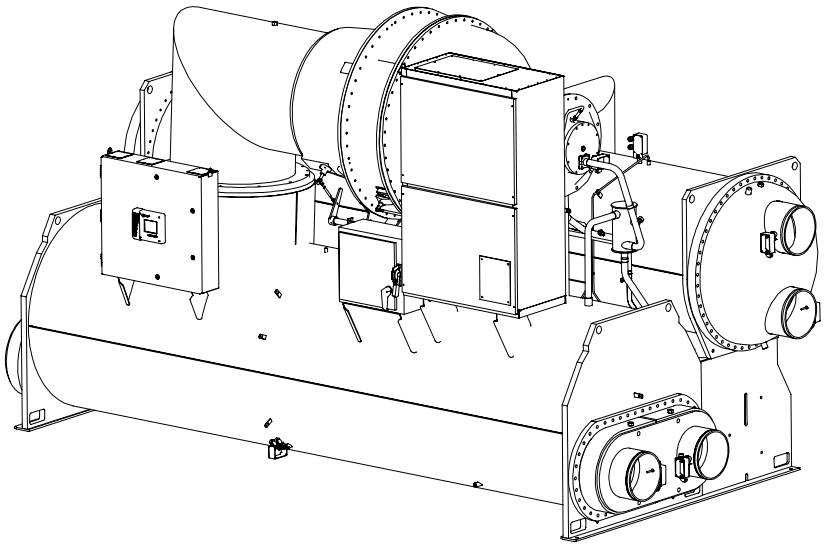
TRANE®

# Installation/Operation Maintenance

# Industrial Chiller Package

## Water Cooled CenTraVac with CH530



X39640726010

**CTV-SVX04A-EN**

# Warnings and Cautions

## Warnings and Cautions

Notice that warnings and cautions 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, while cautions are designed to alert personnel to conditions that could result in equipment damage.

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

**NOTICE:** Warnings and Cautions 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, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

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

# Contents

# Industrial Package (INDP)

INDP equipped CenTraVac chillers feature enclosed wiring in seal-tight conduits and junction boxes, an industrial-grade control panel, and an up-graded purge. The entire chiller is silicone free.

## Installation

The general installation guidelines for an INDP equipped CenTraVac do not differ from the general installation guidelines for a standard CenTraVac. Refer to the latest revisions of manuals CVHE-SVN01*-EN (General Information), CVHE-SVN02*-EN (Piping Information), and CVHE-SVN03*-EN (Electrical Information).

Note: The INDP equipped chiller is available with several options that may affect control, power, or starter wiring connections. Please refer to the INDP Options segment of this manual for further details regarding available options.

## Operation and Maintenance

The operation and maintenance of an INDP equipped CenTraVac does not differ from the operation and maintenance of a standard CenTraVac. Refer to the latest revision of manual CVHE-SVU01*-EN.

## Control Panel

The CH530 control enclosure that is provided on INDP equipped chillers is of oversized NEMA 4 construction. The door of the control panel is secured in place by four latch assemblies that will require the use of a straight blade screwdriver to release. The DynaView main processor is mounted to the center of the door.

The top of the control panel contains three removable panels that are provided for the termination of the customer's wiring conduits to and from the control panel. To install a conduit onto the control panel the installer must first remove the panel from the enclosure, drill the conduit connection holes into the panel, then re-install the panel onto the enclosure. This must be done to prevent debris from entering the enclosure.

Screw-type terminal blocks are provided to ensure secure customer and unit control wiring connections.

Refer to Figure 1 and Table 1: INDP/ CH530 unit control panel.

In Figure 1 all standard and optional controls are shown in their mounting locations inside the INDP control panel.

