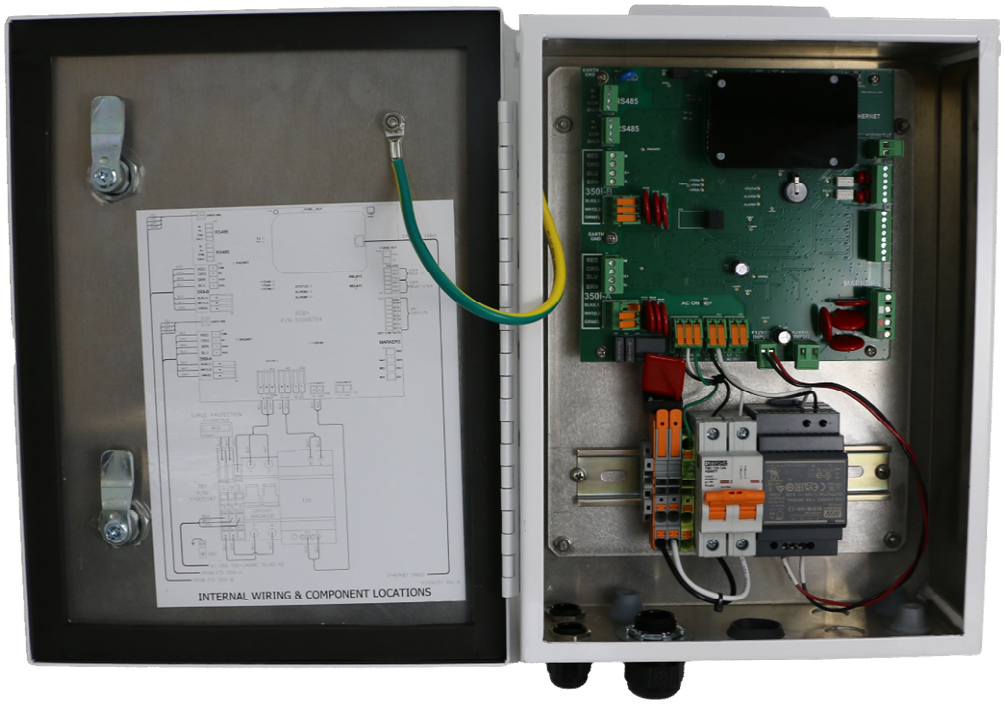
FLASH TECHNOLOGY



FTC 370-2 LCM

ADLS Lighting Control Module

User Manual

Document Number

51005850

Flash Technology, 332 Nichol Mill Lane, Franklin, TN 370-267

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FRONT MATTER

ABSTRACT

This manual contains information and instructions for installing, operating and maintaining the FTC 370-2 Lighting Control Module.

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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.

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.

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SECTION 1 – OVERVIEW

Flash Technology's new FTC 370-2 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 370-2 also provides the additional capability for a SCADA or other control system to monitor alarms in addition to the ADLS. The FTC 370-2 is currently compatible with the Detect Harrier and the Terma Scanter ADLS systems.

The LCM features the ability to control up to 2 new or existing FTS 370i-2 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 370-2 LCM assembly. Please read this document in its entirety before installing the FTC 370-2 LCM.

Shown in Table 1-1, the FTC 370-2 Lighting Control Module (hereafter referred to as the LCM) operates from a 100-240 VAC 50/60 Hz AC line.

