CAPACITY CONTROL MODULE MOD0182 INSTALLATION INSTRUCTIONS

General

The Trane MOD0182 Capacity Control Module (CCM), has been designed to replace the pre-micro CVHE/CVHB/CVAC modules CNT0852, CNT0875 and CNT0876.

Some applications require different control algorithms to provide accurate and stable temperature control at system start-up. To accommodate these system differences, the MOD0182 Capacity Control Module can be configured for two different control sequences.

Installation/Wiring

The mounting and wiring terminal locations for the new module are very similar to the previous modules. However, there are additional terminals associated with a start-stop function, chilled water reset, remote demand limit and % RLA output that were not originally provided on the previous modules. Use of these and the necessary wiring instructions are explained in the **Added Features** section. The information below provides installation and mounting instructions that must be followed closely.

A plastic parts bag is provided with each new module. This bag contains the following parts:

- This manual, 2764-0009-05-00
- Three #8-32 x .375 SEM machine screws
- An options label, 6400-0661-01
- A short ground strap assembly
- A long ground strap assembly
- Two #10-32 x .500 machine screw
- Four #10 star washers
- Two #10 nut
- Two 2000 Ohm 20 watt resistors
- Three knobs
- A mounting template, 6400-0670-01

1. Mounting

a. The new module requires three mounting holes, two of the existing ones used for the original control and a third one to be added. Align the two large holes on the provided mounting template, 6400-0670-01 with the two existing holes used to mount the original control. The holes in the template are large enough to secure them with screws. A hole with a black circle around it is provided where the third mounting hole is to be located. Use a 1/4 inch drill bit.

b. Secure the new module to the door with the three provided #8-32 X .375 SEM machine screws. Do not use the existing thread forming screws used to mount the original control. They will damage the new module. The screws should not be over .375 inches long so as to not damage internal components. Also the star washer SEM is provided to insure electrical continuity through the paint.

c. On the provided Options label, 6400-0661-01, peel off the "40 to 100" label and place over the "% Current" area. Align using the top and side notches.

d. On the provided Options label, peel off the appropriate label to be applied over the "Control Point" area. Labels differ depending on whether the chiller is standard or extended temperature range and whether english or metric units are desired. Align using the bottom and side notches.

e. Install the three provided knobs. The knobs on the existing control will not work.

2. Connection Of The Ground Straps

a. Strip the insulation off the short ground strap and install on TB11-8.

Form 1-15.140(894)
Supercedes 1-15.140(693)

2. Connection Of The Ground Straps (continued)

b. Route the short ground strap over to the #10-32 machine screw used to secure the front panel graphics to the door. This screw is located next to the door hinge midway between the top and bottom edges. If this screw is not in place, use one of the provided #10-32 screw sets and drill a hole. The two star washers are to be placed in contact with the door surface to allow conduction through the paint.

c. Remove the nut on this #10-32 screw leaving the star washer in place.

d. Install the ring quick connect terminal from both the short and long ground straps. Secure with the existing nut.

e. Run the long ground strap along the existing wiring harness into the panel.

f. Secure the ring teminal on this side of the long ground strap to the panel wall via the supplied #10 machine screw, star washers and nut. The two star washers are to be placed in contact with the panel wall to allow conduction through the paint.

g. Secure both the long and short ground straps to the existing wiring harness to prevent binding when the panel door is closed.

3. CCM Temperature Sensors

The leaving and/or return chilled water sensors presently used on the pre-micro CVHE/CVAC modules CNT0852, CNT0875 and CNT0876 will not work with the new module. New sensors must be ordered when ordering the new module.

There are different sensors required depending on the desired options.

a. If neither the chilled water reset feature or the added feature of start differential (explained later) is desired, then only the CCM leaving chilled water sensor, SEN0132 needs to be ordered.

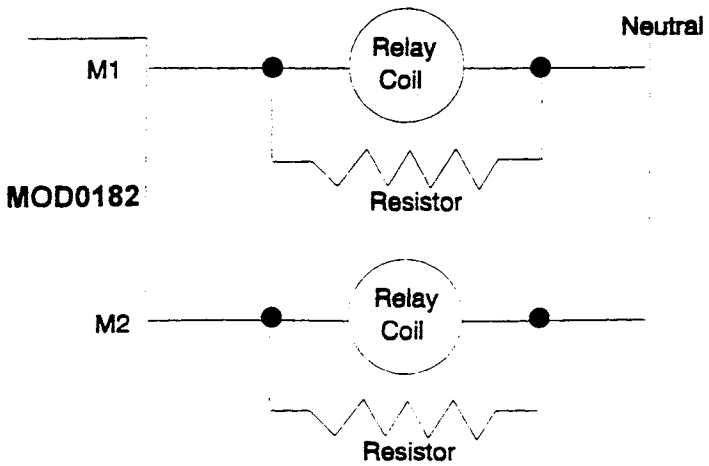
b. If either or both the chilled water reset feature and/or the added feature of start differential is desired, then a matched pair of the leaving chilled water sensor and return chilled water sensor needs to be ordered. Quantity one SEN0205 consists of this matched pair. Notice that since both sensors come with the matched pair, the SEN0132 sensor need not be ordered.

