

T775S Series 2000 Expansion Module

INSTALLATION INSTRUCTIONS

PRODUCT DESCRIPTION



The T775S2008 Relay Expansion Module is a four relay device for use with the T775L2007 and T775P2003 Series 2000 Electronic Stand-Alone Controllers.

The T775L and T775P controllers each comes with four relays and can accept up to two T775S Expansion Modules, which can provide a total of up to 12 relays for each controller.

The T775P and T775L controllers are the next generation of commercial and agricultural controls capable of remote sensing of temperature and providing switched and/or proportional outputs to various types of loads.

When used with the T775L2007 model, the T775S Expansion Modules provide the capability to have up to two PID control loops, which can be used to stage multiple relays (up to 12 when using two T775S modules) from two independent heat or cool setpoints. The number of stages for each setpoint can be freely chosen, limited only by the number of relays available.

When used with the T775P2003 model, up to 12 stages (when using two T775S modules) with reset may be configured with the last stage being an option for a pump stage.

IMPORTANT

The T775S expansion module is an operating control, not a limit or safety control. If used in applications requiring safety or limit controls, a separate safety or limit control device is required.

Table 1. T775S Expansion Module Configuration.

Controller Model	Description	SPDT Relay Outputs	Enclosure
T775S2008	4-Relay Expansion Module	4	NEMA 1

Up to two T775S expansion modules can be used with the T775L or T775P models.

The T775S includes a T775 Bus terminal for connection to other T775L/P/S models.

Controller Dimensions

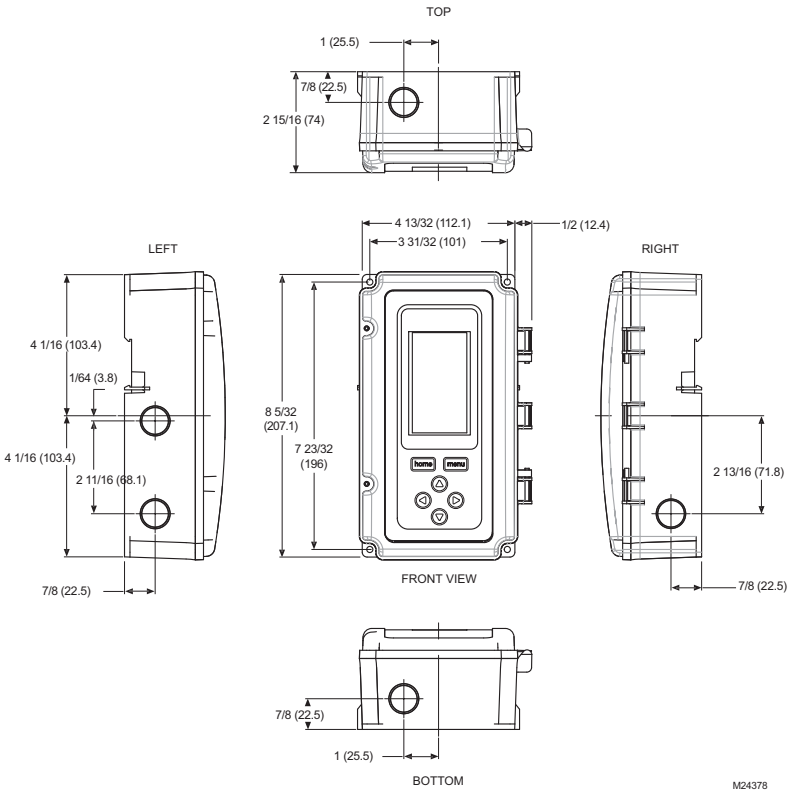


Fig. 1. T775S Dimensions in inches (mm).

SPECIFICATIONS

Power: 24, 120, or 240 Vac; 50/60 Hz;
A separate earth ground is required for any power source.

- Power Consumption:**
- 8 VA maximum at 60 Hz
 - 10 VA maximum at 50 Hz

- Operating & Storage Temperature Ambient Rating:**
- -40°F to 125°F (-40°C to 52°C) @ 50 Hz
 - -40°F to 140°F (-40°C to 60°C) @ 60 Hz

Relative Humidity: 5% to 95% non-condensing

- Relay Contact Output Ratings (N.O. and N.C.):**
- 1/2 hp; 9.8 AFL, 58.8 ALR @ 120 Vac
 - 1/2 hp; 4.9 AFL, 29.4 ALR @ 240 Vac
 - 125 VA pilot duty @ 120/240 Vac
 - 10A @ 24 Vac (resistive)

