TAC I/NET

Installation Guide

Micro Regulator Controller

MR55 Series

for TAC I/NET Building Automation Systems
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FCC Warning

The Federal Communications Commission (FCC) requirements prescribe certification of personal computers and any interconnected peripherals in the FCC rules and regulations.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: this device may not cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

This equipment generates and uses radio frequency (rf) energy for its operation and, if not installed and used in accordance with the installation and operation manual, may cause interference to radio and television reception. It has been found to comply with the limits for a Class A computing device pursuant to the aforementioned regulations. These are designed to provide reasonable protection against such interference when operated in a residential area. Only peripherals (computer input/output devices) certified to comply with the Class A limits may be connected to this device. Operation with noncertified computer peripherals is likely to result in interference with radio and television reception. If this equipment does cause interference to radio or television reception, the user is encouraged to correct the situation by one or more of the following measures.

✦ Relocate the receiver with respect to the computer.
✦ Move the computer away from the receiver.
✦ Plug the equipment into a different outlet, so that the computing device and receiver are on different branch circuits.
✦ Disconnect and remove any unused cables that may be acting as a transmission source.
✦ Make certain that the computing device is plugged into a grounded outlet receptacle.

If necessary, contact Schneider Electric for additional suggestions.
Overview

The Micro Regulator (MR) family of distributed intelligent controllers function within the TAC I/NET integrated network system, providing an extremely flexible array of user programmable control functions within an economical price and point range. Similar in organization to the Unitary Controller family, the MR family uses the Micro Control Interface (MCI) or Micro Regulator Interface (MRI) to connect to the TAC I/NET LAN and communicate with TAC I/NET workstations and other controllers. The MR models reside on the subLAN controlled by the MCI or MRI. The MR family includes multiple models of controllers including general purpose and application specific models.

The MR family includes the MCI or MRI, which is the connection between the TAC I/NET system and the Micro Regulator controllers MR88, MR632, MR160, MR55, MR55X, MR88R, which support an Intelligent Thermostat (I/STAT) or a Maintenance Thermostat (M/STAT).

Note: The M/STAT is a portable version of the I/STAT, with a plug-in jack connection. The keypad, displays, and functions of the M/STAT are identical to the I/STAT. All references to I/STAT displays and operation in this document also apply to the M/STAT. As this is a hand-held model, installation instructions are not given for the M/STAT unit.

This document provides both common and model-specific information for the MR55 series of micro regulator controllers. Unless otherwise indicated as being model-specific, information within this document should be considered common to the MR55 series.

I/STAT

The I/STAT is an intelligent space sensor with local temperature and setpoint display, override select, and setpoint adjustment. The I/STAT has three 7-segment LED digits, each with a decimal point, and five discrete LEDs.

The 7-segment LED digits display alphanumeric data, such as local temperature and setpoint information as well as programming information input at the I/STAT keypad. The bank of four discrete LEDs located at the bottom of the I/STAT provide an indication of which user-selected parameter is currently being displayed. The legends on the current (standard) I/STAT indicate a selection of temperature setpoint, fan speed, room temperature, and outside temperature. The user has total control of the actual value/point displayed on the 7-segment LEDs and may choose to vary the indication to other parameters in the system.

The MR55 may be programmed from the TAC I/NET software using the MR parameters editor. Additionally, the MR55 may be controlled using the keypad on the I/STAT.
Micro Regulators

The family of MRs provide stand-alone Direct Digital Control (DDC) of a collection of several input and output points. Both discrete and pulse-width-modulation (PWM) control is supported by the MRs. The MRs have a 32 KB EPROM for processing and lookup table data. The downloaded database resides in nonvolatile RAM (NOVRAM).

Communications

The MR55 provides two communication ports: a standard asynchronous RS485 subLAN port, and a port for the I/STAT sensor.

Reset

Upon power loss/restoration, the MR55 executes a self-test, checking the microprocessor, a checksum on EPROM contents, a checksum on NOVRAM contents, and the operation of the analog-to-digital (A/D) convertor.

MR55 Input/Output Terminals

The MR55 has four general inputs that are user-configured as thermistor or discrete, and an I/STAT input. It has five low-voltage (24 VAC) triac outputs. The outputs operate in PWM (AO) proportional or latched (discrete) mode. The MR55X is identical to the MR55 but also has a custom-calibrated cubic-feet-per-minute (CFM) transducer input.

Note: Internationally, the CFM transducer is known as a liter-per-second (LPS) transducer.
Physical Description

Each MR is a single printed circuit board. All I/O connections are accomplished through plug-in terminal blocks. The MR55 board measures 4.0” W × 7.0” H (10.2 × 17.8 cm) and is mounted on a baseplate that measures 5.5” W × 8.5” H (14.0 × 21.6 cm) (see Figure 1 on page 4). An MR55 cover is provided to meet U.L. plenum requirements. Cover Model MRCOVERM is used on the standard MR55, and cover Model MRCOVERMX is used on the MR55X.

Power Supply

Electrical power connections are provided at terminal block TB1 on the top left edge of the board (see Figure 1). The power provided must be 24 VAC 50/60 Hz. The power supply must be capable of providing sufficient current for the base board (7 VA) plus the current required by the low voltage triac outputs (60 VA maximum).

Note: Do not attempt to use the same AC transformer for any subLAN device (MR, DPU, UC, or transducer) and its associated LAN interface device (MRI, DPI, MCI, or UCI). This will result in improper operation, and may cause damage to one or both devices.

Input/Output Terminals

The MR55’s input and output terminals are located along the left and right sides of the board. The input terminals, including the sensor port, are on the left side and the outputs are on the right side. The MR55 has five low-voltage triac outputs.

Input Terminations

Four signal inputs are provided for a thermistor (I/STAT or 10K ohm thermistor sensor) or 1.5–4.0 VDC, and discrete contact inputs. The I/STAT sensor port (TB3) is located on the left edge of the MR55.

Inputs are located on terminal blocks on the edges of the MR55. The inputs (IN-1, IN-2, etc.) are located on TB4 on the bottom left edge of the board. These four inputs are configured for thermistor or discrete contact input. The MR55 has one space sensor input port on TB3.

Output Terminations

The MR55 has five low voltage sourcing (24 VAC) triac outputs on TB5. The outputs are configured as voltage sourcing using the controller’s 24 VAC input power after it has been passed through a 4 A fuse. The triac outputs supply a maximum continuous current of 0.5 A each.
LAN Communication Port

There is one communication port on the MR55 board. This is TB2, the connection to the subLAN. The subLAN communications port is located along the upper left side of the controller, below DIP switch block S1.
A terminal block provides connection of the RS485 shielded, twisted pair cable on the standard controller. See Figure 1 on page 4 for port location. The communication speed on the subLAN is 9,600 baud.

