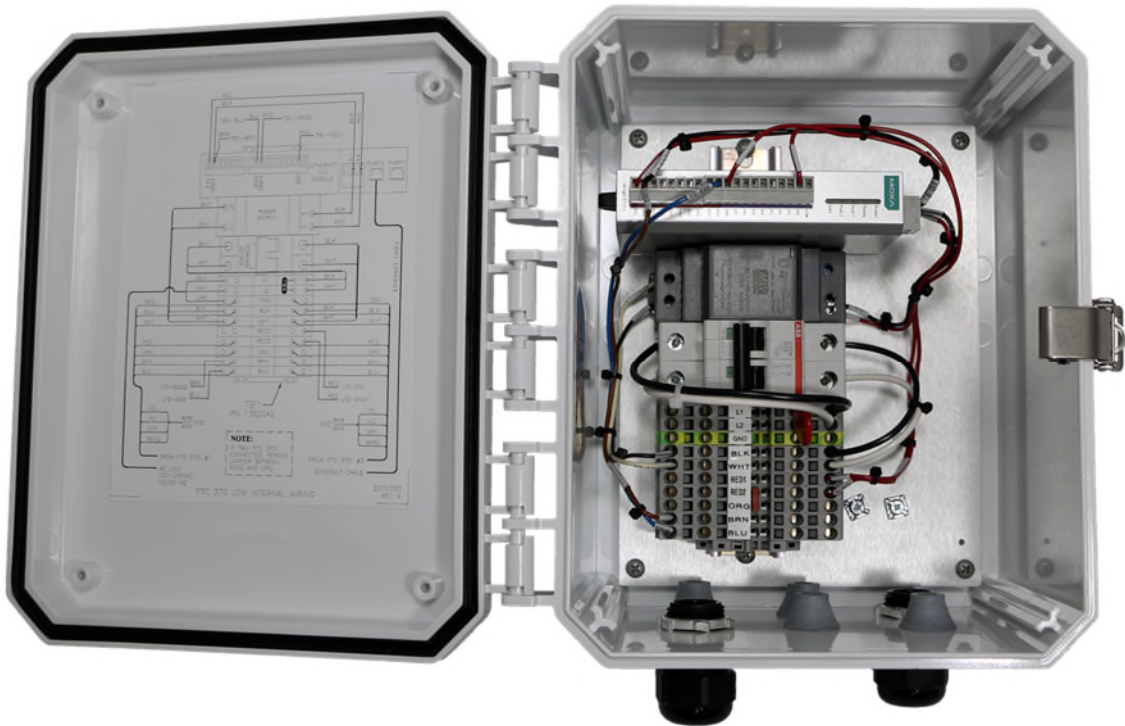


FLASH TECHNOLOGY



FTC 370 / 370A LCM

ADLS Lighting Control Module

User Manual

Document Number

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FTC 370 / 370A LCM USER MANUAL

FRONT MATTER

ABSTRACT

This manual contains information and instructions for installing, operating and maintaining the FTC 370 and FTC 370A Lighting Control Module.

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While every effort has been made to ensure that the information in this manual is complete, accurate and up-to-date, Flash Technology assumes no liability for damages resulting from any errors or omissions in this manual, or from the use of the information contained herein. Flash Technology reserves the right to revise this manual without obligation to notify any person or organization of the revision.

In no event will Flash Technology be liable for direct, indirect, special, incidental, or consequential damages arising out of the use of or the inability to use this manual.

WARRANTY

Flash Technology warrants all components, under normal operating conditions, under a 5-year parts replacement warranty.

PARTS REPLACEMENT

The use of parts or components in this equipment that are not manufactured or supplied by Flash Technology voids the warranty and invalidates the third-party testing laboratory certification which ensures compliance with FAA Advisory Circulars 150/5345-43J, 150/5345-53D and Engineering Brief No. 67D. The certification is valid as long as the system is maintained in accordance with FAA guidelines (FR doc. 04-13718 filed 6-16-04).

PERSONNEL HAZARD WARNING

..... DANGEROUS VOLTAGES

Dangerous line voltages reside in certain locations in this equipment. Also, this equipment may generate dangerous voltages. Although Flash Technology has incorporated every practical safety precaution, exercise extreme caution at all times when you expose circuits and components, and when you operate, maintain or service this equipment.

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AVOID TOUCHING LIVE CIRCUITS

Avoid touching any component or any part of the circuitry while the equipment is operating. Do not change components or make adjustments inside the equipment with power on.

DO NOT DEPEND ON INTERLOCKS

Never depend on interlocks alone to remove unsafe voltages. Always check circuits with a voltmeter after turning the circuit breakers off. Under no circumstances remove or alter the wiring or interlock switches.

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SECTION 1 – OVERVIEW

Flash Technology's new FTC 370 Lighting Control Module (LCM) provides Ethernet connectivity of our wind turbine obstruction light(s) to an Aircraft Detection Lighting System (ADLS) utilizing standard Modbus TCP protocol. The FTC 370A version provides the additional capability for a SCADA or other control system to monitor alarms in addition to the ADLS. The FTC 370 is currently compatible with the Detect Harrier and the Terma Scanner ADLS systems.

The LCM features the ability to control up to 2 new or existing FTS 370i or FTS 350i obstruction lights, Modbus TCP communication protocol, and a Failsafe feature if communication error occurs with ADLS.

This manual provides guidance and recommendations for the installation, inspection, and testing of the FTC 370 LCM assembly. Please read this document in its entirety before installing the FTC 370 LCM.

Shown in [Table 1-1](#), the FTC 370 Lighting Control Module (hereafter referred to as the LCM) operates from a 100-240 VAC 50/60 Hz AC line.

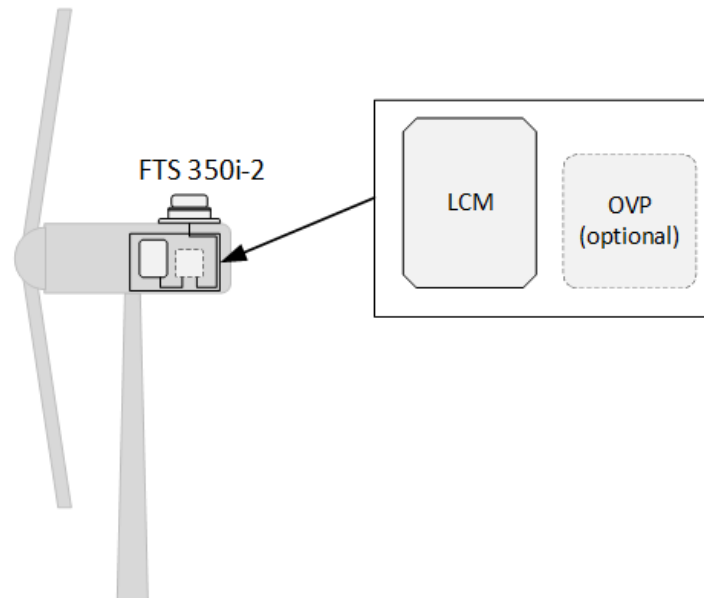


Figure 1-1 – FTC 370 and OVP (optional) installation overview

1.1 SPECIFICATIONS

Type	FTC 370 / FTC 370A: Lighting Control Module
Input Voltage	100-240 VAC
Frequency	50/60 Hz
Power Consumption	7 W
Weight	5.8 lbs. (2.6 kg)
Operating Temperature	-40°F to +131°F (-40°C to +55°C)
Dimensions	10" x 8" x 6" or (254 x 230 x 155) mm
Protection Rating	IP66, NEMA 4x

