CAUTION

To preserve the accuracy of the calibration, the remote sensor module MUST be installed no more than 10 feet from the FMS-1650L controller module using the supplied interface cable. Failure to do so could result in inaccurate differential pressure readings.

The display module may be located up to 4000 feet from the FMS-1650L controller module.
CAUTION

Failure to follow the enclosed wiring diagrams could result in damage to your equipment and could void your warranty. Wiring diagrams can also be found at www.triatek.com.

Under no circumstances should a single transformer be split between actuator and controller. Doing so will damage the actuator, the transformer, the controller or all units. A single 120/24V 30Va transformer is required for the controller and a separate 120/24V 20Va transformer is required for the actuator.
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Electrical
4 Analog Inputs ............................................................................................................. 4-20mAdc, 0-5Vdc or 0-10Vdc
4 Analog Outputs ............................................................................................................. 0-5Vdc or 0-10Vdc
4 Digital Inputs .............................................................................................................. 0-5Vdc or 0-24Vdc, Active-High or Active-Low
4 Relay Outputs ........................................................................................................... 1A@24Vdc
Input Impedance ........................................................................................................... 10k - 0 Ω
Output Impedance ......................................................................................................... Ω 0-10k
Power Supply .............................................................................................................. Class 2, 24Vac ±10%, 30VA universal 120/240 to 24 Vac, 60/50 Hz, step-down isolation transformer provided

Communications
LonWorks® FTT-10A peer-to-peer network ................................................................. Two-Wire Twisted Pair, FTT-10A signaling
Recommended Cable Type ..........................................................................................
  • Level IV, 22AWG Unshielded Plenum UL Type CMP (Windy City 105540; Connet Air W22IP-2001; Metro Wire MWC-1000)
  • Level IV, 22AWG Shielded Plenum UL Type CMP (Windy City 106500; Connet Air W22IP-2002; Metro Wire MWC-1002)

Touch Screen User Interface
LCD Size ......................................................................................................................... 3.2” diagonal
LCD Type ....................................................................................................................... Transmissive
Resolution ...................................................................................................................... 240 x 320 portrait
Viewing Area ................................................................................................................... 50.60 mm x 66.80 mm
Color Depth .................................................................................................................... 18-bit or 262K colors
Backlight Color .............................................................................................................. White
Luminous Intensity ........................................................................................................... min 2500 cd/m2
Specifications

Mechanical
FMS-1650L Display Module Housing (Surface Mount) .............................................................. 3"W x 5"H x 0.75"D
FMS-1650L Display Module Housing (Flush Mount) .............................................................. 5.6"W x 8.5"H x 0.75"D
FMS-1650L Controller Housing .............................................................................................. 4.1"W x 6"H x 1.85"D

Environmental
Operating Temperature ............................................................................................................. 32° to 125° F Operating
Operating Humidity ................................................................................................................ 10% - 95% RH, Non-condensing

Venturi Valve (Order Separately)
Diameter ................................................................................................................................... 6", 8", 10", 12", 14" & 16"O.D.
CFM Range .............................................................................................................................. 30-2400
Materials ................................................................................................................................. Aluminum, Stainless Steel, Heresite Coating
Sound Insulation ..................................................................................................................... Optional
Actuation ................................................................................................................................. Electronic or Pneumatic

Part Number Guide

FMS-1650L - □ - 0- □

Case Style  # of Remote Sensors
T = thin (flush)  1 = single sensor
S = surface  2 = dual sensor
Overview

The TRIATEK FMS-1650L Isolation Monitor is an ultra-sensitive instrument used to control and/or monitor air pressure in hospital rooms, labs, and clean rooms. This unit is a precision measuring system capable of measuring and displaying air pressures down to 0.0001" WC. It can be used to control pressures down to 0.001" WC. Features of the unit include:

- Digital display of pressure with a programmable descriptor
- Full color touch screen
- Audible and visual alarm annunciation
- Four relay outputs for transmitting alarm conditions to a remote location such as a central monitoring station
- Auxiliary analog inputs for use with optional sensors
- Analog outputs used in control applications
- Password protection of programmed setup
- Optional keylock switch for isolation select protection
- Optional LON communications.

The FMS-1650L is equipped with a full color touch screen display and can be wiped clean using a soft cloth without the use of harsh chemicals. No decontamination requirements are required for the proper operation of this product.

There are three background screen colors to indicate "Normal" when pressure is within defined limits, "Caution" when pressure is nearing an out-of-limits condition, and "Alarm" when pressure is outside defined acceptable limits. The pressure ranges for these conditions are easily set by the user for the specific installation when necessary. The background screen colors provide overview of room pressure conditions at a glance.

Alarm Conditions can be defined by the user, in terms of desired pressure settings for the room being monitored. When an alarm condition occurs, it can be annunciared in three user-definable ways: 1) on the display, 2) with an audible alarm, and 3) transmitted via contacts to a remote monitoring station and over network. The alarm can be set to automatically reset when the unit has sensed that the room pressure has returned to proper limits, or it may be set to remain on until manually reset. In either case, the attendant can mute the audible alarm by touching the OK button on the alarm popup.