Memory

The MR55 provides support for several types of memory that are currently organized as follows:

<table>
<thead>
<tr>
<th>Amount</th>
<th>Memory type</th>
</tr>
</thead>
<tbody>
<tr>
<td>236 bytes</td>
<td>RAM storage internal to the microprocessor</td>
</tr>
<tr>
<td>32 KB</td>
<td>EPROM</td>
</tr>
<tr>
<td>1024 bytes</td>
<td>NOVRAM</td>
</tr>
</tbody>
</table>

I/STAT

The I/STAT is packaged in a small plastic enclosure measuring 2.75" W × 4.5" H × 0.9" D (7.0 × 11.0 × 2.0 cm) as shown in Figure 2. Three 7-segment LEDs are located at the top of the I/STAT, and five discrete LEDs are located along the right side of the I/STAT.

A keypad is located on the right side of the I/STAT. There are three groups of keys on the I/STAT keypad: Function, Change, and Select. The Function keys are labeled On/Off, Call, Service, while the fourth has a graphic (.) indicating the Enter key. The Change keys are + and – keys. The Select keys are an up arrow and a down arrow.
Communications Port

The I/STAT communication port is provided in the back of the I/STAT. A 3-conductor cable (18–24 AWG) connects the I/STAT to the MR55 at TB3.

Power Supply

Electrical power for the I/STAT is provided solely from the MR55. The I/STAT receives +12 VDC through the cable connecting it to the MR55.
Installation

This section provides installation instructions for the I/STAT and MR55’s input, output, LAN, and power connections.

Note: Operational errors may occur if equipment is inadequately grounded. Symptoms may include, but are not limited to: intermittent LAN or subLAN communications, improper control actions, or loss of NOVRAM contents. Refer to “Grounding Requirements” on page 8 during equipment installation.

Installing the I/STAT

The three pin terminal block provides connection of the 18–24 AWG, 3-conductor cable (see Figure 3). The I/STAT is designed to mount on a standard electrical utility box. Use the following steps to install the I/STAT.

1. Ensure power is disconnected to the I/STAT.
2. Disconnect power to all devices to be connected to the I/STAT.

Warning: Failure to disconnect power from all interconnected equipment when performing electrical installation may result in electrical shock or burns.

3. Mount the I/STAT base to a wall-mounted, standard electrical utility box no more than 100 feet (30 m) from the MR55.
4. Connect the three-conductor cable from the MR55 to the pigtail leads on the I/STAT as follows (see Figure 3):
   a. Connect the I/STAT terminal 1 (white/signal) to TB3, terminal 1.
   b. Connect the I/STAT terminal 2 (red/+12 VDC power) to TB3, terminal 2.
   c. Connect the I/STAT terminal 3 (black/ground) to TB3, terminal 3.

Note: If the white signal wire is not properly connected to terminal 1, the I/STAT will display a flashing “CSI”.

   a. Connect the I/STAT terminal 1 (white/signal) to TB3, terminal 1.
   b. Connect the I/STAT terminal 2 (red/+12 VDC power) to TB3, terminal 2.
   c. Connect the I/STAT terminal 3 (black/ground) to TB3, terminal 3.

Note: When using shielded cable, the drain/shield wire may be used to connect the black (ground) lead from the I/STAT. In retrofit applications, the three conductors of the existing thermostat cable may be used in most cases for distances up to 100’ (30 m).

5. Reconnect power to the MR55 that is connected to the I/STAT.
6. Program the I/STAT from the host workstation (details in the TAC I/NET Operator Guide).
Installing the Micro Regulator

The following procedures describe how to connect the I/STAT and other field connections, power, and LAN connections.

Grounding Requirements

To ensure proper operation of the controller, it is imperative that the unit be correctly grounded. Depending on the mounting location and mounting method used to install the unit, the controller chassis may not necessarily provide adequate ground for the input power circuit and interconnected sensors/devices; therefore, use the following grounding requirements during unit installation.

Earth Ground

Note: You must establish a proper earth ground connection point prior to connecting ground wires to electrical equipment.

✦ Electrical Service Earth Ground must be securely connected to the equipment chassis.
✦ The 24 VAC transformer secondary common lead must be securely connected to the Electrical Service Earth Ground.
✦ The Electrical Service Earth Ground must then be connected to the ground terminal on the controller power input terminal block.
Baseplate Ground

Note: Baseplate grounding requirements apply to all controllers having a baseplate.

✦ Good contact must exist between the baseplate and chassis. Ensure that all mounting screws are tight.
✦ If you suspect that a good ground on the chassis is not present, attach a 12 AWG (3.331 mm²) ground wire from the Electrical Service Earth Ground wire to the baseplate. Attach the ground wire between the PCB and the baseplate, using one of the mounting screws.
✦ If resolving a grounding issue with previously installed equipment, use star-tooth lock washers to ensure a tight connection between the PCB and the baseplate.

LAN Ground

Note: This procedure applies to all LAN and subLAN connections.

✦ Ensure that the subLAN cable shield drain wire is not connected to the controller subLAN terminal block.
✦ Shield drain wire continuity must be maintained as the subLAN cable passes through each controller. Shield drain wires from each controller subLAN cable must be twisted together, insulated, and tied back such that wires do not come in contact with ground or any conductive surface within a controller.
✦ Connect the shield drain wire directly to Electrical Service Earth Ground at only one end of the cable (e.g., at the MCI, MRI, DPI, or controller).

Installing the MR55 Input Field Connections

The MR55 provides inputs that support 10K Thermistor and DI point types as shipped. Use the procedures shown below to connect the sensors you use to the MR55.

Caution: The input, output and power wiring must be routed along the side of the controller. The wiring must not lay across the controller.

Connecting Space Sensor Inputs

A dedicated I/STAT space sensor thermistor input is provided on the left side of the MR55 at TB3. This sensor port is a single terminal block of three screw terminations (Signal, Power, and Ground). Refer to “Installing the I/STAT” on page 7 for connection procedures for the I/STAT. A 10K ohm thermistor sensor may be used in place of the I/STAT sensor.

All MR55 general inputs are configured for 10K ohm thermistors from the factory. See Figure 4 for thermistor connection to a general input.

Connecting a Thermistor to the I/STAT Input

You may connect a thermistor directly to the I/STAT port on the microregulator. This configuration does not allow any programming.

1. Connect one lead to pin 1 (Signal) of TB3 (see Figure 4).
2. Connect the other lead to pin 3 (Ground) of TB3.
Connecting a Thermistor to a Universal Input

Note: Universal inputs can only be used for thermistor or DI inputs. The input range is fixed at 1.5–4.0 VDC.

1. Connect one lead of the thermistor to the appropriate IN-x signal input terminal.
2. Connect the other lead to the ground terminal on the input terminal block.

Recommended TAC 10K ohm thermistors are shown in Table 2.