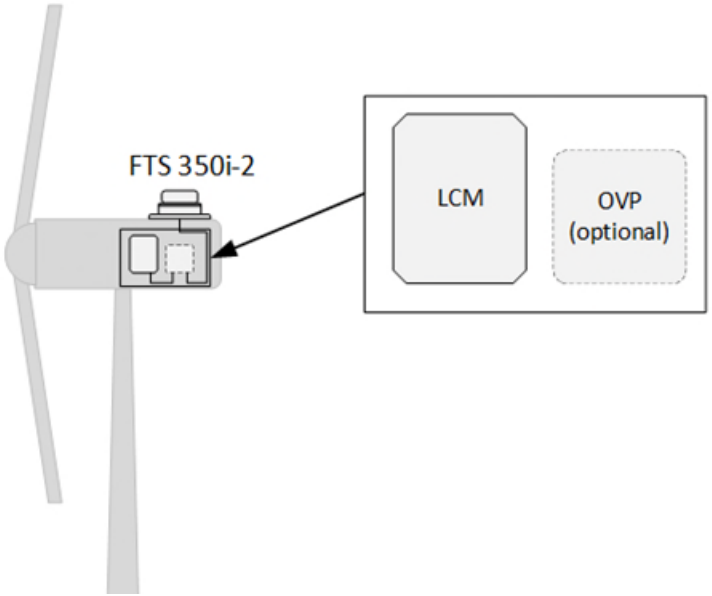


Figure 1-1 – FTC 370-2 and OVP (optional) installation overview

1.1 SPECIFICATIONS

Type	FTC 370-2: Lighting Control Module
Input Voltage	100-240 VAC
Frequency	50/60 Hz
Power Consumption	2 W stand alone, 11W w/ (1) 350i, 20W w/ (2) 350i's @30 fpm
Weight	8.7 lbs. (3.9 kg)
Operating Temperature	-40°F to +131°F (-40°C to +55°C)
Dimensions	16.1 x 10.5 x 4.91 in (408.9 x 266.7 x 124.8 mm)
Protection Rating	IP66, NEMA 4x

Table 1-1 – Specifications

1.2 LCM COMPONENT IDENTIFICATION



Figure 1-2 – External Enclosure

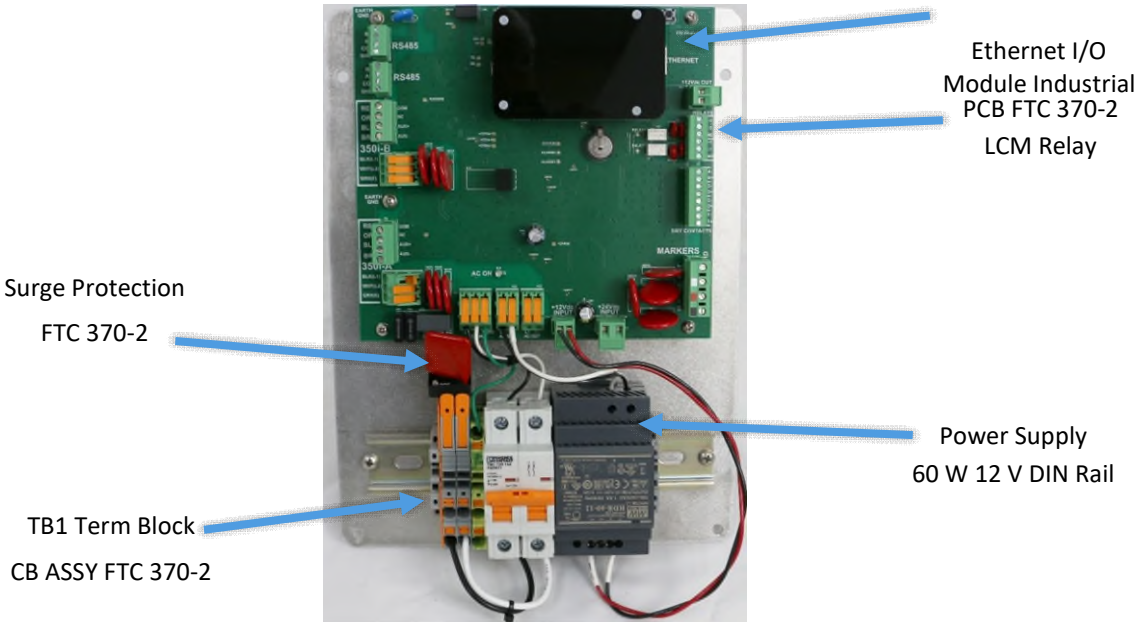


Figure 1-3 – FTC 370-2 Component Locations

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 370-2 LCM
2. Mount the FTC 370-2 LCM
3. Wire the beacon power and monitoring connections
4. Configure number of Lights
5. Verify operation

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

2.1 UNPACK THE FTC 370-2 LCM

The FTC 370-2 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 370-2 LCM

Locate the FTC 370-2 LCM in an area that will allow proper access to the enclosure.