Both the SEN0132 and SEN0205 sensors fit in the existing wells. They, however, do fit loosely so a suitable quantity of thermal mastic heat paste is needed to secure the sensor.

4. Use on Air-Cooled Chillers

The actuators on air-cooled chillers are operated by 24 VAC relays. The triacs in the CCM module output 115 VAC. For this reason, 115 volt relays must be installed in the actuator circuit. To provide sufficient load on the module triacs when using the relays, a 2000 ohm, 20 watt resistor (included) **must** be installed in parallel with the coils of each relay. Because the resistors run warm, they should be mounted at least 4" from other components.

Figure 1



Control Set-Up

A. Control Range Adjustment

The modules normal control range is 35° F - 55° F. Extended range from 20° F - 70° F is available by setting the dip switch SW2-7 to the on position. For normal range switch, SW2-7 should be in the off position.

B. Dead Band

The module dead band can be set as follows:

Switch Position SW2-5	Switch Position SW2-6	Dead Band
Off	Off	±0.25° F
On	Off	±0.50° F
Off	On	±1.00° F
On	On	±1.50° F

C. Reset Ratio Schedule

The reset control process provided in the CCM uses the active control point, design delta temperature setting and the return chilled water temperature to determine the absolute amount of reset required. A return (entering) chilled water sensor must be installed in the system in order to use this feature. See the section on Installation/Wiring.

Switch Position SW2-3	Switch Position SW2-4	Reset Ratio	Deg. of Control Point Reset for Every 1° F Drop in Return Chilled Water Temp.
Off	Off	Infinite	0.0° F
On	Off	2.0	0.5° F
Off	On	1.0	1.0° F
On	On	0.5	2.0° F

The reset ratio is the Degs. F drop in the return chilled water temperature needed to cause a 1° F reset upward of the leaving chiller water temperature. See section D to determine how to set the design delta temperature when using the modules chilled water reset capabilities. If a remote analog input signal is to be used to control chilled water reset see Paragraph C in Added Features Section.

D. System Design Delta Temperature

When using a chilled water reset sensor, you must indicate to the module the system design chilled water temperature differential. Example: Unit design specification calls for 55° F entering chilled water and 45° F leaving chilled water. In this example, the design delta temperature is 10° F. Choose the setting closest to your system design specifications.

Switch Position SW3-7	Switch Position SW3-8	Design Delta Temperature
Off	Off	5° F
On	Off	10° F
Off	On	15° F
On	On	20° F

E. Load Delay

These switches control the off delay time between load and unload pulses.

E. Load Delay (continued)

Switch Position SW3-4	Switch Position SW3-5	Switch Position SW3-6	Load Delay
Off	Off	Off	10 Secs.
On	Off	Off	20 Secs.
Off	On	Off	30 Secs.
On	On	Off	40 Secs.
Off	Off	On	50 Secs.
On	Off	On	60 Secs.
Off	On	On	70 Secs.
On	On	On	80 Secs.

F. Current Control Setting

When using this module to replace CNT0852, CNT0875 or CNT0876 which obtain a chiller current level input signal from the Cutler-Hammer solid state overload (0 to -10 VDC), the switches SW1-1 through SW1-6 must be configured as follows. This corresponds to 8.25 VDC at full load.

SW1 Position					
1	2	3	4	5	6
On	On	Off	On	Off	On

G. System Start-Up Temperature Control

For operation in a typical comfort cooling, single chiller application, SW3-9 should be placed in the "On" position. The control will limit loading and control the leaving chilled water temperature to 5 degrees above the active setpoint for the first 15 minutes of operation to avoid overshoot during system pull down. After 15 minutes the control will allow further loading to bring the leaving chilled water to the active setpoint. Note: The 15 minute timing sequence begins when power is applied to pin 84.

With SW3-9 in the "Off" position, the unit will immediately control to the active setpoint upon start-up.

SW3-9	Operation
ON	Controls to 5° F above active setpoint for first 15 min. of operation.
OFF	Controls immediately to active setpoint.