Table 2. Recommended TAC 10K Ohm Thermistors

<table>
<thead>
<tr>
<th>TAC Model Number</th>
<th>TAC Part Number</th>
<th>10K Ohm Thermistor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTS100D1</td>
<td>605525-0003</td>
<td>Sensor, 4” Duct Probe</td>
</tr>
<tr>
<td>TTS100D2</td>
<td>605525-0004</td>
<td>Sensor, 8” Duct Probe</td>
</tr>
<tr>
<td>TTS100I1</td>
<td>605525-0005</td>
<td>Sensor, Immersion Probe &amp; 4” Thermowell</td>
</tr>
<tr>
<td>TTS100I2</td>
<td>605525-0006</td>
<td>Sensor, Immersion Probe &amp; 8” Thermowell</td>
</tr>
<tr>
<td>TTS1000A</td>
<td>605525-0007</td>
<td>Sensor, Outside Air</td>
</tr>
<tr>
<td>TTS100SP</td>
<td>605525-0008</td>
<td>Sensor, Steel Plate</td>
</tr>
<tr>
<td>TTS100SS</td>
<td>605525-0009</td>
<td>Sensor, Strap-on, Handi-box</td>
</tr>
<tr>
<td>TTS100S2</td>
<td>605525-0010</td>
<td>Sensor, Sealed Element only, 6’ Lead</td>
</tr>
<tr>
<td>TTS100S1</td>
<td>605525-0011</td>
<td>Sensor, Sealed Element only, 6” Lead</td>
</tr>
</tbody>
</table>
Connecting Discrete Input Points
For DI contact sensing on the MR55, use one of the IN-x terminals.

1. Connect one lead from the contact to the appropriate signal (IN-x) terminal on the terminal board (see Figure 5).
2. Connect the other lead of the contact to the GND terminal.

CFM/LPS Velocity Transducer Connections (MR55X Only)
There is a connection for one CFM/LPS velocity transducer on the MR55X. Use the following procedures to connect tubing to the CFM/LPS velocity transducer ports.

Note: Use care when connecting tubing to the CFM/LPS velocity transducer ports

1. The MR55X and velocity transducer should be mounted on a vertical surface with the transducer ports pointed down. This avoids possible contamination of the transducer from condensation. It also corresponds to the position of the transducer during factory calibration.

Caution: Do not make connections to the pressure transducer fittings with excessive pressure in the lines. Applying excessive over-pressure on either fitting could cause permanent damage to the transducer.
2. Connect the tubing to the transducer ports by pushing the tubing straight onto the barbed fitting. Do not use excessive force to the side.

3. The left side port (P1) receives the high pressure signal and the right side port (P2) receives the low pressure signal.

4. Use 1/8-inch I.D. vinyl or urethane flexible tubing.

5. To remove tubing from the fittings, carefully slit the tubing where it covers the fitting. Do not cut the pressure transducer fitting or leakage may occur.

6. After a minimum fifteen minute warm-up period, the output of the transducer can be verified and calibrated using offset counts, if necessary.

Connecting an MR55 to the SubLAN

The subLAN port is located along the upper left side of the controller. It provides asynchronous communications to the RS485 subLAN.

A three-pin terminal block provides connection of the RS485 shielded twisted pair cable (see Figure 7).

1. Connect the Com + line to terminal 1.

2. Connect the Com – line to terminal 2.

3. Twist shield wires for all controllers together at each controller, and connect to a good earth ground at one location only. Ensure that shield wire continuity is maintained (see “LAN Ground” on page 9).

**Caution:** Ensure that you connect terminal 1 to 1 and terminal 2 to 2 on all MRs. Also ensure that the subLAN shield is grounded at only one point (usually at the MCI or MRI controller). Refer to “Grounding Requirements” on page 8.
Installing the MR55 Output Field Connections

Output terminations are provided along the bottom right side of the MR55 controller. Each output consists of a solid state voltage sourcing AC triac output circuit capable of handling 0.5 A at 24 VAC. Each output provides discrete control of a field contactor or analog proportional control through pulse-width-modulation (PWM) of the output.

When connecting low voltage triac outputs to the MR55, the devices are configured as voltage sourcing.

1. Connect one lead from the device to the desired output (OUT1 through OUT5) terminal at TB5 (see Figure 8).
2. Repeat as required for additional connections.
3. Twist return wires for all output devices together, and connect to a good earth ground (see “LAN Ground” on page 9).

Connecting the Power Supply

Electrical power connections for the 24 VAC input power are provided along the upper left side of all MR55s (see Figure 9).

**Caution:** Before applying power, ensure that the two 24 VAC leads are connected to TB1. Connection to any other terminal block will damage the MR55!

**Warning:** Failure to disconnect power from all interconnected equipment when performing electrical installation may result in electrical shock or burns.

1. Connect one of the 24 VAC input leads from a separate, isolated 24 VAC transformer, to pin 1 of terminal block TB1
2. Connect the other 24 VAC input lead from the transformer to pin 2 of TB1.
Note: Do not attempt to use the same AC transformer for any subLAN device (MR, DPU, UC, or transducer) and its associated LAN interface device (MRI, DPI, MCI, or UCI). This will result in improper operation, and may cause damage to one or both devices.

3. The conductor connecting to pin 2 of TB1 (GND) must also be connected to a good earth ground (see Figure 9).
Setup and Operation

This chapter describes the various components of the I/STAT and MRs and their setup and operation. These units should be mounted indoors on a wall surface in an area that meets the specifications outlined (refer to “Specifications” on page 35). You should set the MR55’s address with DIP switch S1 before powering up the unit, or with the I/STAT prior to connection to the subLAN. Identify and record input and output terminals and addresses with their physical terminal block and pin numbers. Also identify the devices to which they connect. Write this information on a copy of the “Pinout Chart” on page 33.

MR55 Setup

The MR55 setup requirements include connecting the input and outputs, setting the subLAN baud rate, and setting the subLAN address. The following paragraphs provide MR55 setup information.

Hardware Inputs

The MR55 has one I/STAT space sensor and four general inputs. The space sensor point is connected either to an I/STAT sensor or 10K ohm thermistor (see Figures 3 and 4). The MR55 provides four general inputs. These inputs are processed by a single A/D convertor (1.5–4.0 VDC). The MR55X also includes one CFM/LPS velocity transducer.

For discrete contact input operation, select the “Normal” span lookup table in the host software MR Parameters editor. The field contact will be wired between the input and ground and will pull the input to ground when the contact is closed. The input is stimulated with 5 VDC from the MR55. A voltage below 2.125 V (25% scale) is considered a closed contact and a voltage above 3.375 V (75% scale) is considered an open contact.

**Note:** All MR55 inputs must be set to “Normal” range within the MR Parameters editor. The “Normal” input range on the MR55 is 1.5–4.0 VDC.

The thermistor input circuit consists of a 10K ohm, NTC thermistor connected between the signal input and ground. The thermistor signal input is biased/excited on the MR55 using a precision 5-volt reference. The MR55 meters the resulting voltage divider network and translates the voltage to temperature.

The MR55 provides a glitch filter on the AI inputs that takes the median of the last three averaged samples. The points defined as DI are considered to have changed state after seeing two consecutive samples in the new state (above 75% or below 25%).

The MR55 also provides a mean value filter to reduce/eliminate random electrical noise, especially AC (60 Hz) power line noise.
I/STAT Sensor Port

The I/STAT sensor port is designed to support connection of an intelligent thermostat (I/STAT), or connection of an inexpensive 10K ohm thermistor for space temperature sensing.

