SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.
Warnings, Cautions and Notices

Warnings, Cautions and Notices. Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provided to alert installing contractors to potential hazards that could result in personal injury or death. Cautions are designed to alert personnel to hazardous situations that could result in personal injury, while notices indicate a situation that could result in equipment or property-damage-only accidents.

Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

**ATTENTION:** Warnings, Cautions and Notices appear at appropriate sections throughout this literature. Read these carefully.

⚠️ **WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠️ **CAUTION:** Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

**NOTICE:** Indicates a situation that could result in equipment or property-damage-only accidents.

⚠️ **WARNING**

Personal Protective Equipment (PPE) Required!

Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards.

- Before installing/servicing this unit, technicians MUST put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. ALWAYS refer to appropriate MSDS sheets and OSHA guidelines for proper PPE.
- When working with or around hazardous chemicals, ALWAYS refer to appropriate MSDS and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations.
- If there is a risk of arc or flash, technicians MUST put on all Personal Protective Equipment (PPE) in accordance with NFPA70E or other country-specific requirements for arc/flash protection PRIOR to servicing the unit.

Failure to follow recommendations could result in death or serious injury.

⚠️ **WARNING**

Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow codes could result in death or serious injury.
Overview of Manual

**Note:** At least one copy of this document ships with every order and is customer property. It must be retained by the unit's maintenance personnel.

This booklet describes proper installation procedures for delivered air systems. By carefully reviewing the information within this manual and following the instructions, the risk of improper operation and/or component damage will be minimized. It is important that periodic maintenance be performed to help assure trouble free operation. Should equipment failure occur, contact a qualified service organization with qualified, experienced HVAC technicians to properly diagnose and repair this equipment.

**General**

These instructions do not cover all variations in systems nor provide for every possible contingency that may arise at a job site installation.

**Inspection**

Check carefully for any shipping damage. This must be reported to and claims made against the transportation company immediately. Any missing parts should be reported to your supplier at once and replaced with authorized parts only.
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General

Damper Descriptions & Actuator Specifications

Round Dampers

**Cylinder:** 18-gage galvanized–rolled and seam welded

**Damper:** Two 22-gage galvanized steel plates locked together with an elastomeric gasket sandwiched between.

**Actuator:** Internal actuator w/synchronous motor and gear reduction is direct coupled to the damper shaft. It has a drive time of 60 seconds.

- **Electrical Rating:**
  - Power Supply—24 VAC (20 to 30 VAC) at 50/60 Hz
  - Transformer Sizing—2.0 VA maximum at nominal voltage, Class 2

<table>
<thead>
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</tr>
<tr>
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</tr>
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</table>

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</tr>
</thead>
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<td>12</td>
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<tr>
<td>14</td>
</tr>
<tr>
<td>16</td>
</tr>
</tbody>
</table>

Rectangular Bypass Damper

**Sheet Metal Box:** 22-gage galvanized steel

**Length:** 16”

**Damper Frame:** 18-gage galvanized steel

**Damper Blades:** 18-gage galvanized steel

**Damper Shaft:** 1/2” Diam.

<table>
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</tr>
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<td>14 x 12</td>
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<tr>
<td>16 x 16</td>
</tr>
<tr>
<td>20 x 20</td>
</tr>
<tr>
<td>30 x 20</td>
</tr>
</tbody>
</table>
General

Rectangular Zone Damper

**Sheet Metal Box:** 22-gage galvanized steel  
**Length:** 16"  
**Damper Frame:** 18-gage galvanized steel  
**Damper Blades:** 18-gage galvanized steel  
**Crank Bearings:** Glass filled Nylon  
**Damper Shaft:** 1/2" Diam.