DoC

Emissions Compliance

- EN 55022: 2006
- CISPR 22: 2006
- VCCI V-3/2006.04
- ICES-003, Issue 4: 2004
- FCC PART 15 SUBPART B, Class B Limit

Immunity Compliance

- EN 61000-6-1: 2001 covering the following:
 - EN 61000-4-2: 1995 + A1: 1998 + A2: 2001
 - EN 61000-4-3: 2002
 - EN 61000-4-4: 2004
 - EN 61000-4-5: 1995 + A1: 2001
 - EN 61000-4-6: 1996 + A1: 2001
 - EN 61000-4-8: 1993 + A1: 2001
 - EN 61000-4-11 2nd Edition: 2004

Safety Compliance

UL 60730-1 for US and Canada

FCC Compliance Statement:

This equipment has been tested and found to comply with limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in residential installations. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television equipment reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Move the equipment away from the receiver
- Plug the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/television technician for additional suggestions

You are cautioned that any change or modifications to the equipment not expressly approved by the party responsible for compliance could void Your authority to operate such equipment.

This device complies with Part 15 of the FCC Rules. Operation is subjected to the following two conditions 1) this device may not cause harmful interference and 2) this device must accept any interference received, including interference that may cause undesired operation.

BEFORE INSTALLATION

Review the “Specifications” on page 2 before installing the controller.

When Installing This Product

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check ratings given in instructions and on the product to ensure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

INSTALLATION AND SETUP

The following installation procedures are typically performed in the order listed:

1. Mounting — see “Mounting” below.
2. Wiring — see “Wiring” on page 4.
3. Checkout — see “Checkout” on page 8.

NOTE: Troubleshooting begins on page 8.

MOUNTING

IMPORTANT

Avoid mounting in areas where acid fumes or other deteriorating vapors can attack the metal parts of the controller circuit board, or in areas where escaping gas or other explosive vapors are present.

IMPORTANT

The controller must be mounted in a position that allows clearance for wiring, servicing, and removal.

Use a screwdriver to pry out only the knockouts that you will use.

If mounting on DIN rail, be sure to remove the knockouts before mounting. See “Wiring Access” and Fig. 4 on page 5 for recommended knockout usage and locations. If you do not use an opened knockout be sure to cover it.

Mount the controller on any convenient interior location using the four mounting holes provided on the back of the enclosure using #6 or #8 screws (screws are not provided and must be obtained separately). Use controller dimensions in Fig. 1 on page 2 as a guide.

The controller may be mounted in any orientation.

WIRING



WARNING

Electrical Shock Hazard.

Can cause severe injury, death or property damage.

Disconnect power supply before beginning wiring, or making wiring connections, to prevent electrical shock or equipment damage.

CAUTION

Do not use 24 Vac power to power any external loads if 120 Vac or 240 Vac is used to power the T775S controller.

CAUTION

A separate earth ground is required. Equipment damage can result if the earth ground is not connected. See Fig. 2 and Table 2 on page 5.

CAUTION

Equipment Damage Hazard.
Electrostatic discharge can short equipment circuitry.
Ensure that you are properly grounded before handling the unit.

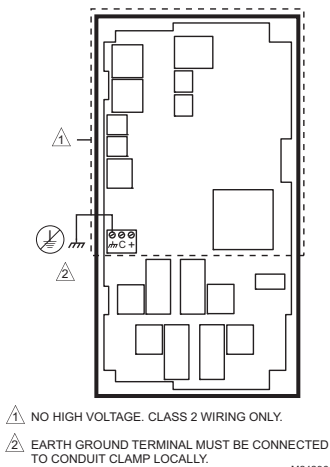


Fig. 2. Earth Ground.

IMPORTANT

When wiring the input power, only one source of power can be applied to the T775S controller (24 Vac or 120 Vac or 240 Vac).

All wiring must comply with applicable electrical codes and ordinances, or as specified on installation wiring diagrams. Controller wiring is terminated to the screw terminal blocks located inside the device.

Wiring Access

To access the wiring connections, remove the two screws on the left side of the enclosure and gently swing open the top.

Access to the terminals can be gained through standard conduit knockouts (A through E in Fig. 4 on page 5) located around the perimeter of the enclosure:

- Knockouts A and B should be used only for sensor and low-voltage wiring.

- Knockouts C, D, and E can be used to gain access to the load relay output terminals and 120/240 Vac power wiring.

See Fig. 4 on page 5 for locating the appropriate power input, T775 Bus connection, and load output terminals.

Wiring Method

Wire the outputs, the bus connection, then wire the power connection.