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.

	Wire Color	Function	Wiring Connections	External Connections
10 Conductor Cable	Black	Input Power	P6 350i-A – BLK	(120 VAC) or (240 VAC) - L1
	White	Input Power	P6 350i-A – WHT	(120 VAC) or (240 VAC) – L2
	Green	Ground	P6 350i-A – GRN	Ground
	Red	Alarm Contact	P6 350i-A – RED	Alarm Output[1]
	Orange	Alarm Contact	P6 350i-A – ORG	Alarm Output[1]
	Brown	Radar Inhibit Input	P6 350i-A – BRN	AUX Control Input[2]
	Blue	Radar Inhibit Input	P6 350i-A – BLU	AUX Control Input[2]
	Violet	Ground	EARTH GND	Ground
	Yellow	Ground	EARTH GND	Ground
	Gray	Ground	EARTH GND	Ground
	Bare (Drain)	Ground	EARTH GND	Ground

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

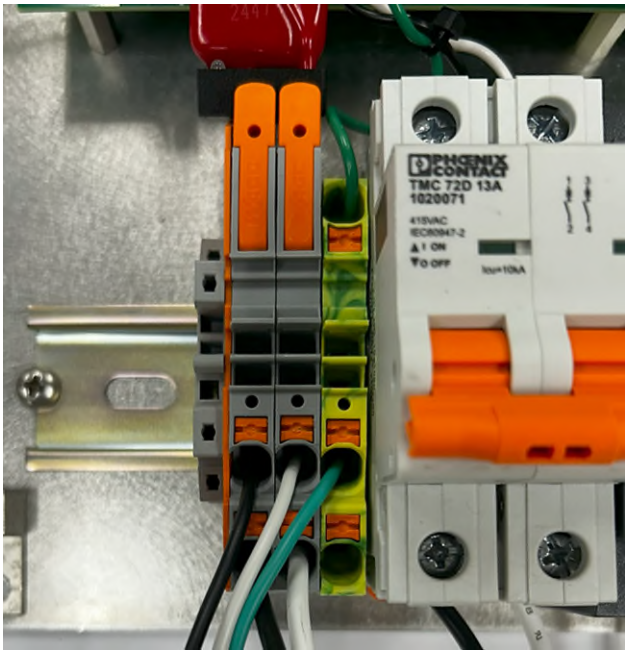


Figure 1-4 – AC Line Termination

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

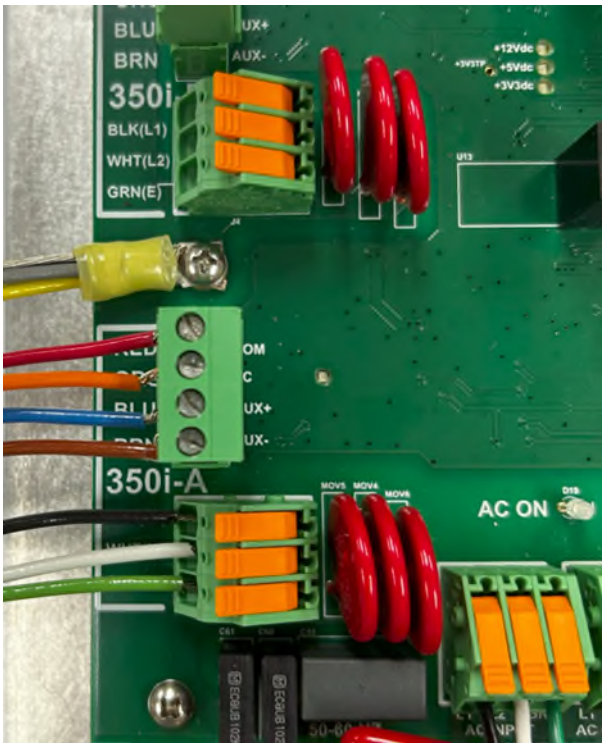


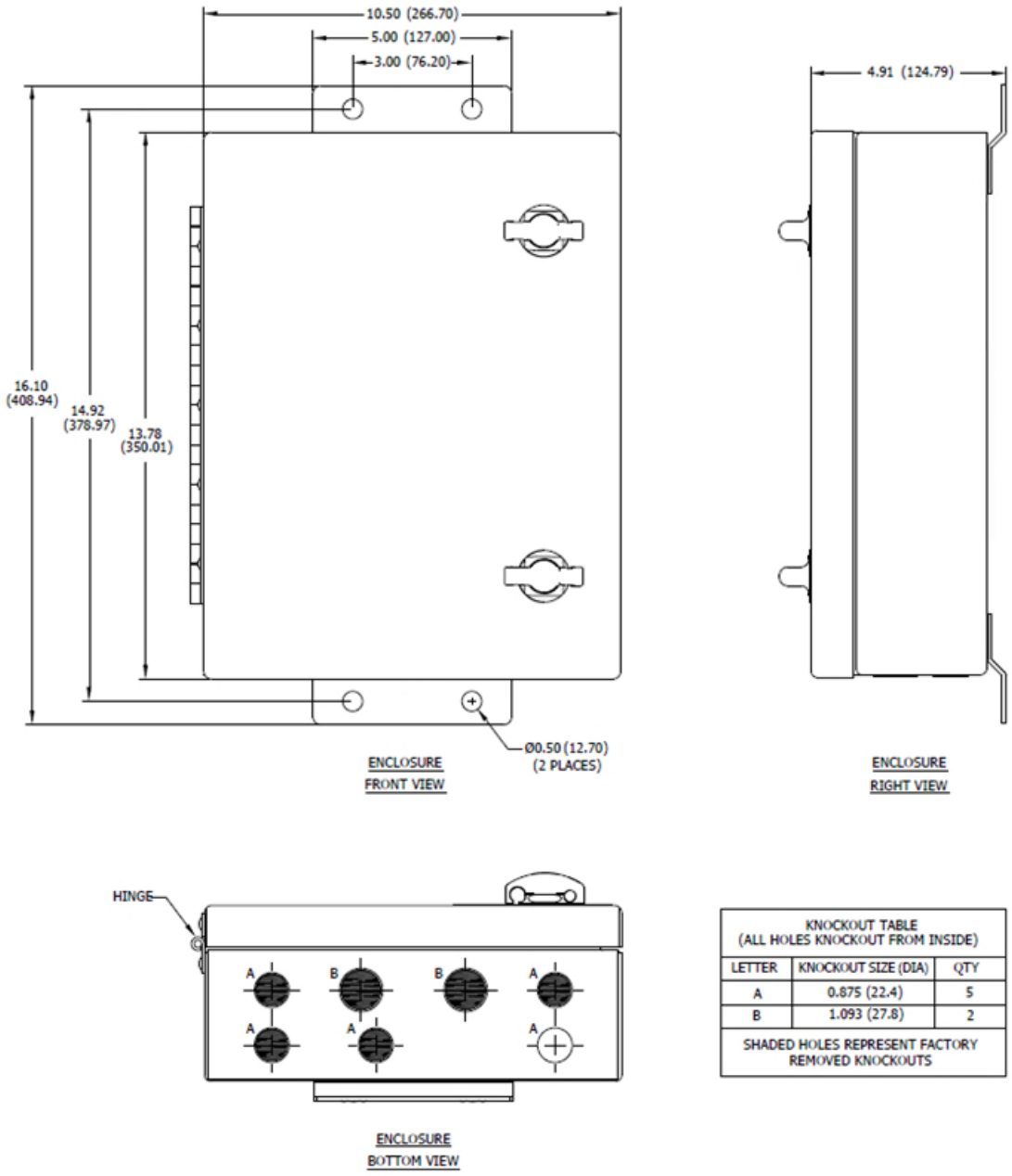
Figure 1-5 – FH #1 Cable Termination

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.