<table>
<thead>
<tr>
<th>Size H&quot; x W&quot;</th>
<th>No. of Blades</th>
<th>Shipping Weight</th>
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<td>8 lbs</td>
</tr>
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<td>08 x 14</td>
<td>2</td>
<td>10 lbs</td>
</tr>
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<td>08 x 16</td>
<td>2</td>
<td>12 lbs</td>
</tr>
<tr>
<td>10 x 16</td>
<td>2</td>
<td>14 lbs</td>
</tr>
<tr>
<td>10 x 20</td>
<td>2</td>
<td>16 lbs</td>
</tr>
<tr>
<td>14 x 18</td>
<td>3</td>
<td>18 lbs</td>
</tr>
</tbody>
</table>

Actuator Specification

**Actuator Design:** 3 Wire 18 ga 24 VAC Floating Point Control, Non-spring return  
**Actuator Housing:** Housing Type—NEMA 1, IP20  
**Shaft Rotation:** All damper shafts rotate counter-clockwise to open  
**Electrical Rating:**  
- Power Supply—24 VAC (20 to 30 VAC) at 50/60 Hz  
- Transformer Sizing—2.5 VA maximum at nominal voltage, Class 2  
**Manual Override:** External release lever  
**Humidity:** 90% RH maximum, non-condensing  
**Temperature Rating:**  
- Ambient – 35°–125°F (2°–52°C)  
- Shipping and Storage: -20°–150°F (-29°–66°C)  
**Torque:**  
- Running: 35 lb-in (4 N-m)  
- Breakaway: 35 lb-in (4 N-m) minimum  
- Stall: 40 lb-in (4.5 N-m) minimum  
**Running Time for 90° Rotation:**  
- 60 seconds at 60 Hz nominal  
- 72 seconds at 50 Hz nominal  
**Weight:** 1.5 lb (0.68 kg)

Install Bypass Dampers

Bypass damper(s) should be located before the first zone runs out from the supply air duct. VariTrac dampers or supply duct branches should be installed downstream of bypass dampers. The distance between bypass dampers and the communicating sensor/bypass control should be two to three equivalent duct diameters (see Figure 1, p. 7).
In systems with plenum return, bypass damper(s) should be ducted into the return air riser. Confirm that sufficient relief or exhaust exists to prevent return plenum pressurization.

**Important:** The use of a relief fan or backdraft damper is strongly recommended in the return air system. This will prevent bypassed air from pressurizing the return air duct system and spilling out of return grills into conditioned space, especially when the unit is in economizer mode.

### Bypass Damper Wiring

**WARNING**

Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

**WARNING**

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

The interconnect cable is pre-wired to the bypass damper and may be lengthened if necessary.

**Important:** Mounting screws must be located towards the ends of the damper when hanging straps are used to avoid interference with the rotating damper. A label attached to the dampers indicates the acceptable areas for mounting screws.

**NOTICE**

Equipment Damage!

The bypass damper must be positioned to orient the drive shaft horizontally. Failure to do this could result in drive train malfunction (see Figure 1, p. 7).

**Important:** It is important to note the airflow direction when installing dampers. A label for this is present on each damper assembly.

**Figure 1. Bypass damper installation**
Installation

Installing the Communicating Sensor/Bypass Control

⚠️ WARNING
Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

The communicating sensor/bypass control is located between the supply fan and the bypass damper in the least turbulent location possible. It is recommended that the distance between the control and the nearest upstream transition be two to three equivalent duct diameters.

If the supply duct branches out at the riser, install the control in the largest supply duct.

A two-inch hole is required to insert the temperature and static pressure sensor. Use the supplied gasket to seal off air leaks. Secure the sensor to the duct with a minimum of three sheet metal screws.

**Important:** The sensor assembly should be installed on the side of the duct to keep the pressure transducer in a vertical orientation. Do not install horizontally on the top or bottom of a duct.

**Note:** Each of the three steps below may be found illustrated in Figure 2, p. 8. Each step has a corresponding oval in the figure.

1. Plug the actuator connector from the BYPS damper onto the master damper UCM socket (ACT).
2. If two bypass dampers are used, connect the actuator plug of the second bypass damper to the spare connector socket pigtailed on the first BYPS damper cable assembly.
3. If the cable assembly needs to be extended, cut and splice additional wire on the BYPS damper end of the cable.

**Figure 2.** Installing the communicating sensor/bypass control
Connect the Communicating Sensor/Bypass Control Wiring

⚠️ WARNING
Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

The pre-wired interconnect cable plugs into the actuator connector inside the control box. The cable is designed to connect in one orientation only. Refer to the VariTrac Changeover Bypass VAV Literature (VAV-PRC003-EN) for information regarding system wiring.