The FMS-1650L provides four Relay outputs that can be used for remote alarm annunciation or pilot control functions. The operation of each output can be configured by the user to define the exact room air pressure values above and below which the output will operate. Delay times before activation can be specified to minimize nuisance activation.

In many installations, it is important to have other room variables such as temperature or relative humidity to be displayed along with room pressure.

The FMS-1650L provides this by means of Additional Analog Inputs which can be configured for 4-20 ma current or for voltage input signals. The input can be scaled as needed to display correct values, and a suitable descriptor can be applied.

The FMS-1650L provides Analog Outputs which can be set up for voltage. It can be programmed to be proportional output (AO-2, AO-3 or AO-4) for providing a linear signal to an automation system, or programmed for PID floating point output (AO-1) for direct control of damper actuators, speed drives, etc.

The user can set up multiple access level passwords to protect against unauthorized or casual access to the FMS-1650L programmed variables.

Room pressure selection of Positive, Negative, or No Isolation is set using the user menu or an optional Keylock Switch.

A LON Communications Interface enables the unit to communicate room status information to the building automation system.
FMS Case Dimensions

- 3" x 3/4" x 3/4"
- 5"

Recommended Cable Type: Belden 1325A

MOUNTING/WIRING

TRIATEK reserves the right to change product specifications without notice.
FMS Display Mounting Hole Pattern

The FMS-1650L display backplate may be mounted directly to a standard single-gang wall box using the two slots along the centerline. Use the backplate as a template to mark the mounting holes and the cable access hole at the center of the backplate.
Controller Mounting Hole Pattern
Remote Sensor Option

FMS-1650Ls ordered with a remote sensor must be installed in the wall between the isolation room and the adjoining corridor. Port P1 must be oriented towards the isolation room and Port P2 toward the corridor. Please see illustration on page 13. With this sensor orientation a positive pressure value indicates that the isolation room is positive with respect to the corridor. A three conductor cable must be connected between the remote sensor and the display processor unit. Maximum length of this cable is 4000 feet. The display unit can be installed outside the room, at the nurses station, in the engineering office, or at any other location as needed.

Mounting Steps:

1. Cut opening in the wall of the isolation room to receive the mounting enclosure for the remote sensor electronics. Nominal hole dimensions are 3 ⅜” h x 2” w.

2. Drill a ⅞” hole through the opposite wall for the flow tube as shown.

3. Bring the 2-conductor signal wire through the cut-out.

4. Knock out the back and one bottom knock-out, then with the signal wire pulled through the bottom hole into the box. Mount the enclosure box in the opening provided and secure with screw and anchors. Seal around the edges of the box with UL Classified Fire Sealant.

5. Push a length of flow tube through the back hole on through the ⅞” hole in the opposite wall.

6. Attach the flow tube to the sensor port, then push the tube and sensor module into place and secure to the mounting enclosure with two 6-32 x ⅝” screws supplied.

7. Install the louvered cover plate.

8. On the opposite side (corridor) attach the flow tube to the barbed fitting of the flow tube mounting plate.

9. Press the mounting plate into place, allowing the excess tube length to go into the wall space. Secure with the screws and anchors.

10. Install the louvered cover plate.

11. For 4-20mA operation - At the FMS-1650L connect the three leads from the remote sensor to the terminals marked +V, “AI-1” and “GND”. Remote Sensor “Vin” goes to terminal “+V”; “GND” connects to “GND” and “Io” connects with terminal “AI-1”.

Install jumper on pin 1 JP6 and JP3 see diagram on page 14. (If not installed at the factory)
Remote Sensor Option

Remote Sensor Installation Detail
(Side View)

- Stainless Steel Flow Tube Mounting Plate
- Gasket
- Wall Section (cutaway view)
- Stainless Steel Mounting Plate
- Gasket
- Louvered Cover Plate

- Flow Tube
  When Flow Tube mounting plate is located directly opposite the sensor, flow tubing must be cut as short as possible to prevent kinks.

- Terminal
  For connection of transmitter to FMS-1650L

- Thin Silicone Caulking
  (apply around tube and between stainless steel plate and wall to seal unit penetration)

- Orange wall bracket to be installed first by using the rotating clamps for secure wall attachment.

- To FMS-1650L Controller

TRIATEK reserves the right to change product specifications without notice.
Remote Sensor Option

Stainless Steel Flow Tube Mounting Plate

Gasket

Flow Tube
When Flow Tube mounting plate is located directly opposite the sensor, flow tubing must be cut as short as possible to prevent kinks.

Terminal
For connection of transmitter to FMS-1650L

To FMS-1650L Controller

Wall Section (cutaway view)

Rotating clamps secure assembly to wall board

Thin Silicone Caulking (apply around tube and between stainless steel plate and wall to seal unit penetration)

CORRIDOR

Remote Sensor Installation Detail
(Bottom View)
The electrical connections to the FMS-1650L are made via a convenient removable terminal block as shown below. All wiring should conform to the Local Regulations and National Electrical Code. Take care not to run Sensor wiring in the same conduit as line voltage or other conductors that supply highly inductive loads such as generators, motors, solenoids, contactors, etc. Use 22 AWG or larger.