Each terminal can accommodate the following gauges of wire:

- Single wire – from 14 AWG to 22 AWG solid or stranded
- Multiple wires – up to two 22 AWG stranded

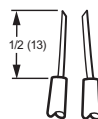
For 24, 120, or 240 Vac power connections:

Single wire – from 14 to 18 AWG solid or stranded

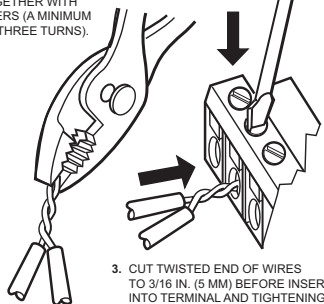
Prepare wiring for the terminal blocks, as follows:

- Strip 1/2 in. (13 mm) insulation from the conductor.
- Cut a single wire to 3/16 in. (5 mm). Insert the wire in the required terminal location and tighten the screw.
- If two or more wires are being inserted into one terminal location, twist the wires together a minimum of three turns before inserting them to ensure proper electrical contact.
- Cut the twisted end of the wires to 3/16 in. (5 mm) before inserting them into the terminal and tightening the screw.
- Pull on each wire in all terminals to check for good mechanical connection.

1. STRIP 1/2 IN. (13 MM) FROM WIRES TO BE ATTACHED AT ONE TERMINAL.



2. TWIST WIRES TOGETHER WITH PLIERS (A MINIMUM OF THREE TURNS).



3. CUT TWISTED END OF WIRES TO 3/16 IN. (5 MM) BEFORE INSERTING INTO TERMINAL AND TIGHTENING SCREW. THEN PULL ON EACH WIRE IN ALL TERMINALS TO CHECK FOR GOOD MECHANICAL CONNECTION.

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Fig. 3. Attaching two or more wires at terminal blocks.

Controller Wiring Details

The wiring connection terminals are shown in Fig. 4 and are described in Table 2 on page 5.

Table 2. Description of Wiring Terminal Connections.

Connection	Terminal Label	Description
Outputs		
Relay 5(9) ^a	NO COM NC	120-240 Vac Relay Output
Relay 6(10)		
Relay 7(11)		
Relay 8(12)		
Interconnects		
T775 Bus	+ -	Bus connection to/from T775P/L/S
Jumper Terminal ^b	+ -	Jumper connection used by the second connected T775S Expansion Module
24 Vac Power		
24V +	+	24 Vac Hot
Common	-	24 Vac Common
Ground		Earth Ground ^c
120 or 240 Vac Power		
120 Vac	120	120 Vac Power
Common	COM	Common
240 Vac	240	240 Vac Power

^a Relays 5 through 8 are assigned to the first T775S connected to a T775P/L. Relays 9-12 are assigned to the second T775S connected. See "Wiring Examples" on page 5.

^b The Jumper Terminal is jumpered on the second of two T775S expansion modules to identify the second one as the module with relays 9 through 12. See Fig. 6 on page 7 for an illustration of the jumper in place.

^c A separate earth ground is required for all installations regardless of the power source (24, 120, or 240 Vac).

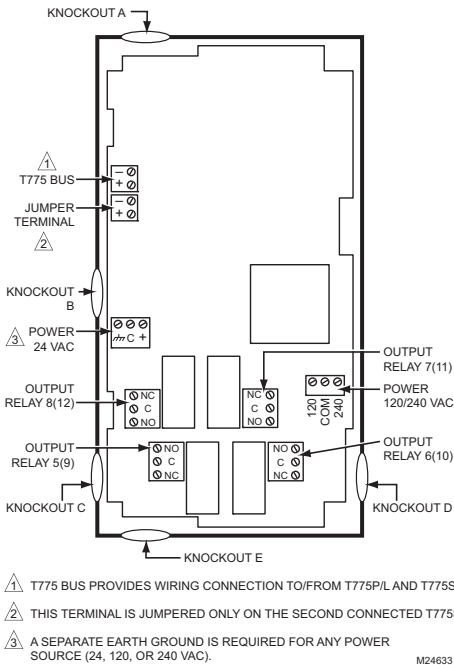


Fig. 4. T775S Terminal and Feature Locations.

WIRING EXAMPLES

Fig. 5 and Fig. 6 beginning on page 6 illustrate single and dual T775S controller wiring.