***Figure 1 - CH530/INDP Control Panel Exterior View***

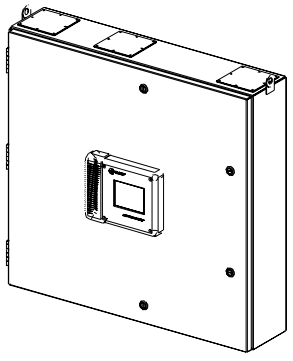


***Figure 2 - CH530/INDP Control Panel - Front View (shown without door and gasket)***

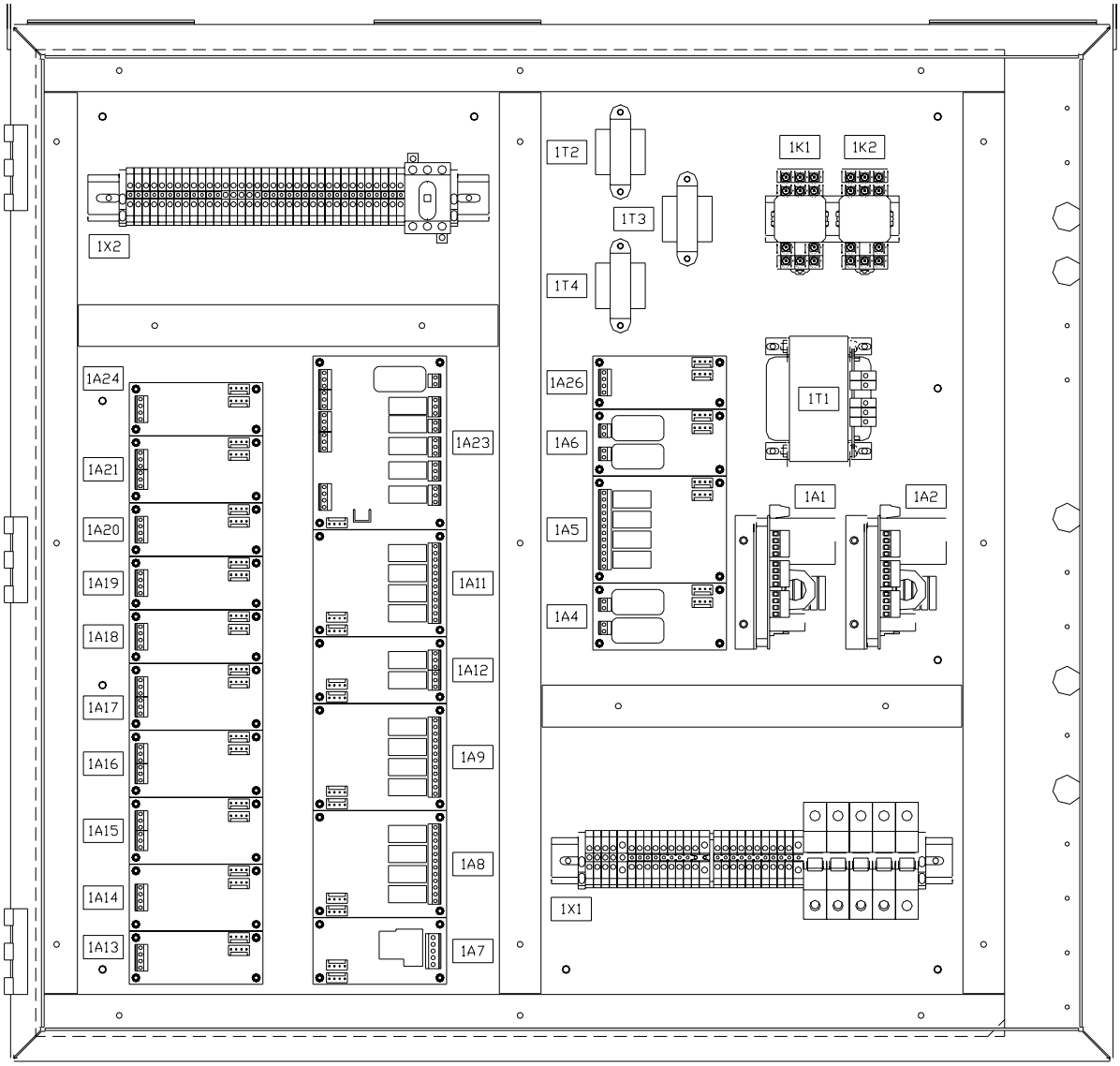


***Table 1 - CH530/INDP Control Panel Key***

| # | Description | Option (note) |
|---|---|---|
| 1X2 | Control Panel Terminal Block, customer connection | |
| 1A24 | Starter Fault input | Optional (11) |
| 1A21 | Evap and Cond Water Diff Pressure inputs | Optional (6) |
| 1A20 | External Free Cooling Command and Valve Status inputs | Optional (12) |
| 1A19 | External Ice Building Command input | Optional (12) |
| 1A18 | External Base Load and Hot Water enable/disable inputs | Optional (12) |
| 1A17 | External Base Load and Refrigerant Monitor inputs | Optional (12) |
| 1A16 | External Current Limit and Chilled Water Setpoint inputs | Optional (2) |
| 1A15 | % RLA and Cond Press outputs (2-10vdc) | Optional (2) or (3) |
| 1A14 | Comm 4 or Comm 5 module | Optional (4) or (5) |
| 1A13 | External Auto/Stop and Emerg Stop inputs | |
| 1A23 | Starter module | Optional (8) |
| 1A11 | Free Cooling output | Optional (12) |
| 1A12 | Hot Gas Bypass output | Optional (12) |
| 1A9 | Chiller Status outputs | Optional (1) |
| 1A8 | Chiller Status outputs | Optional (1) |
| 1A7 | Oil/Ref Pump Motor control relay | |
| 1T2 | Secondary PT | Optional (8) |
| 1T3 | Secondary PT | Optional (8) |
| 1T4 | Secondary PT | Optional (8) |
| 1K1 | Vac Circuit Breaker control relay | Optional (9) |
| 1K2 | Vac Circuit Breaker control relay | Optional (9) |
| 1A26 | Motor Winding Temp inputs | |
| 1A6 | Cond & Evap flow switch/interlock inputs | |
| 1A5 | Cond & Evap wtr pump and oil heater outputs | |
| 1A4 | Cond High Press Sw Input | |
| 1T1 | Control Power Transformer | |
| 1A1 | 24VDC Power Supply #1 | |
| 1A2 | 24VDC Power Supply #2 | Optional (13) |
| 1X1 | Control Panel Terminal Block | |
| 1S1 | 3 Pole Disconnect | Optional (10) |

OPTION NOTES

(1) OPST Operating Status Option
(2) GBAS Generic BAS Option
(3) CDRP Condenser Refrigerant Pressure Option
(4) TRM4 Tracer Communications Interface
(5) TRM5 LonTalk Communications Interface
(6) WPSR Variable Flow Compensation
(7) EPRO Enhanced Protection
(8) Starter By Others
(9) Starter By Others with CVAC starter type
(10) Starter By Others with line voltage greater than 600vac
(11) With SSS starter type
(12) Only present if the corresponding HGBP, FC, or Base Load option is applied
(13) As determined by 24vdc load requirement