**Note:** Recommended 10K ohm sensors are TAC models TTS100D1, TTS100D2, TTS100I1, TTS100I2, TTS100A, TTS100SP, TTS100SS, TTS100S2, and TTS100S1. Refer to Table 2 on page 10 for corresponding TAC part numbers.

The following temperature vs. resistance conversion table is provided for the recommended TAC 10K ohm resistors.

<table>
<thead>
<tr>
<th>Temperature °F</th>
<th>Temperature °C</th>
<th>Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>–5</td>
<td>42,340</td>
</tr>
<tr>
<td>32</td>
<td>0</td>
<td>32,660</td>
</tr>
<tr>
<td>50</td>
<td>10</td>
<td>19,900</td>
</tr>
<tr>
<td>68</td>
<td>20</td>
<td>12,490</td>
</tr>
<tr>
<td>77</td>
<td>25</td>
<td>10,000</td>
</tr>
<tr>
<td>86</td>
<td>30</td>
<td>8,056</td>
</tr>
<tr>
<td>104</td>
<td>40</td>
<td>5,326</td>
</tr>
<tr>
<td>113</td>
<td>45</td>
<td>4,368</td>
</tr>
</tbody>
</table>

**Lookup Tables**

The MR55 series provides two lookup tables (Lookup Tables 1 and 2) to accurately translate the non-linear characteristics of thermistors. The MR55X provides another lookup table (Lookup Table 3) to translate the characteristics of the on-board CFM/LPS velocity transducer. Table 4 outlines the lookup tables available.

**Table 4. MR55 Series Lookup Tables**

<table>
<thead>
<tr>
<th>Table</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No lookup table = no adjustment.</td>
</tr>
<tr>
<td>1</td>
<td>I/STAT port input.</td>
</tr>
<tr>
<td>2</td>
<td>All other inputs</td>
</tr>
<tr>
<td>3</td>
<td>Velocity transducer input (MR55X only).</td>
</tr>
</tbody>
</table>

**Note:** There are several variations of curves, dissipation characteristics and accuracies available for 10K ohm thermistors, not all 10K thermistors are alike. Thermistor characteristics correspond to Dale part #IM1002-C3 (Dale curve #1).

The lookup tables translate the thermistor-controlled voltage directly to temperature in degrees centigrade, with a 100° positive bias to permit readings below zero. The lookup table entries are defined by the equation 100(°C+100).
The output from the lookup table will apply the user-defined M and B conversion coefficients to create the engineering unit value. The typical M and B coefficients are as follows for counts \( m = 1 \) and \( b = 0 \) with lookup table 0 (no table).

For engineering units of °C:
\[
M = 0.0100 \quad B = -100
\]

For engineering units of °F:
\[
M = 0.0180 \quad B = -148
\]

When connecting a 10K ohm thermistor to the space sensor input, specify the database point to use Lookup Table 2. When connecting the I/STAT to the space sensor input, specify Lookup Table 1. Table 1 corrects for an elevated self-heating error that is a function of the I/STAT communications interface. Table 2 is provided in the MR55 firmware to support accommodation of thermistors on the other four dual-purpose inputs.

Refer to “CFM/LPS Point Setup” on page 27 for discussion of CFM Airflow AI point definition and the use of MR55X Lookup Table 3.

## Automatic Time Schedule

The MCI or MRI maintains a clock for its connected MRs. The MCI or MRI sends a Time/Day of Week synchronization broadcast every minute to its family of MRs. If communication between the MRs and the MCI or MRI is severed, the MRs revert to their local resident automatic time schedule (ATS). The local resident schedule provides one start and stop command for each day of the week. When communication with the MCI or MRI is reestablished, the MRs return to the clock ATS commands controlled by the MCI or MRI.

**Note:** If MR power is lost and subsequently restored following an MRI/MCI-to-MR communications failure, the master device control point (controlled by the MR stand-alone ATS schedule) will default to its deenergized state. No further time-based commands will be issued to the point until MRI/MCI-to-MR communications are reestablished.

## SubLAN Port

The RS485 subLAN port (TB2) is accessed through a three-position terminal block located along the left edge of the MR55 (see Figure 10). When connected through this port, the MR55 can communicate with the MCI, MRI, or I/SITE®.

Field connections for the RS485 LAN port are shown in Table 5 below.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LAN +</td>
</tr>
<tr>
<td>2</td>
<td>LAN –</td>
</tr>
<tr>
<td>3</td>
<td>No connection</td>
</tr>
</tbody>
</table>

Table 5. RS485 Port Termination

## SubLAN Addressing

Set the subLAN address (point address of the MR55) through the DIP switch located between TB1 and TB2. The MR55 address range is 0 through 31, and corresponds to the PP (point) field in the LLSSPPBB LAN address.
The switch values are given in Table 6. The value of the switches are added together when they are in the **ON** position. All switches **OFF** equal an address of zero (00). All switches **ON** equal an address of 31. For example, an address of 13 would have switches 1, 3, and 4 **ON** ($1 + 4 + 8 = 13$).

**Note:** Each MR on the same subLAN must have a unique address for proper operation.

**Table 6. MR55 Addressing Switch Values**

<table>
<thead>
<tr>
<th>Switch Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch Values</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>16</td>
</tr>
</tbody>
</table>

You may also set the LAN address through the I/STAT keypad. Refer to “MR55 Address” on page 23 for the procedure.

**SubLAN Baud Rate**

Set the subLAN communications speed for the MR55s on the S1 DIP switches 6 and 7. Set the subLAN speed to 9,600 baud using Table 7 below.

**Table 7. SubLAN Communications Speed Setting**

<table>
<thead>
<tr>
<th>Baud Rate</th>
<th>Switch 6</th>
<th>Switch 7</th>
<th>Switch 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>9,600 baud</td>
<td>On</td>
<td>On</td>
<td>Off</td>
</tr>
</tbody>
</table>

**Note:** Switch 8 must be set Off, unless you choose to set the address and baud rate from an I/STAT.
You may also set the subLAN communications speed for the MR55 using the I/STAT keypad. Refer to “Parameters” on page 22 for the procedure.

**Caution:** When using the I/STAT to set the subLAN parameters, turn DIP switch 8 to the **ON** position. If switch 8 is placed in the **OFF** position, any address or baud rate entered with the I/STAT will be overwritten with the dip switch settings at the next power cycle.

**MR55 Control Outputs**

The MR55 provides five low-voltage triac outputs for 24 VAC at a maximum of 0.5 A. These outputs occupy the address range of 00–04. The MR55 also provides a bank of ten LEDs (U1) to indicate specific output status (see Figure 11). The TST LED is a self-test/power indicator. If the MR55 self-test passes, the LED will come on and remain illuminated. If the self-test fails, the LED will flash according to the specific self-test failure listed in Table 8. The functions of the MR55 LEDs are listed in Table 8.