Added Features

A. Start Differential

This module has a start/stop differential feature that will open and close a circuit between terminals TB11-6 and TB11-7 on the module, and that can be wired into the existing control scheme. In order to use the start-up/stop differential feature a return (entering) chilled water sensor must be used. See the section on Installation/Wiring. This feature allows you to set the chiller starting point based on the chilled water setpoint. Example: You may choose to set the chiller to start when the actual chilled water temperature gets to 7° F above the current module setpoint of 45° F. In this case, the chiller will start when the entering chilled water temperature rises to 52° F. The chiller offpoint is fixed at 1° below setpoint. Once the leaving chiller water temperature in the example above drops to 44° (1° F below setpoint), the chiller will stop after a time delay period. This period of delay will vary and shorten if the return chilled water temperature continues to drop below the 1° F off setting. The differential to start and the chiller off point will vary as the setpoint is changed. To select the differential to start, set switches SW3-1 through SW3-3 as follows:

A. Start Differential (continued)

Switch Position SW3-1	Switch Position SW3-2	Switch Position SW3-3	Differential To Start
Off	Off	Off	2 °F
On	Off	Off	3 °F
Off	On	Off	4 °F
On	On	Off	5 °F
Off	Off	On	6 °F
On	Off	On	7 °F
Off	On	On	8 °F
On	On	On	10 °F

B. Remote Demand Limit

The original CNT0852, CNT0875 and CNT0876 required an interface module to accept a remote 0-10 VDC or 4-20 mA input signal for current demand limiting. The new module will accept these signals directly at terminals TB12-1 and TB12-2 (See Figure 1). To select a voltage or current input, set the dip switch SW2-1 as follows:

SW2-1	Remote Signal
Off	Voltage Source
On	Current Source

When using a voltage source signal, the relationship to demand limit is shown below.

VDC	Load
0.0- 2.0	100%
2.0-10.0	115-(7.5 X VDC)
0.0-12.0	40%

Example: 5.0 VDC = 115-(7.5 X 5.0) or 77.5% maximum current

When using a current source signal, the relationship to demand limit is shown below.

mA	Load
0.0- 4.0	100%
4.0-20.0	115-(3.75 X mA)
20.0-24.0	40%

Example: 10mA = 115-(3.75 X 10.0) or 77.5% maximum current

The maximum voltage allowed from the remote device is 18 VDC. The maximum current allowed is 36 mA DC.

IMPORTANT: When no remote device is connected, the switch SW2-1 should be **ON**.

CAUTION: The 4-20mA input of this module conforms to ANSI standard for 4-20mA transmitters #ANSI-MC12.1-1975. TB12 PIN2 marked "input-" for both the 0-10 and 4-20mA transmitters is at ground potential. Review of individual 4-20mA transmitters attached to this input is strongly recommended to prevent damage to this module or the 4-20mA transmitter driving this module. When the CCM is used with a non-isolated transmitter, an isolating transmitter may be required such as Trane PLU0172 and TDR0271. Contact Trane customer service for further clarification.

C. Remote Chilled Water Reset

The original CNT0852, CNT0875 and CNT0876 modules required an interface module CNT0902 to accept a remote 0-10 VDC or 4-20 mA input signal for chilled water reset. To allow a remote input signal to take priority for control of chilled water reset switches SW2-3 and SW2-4 must both be in the OFF position. The new module will then accept these inputs directly at terminals TB12-3 and TB12-4 (see Figure 2). To select a voltage or current input set the dip switch SW2-2 as follows:

SW2-2	Remote Signal
Off	Voltage Source
On	Current Source

When using a **voltage source**, the relationship to chilled water reset is shown below.

VDC	Reset
0.0- 2.0	0° F Reset
2.0-10.0	(4 X VDC)-8
10.0-12.0	32° F Reset

Example: 3.0 VDC = (4 X 3)-8 = 4°. F of reset

When using a **current source signal**, the relationship to chilled water reset is shown below.

mA	Reset
0.0- 4.0	0 ° F Reset
4.0-20.0	(2 X mA)-8
20.0-24.0	32° F Reset

Example: 6.0mA = (2 X 6)-8 = 4° F of reset

The maximum voltage allowed from the remote device is ± 18 VDC. The maximum current allowed is ±36 mA DC.

IMPORTANT: When no remote device is connected, the switch SW2-2 should be **ON**.

CAUTION: The 4-20mA input of this module conforms to ANSI standard for 4-20mA transmitters #ANSI-MC12.1-1975. TB12 PIN4 marked "input-" for both the 0-10 and 4-20mA transmitters is at ground potential. Review of individual 4-20mA transmitters attached to this input is strongly recommended to prevent damage to this module or the 4-20mA transmitter driving this module. When the CCM is used with a non-isolated transmitter, an isolating transmitter may be required such as Trane PLU0172 and TDR0271. Contact Trane customer service for further clarification.

D. % RLA Output, TB12-5 to TB12-6

An additional output is provided which indicates the present % RLA current draw of the compressor motor. It basically is a 0 to 20 mAmp output to be monitored by an upstream device like the Tracer.

The relationship between motor % RLA and output current is:

%RLA = Current Output (mA) x 5.35
Example: Output 10 mA x 5.35 = 53.5% RLA.

Output currents greater than 20.0 mA are out of range. The allowed impedance of the monitoring device is 0.0 to 250 ohms.

Figure 2