## Purge

The purge unit provided on INDP equipped chillers is of NEMA 4 construction, with sealed conduits, a sealed purge compressor motor terminal box, and a Totally Enclosed Fan Cooled (TEFC) pump-out motor driving an open type pump-out compressor. The purge suction temperature and carbon tank sensor LLIDs (3R1 and 3R2) have been relocated to positions inside the purge control panel which also houses the condenser refrigerant pressure transducer (3R4). The spring clamp terminal strip has been replaced with a screw-type terminal block.The 1/12hp, 115v, 2.2 amp TEFC pump-out motor of the INDP purge has a side mounted thermal protector that requires a manual reset if tripped. If a thermal trip occurs it can be reset, after the motor cools, by pressing the red button on the side of the motor shell. A “click” noise indicates reset.

Purge operation and maintenance on INDP equipped chillers is the same as on standard chillers. Refer to the latest revision of purge manual PRGD-SVU01*-EN.Refer to Figure 3: INDP/CH530 purge control panel.

***Figure 3 - INDP Purge Control Panel***

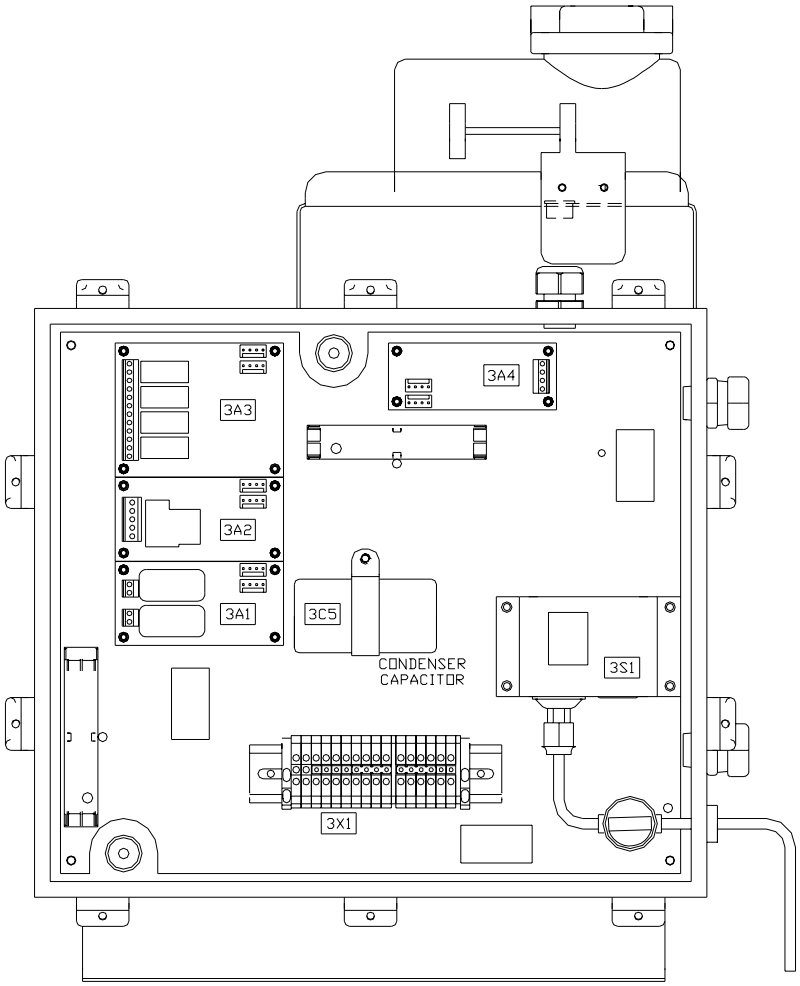



***Table 2 - CH530 Purge Key***

| # | Description |
|---|---|
| 3A1 | Purge Pumpout and Exhaust Valve Control LLID |
| 3A2 | Purge Condensing Unit Control Relay LLID |
| 3A3 | Purge Pumpout, Carbon Tank Heater, Regeneration Valve, and Alarm Relay LLID |
| 3A4 | Purge Liquid Level Switch Input LLID |
| 3C5 | Purge Condensing Unit Capacitor |
| 3M6 | Purge Pumpout Compressor Motor |
| 3R1 | Purge Refrigerant Compressor Suction Temperature Sensor |
| 3R2 | Purge Carbon Tank Temperature Sensor |
| 3R4 | Condenser Pressure Transducer |
| 3S1 | Condenser High Pressure Cutout Switch |
| 3X1 | Purge Panel Terminal Block |

## Sensors and Transducers

On INDP equipped chillers the CH530 system temperature sensors and pressure sensors, if not contained within a control panel, are mounted inside sealed polycarbonate boxes.

The diagram designator for the device inside a box is indicated on a permanent label affixed to the box.

The larger polycarbonate box mounted on the face of the oil sump contains the oil sump temperature sensor (4R5) and the oil sump pressure transducer (4R4).

The CH530 bus enters into the box and is connected to the device inside the box using a standard CH530 butterfly connector. If necessary, it is connected using another butterfly connector to the CH530 bus leaving the box to go to the next device.

The cover of the box is clear to provide viewing of the LLID led during binding and troubleshooting, and in most cases the magnet activated LLID binding switch can be activated through the cover without removing it.