Install the VariTrac Dampers

A sketch of basic damper installation is shown in Figure 4, p. 10. The damper may be connected with hard duct or flex duct at either end.

If two bypass dampers are installed, a pigtail socket is provided on the cable so the second damper can be plugged into the UCM.

**Important:** Mounting screws must be located towards the ends of the damper when hanging straps are used to avoid interference with the rotating damper. A label attached to the dampers indicates the acceptable areas for mounting screws.

**Important:** It is important to note airflow direction when installing the damper. A label for this is present on each damper assembly.

NOTICE
Equipment Damage!

The control box on each damper must be positioned to orient the drive shaft horizontally. Failure to do this could result in drive train malfunction. (See Figure 3, p. 9.)

Figure 3. Proper damper mounting positions

Dampers must always be installed with the drive shaft horizontal.
Attach unit to hard duct using a minimum of four sheet metal screws.

Attach flex duct to unit using self-locking plastic tie strap. A screw & washer can be used to secure the tie-strap if required.

**IMPORTANT:** Mounting screws must be 3" away from damper bend to avoid interference with rotating damper.

Attach unit to hard duct using a minimum of four sheet metal screws.
Connect UCM Wiring

⚠️ **WARNING**
Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

⚠️ **CAUTION**
Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in minor to moderate injury.

**NOTICE**
Use Copper Conductors Only!

Unit terminals are not designed to accept other types of conductors. Failure to use copper conductors could result in equipment damage.

**NOTICE**
Equipment Damage!

Connecting a shared UCM power supply with reversed polarity will cause damage to the UCM, TCI, and central control panel.

**NOTICE**
Equipment Damage!

When powering multiple UCMs from one transformer, polarity must be maintained. Terminal TB1-1 is designated positive (+) and Terminal TB1-2 is negative (−) to unit casing ground.

**Important:** UCM control box cover must be replaced after field wiring to prevent electromagnetic interference.

1. Connect the power to terminals TB1-1 (24V) and TB1-2 (ground). 24 Vac is required to power the UCM control. 20 Vac to 28 Vac is acceptable. Use 18 to 20 AWG for power wiring.
2. The power consumption for an auto-changeover cooling-only UCM (model CHGR) is 10VA.
3. Local heat outputs are rated at 12VA maximum for each output. To determine the total UCM power requirements, add the power consumption of local heat to the circuit board power.

**DIP Switch Settings**

Dip switch SW1 contains six switches for addressing the UCM. These switches allow a user to set a unique communication address for each UCM. Each UCM on a given communication link must have a unique address in order for the CCP to communicate to it. Refer to Table 5, p. 12 for UCM 4.1 DIP switch settings.
### Table 5. DIP switch settings

<table>
<thead>
<tr>
<th>UCM Unit #</th>
<th>Dip 1</th>
<th>Dip 2</th>
<th>Dip 3</th>
<th>Dip 4</th>
<th>Dip 5</th>
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</table>

(a) Bypass damper must always be addressed at 33.
Figure 5. Typical VariTrac Zone/Changeover Wiring Diagram.

- **Damper Actuator Wiring**
- **Transformer**
- **Address Switch**
- **D.D.C. U.C.M. Control Board**
- **D.D.C. U.C.M. Control Box**
- **Zone Sensor**
- **Remote MTD. Zone Sensor**
- **Remote MTD.**
- **Electric Heater**
- **Heater Stage**
- **Contactors**
- **Transformer**

**NOTE:**
1. Factory wiring
2. Zone sensor terminals 4 and 5 require shielded twisted pair wiring for communications jack equipped zone sensor option.
3. Optional or alternate wiring
4. ¼” quick connect required for all field connections.
5. As shipped, the AUX input is configured as an AUX input. The AUX input can be reconfigured as a CO2 sensor input via the communications interface.
6. S terminal not to be used with VariTrane.
7. If unit mounted transformer is not provided, polarity from unit to unit must be maintained to prevent permanent damage to control board. If one leg of 24VAC supply is grounded, then ground leg must be connected to TB1-2.
8. Shields of communications wiring should be tied together and insulated.
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