Table 1-1 – Specifications

1.2 LCM COMPONENT IDENTIFICATION



Figure 1-2 – External Enclosure

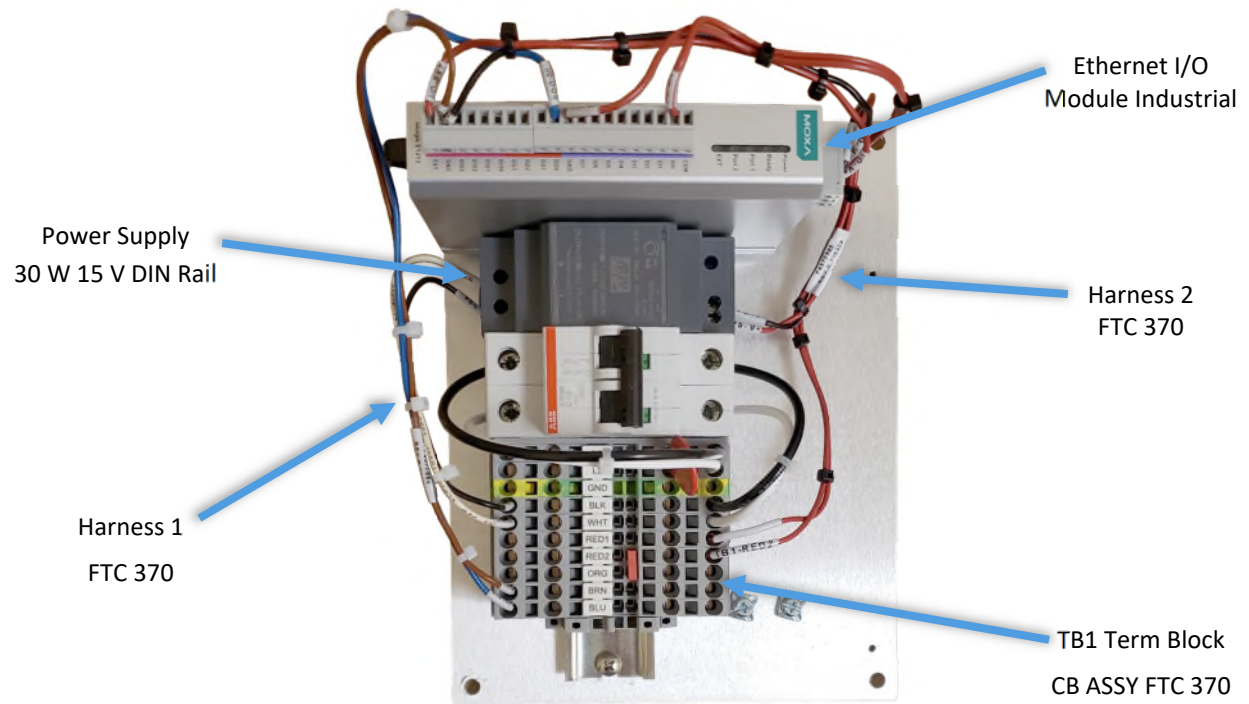


Figure 1-3 – FTC 370 Component Locations

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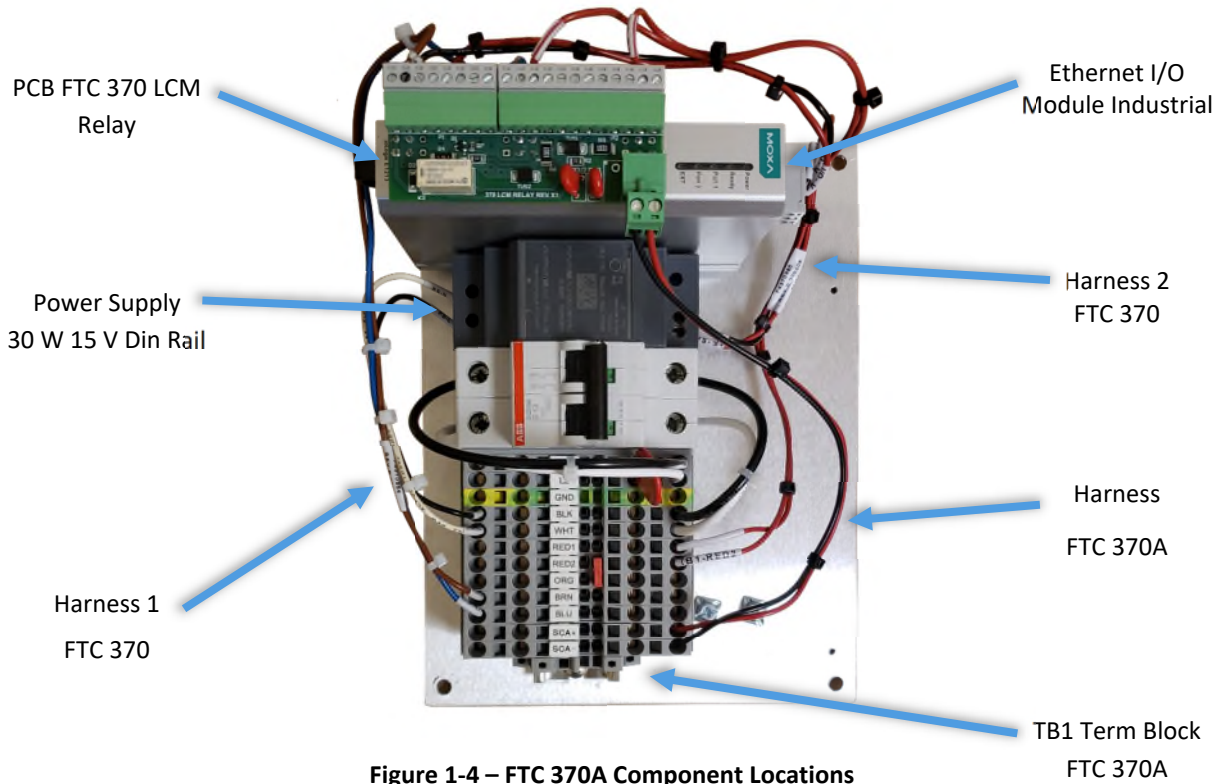


Figure 1-4 – FTC 370A Component Locations

SECTION 2 – INSTALLATION

WARNING

Read the [Personal Hazard Warning](#) (page 2) now. Remove power from all wiring and circuitry before installing or performing work on the beacon. It is the installer's responsibility to comply with all applicable electrical codes.

INSTALLATION PROCEDURES

1. Unpack the FTC 370 LCM
2. Mount the FTC 370 LCM
3. Wire the beacon power and monitoring connections
4. Verify operation

After all steps are completed successfully, the installation is complete.