To remove the cover of a device box, loosen the four captive screws that secure the cover to the box.

## CH530 Bus

The CH530 comm/24vdc bus wire on INDP equipped chillers is run within sealed conduits, with all junctions occurring in unit control panels or in the polycarbonate device boxes. No junctions or splices exist inside the conduits. Service or troubleshooting of the CH530 bus on the chiller frame can be accomplished by accessing it through the device boxes.

***Figure 4 - Typical photographs of a temp sensor/polycarbonate box***

# INDP Options

## Control Power Transformer (CPTR)

The CPTR consists of a unit mounted, factory wired enclosure that contains a 4 kva, 480v/120v control power transformer (4T5). This option is applied when a customer desires to have the chiller control power provided by an alternate source.

The CPTR has a disconnect switch (4S1), and primary and secondary fuses are installed.

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***Figure 5 - CPTR Interior***

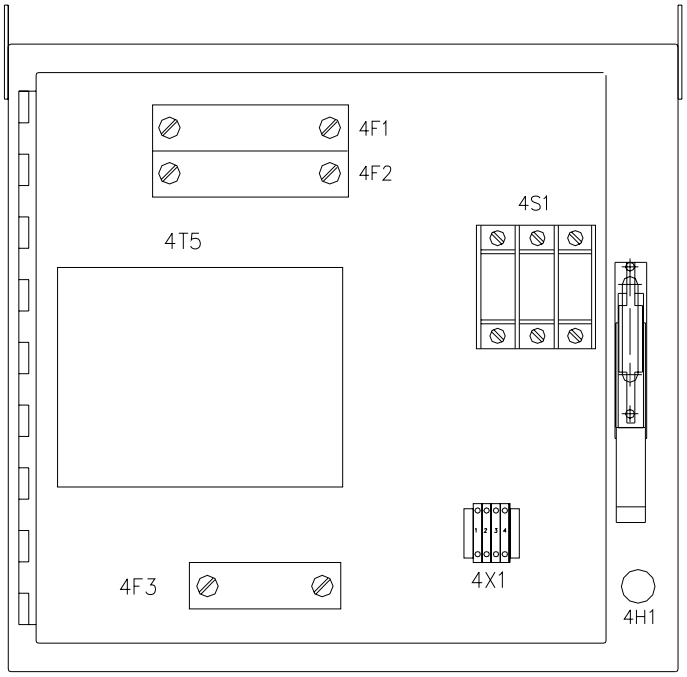



***Table 3 - Control Power Transformer CPTR (option)***

| Device Designation | Description |
|---|---|
| 4S1 | Disconnect Switch |
| 4H1 | Light |
| 4X1 | Terminal block, 40A, 600V |
| 4F1, 4F2 | 600V Fuse, Class RK5, TRS10R |
| 4F3 | 250V Fuse, Class R5K, TR40R |
| 4T1 | 4KVA Transformer, 480:120 |

A fuse status indicator light (4H1) is provided for the secondary fuse. Light 4H1 is illuminated when power is on and the secondary fuse is intact. Light 4H1 will be off when the main power is off or if the secondary fuse has opened.

### ⚠ 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 door latch of the CPTR is interlocked with the disconnect switch. To open the CPTR panel first open the disconnect switch to remove incoming power, then apply light upwards pressure to the release trigger that is on the door latch while using a flat bladed screw-driver or other similar tool to unlock the door latch.

The primary fuses (4F1 and 4F2) are 10 amp, 600v, Class RK5.

The secondary fuse (4F3) is 40 amp, 250v, Class RK5.

The approximate weight of the CPTR is 120 lbs (55 kg)

During the installation of a chiller equipped with the CPTR option the installer must provide 460-480vac, 20amp, 3 phase power to the L1, L2, and L3 (only 2 phases are used L1 & l3, single phase transformer) connections of the disconnect switch (4S1). The input power should be from a source that is separate from the main chiller power supply.

The incoming power conduit provided by the installer should be connected to the CPTR enclosure on the top right side, at a position above the disconnect switch. Care must be taken to not contaminate the enclosure while drilling or cutting conduit access holes.

The disconnect switch will accept incoming wire sizes of #14 to #4. The incoming wire must be copper and be rated for a minimum of 90C. Torque the incoming wire connections at the disconnect to 55 lb-in (6.2 Nm).

A ground lug is provided in the CPTR enclosure and must be torqued to 35 lb-in (4 Nm).

Refer to Figure 6: CPTR panel, and to the CPTR wiring diagram.

## Supplemental Motor Protection (SMP)

SMP is available on INDP equipped chillers that have medium voltage motors. SMP is factory installed and wired in an enclosure that is mounted directly on the motor terminal flange. SMP consists of Surge Capacitors, Lightning Arrestors, and a Zero-Sequence ground fault detector. Refer to figure 7 and to the SMP wiring diagram

## Surge Capacitors

The surge capacitors (4F7, 4F8, and 4F9) operate along with the lightning arrestors to provide electrical surge protection for the chiller motor.

### ⚠ WARNING!

### Hazardous Voltage

**Capacitors Store Electrical Energy!**

**The surge capacitors will retain residual power for an extended period of time after power is removed. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.**

Wait a minimum of five minutes for the internal discharge (or bleed?) resistors to reduce the residual voltage then short the capacitor terminals to ground using an insulated stick or equivalent.

Failure to disconnect power and properly discharge capacitors properly could result in death or serious injury.