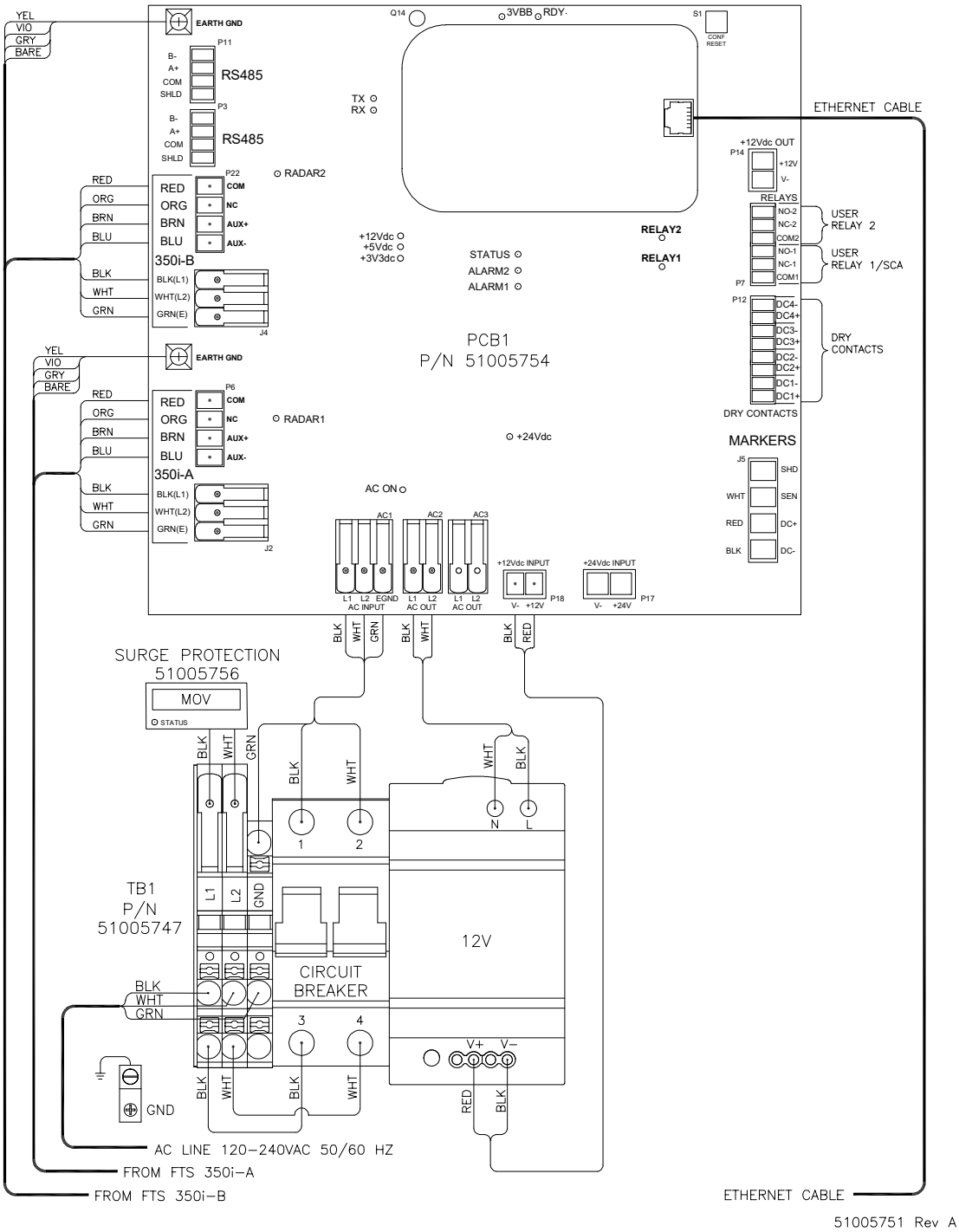


Figure 2-1 – Optional 1370-2191 OVP



KNOCKOUT TABLE (ALL HOLES KNOCKOUT FROM INSIDE)		
LETTER	KNOCKOUT SIZE (DIA)	QTY
A	0.875 (22.4)	5
B	1.093 (27.8)	2
SHADED HOLES REPRESENT FACTORY REMOVED KNOCKOUTS		

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



INTERNAL WIRING & COMPONENT LOCATIONS

Figure 2-3 – FTC 370-2 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 blue LED on the power supply is 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.

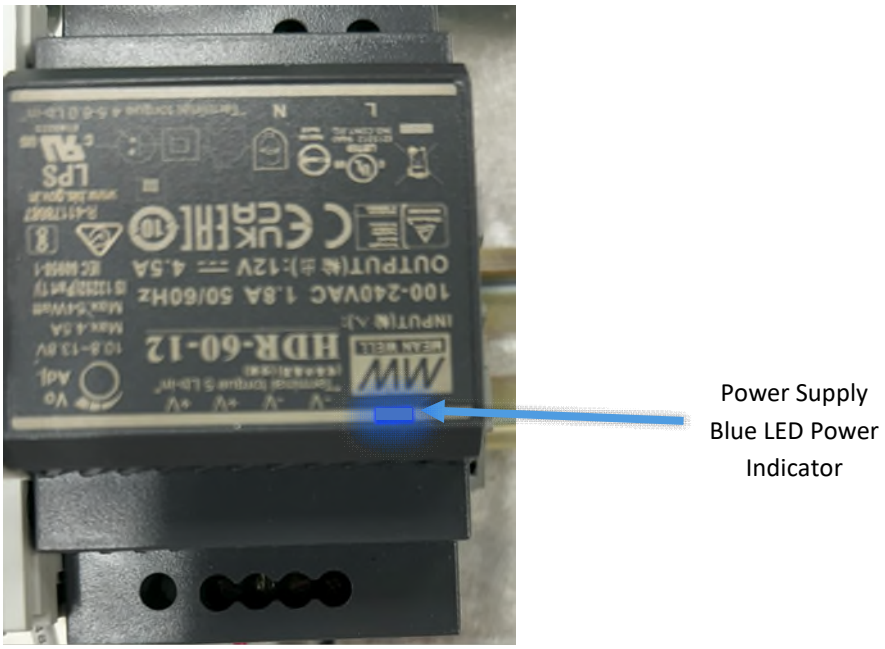


Figure 2-4 – Power Supply and MOXA LED Indicators

2.5.2 SURGE PROTECTION

There is a removable MOV surge protection board mounted on TB1 above the incoming power connections. There is an LED indicator light on this board that will be illuminated when there is power applied to the LCM and the MOV is in good condition. If the LCM is powered up and this LED is not illuminated, the MOV has protected the LCM from an incoming surge and should be replaced for the best continued protection. Though not recommended, the LCM will continue to operate with a damaged MOV or with this surge board removed.



Figure 2-5 – Surge Board and LED Indicator

2.5.3 OPERATIONAL LED INDICATORS

In the center of the board, there is a STATUS, ALARM1, and ALARM2 LED indicator. When the board is powered up and the processor is fully booted up, the STATUS LED will be GREEN. When there is an ALARM on the 350i-A flash head, the ALARM1 LED will be RED. Otherwise, with no ALARM, the LED will be OFF. The ALARM2 LED corresponds to the 350i-B flash head when there is a second one installed and enabled in the web interface. If ALARM2 is RED and with no flash head installed, the system must be set up for 2 flash heads and should be adjusted. Factory default is set to 1 Flash head.