2.1 UNPACK THE FTC 370 LCM

The FTC 370 LCM is packaged in custom packaging to ensure that it arrives safely and undamaged at the installation location. Unpack all hardware and inspect for damage. Please contact [Flash Technology Customer Service](#) (page 26) if any parts are damaged or missing. See the [RMA Policy](#) (page 27) for additional information.

2.2 MOUNT THE FTC 370 LCM

Locate the FTC 370 LCM in an area that will allow proper access to the enclosure. Ensure the mounting location does not interfere with the quick-release latch that secures the enclosure's door. Release the latch to open the door for internal access.

Use the following guidelines for mounting the controller:

- Ensure that adequate space exists around the equipment for access during installation, maintenance, and servicing.
- Allow space for airflow around the controller. Recommended 3-4" of space allowed on each side of the controller. Flash Technology does not furnish mounting hardware unless it is ordered as part of an installation kit.
- Flash Technology recommends using flexible conduit for all cable runs with the exception of the beacon cable and jacketed ground wires.

2.3 WIRING THE BEACON AND MONITORING CONNECTIONS

The beacon is supplied with a 50-foot length (15.2 m) of 10-conductor power & alarm cable pre-wired to the internal electronics to facilitate installation (see Table 2-1, in the next page). The ground wire must be connected for proper operation and protection of the beacon. Optional 75-foot (22.8m), 100-foot (30.5m) and custom cables lengths are available.

Optional dry contact monitoring connections permit monitoring of lighting system operation. The contact is closed when the beacon is operating normally, and no fault is detected.

Refer to the LCM wiring diagrams for information on connections.

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10 Conductor Cable	Wire Color	Function	Wiring Connections	External Connections
	Black	Input Power	TB1 – BLK	(120 VAC) or (240 VAC) - L1
	White	Input Power	TB1 – WHT	(120 VAC) or (240 VAC) – L2
	Green	Ground	TB1 – GND	Ground
	Red	Alarm Contact	TB1 – RED1 / RED2	Alarm Output ¹
	Orange	Alarm Contact	TB1 – ORG	Alarm Output ¹
	Brown	Radar Inhibit Input	TB1 – BRN	AUX Control Input ²
	Blue	Radar Inhibit Input	TB1 – BLU	AUX Control Input ²
	Violet	Ground	Chassis GND	Ground
	Yellow	Ground	Chassis GND	Ground
	Gray	Ground	Chassis GND	Ground
	Bare (Drain)	Ground	Chassis GND	Ground

Table 2-1 – Power, Alarm and Radar Interface Connections

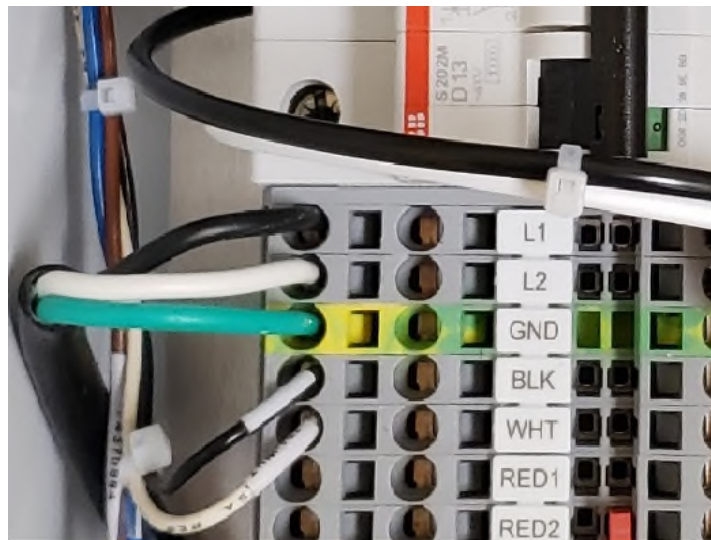


Figure 1-5 – AC Line AC Line Termination

Note ¹ Refer to the monitoring system manufacturer's installation manual for connection locations

Note ² Refer to the radar interface manufacturer's installation manual for connection locations