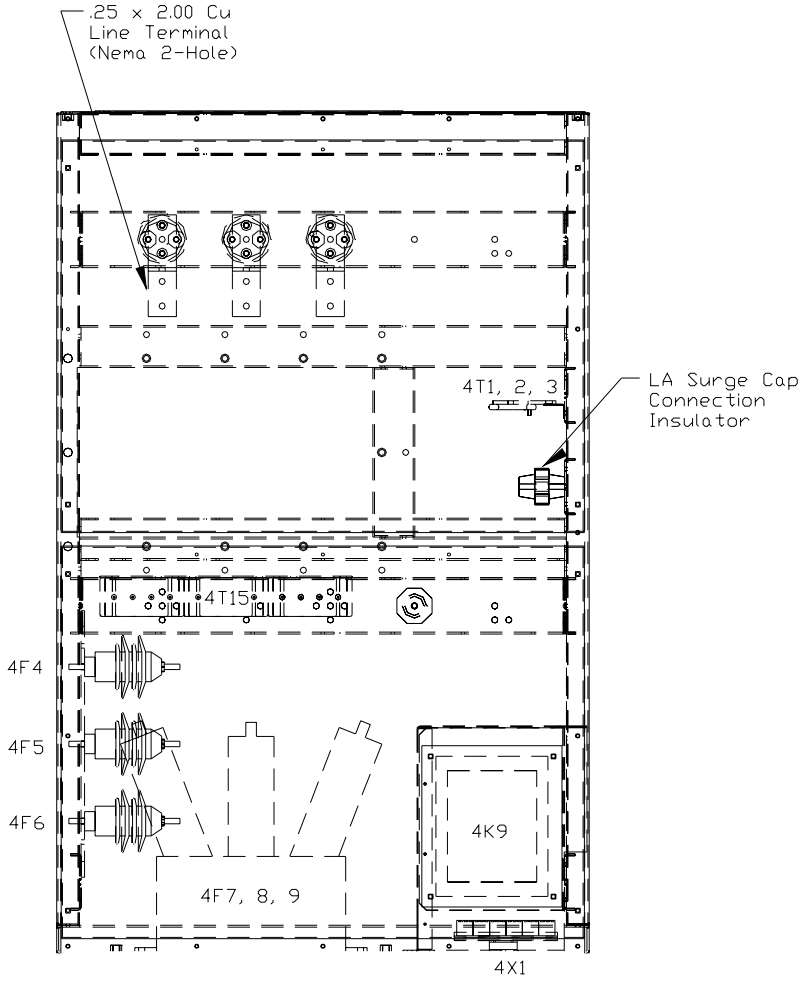
Internal discharge resistors are installed in the capacitors to reduce the residual voltage to 50 volts or less within 5 minutes after removing power. However, after the 5 minutes and before servicing the capacitor or the wiring in the SMP enclosure, the capacitor terminals should be shorted and grounded using an insulated grounding stick or equivalent.

Surge Capacitor Maintenance: Under normal service conditions no further maintenance is required during the life of the unit. However, periodic cleaning of the bushings and connections may be necessary in contaminated atmospheres to prevent inadvertent arc-over.

## Lightning Arrestors

The lightning arrestors (4F4, 4F5, and 4F6) provided in the SMP are plastic coated high performance metal oxide varistors. They require no regular maintenance under normal service conditions. However, periodic cleaning of their housings and connections may be necessary in contaminated atmospheres.

***Figure 6 - SMP Interior***



## Zero-Sequence Ground Fault

The ground fault protection system of the SMP is designed to protect electrical equipment from destructive ground faults, it is not sufficiently sensitive to protect personnel.

The system consists of a current transformer type sensor (4T15) and a solid-state ground fault relay (4K9).

All three phases of the compressor motor power are run through the sensor, any ground fault current will be sensed and then passed on to the relay. The sensor provides a trip signal of 4 to 12 amps of ground fault current, the actual trip point of the relay will vary according to it's setting. The factory default setting of the relay is "C", which provides a nominal trip at 7 amps of ground fault current. The response time based on 200% of nominal trip amps is about 240ms.

Once tripped, the ground fault relay (4K9) interrupts the control power to the starter contactors, causing the contactors to open and remove the motor from the line.

For further information regarding the ground fault protection system refer to Cutler-Hammer document I.L. 16-220-3G1.

## Current Transformers

If the unit is equipped with SMP and is also a Starter By Others application, then the SMP enclosure will contain factory installed single-stage current transformers. These transformers are factory wired and provide the current sensing needed by the CH530, the customer will not have to provide primary or secondary CTs for this purpose.

# SMP Installation

The SMP is factory installed on the chiller.

The following procedure assumes the chiller is new and has never been installed and therefore there is no electrical power connected to the chiller.

A removable access panel is provided on the top of the SMP enclosure specifically for the field installation of the incoming power conduits. The installer should remove the panel, make his conduit cutouts in the panel, re-install the panel onto the enclosure, then connect the conduits to the enclosure. This is required to prevent contamination of the SMP enclosure.

The wire or conduit must be properly supported and protected as it enters the SMP enclosure. Do not allow the abrasion of wire insulation on sharp panel edges, etc.

After the power wiring to the SMP is installed, the wire entry into the SMP enclosure should be sealed as well as possible to prevent the entry of dirt, debris, or moisture into the SMP enclosure.