### Wiring Guide Legend

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>No Connection to Field Wiring</td>
</tr>
<tr>
<td></td>
<td>Field Wiring w/ space for Number</td>
</tr>
<tr>
<td></td>
<td>Internal Wiring</td>
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<tr>
<td></td>
<td>Screw Terminal</td>
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<tr>
<td></td>
<td>Air Flow To and From Unit</td>
</tr>
<tr>
<td></td>
<td>Between Room and Corridor</td>
</tr>
</tbody>
</table>

Note:
The FMS remote sensor is an option which must be specified at time of purchase from factory.
## Function Descriptions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUX Power Output</td>
<td>Power supply outputs used for power auxiliary devices. Each is supply limited to 100 ma.</td>
</tr>
<tr>
<td>LON Communications</td>
<td>LON FTT-10A Free Topology Network building automation system can access the status and the configuration of the unit. Also used by configuration software to configure unit.</td>
</tr>
<tr>
<td>Analog Output</td>
<td>Unit has 4 Analog Outputs which can be configured for 0-5 VDC or 0-10VDC.</td>
</tr>
<tr>
<td>Analog Input</td>
<td>Unit has 4 Analog Inputs which can be configured for 4-20 mA, 0-5VDC, or 0-10VDC.</td>
</tr>
<tr>
<td>Power</td>
<td>The FMS-1650L Series can be powered by either 24 VAC or 24 VDC. A 120 VAC to 24 VAC Step Down Isolation Transformer is provided and recommended. This power must be from a Class 2 supply only.</td>
</tr>
<tr>
<td>Digital Input</td>
<td>The unit has 4 Digital Inputs with selectable pull-up voltages of 0V, +5V and +18V.</td>
</tr>
<tr>
<td>Relay Output</td>
<td>The unit has 4 SPDT Relay outputs with normally open contacts.</td>
</tr>
</tbody>
</table>
Mounting / Wiring Remote Sensor

Analog Output to Modulated Air Controller

CONNECTIONS FOR POWERED OUTPUT

<table>
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<tr>
<td>Screw Terminal</td>
<td>Screw Terminal</td>
</tr>
<tr>
<td>Air Flow To</td>
<td>Air Flow To and From Unit</td>
</tr>
<tr>
<td>From Unit</td>
<td>Between Room and Corridor</td>
</tr>
</tbody>
</table>

Purchased Separately

Power Supply

Optional External Transmitter

4-20mA Loop

Purchased Separately

Air Control Modulator

Wiring Guide Legend

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI 4</td>
<td>Analog Input 0-5v (JP7)</td>
</tr>
<tr>
<td>AI 3</td>
<td>Analog Input 0-10v (JP7)</td>
</tr>
<tr>
<td>AI 2</td>
<td>Analog Input 4-20mA (JP6)</td>
</tr>
<tr>
<td>AI 1</td>
<td>Analog Input 0-10v (JP5)</td>
</tr>
</tbody>
</table>

Jumper Setting

Analog Input 0-5v (JP7)

<table>
<thead>
<tr>
<th>Jumper Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI 4 4</td>
</tr>
<tr>
<td>AI 3 3</td>
</tr>
<tr>
<td>AI 2 2</td>
</tr>
<tr>
<td>AI 1 1</td>
</tr>
</tbody>
</table>

Note: Each Analog Input or Output value can be set independent of one another.

Example:
AI 1 can be set to 0-5v jumper ON (JP7 PIN 1)
AI 2 can be set to 0-10v jumper ON (JP7 PIN 2)
AI 3 can be set to 4-20mA jumper ON (JP6 PIN 3) and jumper OFF (JP7 PIN 3)
AO 1 can be set to 0-10v jumper ON (JP5 PIN 1)
AO 2 0-5v can be set to 0-5v jumper OFF (JP5 PIN 2)

TRIATEK reserves the right to change product specifications without notice.
Analog Input to Remote Pressure Sensor - 0-10V Out

Wiring Guide Legend

<table>
<thead>
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<th>Description</th>
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<td></td>
<td>Air Flow To and From Unit</td>
</tr>
<tr>
<td></td>
<td>Between Room and Corridor</td>
</tr>
</tbody>
</table>

Jumper Setting

Note: Each Analog Input or Output value can be set independent of one another.

Example:
- AI 1 can be set to 0-5v jumper OFF (JP7 PIN 1)
- AI 2 can be set to 0-10v jumper ON (JP7 PIN 2)
- AI 3 can be set to 4-20mA jumper ON (JP6 PIN 3) and jumper OFF (JP7 PIN 3)
- AD 1 can be set to 0-10v jumper ON (JP5 PIN 1)
- AD 2 can be set to 0-5v jumper OFF (JP5 PIN 2)

Note: 4-20mA can only be used if the corresponding JP7 Analog Input Jumper is set to OFF.
Due to continuous improvement, TRIATEK reserves the right to change product specifications without notice.