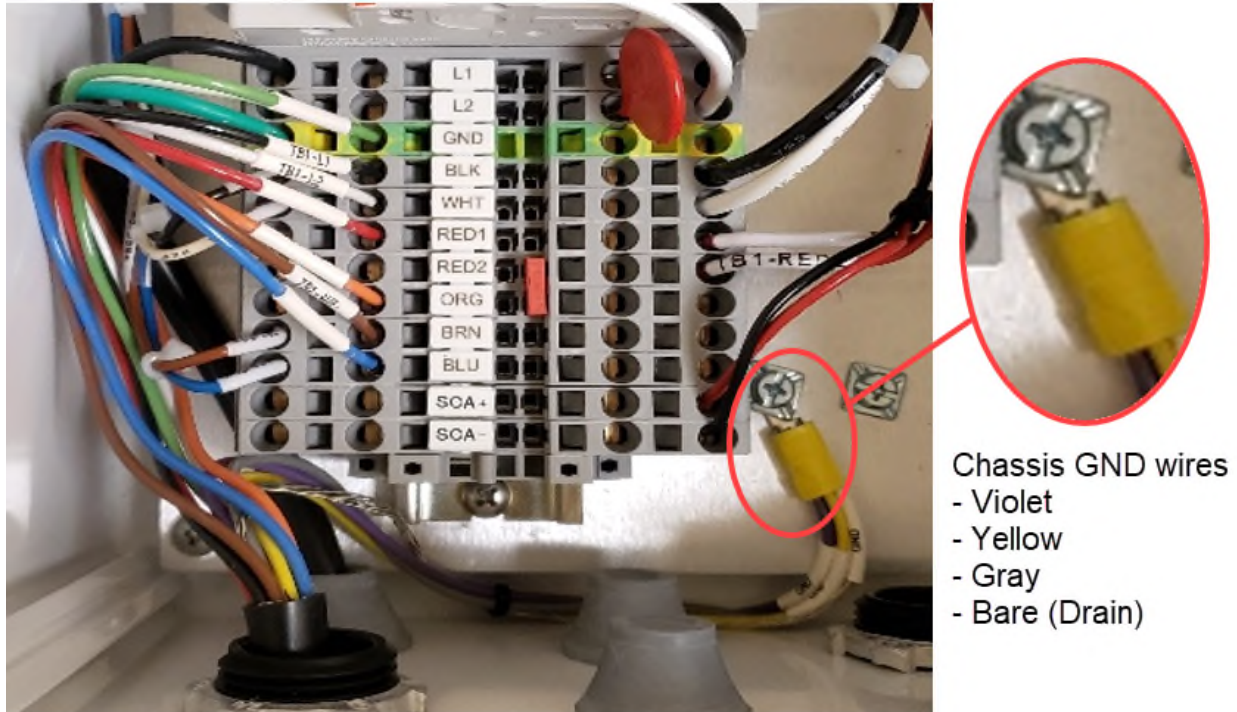


Figure 1-6 – FH #1 Cable Termination

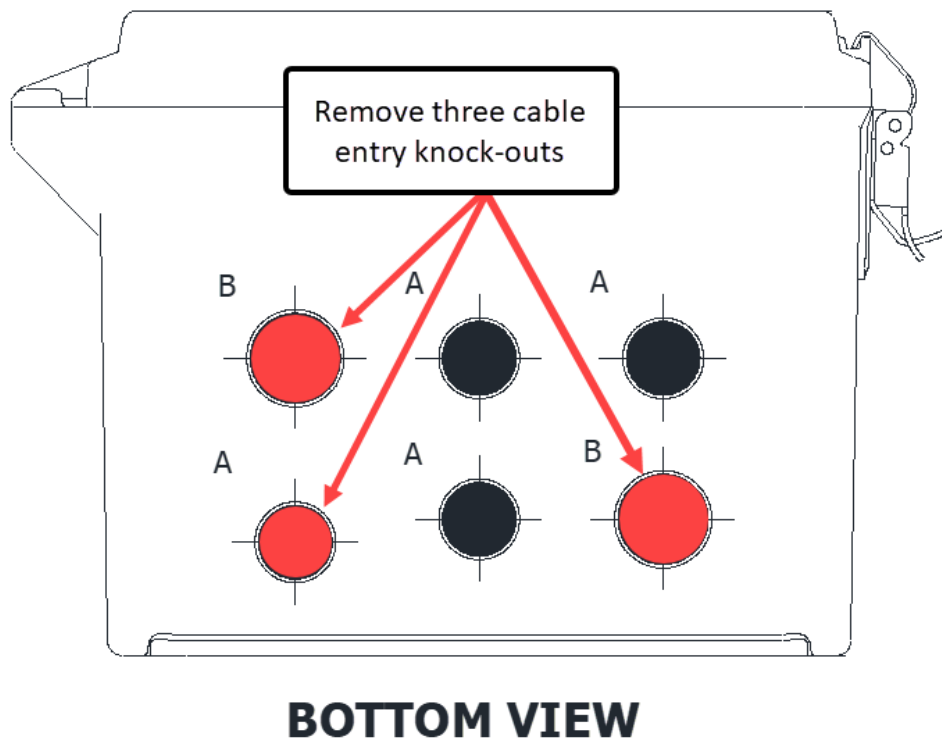


Figure 1-7 – Cable Entry from Bottom of Control Box

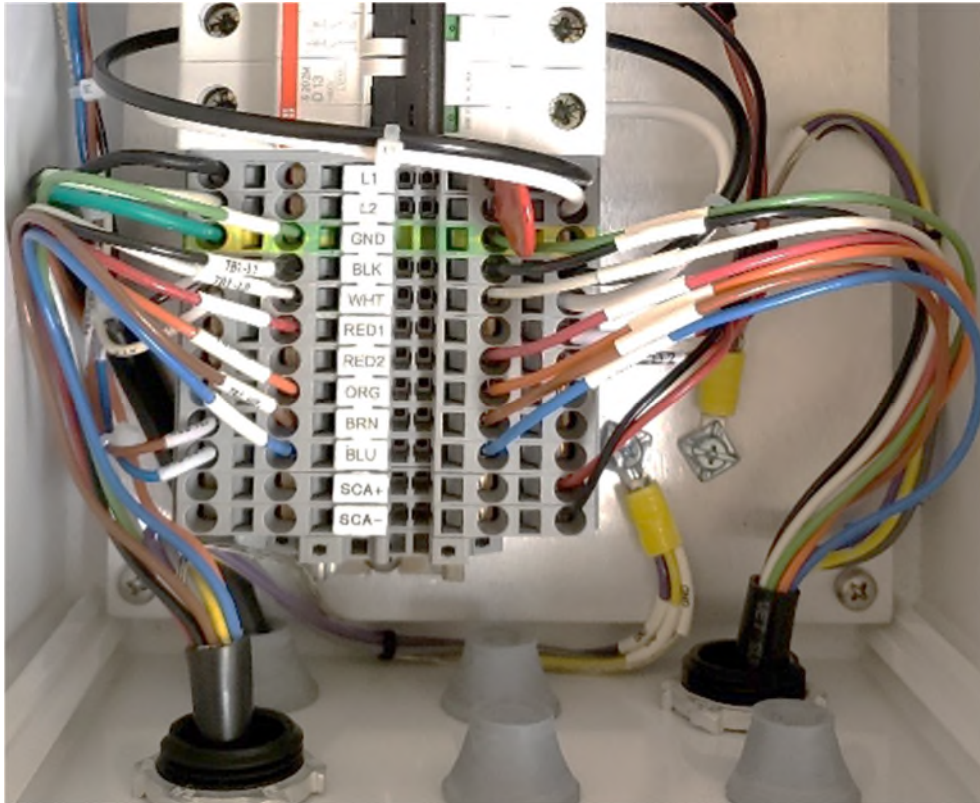


Figure 1-8 – FH #2 Cable Termination

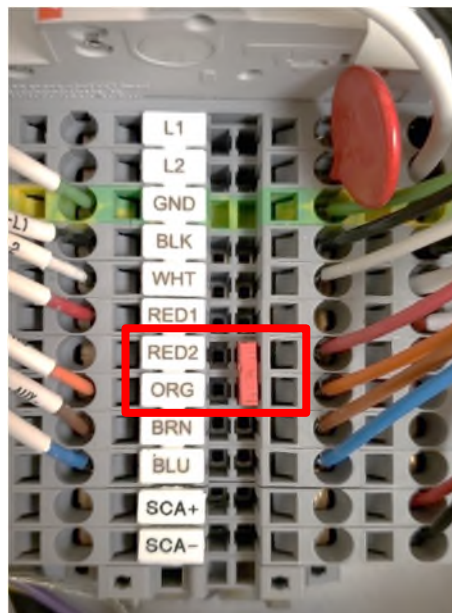


Figure 1-9 – JUMPER REMOVAL

IF TWO BEACONS ARE CONNECTED, REMOVE JUMPER BETWEEN RED2 AND ORG

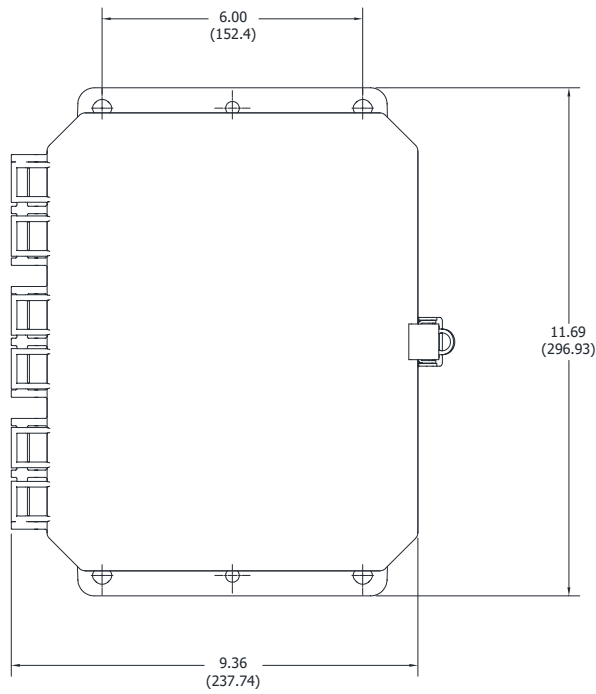
2.4 WIRING THE LCM WITH OVP SYSTEM

The LCM can be installed in conjunction with the optional Flash Technology Overvoltage Protection System (OVP-Radar, Part number 1390191). Install the OVP in between the LCM and each Beacon. See OVP manual for installation.