Trane recommends the use of copper conductors to connect the 3-phase power supply from the starter to the SMP.

Make sure the incoming power wiring is properly phased, and if multiple conductors per phase are used, that each power supply conduit run to the SMP enclosure carries the correct number of conductors to ensure equal phase representation.

The incoming wire from the chiller starter is brought through the top of the SMP enclosure and terminated to the L1, L2, and L3 tabs provided. The tabs are 0.25” x 2” tinned copper, with two 7/16” holes provided for bolting wire lugs to the tabs. Grade 5, 3/8-16 steel hardware should be used to connect the lugs to the tabs. Carefully tighten each connecting bolt to 25 ft-lbs (34 Nm).

A copper bus for the incoming ground connection is provided in the left side of the SMP enclosure.

The lower right hand side of the SMP enclosure contains the low voltage control section and a control voltage terminal strip (4X1).

## Limited Access Installation

If required, additional clearance for unit rigging and installation procedures can be obtained by removing the SMP enclosure. The following procedure assumes the chiller is new and has never been installed and therefore there is no electrical power connected to the chiller.

1 Mark/label and disconnect, at the compressor motor terminal lugs inside the SMP, the power wiring between the SMP and the motor terminals.

2 Mark/label and disconnect the control wiring entering the SMP panel. Disconnect the control wiring conduit from the SMP panel.

3 Remove the bolts securing the bottom of the SMP panel to the brackets on the evaporator.

4 For moving the SMP panel away from the chiller it is recommended that a fork truck be used. Position the truck so that it is ready to take up the weight of the starter panel. The panel will weigh approximately 500 lbs. (227 Kg). The panel is heavy and must be adequately secured before moving.

Use care to prevent the forks from damaging the enclosure and/or the enclosure finish.

If the use of a fork truck is not possible, the SMP may be supported and lifted away from the chiller using the two lifting eyes that are located on the top of the SMP enclosure. The proper use of a spreader bar is required. The lifting force applied to the eyes must be vertical.

5 Loosen the bolts which secure the SMP enclosure to the flange on the motor. Steady the SMP as the retaining bolts are removed because the panel may tip forward.

### ⚠ WARNING!

### Heavy Object!

**Use extreme care when moving and storing heavy components. The starter may tip if mishandled. Failure to use caution could result in death or serious injury.**

6 Support the weight of the SMP panel with the fork truck or hoist/ lifting eyes and carefully remove the SMP panel from the chiller.

7 Store the SMP panel in a clean and dry location with ample air circulation and heat to prevent condensation from occurring. Always protect the SMP from dirt and moisture.

8 When ready, reassemble the SMP panel onto the chiller in the reverse order.

## Inspection

Prior to the initial energizing of an SMP equipped chiller, or after major chiller service has occurred that required access to the SMP panel, it is required that the commissioning technician perform an inspection.

Inspect the SMP closely for any damage that may have occurred during shipping or installation. Check all hardware for correctness and tightness.

Remove any loose dust, dirt, or debris (scraps of wire, tools, etc.) that may have entered into the SMP enclosure. Use of a vacuum cleaner is recommended.

Ensure no moisture is present in the SMP enclosure.

Ensure all panels, covers, arc shields, etc. are correctly in place. ALL SMP panel retaining screws and hardware must be correctly re-installed prior to energizing the equipment.

## Maintenance

Confirm and maintain the NEMA integrity of the SMP enclosure. Use a vacuum to clean the enclosure if needed. Ensure the SMP enclosure is maintained clean and dry.

### ⚠ 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.**

At least annually, verify the power and control wiring and connection integrity. Inspect for loose joints that may produce excess heat and discolor or damage conductors. Verify the wire or cable insulation has not been damaged by high temperatures. Use care to not over-torque bolts while verifying tightness.

## Differential Motor Protection (DMP)

Differential protection can be used to detect internal faults in the windings of motors, including ground faults, short circuits and open circuits. Possible causes of faults are damaged insulation due to aging, overheating, over-voltage, wet insulation and mechanical damage. We are using the self compensating method (one CT per motor winding)

If the DMP option is selected, a SMP panel will be provided but the sensor and relay of the Zero-Sequence Ground Fault Protection of the SMP will not be present. The ground fault sensor and relay are replaced by the SEPAM module and three individual current sensors.

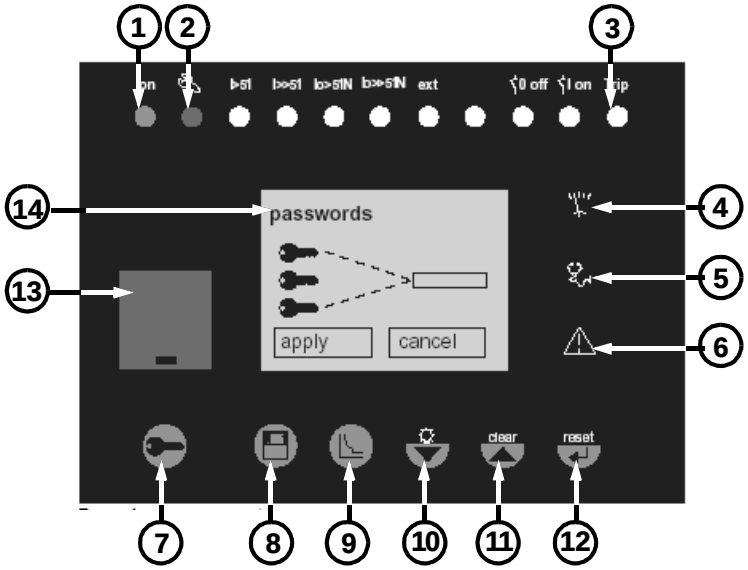
In order to employ differential motor protection, the chiller must be equipped with a large motor (1062 kw and above) and the motor and motor terminal board will be of 6 lead construction.