![Figure 11. MR55 LED and Output Location](image)

**Table 8. MR55 LED Functions**

<table>
<thead>
<tr>
<th>LED</th>
<th>Label</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Triac output at address 00 is energized</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Triac output at address 01 is energized</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Triac output at address 02 is energized</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Triac output at address 03 is energized</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>Triac output at address 04 is energized</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Not used</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Not used</td>
</tr>
</tbody>
</table>
I/STAT Setup

The I/STAT setup is done through the TAC I/NET software MR parameters editor. The MR parameters editor allows you to define and control a master device point or call point by pressing the On/Off button or Call button, respectively, on the I/STAT. You may also perform password-protected service functions such as address and baud rate changes, conversion coefficient changes (FM and FB) for all input points, display input values, display/control output values, or display any module output in the connected MR.

LED Display

The three-digit, 7-segment LED display follows certain limitations due to its design. Numeric data is normalized to accommodate the displayed value. Values from 0.00 to 9.99 display with two fractional digits. Values from 10.0 to 99.9 display with one fractional digit. Any value of 100 or greater is displayed without fractional digits.

When an operator error occurs during input, the contents of the display flash at 0.5-second intervals. The display reverts to non-flashing display when any key is pressed.

Information displayed by the LEDs depends upon the current mode of the I/STAT. Under the normal operations mode, the LEDs are interpreted as defined by operator input through the MR parameters editor. Under Call and Service modes, the LEDs display the currently selected function information.

I/STAT Functions

Other than the basic display and control features accessed through the Select buttons and LEDs on the I/STAT, there are three functions provided from the I/STAT keypad: On/Off, Call and Service (see Figure 2 on page 5).

On/Off

This function controls the Master Device Control Point of the MR from the I/STAT. The point controlled is assigned through the MR Parameters editor. The On/Off LED shows the current status of this function. When the On/Off key is pressed while the point is off, the point is controlled on, and an interval timer (assigned from the MR parameters...
editor) begins to count down. When the timer expires, the point and LED are controlled off. If the interval timer is set to zero, the point and LED will be controlled on when the key is pressed and will remain on until the key is pressed again, or until the ATS off time occurs.

When the On/Off key is pressed while the point is on, the point and LED are controlled off. The command to turn the point off is actually delayed two seconds to allow a resumption of the interval timer without short-cycling the controlled equipment.

If an ATS extension has scheduled the point on, the first time the On/Off key is pressed the point and LED will be controlled off. The second time the key is pressed it will turn the point and LED on.

**Note:** If the interval timer expires before the ATS scheduled off time, the point will follow the ATS off time. If the interval timer expires after the scheduled ATS off time, the point will follow the interval timer off time.

**Call**

The Call function allows you to control a discrete point output, which must be assigned in the MR parameters editor. Pressing the Call button causes this point to toggle states. For advanced applications, attach an Event Definition extension to this point to enable event actions and event sequences.

**Service**

The Service function mode allows you to adjust parameters (MR55 address and subLAN speed). You may also calibrate the hardware coefficient parameters (factory calibrated coefficients). Offset calibration (P1) allows you to adjust the analog input point’s offset value (FB). Gain and offset calibration (P2) allows you to adjust both the offset value (FB) and gain value (FM) for any of the analog input points. The “Point” function allows you to display any input point or display/control any output point (refer to “Point” on page 25). The “Module” function works the same as the “Point” function, except that you can only display the output of the MR55 module (refer to “Module” on page 26).

After pressing Service, you must enter a numeric password that is set through the MR parameters editor. The default password is 000. The password is entered and displayed on the LED from left to right, one digit at a time. The I/STAT identifies the digit position you are entering by illuminating the accompanying decimal point. The LED displays 000 and you must press the Change +/- keys to display the desired number. Use the following steps to enter the password.

1. Press the Change +/- keys until the desired number appears.
2. When the number displays, press the Enter [+] key.
3. Repeat this procedure for each number.

The MR55 validates the password and enables the Select LED functions on the I/STAT. At this point, select the target function by pressing the Select up/down arrow keys. One of the four LEDs located on the lower right corner of the I/STAT illuminates as you press the up/down arrows. When the desired function LED illuminates, press the Enter [+] key. Change the displayed state or value, or the point parameter number, and again press the Enter key. The specific procedures for each adjustable parameter are listed in Table 9.

**Note:** The I/STAT password may be created or modified using the TAC I/NET software.
Parameters

The parameters function allows modification of the MR55 address and the MCI/subLAN communications speed.

**Note:** The I/STAT can be used to override the MR address and baud rate at any time. However, if dip switch S1-8 is placed in the **OFF** position, any address or baud rate entered with the I/STAT will be overwritten with the dip switch settings at the next power cycle.

**Caution:** Exercise caution when inspecting or changing the MR address/baud rate from the I/STAT. If the I/STAT Enter button is pressed while the new (or current) MR address/baud rate is displayed, the MR address/baud rate will be changed (or re-enforced) and *all previously-entered MR database information will be erased*. This is true even if the current address/baud rate is not changed. To inspect the current MR address or baud rate without erasing any existing MR information, use the I/STAT Service button when exiting the I/STAT Service mode.

<table>
<thead>
<tr>
<th>Table 9. I/STAT Target Service Function Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LED Position</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

**Parameters**

1. Press the Service key.
2. Enter the numeric password by using the Change +/- keys and then press the Enter key.
3. The prompt SEL appears.
4. Select the function type by pressing the Select up/down arrow keys until the Set Temp LED is lighted.
5. Press the Enter key. P1 displays in the LED (refer to Table 10).
6. Use the Select up/down arrow keys to switch between P1 (address) and P2 (baud rate).

**Table 10. Parameters Selection**

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Parameter</th>
<th>Selection Number</th>
<th>Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>MR55 Address</td>
<td>None</td>
<td>PP portion of LLSSPPBB address</td>
</tr>
<tr>
<td>P2</td>
<td>SubLAN Speed</td>
<td>1.2</td>
<td>1200 baud</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.4</td>
<td>2400 baud</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.8</td>
<td>4800 baud</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.6</td>
<td>9600 baud *</td>
</tr>
</tbody>
</table>

* 9600 baud is currently the only supported baud rate
MR55 Address
1. To select or change the MR55 address, select P1 and press the Enter key. The current MR55 address appears in the LED display.
2. Change the address by pressing the Change +/- keys until the desired selection appears in the LED display.
3. Press the Enter key to accept the displayed address.
4. The I/STAT returns control of the keypad and displays the initial P1 selection.

MR55 Baud Rate

Note: Parameters (address and baud rate) edited from the I/STAT will be discarded upon the next power cycle unless DIP switch S1-SW8 is set to On.

1. To display or set the MR55 baud rate, select P2 and press the Enter key. The current baud rate appears in the LED display (refer to Table 10).

Note: The current release of the MR55s support only 9,600 baud.

2. Change the baud rate by pressing the Change +/- keys until the desired baud rate appears in the LED display.
3. Press the Enter key to accept the displayed baud rate.
4. The I/STAT returns control of the keypad and displays the initial P2 selection.

Calibration
This function allows you to change the factory calibrated M and B coefficients (FM and FB). There are two calibration procedures: adjust offset (FB), and adjust gain (FM) and offset (FB).

Caution: Use of the recalibration functions is not recommended for those persons that have not received factory training on the process and associated instructions.