For specific application wiring examples refer to the appropriate Installation Instructions document for the controlling device (T775L or T775P) to set up and program your system:

- T775L2007 - T775L Series 2000 Electronic Stand-Alone Controller (form 62-0257)
- T775P2003 - T775P Series 2000 Electronic Stand-Alone Controller (form 62-0256)

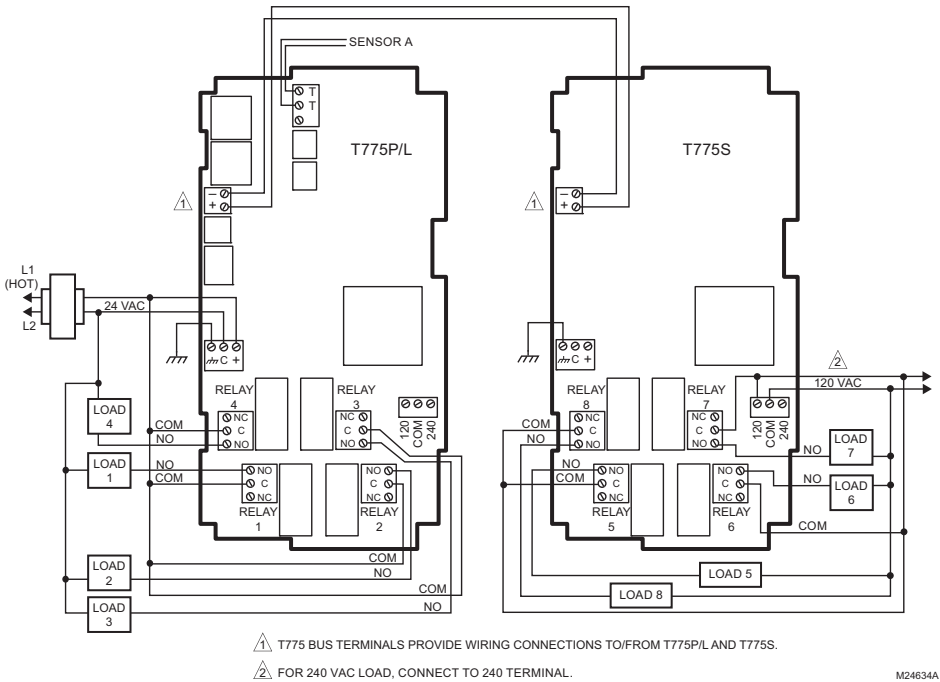


Fig. 5. Wiring Example for Single T775S Expansion Module.

Fig. 5 illustrates a single connected T775S Expansion Module. In this example:

- The T775P or T775L is the controlling device, which is powered with 24 Vac and has loads connected to relays 1, 2, 3, and 4.
- The T775S is powered with 120 Vac and has loads connected to relays 5, 6, 7, and 8.

Each controller may be powered by 24 Vac, 120 Vac, or 240 Vac. A separate earth ground **must** be connected to the 24 VAC ground terminal, regardless of the power source.

The T775P or T775L is able to use up to four relays (1 through 4). However, it may be configured to use any or all of its relays.

The T775S Expansion Module is able to use up to four relays (5–8). However, it may be configured to use any or all of its relays.