The DMP option consists of three current transformers, one on each motor phase to monitor the current in and out of each of the motor windings, and a controlling module. If a fault is detected in the current flow of the motor the module will open a contact and interrupt the control power to the starter contactors, causing the system to shutdown.

The DMP module is located in the low voltage section in the lower right hand corner of the SMP enclosure. The module is a Square D (Schneider Electric) “Sepam Series 20” protection unit.

## SEPAM MODULE DISPLAY

***Figure 7 - SEPAM Module Front Panel***




1 Green “On” indicator, this lamp is lit when power is applied to the Sepam and it is functional.

2 Red “Wrench” indicator, this lamp is lit when the Sepam is not functional due to an internal fault. This lamp will also flash for several seconds when control power is first applied to the Sepam.

3 “Trip” indicator, this lamp is lit when the Sepam has detected a chiller motor fault. Chiller operation is prevented.

The remaining indicator lamps along the top edge of the Sepam are not active for the Trane application.

4 “Metering” display key. Pressing this key will scroll the main display through the available metering data screens.

5 “Diagnostics” key. Pressing this key will scroll the main display through the available diagnostic screens.

6 “Alarm” display key. Pressing this key will display the 16 most recent alarm events.

7 “Reset/enter” key. Pressing this key after a trip event will reset the Sepam module and allow another unit operation attempt. This key is also used to confirm protection settings, parameter settings, and passwords.

8 “Clear” key. Pressing this key when an alarm is shown on the main display will return the main display to the previous screen. If the main display is in the Metering data screens, pressing the Clear key will reset the average and peak demand currents. If the main display is in the Diagnostic screens, pressing the Clear key will reset the run hour counter. If the main display is in the Alarm display screen,

pressing the Clear key will erase the 16 stored alarms. The Clear key is also pressed to scroll up through menu choices.

9 "Lamp test" key. Pressing and holding this key for 5 seconds will initiate a test of the display lamps. The Lamp test key is also used to scroll down through menu choices.

10 "Protection settings" key. Pressing this key will access the protection settings of the Sepam. Password access is required to change settings.

11 "Parameter settings" key. Pressing this key will access the parameter or general settings of the Sepam. Password access is required to change settings.

12 "Password" key. Pressing this key will allow the user to enter passwords to access and change the protection or parameter setting menus.

13 Connection port for Square D laptop interface (not required for the Trane application).

14 Main display.

For detailed information please refer to the Square D (Schneider Electric) literature 63230-216-208B1 "Sepam Series 20 Digital Relay Installation Guide"

See below the Web address for the SEPAM literature on-line.

*http://www.squared.com/us/products/powerlog.nsf/DocumentsByCategory?OpenView&Start=1&Count=999&Expand=14.2#14.2*

DEFAULT SEPAM PARAMETER SETTINGS FOR THE TRANE APPLICATION

Settings in the Parameter menus can be viewed without using a password, but they cannot be changed.

If it is necessary to change any Parameter settings, first press the Password key to enter the password screen, then enter the appropriate password. Default password(s) 0000

If any settings in a menu are changed, scroll to the bottom of the menu and select and enter "apply" to make the change effective.

Press the Parameter key to enter the General Settings menu. Default settings are:

- Language English
- Frequency 60
- A/B Selection A
- Remote Settings Off
- Settings Mode 10 I/Is
- Passwords 0000 (default for both)

Press the Parameter key to enter the About Sepam menu. Default settings are:

- Type S20
- VO247
- UMIVO232

Press the Parameter key to enter the MES 108/114 menu. Default settings are:

- MES 108/114 Off

  The settings in this menu do not apply to the Trane application.

Press the Parameter key to enter the MODBUS menu. Default settings are:

- MODBUS Off

  The settings in this menu do not apply to the Trane application.

Press the Parameter key to enter the MSA 141 menu. Default settings are:

- MSA 141 Off

  The settings in this menu do not apply to the Trane application.

Press the Parameter key to enter the Current Sensors menu. Default settings are:

- Phase
  - Sensors 1 - I2 - I3
  - In 50.0A/5A (CT primary rating)
- Residual
  - Sensor Sum 3I
  - In0 50.0A
- Integration Period 5mn
- Ib 50.0A

Press the Parameter key to enter the O1 Output menu. Default settings are:

- O1 Output On
- Trip Coil Shunt
- Mode

Press the Parameter key to enter the Digital I/O menu. You may use this menu to test the function of the Sepam fault contacts that are connected into the starter safety circuit (connected between terminals 1X1-18 and 1X1-4).

To Test:

- Main chiller power off, 120vac control power applied.
- Chiller in local stop.
- Place volt meter across 1X1-18 and 1X1-4
- Ok status is normally closed (0 volts).
- In the Digital I/O menu, select Test 02.
- Select Test.
- The 02 relay will open, confirm with volt reading (120 volts).
- The 02 relay will automatically re-close after a few seconds.