Note: Calibration parameters are saved only in the MR55. If the MR55 is replaced for any reason, this data must be reentered.

Offset Calibration Procedure.
The offset calibration procedure (P1) allows you to adjust the offset value for each of the available input points. To perform this function with the I/STAT, use the following steps.
1. Press the Service key.
2. Enter the numeric password by using the Change +/- keys and then press the Enter key.

<table>
<thead>
<tr>
<th>Calibration Number</th>
<th>Calibration Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Adjust Offset</td>
</tr>
<tr>
<td>P2</td>
<td>Adjust Gain and Offset</td>
</tr>
</tbody>
</table>

Table 11. Calibration Selection
3. The prompt SEL appears.

4. Select the function type by pressing the Select up/down arrow keys until the Fan Speed LED lights.

5. Press the Enter key.

6. Select offset calibration by pressing the Enter key when P1 displays (see Table 11).

7. The LEDs will display P0 for bit address 00. Select the value of the offset bit (BB of LLSSPPBB address) that you wish to calibrate (0–7) by pressing the Select up/down arrow keys until the desired bit offset appears in the LED.

8. Press the Enter key to accept the selection.

9. The LEDs display the calibrated Adjusted Temperature (A/D counts if no database or CFM/LPS transducer is installed) for the selected input point. Press the Change +/- keys until the desired reading appears in the LED. Each time you press a change key the value will change by one unit (i.e., pressing the + key three times increases the current FB parameter by three).

10. Press the Enter key to accept the displayed value.

11. FB is calculated automatically. The I/STAT returns control of the keypad displaying the original BB number selected.

12. Repeat Steps 7 10 until all FB coefficients are entered for the desired points.

13. Press the Service key to escape from the function.

**Gain and Offset Calibration Procedure.**

The gain and offset calibration procedure (P2) allows you to adjust the gain and offset values for each of the available input points. This procedure requires that the values be adjusted at two separate points on the sensor’s curve, at least 10% apart with 50% preferred. This allows the system to automatically perform the necessary calculations.

**Caution:** *You should use this procedure only when you have the ability to control the process variable, or you are calibrating the MR55 to a specified transducer voltage output that can be simulated with a variable power supply.*

**Note:** *The difference between the two adjustment points must be at least 10% of the span. The I/STAT will indicate an error condition (flashing LED) if this criteria is not met.*

1. Press the Service key.

2. Enter the numeric password by using the Change +/- keys and then press the Enter key.

3. The prompt SEL appears.

4. Select the function type by pressing the Select up/down arrow keys until the Fan Speed LED lights.

5. Press the Enter key.

6. Select gain and offset calibration by pressing a Select up/down arrow keys until P2 displays (see Table 11).

7. Press the Enter key to accept the function.
8. The LEDs will display P0. Select the value of the point (BB of LLSSPPBB address) that you wish to calibrate (0–7) by pressing the Select up/down arrow keys until the desired point’s bit offset appears in the LED.
9. Press the Enter key to accept the selected offset point.
10. The selected point’s Adjusted Temperature (A/D counts if no database or CFM/LPS transducer is installed) value displays in the LED.
11. Drive the process variable to the low end of the applicable span, then press the Change +/- keys until the correct reading is achieved.
12. Press the Enter key to accept the displayed value.
13. Drive the selected process variable to the high end of the applicable span. This must be at least 10% above the low end, with a 50% increase preferred.
14. Press the Change +/- keys until the correct value is displayed in the LED.
15. Press the Enter key to accept the displayed value.
16. FM and FB are calculated automatically. The I/STAT returns control of the keypad displaying the original bit offset selection.
17. Repeat Steps 8–15 until all FM and FB coefficients are set for the desired points.
18. Press the Service key to escape from the function.

Point

At times you may want to display or control a point. Using the I/STAT keyboard, follow the steps shown below.

1. Press the Service key.
2. Enter the numeric password by using the Change +/- keys, then press the Enter key.
3. Press the Select up/down arrow keys until the Room Temp LED lights, then press the Enter key.
4. The LEDs will display the output points designated PC0 through PC9, and the input points as P0 through P9.

Note: You may want to download the controller with all possible input (AI) and output (DO) points before installation in order to provide engineering unit display of the AI points and control of the DO points. Check-out of DO points may be easier without an application program downloaded. When you plan to use the I/STAT to control outputs for equipment/wiring checkout, ensure that you do not direct any DDC modules to the outputs, as these are not overridden by I/STAT control.

5. Select the point to be displayed or controlled using the Select up/down arrow keys, then press the Enter key.

Note: The first point is displayed when the function is invoked. The LED display precedes the bit offset number (BB) with a C for control output points. Control output points will be displayed before an input point with the same bit offset.

6. The I/STAT displays the current state/value of the point. The display is updated at a 1 second scan rate.
7. Change the state/value by pressing the Change +/- keys.
Note: Input points are for display only.

8. Accept the changed state/value by pressing the Enter key.
9. The I/STAT returns control to you and displays the original point selected. Repeat Steps 5-8 as desired.

Module

The Module function allows you to display the outputs of all 16 modules in an MR55. In each case, except for Float modules, the current output is displayed. Float always displays zero. Use the following procedure to display modules.

1. Press the Service key.
2. Enter the numeric password by using the Change +/- keys, then press the Enter key.
3. Press the Select up/down arrow keys until the Outside LED lights, then press the Enter key.
4. Select the module (P1–P16) to be displayed using the Select up/down arrow keys, then press the Enter key.

Note: Only the modules defined in the database are displayed when this function is invoked.

5. The I/STAT displays the current state/value of the modules output. The module output display is refreshed at a 1 second scan rate.
6. Pressing the Enter key returns control to you and displays the original module selected. Repeat Steps 4-5 as desired.

Velocity Transducer Setup (MR55X Only)

It is necessary to field calibrate the air flow (CFM) reported by the sensor/transducer/controller hardware to the actual flow measured by the testing, adjusting and balancing (TAB) technician. This action will both ensure accurate readings from the control system, and facilitate reliable CFM setpoint adjustments through the control system within the range of the VAV box.

Initial CFM/LPS Velocity Transducer Offset Calibration

If the factory calibration is disturbed during shipment, use the following procedure to set the transducer offset calibration.

1. Close the VAV box damper completely (0” or 0 cm water column from the probe), or disconnect the tubing at the airflow probe ports on the duct.
2. From the MR55X center pin of P2 referenced to ground, check and adjust the transducer offset potentiometer for 1.620 VDC output. The transducer potentiometer is located under a circular snap-off dustcover on the transducer face (see Figure 6 on page 12).
3. Subsequent calibration of the velocity measurement should be done through software “Offset” parameter entries.
CFM/LPS Point Setup

Air flow measurements are achieved by measuring the velocity pressure generated by the flow of the air stream through the VAV box collar. This velocity pressure analog input is converted to a direct current voltage input by an on-board pressure-to-voltage transducer. The analog voltage is then converted to a discrete number of counts by the analog-to-digital converter. This signal is then interpreted through firmware and software and reported as the process (measured) variable, “air flow,” with units of cubic feet per minute (CFM).