**Mounting / Wiring**

**Analog Input to Remote Pressure Sensor - 4-20mA Out**

**Wiring Guide Legend**

<table>
<thead>
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<tr>
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<td>Screw Terminal</td>
</tr>
<tr>
<td></td>
<td>Air Flow To and From Unit Between Room and Corridor</td>
</tr>
</tbody>
</table>

**Jumper Setting**

- **Analog Input 0-5v (JP7)**
  - AI 4: 3
  - AI 3: 2
  - AI 2: 1
  - AI 1: 0

- **Analog Input 4-20mA (JP6)**
  - AI 4: 3
  - AI 3: 2
  - AI 2: 1

- **Analog Output 0-5v (JP5)**
  - AO 4: 3
  - AO 3: 2
  - AO 2: 1
  - AO 1: 0

- **Analog Output 0-10v (JP5)**
  - AO 4: 3
  - AO 3: 2
  - AO 2: 1

Note: 4-20mA can only be used if the corresponding JP7 Analog Input Jumper is set to OFF.

Note: Each Analog Input or Output value can be set independent of one another.

Example:
- AI 1 can be set to 0-5v jumper OFF (JP7 PIN 1)
- AI 2 can be set to 0-10v jumper ON (JP7 PIN 2)
- AI 3 can be set to 4-20mA jumper ON (JP6 PIN 3) and jumper OFF (JP7 PIN 3)
- AO 1 can be set to 0-10v jumper ON (JP5 PIN 1)

TRIATEK reserves the right to change product specifications without notice.
Analog Input to 2 Remote Pressure Sensors - 0-10V Out

Purchased Separately

0-10V OUT
Pressure Sensor 2
IN
+
Pressure Sensor 1
IN
+

Wiring Guide Legend

<table>
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<td>Screw Terminal</td>
</tr>
<tr>
<td></td>
<td>Air Flow To and From Unit Between Room and Corridor</td>
</tr>
</tbody>
</table>

Jumper Setting

Note: 4-20mA can only be used if the corresponding JP7 Analog Input Jumper is set to OFF.

AI 1 can be set to 0-5v jumper OFF (JP7 PIN 1)
AI 2 can be set to 0-10v jumper ON (JP7 PIN 2)
AI 3 can be set to 4-20mA jumper ON (JP6 PIN 3) and jumper OFF (JP7 PIN 3)
AI 4 can be set to 0-10v jumper OFF (JP7 PIN 1)
AO 1 can be set to 0-5v jumper OFF (JP5 PIN 2)
AO 2 0-5v can be set to 0-5v jumper OFF (JP5 PIN 2)

Note: Each Analog Input or Output value can be set independent of one another.
Example:
AI 1 can be set to 0-5v jumper OFF (JP7 PIN 1)
AI 2 can be set to 0-10v jumper ON (JP7 PIN 2)
AI 3 can be set to 4-20mA jumper ON (JP6 PIN 3) and jumper OFF (JP7 PIN 3)
AI 4 can be set to 0-10v jumper OFF (JP7 PIN 1)
AO 1 can be set to 0-5v jumper OFF (JP5 PIN 2)
AO 2 0-5v can be set to 0-5v jumper OFF (JP5 PIN 2)
Due to continuous improvement, TRIATEK reserves the right to change product specifications without notice.

Mounting / Wiring

Analog Input to 2 Remote Pressure Sensors - 4-20mA Out

Purchased Separately

4-20mA OUT
Remote Pressure Sensor 2
Remote Pressure Sensor 1

Wiring Guide Legend

<table>
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<td>⚙️</td>
<td>Screw Terminal</td>
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<tr>
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<td>Air Flow To and From Unit Between Room and Corridor</td>
</tr>
</tbody>
</table>

Note: 4-20mA can only be used if the corresponding JP7 Analog Input Jumper is set to OFF.

Jumper Setting

- Analogue Input 0.5v (JP7):
  - AI 4 on JP7 PIN 1
  - AI 3 on JP7 PIN 2
  - AI 2 on JP7 PIN 3
  - AI 1 on JP7 PIN 4

- Analogue Input 4-20mA (JP6):
  - AO 4 on JP6 PIN 1
  - AO 3 on JP6 PIN 2
  - AO 2 on JP6 PIN 3
  - AO 1 on JP6 PIN 4

Note: Each Analogue Input or Output value can be set independent of one another. Example:
  - AI 1 can be set to 0.5v jumper OFF (JP7 PIN 1)
  - AI 2 can be set to 0.10v jumper ON (JP7 PIN 2)
  - AI 3 can be set to 4-20mA jumper ON (JP6 PIN 3) and jumper OFF (JP7 PIN 3)
  - AO 1 can be set to jumper OFF (JP7 PIN 1)
  - AO 2 can be set to 0-5v jumper ON (JP5 PIN 2)
  - AO 3 can be set to 0-5v jumper OFF (JP5 PIN 2)
  - AO 4 can be set to 0-5v jumper ON (JP5 PIN 2)

TRIATEK reserves the right to change product specifications without notice.
Analog Input to Temperature Sensor

Wiring Guide Legend

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<td>-</td>
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<td>-</td>
<td>Air Flow To and From Unit</td>
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<td></td>
<td>Between Room and Corridor</td>
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Jumper Setting

<table>
<thead>
<tr>
<th>Analog Input</th>
<th>0-5v (JP7)</th>
<th>4-20mA (JP6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI 4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>AI 3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>AI 2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>AI 1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: 4-20mA can only be used if the corresponding JP7 Analog Input Jumper is set to OFF.