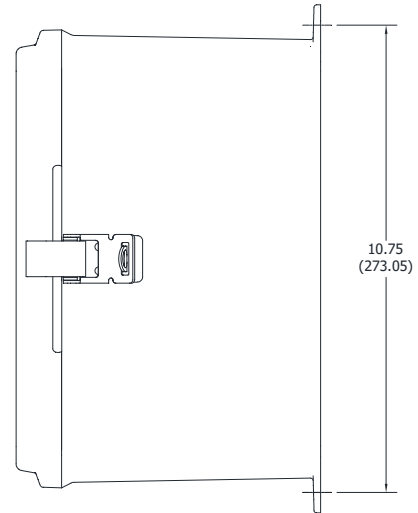


Figure 2-1 – Optional 1370191 OVP

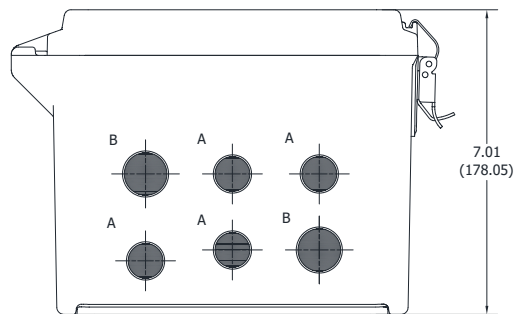
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FRONT VIEW



RIGHT SIDE VIEW



BOTTOM VIEW

KNOCKOUT TABLE		
LETTER	KNOCKOUT SIZE (DIA)	QTY
A	0.875 (22.4)	4
B	1.093 (27.8)	2

Figure 2-2 – FTC 370 LCM Enclosure Mounting and Outline

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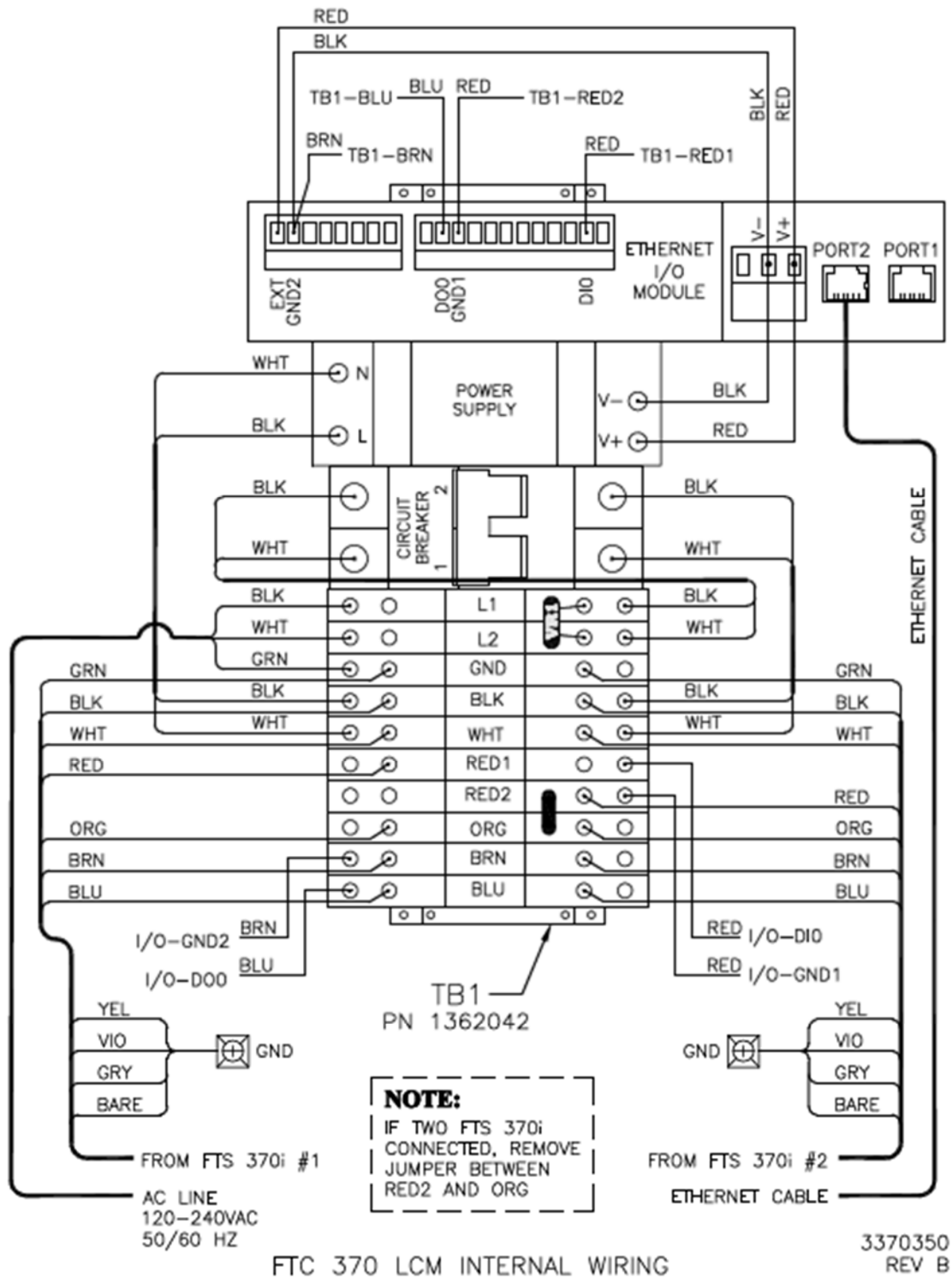