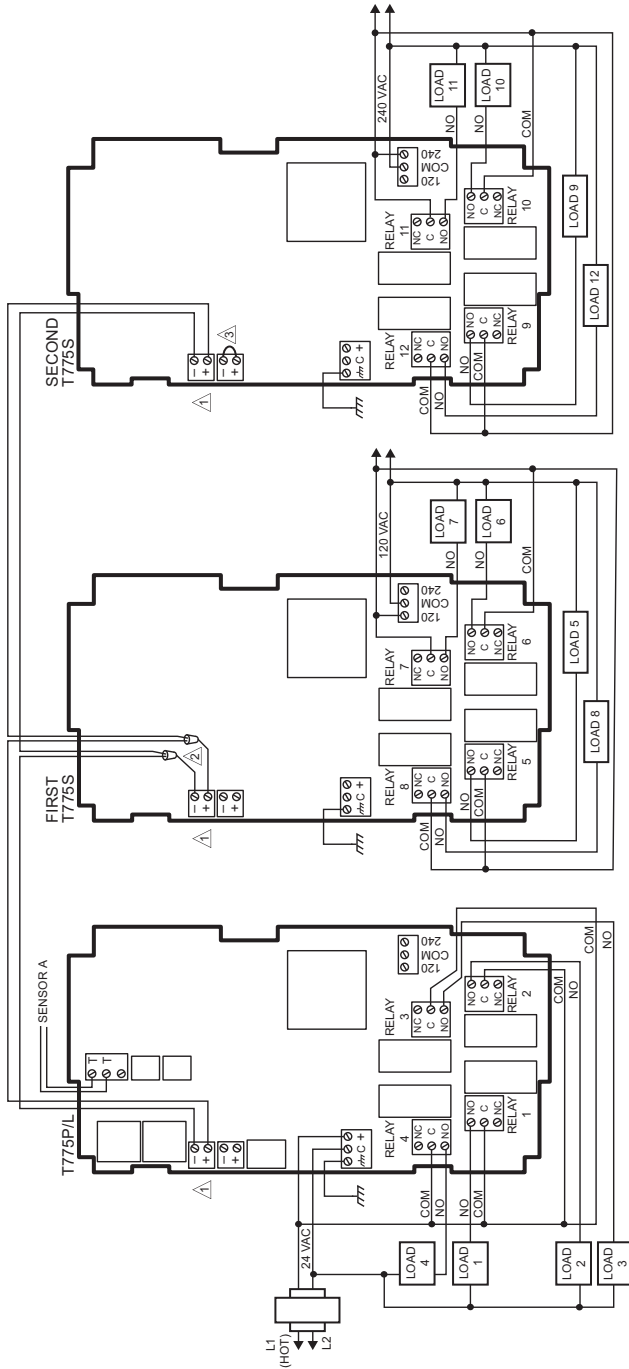


Fig. 6. Wiring example for two T775S Expansion Modules.

⚠ T775 BUS TERMINALS PROVIDE WIRING CONNECTIONS TO FROM T775P/L AND T775S.

⚠ USE PIGTAIL CONNECTIONS TO WIRE THE T775 BUS TERMINALS ON THE FIRST T775S.

⚠ SECOND T775S MUST HAVE A JUMPER INSTALLED AS SHOWN AT THE JUMPER TERMINAL.

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Fig. 6 on page 7 illustrates two connected T775S Expansion Modules. In this example:

- The T775P or T775L is the controlling device, which is powered with 24 Vac and has loads connected to relays 1, 2, 3, and 4.
- The first T775S is powered with 120 Vac and has loads connected to relays 5, 6, 7, and 8.
- The second T775S is powered with 240 Vac and has loads connected to relays 9, 10, 11, and 12.

NOTE: A jumper is required on the second T775S. This jumper identifies the relays (9, 10, 11, and 12) on the second T775S to the controlling device, the T775L or T775P.

Each controller may be powered by 24 Vac, 120 Vac, or 240 Vac. A separate earth ground **must** be connected to the 24 Vac ground terminal, regardless of the power source.

The T775P or T775L is able to use up to four relays (1 through 4). However, it may be configured to use any or all of its relays.

Each T775S Expansion Module is able to use up to four relays (5–8 or 9–12). However, it may be configured to use any or all of its relays.

CHECKOUT

Inspect all wiring connections at the controller terminals, and verify compliance with the installation wiring diagrams.



WARNING

Electrical Shock Hazard.
Can cause severe injury, death or property damage.

Disconnect power supply before beginning wiring or making wiring connections, to prevent electrical shock or equipment damage.

If any wiring changes are required, *first* be sure to remove power from the controller *before* starting work. Pay particular attention to verifying the power connection (24, 120, or 240 Vac).

After the expansion module is installed and wired to all loads and interconnects, apply power.

Programming and Setup

Use the appropriate Installation Instructions document for the controlling device (T775L or T775P) to set up and program the system:

- T775L2007 - T775L Series 2000 Electronic Stand-Alone Controller (form 62-0257)
- T775P2003 - T775P Series 2000 Electronic Stand-Alone Controller (form 62-0256)

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TROUBLESHOOTING

The controlling device, the T775L or T775P controller, provides an error message and diagnostic status as described below.

Error Message

There is a two-character error code that displays on the T775L or T775P controller in response to controller software problems:

EE

EEPROM Failure— The values read back from the EEPROM are not the same as written into the EEPROM. This error cannot be field repaired. Replace the device.

Diagnostic Messages

There are two diagnostic messages that can display on the T775L/T775P controller in response to sensor problems. The diagnostic codes that can flash on the display are:

--

Sensor Open or Shorted— Two dashes display when a sensor (typically temperature) is open or shorted. An open circuit is considered anything greater than 1570 ohms (greater than 300F), shorted is anything less than 770 ohms (less than -73F). Whichever stages are operating with this sensor cease to control (meaning relays go to OFF and proportional outputs go to zero percent).

This message can also mean that the sensor is programmed, but not physically connected.

-60°F or 270°F (-51°C or 132°C) Blinking

Temperature Out of Range — The temperature display blinks when the sensed temperature range is outside of the display range, below -60°F (-51°C) or above 270°F (132°C). The displayed value remains at that displayed limit and control continues. Controller continues to function unless an open or shorted state is detected.

Blinking relay status

Relay Minimum Off Time is Active — On the T775L or T775P home screen, each relay's indicator (■) blinks while the relay's minimum off time is active.

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