<table>
<thead>
<tr>
<th>Analog Output</th>
<th>0-5v (JP5)</th>
<th>0-10v (JP5)</th>
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</thead>
<tbody>
<tr>
<td>AO 4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>AO 3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>AO 2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>AO 1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: Each Analog Input or Output value can be set independent of one another.
Example:
- AI 1 can be set to 0-5v jumper OFF (JP7 PIN 1)
- AI 2 can be set to 0-10v jumper ON (JP7 PIN 2)
- AI 3 can be set to 4-20mA jumper ON (JP6 PIN 3) and jumper OFF (JP7 PIN 3)
- AO 1 can be set to 0-5v jumper ON (JP5 PIN 1)
- AO 2 0-5v can be set to 0-5v jumper OFF (JP5 PIN 2)
A switch having normally-open or normally-closed contacts may be used with the FMS-1650L to serve as a timed alarm buzzer inhibit, when the room door has been opened. An optional door switch (part number SWD-100) may be purchased from TRIATEK for this specific purpose.

Door switch connections are located inside the front cover of the FMS-1650L. After the switch has been installed at the door and connected to the FMS unit, its operation may be programmed as described on page 30 of this manual.
Digital Input to Flow Switch

JP4 is set at factory to +5 setting. User can change voltage setting to suit application requirement.

Wiring Guide Legend

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>No Connection to Field Wiring</td>
</tr>
<tr>
<td></td>
<td>Field Wiring w/space for</td>
</tr>
<tr>
<td></td>
<td>Internal Wiring</td>
</tr>
<tr>
<td></td>
<td>Screw Terminal</td>
</tr>
<tr>
<td></td>
<td>Air Flow To and From Unit Between Room and Corridor</td>
</tr>
</tbody>
</table>
Due to continuous improvement, TRIATEK reserves the right to change product specifications without notice.

Digital Input to Occupancy Sensor

---

**Wiring Guide Legend**

<table>
<thead>
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<tbody>
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<td></td>
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<td></td>
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<tr>
<td></td>
<td>Screw Terminal</td>
</tr>
<tr>
<td></td>
<td>Air Flow To and From Unit Between Room and Corridor</td>
</tr>
</tbody>
</table>
Relay Output to Alarm

NOTE: Relay 3 & 4 Share a common contact terminal block pin, (C3/4).

Wiring Guide Legend

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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</tr>
</tbody>
</table>
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Mounting / Wiring

Relay Output to Warning

Purchased Separately

Monitor Output 2

External Power 30VDC Max

2A Max

**Wiring Guide Legend**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>No Connection to Field Wiring</td>
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<tr>
<td></td>
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<tr>
<td></td>
<td>Air Flow To and From Unit Between Room and Corridor</td>
</tr>
</tbody>
</table>

TRIATEK reserves the right to change product specifications without notice.
Mounting / Wiring

Relay Output 1

Wiring Guide Legend

<table>
<thead>
<tr>
<th>Symbol</th>
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</thead>
<tbody>
<tr>
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<tr>
<td></td>
<td>Field Wiring w/space for Number</td>
</tr>
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<tr>
<td></td>
<td>Air Flow To and From Unit Between Room and Corridor</td>
</tr>
</tbody>
</table>
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Mounting / Wiring

Relay Output 2

Wiring Guide Legend

<table>
<thead>
<tr>
<th>Symbol</th>
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<tbody>
<tr>
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<td></td>
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<td>Internal Wiring</td>
</tr>
<tr>
<td></td>
<td>Screw Terminal</td>
</tr>
<tr>
<td></td>
<td>Air Flow To and From Unit Between Room and Corridor</td>
</tr>
</tbody>
</table>
Mounting / Wiring

Power

[Diagram of Power connections and specifications]
**Isolated Power Supply**

- **Red** / Fused 24 VAC connected to Power (+) on the FMS
- **Blue** / 24 VAC / 30Va connected to Power (-) on the FMS

**Stepdown Isolation Transformer** (provided with FMS-1650L)

120 VAC 60 Hz

Ground

1 Amp Fuse

Only Class 2 wiring in this compartment.