Figure 2-3 – FTC 370 LCM Internal Wiring Diagram

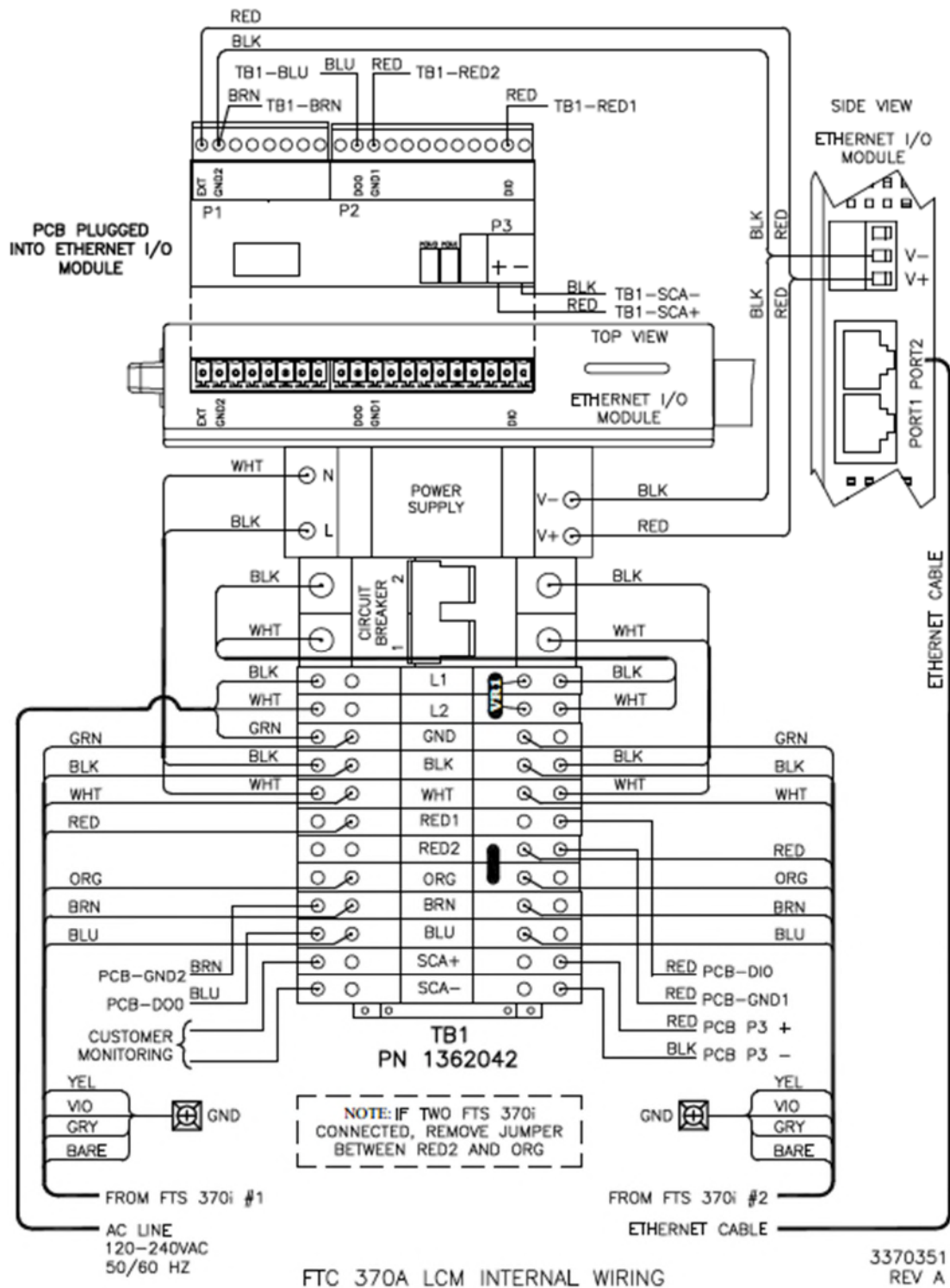


Figure 2-4 – FTC 370A LCM Internal Wiring Diagram

2.5 VERIFYING OPERATION

Apply power to the LCM and verify operation.

2.5.1 POWER UP

Power the system using the breaker located on the TB1 Terminal Block. Observe that the LEDs on the power supply and MOXA are illuminated.

When powered up, the beacon will begin flashing after several seconds. The beacon will continue to flash for 15 minutes. After the initial 15 minutes, the unit will stop flashing once the photodiode detects sufficient light for 30 seconds.

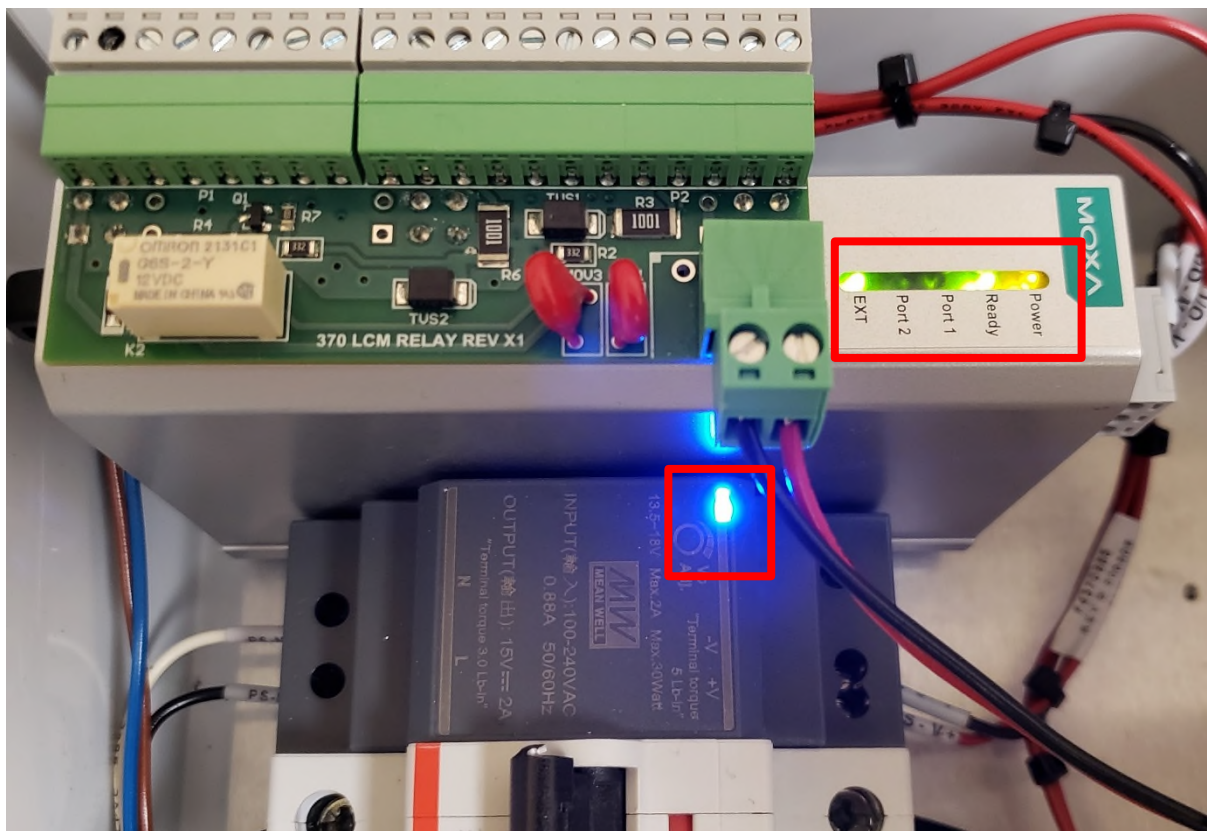


Figure 2-5 – Power Supply and MOXA LED Indicators

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LED	State	Description
Power	Amber	System power is ON
	OFF	System power is OFF
Ready	Green	System is ready
	Flashing	Flashes every 1 second when the “Locate” function is triggered
	Flashing	Flashes every 0.5 second when the firmware is being upgraded
	Flashing	ON/OFF cycle period of 0.5 second represents “Safe Mode”
	OFF	System is not ready
Port 1	Green	Ethernet connection enabled
	Flashing	Transmitting or receiving data
Port 2	Green	Ethernet connection enabled
	Flashing	Transmitting or receiving data
EXT	Green	EXT field power input is connected
	Off	EXT field power input is disconnected

Table 2-2 – MOXA LED Indicators

2.5.2 CHECK ALARM STATUS

VIA ALARM RELAY

After 5 minutes of operation, check the alarm contact to ensure there are no alarm conditions. A multi-meter may be used to check for continuity between the COM (Red) and NC (Orange) conductors. The contact is closed when the beacon is powered, operating normally and no fault is detected. If an alarm condition is observed, refer to [Troubleshooting](#) (page 23).