The relationship between velocity pressure and air flow is non-linear. In a duct with uniform flow, this relationship for standard air is governed by the equation

\[ VP = \left( \frac{V}{4005} \right)^2 \]

where:
- \( VP \) = velocity pressure in inches of water column
- \( V \) = air velocity in feet per minute

Air flow is now expressed as

\[ CFM = \sqrt{VP \times 4005 \times A_D} \]

where:
- \( CFM \) = air flow in cubic feet per minute
- \( A_D \) = the cross sectional area of the duct in square feet

Note the square root function in this relationship.

In the case of a VAV box with a velocity pressure measuring station, the constant 4005 is replaced by a manufacturer-specific constant or “box coefficient” (BC), which is based upon factory test of the VAV box. The expression for velocity pressure at the VAV box measuring station becomes

\[ VP = \left( \frac{V}{BC} \right)^2 \]

and air flow becomes

\[ CFM = \sqrt{VP \times BC \times A_D} \]

After the input signal has been converted to counts by the analog-to-digital converter, it is passed through a lookup table, a square root function, and finally a linear conversion.

The lookup table used with the MR55X is Lookup Table 3. This table is in the firmware and is not editable. The output values in the lookup table correspond to the input velocity pressure multiplied by 10,000.

The square root function is implemented by specifying a “Flow Sensor” for the AI point. This directs the firmware to take the square root of the lookup table output and pass the results on to the linear conversion.
The linear conversion equation within the software now becomes
\[ y = mx + b \]
where:
\[ y \] = flow rate in CFM
\[ x \] = lookup table output value
\[ m \] = slope of the relationship
\[ b \] = CFM value when \( \sqrt{x} = 0 \) (y-intercept)

From the available data, we may use any two convenient points to determine the slope (m). The most convenient points are where the lookup table output values are 0 and 13,000. These points correspond to velocity pressures of 0 and 1.3 inches. They also correspond to values for CFM based on the duct area and the box coefficient (BC) at velocity pressures of 0 and 1.3 inches. Therefore, the slope coefficient “m” becomes
\[ m = \frac{A_D \times BC \times \sqrt{1.3} - 0}{100 \times \sqrt{1.3}} = \frac{A_D \times BC}{100} \]
As “b” is the value when the square root of x is equal to zero, “b” will be zero as the CFM is zero at that point.

**Airflow Balance**

1. Calculate an appropriate “m” value for the VAV box in use, according to the relationship
   \[ m = \frac{A_D \times BC}{100} \]
   where:
   \[ A_D \] = the cross-sectional area of the VAV box collar in square feet
   \[ BC \] = box coefficient or air flow constant as published by the manufacturer

   An example calculation is shown in Table 12 below:

   **Table 12. Example Airflow Balance Calculation**

   | Given: A VAV box with an air flow constant of 2750 and an 8-inch diameter collar. |
   | Calculation: \[ m = \frac{A_D \times BC}{100} = \frac{0.3491 \times 2750}{100} = 9.5993 \] |

2. Enter this value and “b,” the y-axis intercept, in the conversion coefficient table under the station parameter menu of the TAC I/NET software (refer to TAC I/NET operator guide for instructions).

   **Caution:** The above value for “m” and a “b” value of zero reside as the first coefficient pair in the application software as part of the default parameter set. You MUST change the “m” value to agree with the airflow or box constant for that specific VAV box. The “b” value should remain set to zero (0).
3. To complete the calibration of the installed system, record the actual CFM being delivered, either by flow hood or pitot tube traverse, and compare it to the CFM being reported on the AI point. To facilitate this process, the software has a CFM Calibration and Override point, 08 AO, which you may use to input a fixed CFM setpoint.

   a. To make the initial CFM comparison, set the value of the 08 AO point to the designed maximum flow for the VAV box.

   b. Take an actual flow measurement and compare it to the reported CFM. If the difference is less than ±30 CFM, no further calibration is recommended.

4. If the difference is greater than ±30 CFM, an offset value for input counts must be determined and entered into the resident I/O points editor for the AI point. This will eliminate the difference between the actual and reported CFM values.

**Caution:** This equation is valid only for Lookup Table #3 in the MR55X firmware.

   a. The appropriate offset value is determined by the following calculation.

\[
\text{Offset} = \frac{\text{CFM}_A - \text{CFM}_R}{m^2 \times 53.55}
\]

where:

- \(\text{CFM}_A\) = actual CFM measured in the field
- \(\text{CFM}_R\) = CFM reported at the AI point
- \(m\) = conversion coefficient as calculated for the specific box in use
- 53.55 = average change in output value from the table as the counts change by 1 unit (derived from the lookup table characteristics)

   b. Round the calculated value to the nearest whole number.

   An example offset calculation is shown in Table 13.

**Table 13. Example Offset Calculation**

| Given: | \(m = 9.5993\)  
measured CFM\(_A\) = 600  
reported CFM\(_R\) = 550 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculation:</td>
<td>[\text{Offset} = \frac{\text{CFM}_A^2 - \text{CFM}_R^2}{m^2 \times 53.55} = \frac{600^2 - 550^2}{(9.5993)^2 \times 53.55} = 11.65 \approx 12]</td>
</tr>
</tbody>
</table>

   c. Enter this value in the resident I/O points editor, as the offset for the AI point.

**Note:** The result of this calculation may be a negative number, if the reported CFM is greater than actual flow. Make sure that the sign of the entered offset, positive (+) or negative (−), matches the sign of the calculated value.
5. Repeat Steps 1–3 at the midpoint of the design flow for the VAV box. If measured flow differs by more than ±30 CFM from reported flow, complete the following steps:
   
a. Compute another value for offset (Step 4) using the midpoint flow data.
   
b. Compute the average of the two offset values (maximum flow and midpoint flow).
   
c. Round the average value to the nearest whole number.
   
d. Enter the rounded average in the resident I/O points editor, as the offset for the AI point.
All base board addresses begin with 00 (BB, bit offset). Addresses labeled below as internal will be used only as internal points (they do not have external hardware points associated with them). Points labeled below as external can be defined as external (hardware) points or internal (software) points.

### Inputs

There are a total of 10 input point addresses available on each of the MR55s.

**Table 14. Input Point Addresses**

<table>
<thead>
<tr>
<th>Point Type</th>
<th>Number of Points</th>
<th>Point Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>External DI/Thermistor</td>
<td>4</td>
<td>00–03</td>
</tr>
<tr>
<td>CFM/LPS Velocity Pressure (MR55X only)</td>
<td>1</td>
<td>04</td>
</tr>
<tr>
<td>Thermistor or I/STAT</td>
<td>1</td>
<td>07</td>
</tr>
<tr>
<td>Internal/Indirect only</td>
<td>4</td>
<td>05, 06, 08, 09</td>
</tr>
</tbody>
</table>

Input points may be defined as AI or DI, but only one type can be defined for a specific point.

### Outputs

There are 10 output point addresses available through the MR55.