- **Black**
- **White**

- **24 VAC 60 Hz**

*Note:
This product should be installed with the manufacturer provided isolated power supply and connected to an electrical circuit protected by a minimum 20A circuit breaker. This circuit breaker should be mounted in an approved electrical enclosure located separately from this product.
Communications

Wiring

FMS CONTROLLER

LON FTT-10 Free Topology Communications Network 18-22AWG Twisted Pair

Wiring Guide Legend

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
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<td></td>
<td>Screw Terminal</td>
</tr>
<tr>
<td></td>
<td>Air Flow To and From Unit Between Room and Corridor</td>
</tr>
</tbody>
</table>

Free Topology Cable Specifications

<table>
<thead>
<tr>
<th>Cable Type</th>
<th>Maximum Node-to-Node Distance (FT)</th>
<th>Maximum Total Wire Length (FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belden 8471</td>
<td>1312 ft</td>
<td>1640 ft</td>
</tr>
<tr>
<td>Level IV, 22AWG</td>
<td>1312 ft</td>
<td>1640 ft</td>
</tr>
<tr>
<td>JF (St) Y x2x0.8</td>
<td>1049 ft</td>
<td>1640 ft</td>
</tr>
<tr>
<td>TIA Category 5</td>
<td>629 ft</td>
<td>1476 ft</td>
</tr>
</tbody>
</table>

Refer to www.lonmark.org for more details.
LON WIRING INSTRUCTIONS
Communications connections require that the FMS-1650L units be connected with twisted pair communication cable to each unit in the network. The unique network address of each FMS unit is set by a network management tool like LONMAKER.

All wiring must be done in accordance with the NEC as well as regulations of all authorities having jurisdiction, and must conform to applicable codes. When required by code, communications wiring may be installed in conduit of a type designed specifically for this purpose.

WIRE TERMINATIONS
The FMS-1650L is provided with a removable connector block with convenient screw terminals. Make the LON FTT-10 communications connections as follows:

1. Connect a cable lead to the "NT1 -" terminal (#1).
2. Connect a cable lead to the "NT2" terminal (#2)

GUIDELINES FOR WIRING
Following these guidelines will help to keep wiring-related communications problems to a minimum:

1. Do not splice communications cable or wire at any point.
2. Avoid "T-tap" technique of routing/connecting communications cable. Conductor discontinuities produced by such connections may generate RFI or other electromagnetic interference on the communications circuit.
3. Do not use wire nut devices for connecting communications cable.

4. Do not route any part of the communications cable through conduit, junction boxes or other devices containing AC electrical wiring.
5. Do not strap communications cable to any conduit or other device containing AC electrical wiring, or run communications cable parallel to (or against) such devices.

NOTE: AC electrical devices such as transformers, disconnects, fluorescent lighting, motor controllers, variable frequency drives or other high voltage power sources may generate RF interference which could cause intermittent problems in the communications network.

Wire the LON network in accordance with LON network standards.

NOTE: Be sure to observe installation instructions regarding possible need for a termination load or other device that may have to be attached on the end of a run.
After the FMS-1650L unit has been installed, apply power to the unit. On power up, you will hear two short beeps that indicate the FMS-1650L display module is communicating with the main controller module, and has begun the initialization sequence. The LED backlighting will cycle through the three unit status colors (green, yellow, red) as part of the power-up initialization sequence, followed by the displaying of the Triatek splash screen indicating serial number, Neuron ID, firmware version numbers, and network address (Figure 1).

This splash screen remains displayed for approximately 5 seconds and then disappears to reveal the main display screen. This splash screen information can also be redisplayed using the About This FMS option on the Diagnostics menu.

Main Display Screen
All FMS-1650L units come shipped from the factory in the Neutral isolation mode, which is represented by white text being displayed on a blue background. Information displayed on the main screen includes the following (see Figure 2):

- Name of monitored isolation room (up to 20 chars)
- Current room status (occupied, unoccupied)
- Current temperature (if temperature sensor has been installed)
- Current relative humidity (if humidity sensor has been installed)
- Current differential pressure reading in selected engineering units (default is "WC")
- Current time and date

As mentioned earlier, the background color of the main display screen will be blue while set to Neutral isolation mode. However, while in either Positive or Negative isolation modes, the background colors actively represent that current alarm status of the monitor. A green background indicates that the current differential pressure is within allowable limits of the desired setpoint, as shown in the case represented by Figure 2. A yellow background as shown in Figure 3 indicates that the current differential pressure has drifted outside of the allowable limits of the desired setpoint, and is in the caution range. A red background indicates that the current differential pressure has reached a critical condition and is significantly outside of the allowable limits of the desired setpoint.

Figure 1. This splash screen is displayed briefly following a power up or system reset.

Figure 2. The main screen of the FMS-1650L displays the differential pressure, room status, temperature and humidity (if so equipped), along with the time and date along the bottom of the screen.
Basic Programming

The FMS-1650L incorporates a full-color touch screen with an extensive easy-to-use menu system that allows the user to quickly setup the controller for immediate use. Also integrated into the FMS-1650L display are several hotspots that provide quick access to various settings. Refer to page 36 for details on using these hotspots as display settings shortcuts. Touching the screen anywhere other than one of the reserved hotspots invokes the menu system, unless one or more security passwords have been entered.