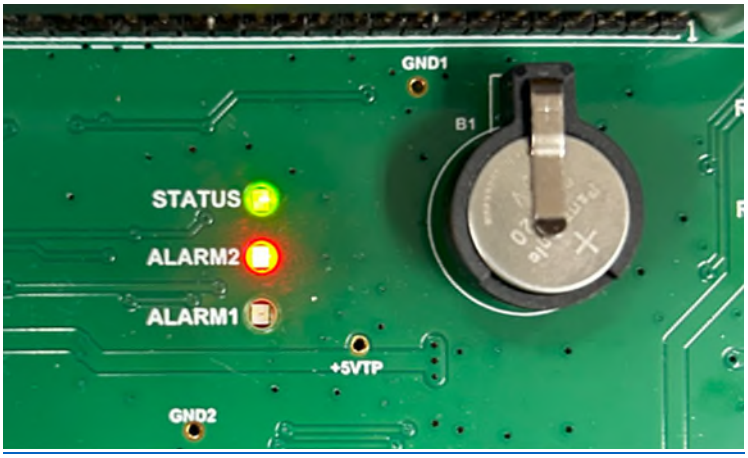


Figure 2-6 – Status and Alarm Indicators

Additionally, there are LED indicators for the output relay states that correspond to the ALARM condition. The LED for RELAY1 will be GREEN if the FORM-C coil of the relay is energized representing no ALARM condition. Conversely, the LED will be OFF if the relay coil is not energized representing an ALARM condition. For example, if ALARM2 is ON and ALARM1 is OFF, RELAY2 should be OFF and RELAY1 should be ON.



Figure 2-7 – Alarm and Relay Indicators

There is an LED indicator next to each flash head connection that indicates the status of the command from the RADAR light manager. If the LCM is being told to turn off the lights, the RADAR1 LED will be GREEN. Otherwise, it will be OFF.

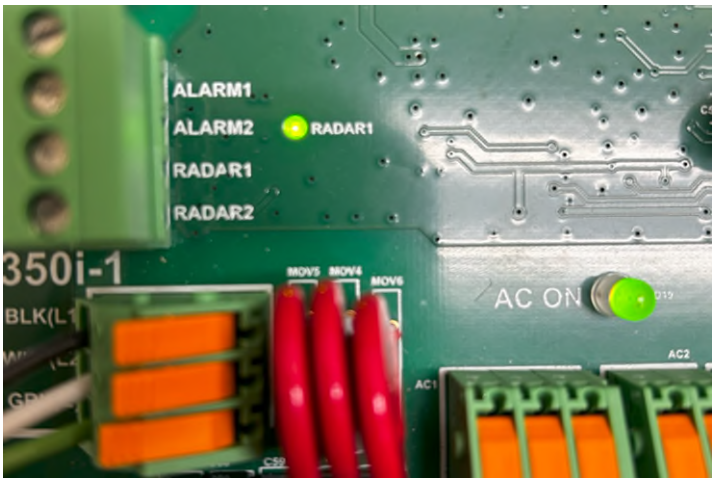


Figure 2-8 – Radar Indicator

LED	State	Description
AC ON	Green	System power is ON
	OFF	System power is OFF
Status	Green	System is ready
	Flashing	Factory reset button is pressed.
	OFF	System is not ready
ALARM1	Red	350i-A is in ALARM
	OFF	350i-A is NOT in ALARM
ALARM2	Red	350i-B is in ALARM
	OFF	350i-B is in NOT in ALARM
RELAY1	Green	Relay is energized; 350i-A is NOT in ALARM
	OFF	Relay is NOT energized, 350i-A is in ALARM
RELAY2	Green	Relay is energized; 350i-B is NOT in ALARM
	OFF	Relay is NOT energized, 350i-B is in ALARM
RADAR 1	Green	ADLS Radar light manager is asking to turn off 350i-A
	OFF	ADLS Radar light manager asked to turn on 350i-A
RADAR2	Green	ADLS Radar light manager is asking to turn off 350i-B
	OFF	ADLS Radar light manager asked to turn on 350i-B

Table 2-2 –LED Indicators

2.5.4 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.