2.5.3 CHECK MONITORING STATUS

Confirm monitoring status by disconnecting power to the beacon. This should create an alarm.

SECTION 3 – FTC 370 LCM OPERATION

3.1 SYSTEM OVERVIEW

The standard 10-conductor power and alarm cable provides connection for the AC line (3 wires), alarm monitoring connections (2 wires), and auxiliary control input (2 wires). See [wiring instructions](#) (page 10).

The AC input power requirement is 100-240 VAC 50/60Hz. The dry contact alarm connection is closed when the beacon is operating normally, and no fault is detected.

The power supply, with surge suppressors, are located on the TB1 terminal block. The power supply generates the proper DC current to the MOXA when AC line voltage is applied at its input. The surge suppressors provide protection from incoming lightning and transient voltage induced surges.

3.2 IP ADDRESS & MAC ID

Flash Technology programs the LCM according to customer direction before the product ships. Refer to the LCM Information Label on the enclosure door for unit specific information.

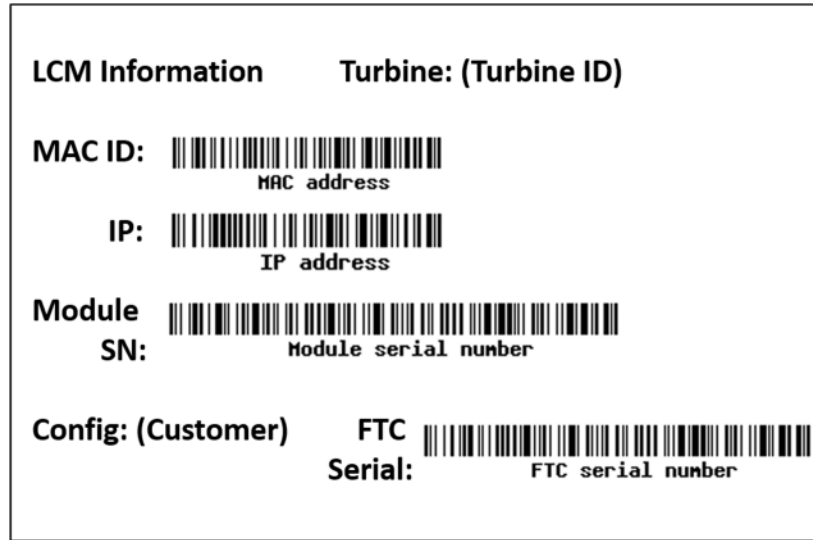


Figure 3-1 – LCM Information Label

3.3 LCM MODBUS MAP

Flash Technology utilizes two registers in the Moxa E1213 Modbus map accessed via the Ethernet on the LCM.

Parameter Name	Description	Start Address (decimal)	Point Type	Start Register (decimal)	Length	Access	Type
DI_status	0: OFF, 1: ON	0000	02:INPUT STATUS	10001	12	R	bit
DO_status	0: OFF, 1: ON	0000	01:COIL STATUS	00001	8	R/W	bit

Table 3-1 – Utilized Registers from Modbus Map

The DI_status (Function code 2) register is used to read alarm contact status from the light and should be monitored to determine alarm state. A value of 0 indicates an alarm state, a value of 1 indicates the light is operating correctly and no alarm is currently present.

The DO_status (Function code 5, offset 0, data as 0xFF 0x00) register is used to write to the single coil digital output to suppress the normal operation of the light (i.e. turn lights OFF). Not sending a DO write command allows

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the light to turn ON. Please note: when not suppressed, the light will follow normal operation and turn the light ON if the photodiode determines it is nighttime. So, if the DO command is not sent and daylight conditions are detected by the photodiode, the light will remain off but is functioning correctly.

The default Modbus station address is “1”.

Below is a sample Modbus TCP command to turn the light off:

0x00, 0x01, 0x00, 0x00, 0x00, 0x06, 0x01, 0x05, 0x00, 0x00, 0xFF, 0x00

The two above registers are all that is needed to monitor alarms and turn the lights off.

All other registers are optional, but are listed below for completeness.

I/O

Parameter Name	Description	Start Address (decimal)	Point Type	Start Register (decimal)	Length	Access	Type
DI_counterOverflowFlag	0: Normal, 1: Overflow	1000	02:INPUT STATUS	11001	12	R	bit
DI_counterOverflowFlagClear	1: clear overflow flag	0288	01:COIL STATUS	00289	12	R/W	bit
DI_counterReset	1: reset to initial value	0272	01:COIL STATUS	00273	12	R/W	bit
DI_counterStatus	0: STOP, 1: START	0256	01:COIL STATUS	00257	12	R/W	bit
DI_counterValue	high/low word	0016	04:INPUT REGISTER	30017	24	R	2 words
DI_status	0: OFF, 1: ON	0000	02:INPUT STATUS	10001	12	R	bit
DI-all_statusFromDI-00	0: OFF, 1: ON	0048	04:INPUT REGISTER	30049	1	R	word
DO_p2pSafeModeFlagClear	1: clear safe mode flag	4128	01:COIL STATUS	04129	8	R/W	bit
DO_p2pSafeModeFlag	0: OFF, 1: ON	4112	02:INPUT STATUS	14113	8	R	bit
DO_p2pStatus	0: OFF, 1: ON	4096	02:INPUT STATUS	14097	8	R	bit
DO_pulseCount		0036	03:HOLDING REGISTER	40037	8	R/W	word

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DO_pulseOffWidth	unit: 1 ms	0068	03:HOLDING REGISTER	40069	8	R/W	word
DO_pulseOnWidth	unit: 1 ms	0052	03:HOLDING REGISTER	40053	8	R/W	word
DO_pulseStatus	0: STOP, 1: START	0016	01:COIL STATUS	00017	8	R/W	bit
DO_status	0: OFF, 1: ON	0000	01:COIL STATUS	00001	8	R/W	bit
DO-all_statusFromDO-00	0: OFF, 1: ON	0032	03:HOLDING REGISTER	40033	1	R/W	word

Table 3-2 – Complete Modbus Address and Register Map (I/O)

System

Parameter Name	Description	Start Address (decimal)	Point Type	Start Register (decimal)	Length	Access	Type
deviceName	Each byte represents ASCII code of each character	5040	04:INPUT REGISTER	35041	30	R	word
deviceUpTime	unit: sec(s)	5020	04:INPUT REGISTER	35021	2	R	word
firmwareVersion	e.g. V1.2.3 --> 1st byte: 1, 2nd byte: 2, 3rd byte: 3	5029	04:INPUT REGISTER	35030	2	R	word
firmwareBuildDate	e.g. Build16051718 --> 16051718	5031	04:INPUT REGISTER	35032	2	R	word

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lanIp	e.g. 192.168.127. 254 -> 1st byte: 192, 2nd byte: 168, 3rd byte: 127, 4th byte: 254	5027	04:INPUT REGISTER	35028	2	R	word
lanMac	e.g. 00:90:E8:3E: 18:CC -> 1st byte: 0, 2nd byte: 144, 3rd byte: 232, 4th byte: 62, 5th byte: 24, 6th byte: 204	5024	04:INPUT REGISTER	35025	3	R	word
modelName	Each byte represents ASCII code of each character	5000	04:INPUT REGISTER	35001	10	R	word
watchdogAlarmFlag	1: clear watchdog alarm	4144	01:COIL STATUS	04145	1	R/W	bit

Table 3-2 – Complete Modbus Address and Register Map (System)

SECTION 4 – MAINTENANCE AND TROUBLESHOOTING

4.1 MAINTENANCE

No regularly scheduled maintenance is required for the LCM.