The following section details the simple procedure for quickly configuring the isolation room controller.

Configuring Isolation Room Controller

Configuring the FMS-1650L isolation room controller settings can be accomplished in three simple steps:

1. Configure alarm limits
2. Set target setpoints
3. Configure the analog output

The FMS-1650L comes pre-configured to operate with a remotely mounted differential pressure sensor module. The first step in configuring the FMS-1650L, following installation, is to configure the alarm and warning setpoints for each mode of isolation. If this unit is only used for monitoring and is not used to control a damper actuator to maintain a specified differential pressure, then this step and the next step may be skipped. Otherwise, target setpoints must be specified to allow the unit to control to specific differential pressures for each mode of isolation.

Set Target Setpoints

If this FMS-1650L is being used for monitoring only and does not control an exhaust or supply damper actuator to maintain a specified differential pressure, then this step and the next step may be skipped. Otherwise, target setpoints for positive, negative, and neutral isolation modes may be specified in sequence for either occupied or unoccupied modes. The final step in getting the FMS-1650L up and running is to configure the analog output used to control the damper actuator in the monitored isolation room.

Configure Alarm Limits

To determine the limits at which the unit status changes from Normal to Warning, and from Warning to Alarm, the alarm limits must be configured. To access the alarm limit settings, select the Unit Setup option from the Main Setup Menu, and then select the Controller Setup option. At the Controller Setup menu, select the Alarm Limits option from the Controller Setup menu (see Figure 4). The high and low alarm limits, as well as the high and low warning limits, for the currently selected isolation mode may be specified in sequence for either occupied or unoccupied modes. These limits should be specified to set the differential pressure range which should be considered normal, as well as the range which indicates a warning condition, and the range which is considered critical and indicates an alarm condition.

Setting up the Analog Output

For those applications requiring control of an exhaust or supply damper actuator, the analog output must be configured accordingly. To access the analog output configuration settings, select the Unit Setup option from the Main Setup Menu, and then select the Controller Setup option. At the Controller Setup menu, select the Analog Output option to begin specifying the settings based on the specific application requirements. At the first configuration screen, the user is prompted to select an action mode (direct or reverse action). Also, the output range 0-5/0-10V or 1-5/2-10V operation. The second screen allows the span of the output to be limited to a percentage of the selected range. These settings only relate to AO-1.
Changing the Isolation Mode
The FMS-1650L isolation room controller can be set for positive, negative, or neutral modes of isolation. To change the isolation mode, select the Unit Setup option from the Main Setup Menu, and then select the Room Setup option.

At the Isolation Room Setup menu, select the Isolation Mode option which allows the user to select one of three isolation modes, unless the available modes has been restricted to either positive or negative plus neutral. Changing the mode of isolation automatically selects the pre-programmed setpoint and analog output action mode associated with each mode.

Adding Password Security
The FMS-1650L menu system can be protected by adding up to ten (10) multi-level passwords to the system. The Password Setup option on the System Setup menu allows the user to manage the security passwords. Options on the Password Setup menu include those for adding, editing, and deleting entries from the system as shown in Figure 5. There is also an option that allows all of the system password entries to be purged. To add a new password entry, select the Add Password option from the Password Setup menu, which prompts the user to enter a minimum of four (4) and up to eight (8) digits. Once a valid password has been specified, the user is prompted to specify one of four access levels: Unrestricted, Standard, Basic, and Restricted. All password entries are saved to non-volatile memory. In the event that a password has been forgotten, there is a factory-default “back door” password that will provide unrestricted access to the user menu system. Please consult the factory for more information regarding this password.

The brightness of the main display screen on the FMS-1650L can be adjusted using the Set Brightness option on the Display Setup menu. The brightness settings are stored in nonvolatile memory and remain in effect through a power cycle.

Changing Display Settings
The FMS-1650L display screen can be customized very easily using options available under the Display Setup menu shown in Figure 6. The information included on the main display screen may be selectively enabled or disabled by selecting Display Options from the Display Setup menu. To disable specific display information, simply deselect those items which should be suppressed on the main display screen.

Changing the time and date can be accomplished either by using the hotspots on the main display screen, or through the Set Time & Date option on the Display Setup menu. Both methods access the same configuration popup screens that allow the user to specify new time and date settings.

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The FMS-1650L isolation room controller can be set for positive, negative, or neutral modes of isolation. To change the isolation mode, select the Unit Setup option from the Main Setup Menu, and then select the Room Setup option.

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Basic Programming

Built-in Diagnostics
The FMS-1650L incorporates several useful diagnostic tools. These include an About this FMS option, an Override facility, a real-time view feature, a Self-test function, and an option to perform a Factory Restore of the FMS-1650L. The About this FMS option on the Diagnostics menu provides information specific to this particular unit, including the firmware versions and electronic serial number of the display module, the Neuron ID associated with the controller module, as well as its network address.