**Table 15. Output Point Addresses**

<table>
<thead>
<tr>
<th>Point Type</th>
<th>Number of Points</th>
<th>Point Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>External DO/PWM</td>
<td>5</td>
<td>00–04</td>
</tr>
<tr>
<td>Internal only</td>
<td>5</td>
<td>05–09</td>
</tr>
</tbody>
</table>

External output points may be defined as DO or PWM but not as both.
DIP Switch Settings

DIP switch block S1 controls the subLAN address of the controller. It also controls the setting of the subLAN communication speed.

Note: DIP switch 8 must be set to the ON position for the I/STAT to control the address and baud rate of the MR55. Switch 8 tells the MR55 to ignore switches 1 through 7. Failing to have switch 8 set to the ON position will cause the switch settings to overwrite the I/STAT address and baud rate settings at the next power cycle.

DIP switches 9 through 12 are not used in this version of the MR55, and should remain in the OFF position.

<table>
<thead>
<tr>
<th>Switch Number</th>
<th>LAN Address</th>
<th>Baud Rate</th>
<th>I/STAT Override</th>
<th>Not Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

Switch 8 OFF = no I/Stat override, switches 1–7 active
Switch 8 ON = I/STAT override of DIP switch in use, switches 1–7 inactive

Table 16. MR55 Addressing Switch Values
### Input

<table>
<thead>
<tr>
<th>Terminal Block</th>
<th>Point Type/ Address</th>
<th>Point Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB4-1</td>
<td>AI/DI 00</td>
<td></td>
</tr>
<tr>
<td>TB4-2</td>
<td>AI/DI 01</td>
<td></td>
</tr>
<tr>
<td>TB4-3</td>
<td>AI/DI 02</td>
<td></td>
</tr>
<tr>
<td>TB4-4</td>
<td>AI/DI 03</td>
<td></td>
</tr>
<tr>
<td>TB4-5</td>
<td>Not Used</td>
<td></td>
</tr>
<tr>
<td>TB4-6</td>
<td>Ground</td>
<td></td>
</tr>
</tbody>
</table>

- **On-board velocity pressure transducer**
  - AI 04: CFM/LPS velocity pressure input (MR55X only)

### Output

<table>
<thead>
<tr>
<th>Terminal Block</th>
<th>Point Type/ Address</th>
<th>Point Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB5-1 (24 VAC)</td>
<td>DO/PWM 00</td>
<td></td>
</tr>
<tr>
<td>TB5-2 (24 VAC)</td>
<td>DO/PWM 01</td>
<td></td>
</tr>
<tr>
<td>TB5-3 (24 VAC)</td>
<td>DO/PWM 02</td>
<td></td>
</tr>
<tr>
<td>TB5-4 (24 VAC)</td>
<td>DO/PWM 03</td>
<td></td>
</tr>
<tr>
<td>TB5-5 (24 VAC)</td>
<td>DO/PWM 04</td>
<td></td>
</tr>
<tr>
<td>TB5-6</td>
<td>Ground</td>
<td></td>
</tr>
</tbody>
</table>
### Specifications

#### Dimensions

- **I/STAT**: 2.75" W × 4.5" H × 0.9" D (7.0 × 11.4 × 2.3 cm)
- **MR55**
  - PCB: 4.0" W × 7.0" H (10.2 × 17.8 cm)
  - Baseplate: 5.5" W × 8.5" H (14.0 × 21.6 cm)
- **MRCOVERM (MR55) and MRCOVERMX (MR55X)**: 5.5" W × 8.5" H (14.0 × 21.6 cm)
  - (Cover required for U.L. plenum)

#### Operating Environment

- **Temperature**: 32–122°F (0–50°C)
- **Humidity**: 10% to 90%, non-condensing

Input power (MR55 only):

- 24 VAC @ 7 VA + output triac load

#### MR55 Inputs

- **General analog inputs**:
  - Quantity: 4 + 1 space sensor input
  - Sensor: 10K Thermistor (NTC)
  - Range: 25–113°F (−4 to 45°C)
  - Resolution: 0.4%
  - Accuracy: 2.0% (Thermistor)
- **Discrete contact inputs**:
  - Contact excitation: 5 V @ 0.5 mA
  - Input duration: 1 second minimum
- **CFM/LPS analog inputs (MR55X only)**:
  - Quantity: 1
  - Range: 0–1.3" (0–3.3 cm) W.C.

#### MR55 Outputs

- **Quantity**: 5

#### SubLAN Port

- **Protocol**: Asynchronous, polling, RS485
- **Baud Rate**: 9,600 baud

#### Cables

- **subLAN**:
  - 22 AWG (0.324 mm²) shielded, twisted pair (Belden 9184) 5,000' (1,500 m) maximum
  - 24 AWG (0.206 mm²) shielded, twisted pair (Belden 9841) 4,000' (1,200 m) maximum per segment
- **I/STAT**:
  - 18–24 AWG (0.206–0.897 mm²) three conductor cable, 100' (30 m) maximum from the MR55
  - 22 AWG (0.324 mm² or Belden 9184) shielded, twisted pair cable (recommended for electrically noisy environments), 100' (30 m) maximum from the MR55

#### Type

- 5 low voltage triac, voltage sourcing
- 24 VAC @ 0.5 A (2 A maximum)

#### Operating Modes

- Latched or PWM Proportional
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**Warranty**

**Repair or Replacement**

If this unit fails to operate because of a defect in materials or workmanship within two (2) years of the date you purchased it, it will either be repaired or replaced by Schneider Electric at no charge to you. Before contacting Schneider Electric, it is recommended that you first contact the dealer from whom you purchased this equipment to determine whether they will have it repaired or replaced. If the dealer will not, please contact Schneider Electric to arrange to have this equipment repaired or replaced.

SCHNEIDER ELECTRIC EXPRESSLY RESERVES THE RIGHT TO REPAIR OR REPLACE THIS EQUIPMENT WITH NEW OR REFURBISHED PARTS OR EQUIPMENT.

**Exclusions and Limitations**

Your warranty does not cover:

- Damage by negligence, misuse, or accident
- Compatibility with the equipment of any other manufacturer
- Modifications to the equipment to make it compatible with the equipment of any other manufacturer
- Damage to the equipment resulting from improper installation or operation.

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**Purchaser’s Responsibility**

In order to obtain service under this warranty, you must deliver the equipment to the place of purchase or to Schneider Electric and provide proof of the original purchase date along with the returned equipment. Failure to provide adequate proof of the original purchase date could result in denial of warranty service.

**Out of Warranty Service**

Direct requests for information on out-of-warranty service to Product Service Manager at the address below.

Schneider Electric
Buildings – Europe
Jägershillgatan 18
213 75 Malmö
Sweden
Phone: +46 40 38 68 50
Fax: +46 40 21 82 87

Schneider Electric
Buildings – Americas
1650 W. Crosby Rd.
Dallas, TX 75006 USA
Phone: +1 (972) 323 1111
Fax: +1 (972) 242 0026

Schneider Electric
Buildings – Asia-Pacific
Level 3/2A Lord Street
Botany NSW 2019
Australia
Phone: +61 (0) 2 8336 6100
Fax: +61 (0) 2 8336 6190

www.schneider-electric.com/buildings

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