2.5.5 CHECK MONITORING STATUS

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

SECTION 3 – FTC 370-2 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.

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 suppressor, are located on the TB1 terminal block. The power supply generates the proper DC current to the LCM board when AC line voltage is applied at its input. The surge suppressor provides 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.

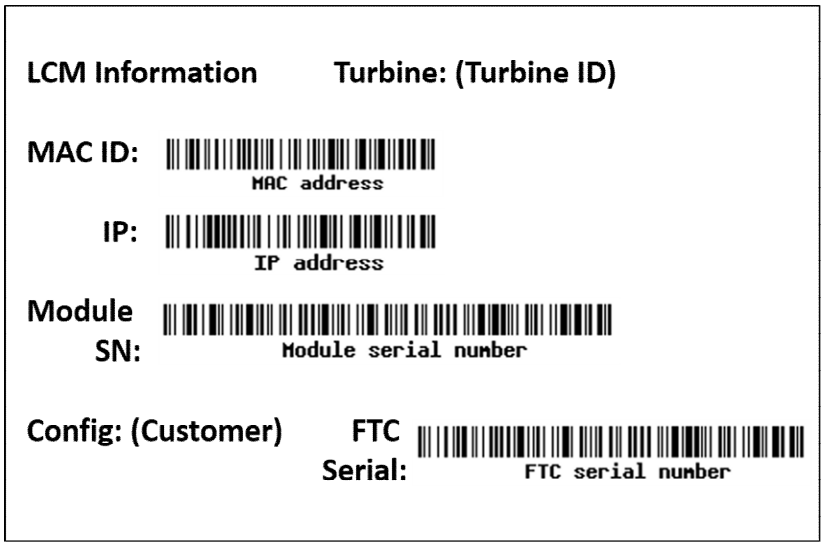


Figure 3-1 – LCM Information Label

3.3 LCM MODBUS MAP

Flash Technology utilizes two registers in the 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 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.

SECTION 4 – MAINTENANCE AND TROUBLESHOOTING

4.1 MAINTENANCE

- The removable surge board should be replaced each time it is noted to have been damaged, as evidenced by an LED that is not illuminated while the unit has power.
- It is recommended to replace the coin battery every 5 years as part of a periodic maintenance program.
- Flash Technology warranties 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.

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

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
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. Alarm 1 and Alarm 2 LEDs indicate which beacon is failed.

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

Possible Cause	Action
Cannot access webpage	1. Confirm the network connections and routing are correct. 2. Confirm IP address of the LCM is correct. 3. Configure IP address in the same subnet as LCM to troubleshoot locally.
Configured IP address does not match IP address on the LCM Information Label	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)	1. Try reaching on default IP address 192.168.1.11 (ping test) 2. Reprogram to correct IP address if necessary.
Ping test failed	1. Verify LEDs on the Ethernet I/O module. If OFF, then check the CAT5/6 cable from LCM to Fiber converter. 2. Use an alternate cable and perform a ping test at the LCM using a laptop.
Reset to Factory Defaults	1. Press and hold the “Config” button for 15 seconds and release after a relay click.

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

Possible Cause	Action
Modbus Control / Monitoring not Working	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

Possible Cause	Action
	4. Verify ADLS Configuration settings on the webpage are configured correctly
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 370-2 LCM Part Number: **51005746**

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 370-267

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
Surge Protection Module	51005756
Harness FTC 370-2 LCM AC INPUT	51005748
Harness FTC 370-2 LCM AC OUTPUT	51005749
Harness FTC 370-2 LCM DC OUTPUT	51005750
POWER SUPPLY 60W 12V DINRAIL	21016526
ETHERNET I/O MODULE INDUSTRIAL	5905110
TERM BLOCK CB ASSY 370-2	51005747
PCBA FTC 370-2 LCM	51005754
BATTERY LITHIUM 3V COIN 12.5MM	11000016227

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