During the test and balance phase, it is often convenient to be able to adjust exhaust damper actuators to a specific position to force a specific airflow condition. The analog outputs may be individually overridden by selecting the Overrides option from the Diagnostics menu, Analog Outputs option, and then selecting the specific analog output to be overridden. The user can then, in real-time, dynamically move the damper actuator to a specific position using the slider on the override screen.

While in override mode, the selected analog output is “disconnected” from its PID control loop, if configured for PID mode. Canceling override mode effectively resumes PID or direct analog output control.

The FMS-1650L incorporates a convenient feature that allows the installer or commissioning technician to view the real-time conditions of all of the hardware resources as well as several system variables. These include the analog inputs, analog outputs and digital inputs. Selecting the Real-Time View option from the Diagnostics menu allows the user to view the real-time conditions of any of the listed resources. For example, selecting the Analog Inputs option from the Real-Time View menu invokes the real-time view configuration screen. To skip to the next set of resources to view, click the Next button. To cancel the real-time view display at any time, click the Exit button to return to the Real-Time View menu.

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By selecting the Run Self-Test option from the Diagnostics menu, the unit performs a quick self-test of the alarm status screens and audible alert by cycling through the normal (green), warning (yellow) and alarm (red) screens while sounding the alarm buzzer. Should it become necessary to reset all of the modifiable configuration parameters of the FMS-1650L to their original default settings, the Factory Restore option on the Diagnostics menu may be selected. Selecting this option invokes a warning message informing the user that all existing configuration settings will be erased and replaced with the factory-configured default settings (see Page 34). The user is then prompted for a password before proceeding to completely reset all configuration settings to their factory default values.

Figure 7. Built-in diagnostics may be accessed at this menu to assist with troubleshooting and initial setup of this controller.
### Configuring Display Module Settings

<table>
<thead>
<tr>
<th>Options Dipswitch (S1) – internal use only</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Graphics Chip Mode Selection</td>
</tr>
<tr>
<td>OFF = Programming Mode</td>
</tr>
<tr>
<td>ON = Run Mode</td>
</tr>
<tr>
<td>2. Touch Screen Calibration Mode</td>
</tr>
<tr>
<td>OFF = Force calibration</td>
</tr>
<tr>
<td>ON = Auto calibration</td>
</tr>
<tr>
<td>3. Reserved</td>
</tr>
<tr>
<td>4. Reserved</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Options Dipswitch (S2) – Product Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sensor Mode</td>
</tr>
<tr>
<td>OFF = Single</td>
</tr>
<tr>
<td>ON = Dual</td>
</tr>
<tr>
<td>2. Test Mode</td>
</tr>
<tr>
<td>OFF = Disabled</td>
</tr>
<tr>
<td>ON = Enabled</td>
</tr>
<tr>
<td>3. Product Type</td>
</tr>
<tr>
<td>OFF = FMS-1650L</td>
</tr>
<tr>
<td>ON = FMS-1650L</td>
</tr>
<tr>
<td>4. Operational Mode</td>
</tr>
<tr>
<td>OFF = Demo Mode</td>
</tr>
<tr>
<td>ON = Run Mode</td>
</tr>
</tbody>
</table>

- Pushbutton Switch (SW1): **Reset Button**
- Pushbutton Switch (SW2): **Options Configuration**
Cleaning the FMS-1650L Display

- The cloth may be used dry, or lightly dampened with a mild cleaner or Ethanol.
- Be sure the cloth is only lightly dampened, not wet. Never apply cleaner directly to touch panel surface; if cleaner is spilled onto touch panel, soak it up immediately with absorbent cloth.
- Cleaner must be neither acid nor alkali (neutral pH).
- Wipe the surface gently; if there is a directional surface texture, wipe in the same direction as the texture.
- Never use acidic or alkaline cleaners, or organic chemicals such as: paint thinner, acetone, toluene, xylene, propyl or isopropyl alcohol, or kerosene.

Hot-Spot Features of FMS-1650L Touch Screen Display

- Touching the current name text brings up an alphanumeric keyboard to quickly change the name of the monitored room.
- Touching anywhere else on the screen enters the Main Setup Menu if no password is stored. Otherwise, a password must be entered before the Main Setup Menu can be accessed.
- Touching DATE brings up the Date Entry popup to quickly change the current displayed date.
- Touching UNITS brings up Engineering Units selection popup to quickly change differential pressure units.
- Touching TIME brings up Time Entry popup to quickly change the current displayed time.
TRIATEK, located in Norcross Georgia, has an extensive network of manufacturer's representatives located throughout North America to service you. Our helpful, experienced sales team can provide solutions for your Laboratory Controls, Medical Controls, HVAC Controls, and Industrial Instrumentation needs. Call 770-242-1922 or visit our website at www.triatek.com for more information or to find an agent near you.

Triatek has been a pioneer in controllers since its origins back in the 1980s. Today, Triatek has the most complete line of controllers and monitors in the industry - the latest of which use full color touchscreens. Additionally, Triatek is unique in that the company engineers and sells both venturi valves and controllers or monitors. In other words, Triatek is the one company that can be turned to for a complete air pressure solution.