- Flash Technology warrants the function of the LCM to meet or exceed FAA/ICAO requirements for a 5-year period.
- Optional mounting brackets and cable glands should be checked periodically for tightness.

4.2 TROUBLESHOOTING

Follow the troubleshooting steps in the tables below as applicable. LCM repair procedures are provided in [Section 4.3](#) (page 26). If Troubleshooting assistance is needed, call Flash Technology Technical Support at 1-800-821-5825, option 9. Tech Support is available M-F, 8 a.m. to 6 p.m. CT.

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Possible Cause	Action
AC Mains power failure / AC Power not applied	Check AC mains power using multi-meter; Restore Power.
External circuit breaker OFF/Tripped	Check circuit breaker; Move breaker to ON position.
Internal circuit breaker OFF/Tripped	Check circuit breaker; Move breaker to ON position (Red indicator = ON, Green indicator = OFF).
AC Power wired incorrectly	Inspect wiring; Correct wiring using wiring diagram.
LCM unit damaged	Replace LCM.

Table 4-1 – Troubleshooting – LCM Does Not Turn On

Possible Cause	Action
LCM is not turned ON	Check circuit breaker; Move breaker to ON position (Red indicator = ON, Green indicator = OFF).
Daytime Operation	By design, Wind Turbine lights will not flash during Daytime operation; Verify proper Nighttime operation.
Loose connections, Incorrect wiring or wiring to Beacon is open or shorted	Inspect wiring; Correct wiring using wiring diagram. Inspect cable for damage; Repair or replace.
Unused wiring not connected to Earth Ground	Inspect wiring; Connect Yellow, Violet, Gray and Bare wires to Earth Ground
Errant signals being sent to LCM via Modbus	Verify Modbus settings
OVP (if equipped) triggered / tripped	Inspect OVP for disconnection indicator; Cycle AC power to restore operation.
Individual Beacon has failed	Replace Beacon

Table 4-2 – Troubleshooting - Beacon Does Not Turn On, Erratic Operation or Cannot Control Beacon

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Possible Cause	Action
Incorrect / No dry contact wiring	Inspect for correct alarm connections: normally open (NO) contacts close on alarm, normally closed (NC) contacts open on alarm
Jumper missing between RED2 and ORG on TB1 Terminal Block (Single Beacon Operation)	Install Jumper between RED2 and ORG on TB1 Terminal Block
Jumper installed between RED2 and ORG on TB1 Terminal Block (Two Beacon Operation)	Remove Jumper between RED2 and ORG on TB1 Terminal Block
OVP (if equipped) triggered / tripped	Inspect OVP for disconnection indicator; Cycle AC power to restore operation.
Individual Beacon has failed	Normal if Beacon is not operating correctly. Inspect Beacon; Replace Beacon.

Table 4-3 – Troubleshooting – Beacon Alarm, False Alarm or No Alarm

Possible Cause	Action
Cannot access webpage	<ol style="list-style-type: none"> 1. Confirm the network connections and routing are correct. 2. Configure IP address in the same subnet as LCM
Configured IP address does not match IP address on the LCM Information Label	<ol style="list-style-type: none"> 1. Verify IP address of the LCM Information Label is correct. 2. Verify the IP address is reachable (ping test)
IP address is not reachable (ping test)	<ol style="list-style-type: none"> 1. Try reaching on default IP address 192.168.127.254 (ping test) 2. Reprogram to correct IP address

Table 4-4 – Troubleshooting – Cannot Communicate to the LCM over Ethernet

Possible Cause	Action
Modbus Control / Monitoring not Working	<ol style="list-style-type: none"> 1. Verify the Modbus Station address = 1 2. Verify user is writing to register 00001, DO_Status 3. Verify communication to the LCM is possible by reading register 10001, DI_Status 4. Verify General settings under Network settings on the webpage is configured correctly

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Possible Cause	Action
DI_Status value does not change	DI_Status value will only change on Beacon operating incorrectly
Radar control not working; AUX wiring open or shorted	Verify AUX connections inside LCM, OVP (if equipped) and Beacon.

Table 4-5 – Troubleshooting – Cannot Control the Lights Using Modbus

4.3 LCM REPAIR PROCEDURES

Warning: Read the [Personnel Hazard Warning](#) (page 2) now. Remove power from all wiring and circuitry before installing or performing work on the LCM. It is the responsibility of the installer to comply with all applicable electrical codes.

Note: While performing the following steps, check for any loose connections and other damaged components.

4.3.1 REPLACE THE LCM

FTC 370 LCM Part Number: **F1371500**, FTC 370A LCM Part Number: **F1371510**

LCM REMOVAL

Disconnect the LCM's cable pigtail from the power source and any monitoring equipment. Unfasten the hardware that holds the LCM unit to the structure or mounting bracket. Remove the LCM.

LCM REPLACEMENT

Refer to [Section 2](#) (page 10).

SECTION 5 – CUSTOMER SUPPORT

5.1 CONTACT INFORMATION

Parts Department: 1-800-821-5825

Telephone: (615) 503-2000

Fax: (615) 261-2600

Website: flashtechnology.com

Shipping Address:

Flash Technology
332 Nichol Mill Lane
Franklin, TN 37067

FTC 370 / 370A LCM USER MANUAL

5.2 ORDERING PARTS

To order spare, replacement, or optional parts, contact Parts Department at 1-800-821-5825.

Description	Part Number
FLASH OVP-RADAR ASSEMBLY	1390191

Table 5-1 – Optional Parts

Description	Part Number
TERM BLOCK CB ASSY FTC 370	1362042
HARNESS 1 FTC 370	4370884
HARNESS 2 FTC 370	4370885
POWER SUPPLY 30W 15V DINRAIL	5371130
ETHERNET I/O MODULE INDUSTRIAL	5905110
TERM BLOCK FTC 370A*	1362043*
HARNESS FTC 370A*	4370890*
PCB FTC 370 LCM RELAY*	2356000*

*** PARTS FOR THE FTC 370A LCM ONLY**

Table 5-2 – Spare/Replacement Parts

5.3 RMA POLICY

If any system or part(s) purchased from Flash Technology needs to be returned for any reason (subject to the warranty policy), please see the current RMA policy available online at flashtechnology.com/rma