Press the Parameter key to enter the Control Logic menu. Default settings are:

- CB Control Off
- SSL Off

DEFAULT SEPAM PROTECTION SETTINGS FOR THE TRANE APPLICATION

Settings in the Protection menus can be viewed without using a password, but they cannot be changed.

If it is necessary to change any Protection settings, first press the Password key to enter the password screen, then enter the appropriate password.

If any settings are changed, scroll to the bottom of the menu and select and enter “apply” to make the change effective.

Press the Protection key to enter the Protections Menu. Default settings are:

- 50/51 1A On
  - Trip
    - Curve SIT
    - Threshold “Is” 15A
    - Delay 100ms
      Timer Hold
    - Curve Definite
    - Delay 0.00ms
- 50/51 1BOn
  - Trip
    - Curve SIT
    - Threshold “Is” 15A
    - Delay 100ms
      Timer Hold
    - Curve Definite
    - Delay 0.00ms
- 50/51 2A Off
- 50/51 2B Off
- 50N/51N 1A Off
- 50N/51N 1B Off
- 50N/51N 2A Off
- 50N/51N 2B Off
- 46 Off
- 79 Off

# Starter By Others

Please refer to Trane's Starter By Others specification S6516-0513.

If an INDP equipped chiller is shipped from the factory with no starter installed, and is to be equipped with a "starter by others" (i.e. the starter is NOT provided by Trane), then the CH530/INDP control panel will also be equipped with the following.

***Figure 8 - Remote "Starter by Others" to CH530 INDP Control Panel Terminations***

| Wire # or Device Designation | CH530 Panel Termination | Acceptable Wire | Recommended Starter Panel Termination | Note |
|---|---|---|---|---|
| ***120 volt Control Wiring*** | | | | |
| 120 vac power supply, wire 1A | 1X1-1 | #8 AWG | 5X1-1 | |
| 120 vac power supply, wire 2A | 1X1-12 | #8 AWG | 5X1-12 | |
| 120 vac power supply, wire GND | GND | #8 AWG | 5X1-Ground | |
| Oil Pump Interlock, wire 9A | 1A7 J2-4 | #14 AWG | 5X1-7 | |
| Oil Pump Interlock, wire 10A | 1A7 J2-2 | #14 AWG | 5X1-8 | |
| Interlock Relay Signal, wire 15A | 1X2-2 | #10 AWG | 5X1-4 | |
| Start signal, wire 16A | 1X2-3 | #10 AWG | 5X1-5 | |
| Run signal, wire 18A | 1X2-4 | #10 AWG | 5X1-10 | 1 |
| Transition complete signal, wire 3B | 1X1-3 | #10 AWG | 5X1-3 | 1 |
| Transition complete signal, wire 13A | 1X2-1 | #10 AWG | 5X1-14 | 1 |
| Starter Fault 5A10-K1 | 1A24 J2-1, J2-2 | #14 AWG | 5X1-11, 5X1-12 | 5 |
| ***Low Voltage Wiring (<30vac)*** | | | | |
| From secondary CT 5CT4, white - black | 1X2-19, 1X2-20 | #10 AWG | 5X1-19, 5X1-20 | 2 |
| From secondary CT 5CT5, white - black | 1X2-21, 1X2-22 | #10 AWG | 5X1-21, 5X1-22 | 2 |
| From secondary CT 5CT6, white - black | 1X2-23, 1X2-24 | #10 AWG | 5X1-23, 5X1-24 | 2 |
| From PT 5T17, wires 236, 237 | 1X2-25, 1X2-26 | #10 AWG | 5X1-25, 5X1-26 | 3 |
| From PT 5T18, wires 238, 239 | 1X2-27, 1X2-28 | #10 AWG | 5X1-27, 5X1-28 | 3 |
| From PT 5T19, wires 240, 241 | 1X2-29, 1X2-30 | #10 AWG | 5X1-29, 5X1-30 | 3 |
| ***120v Voltage Sensing (note 4)*** | | | | |
| From line/120 3ph primary PT, wire 216A | 1S1 disconnect, L1 | #8 AWG | 5T9 | 4 |
| From line/120 3ph primary PT, wire 217A | 1S1 disconnect, L2 | #8 AWG | 5T9 | 4 |
| From line/120 3ph primary PT, wire 218A | 1S1 disconnect, L3 | #8 AWG | 5T9 | 4 |

**Notes:**

Note 1. For transitioning starter types only.

Note 2. INDP chillers that are also equipped with the SMP (Supplemental Motor Protection) or the DMP (Differential Motor Protection) options do not require the field installation of primary or secondary CTs. The protection panel of these chillers will contain the required CTs factory installed and wired to the CH530.

Note 3. Only in INDP chillers with low voltage motors (<600v).

Note 4. Only in INDP chillers with medium voltage motors (>600v). These chillers have secondary PTs factory installed in the CH530.

Note 5. Solid State Starter types only.

## Industrial Terminal Block

For a Starter By Others application the CH530 control panel of the INDP chiller contains a screw type terminal block (1X2) in it's upper left hand corner. This terminal block is intended for the customer's use when connecting his field installed wiring. Connected to this terminal block will be the wiring for current transformers, potential transformers, contactor control, etc. The customer will not be required to connect his field wires directly to the individual CH530 LLIDs (starter module 1A23, etc.). The terminal block will accept wire sizes from #24 to #10 AWG. Torque these terminals to 4.4 to 7 lb-in (0.5 to 0.8 Nm).

## Three-Pole Disconnect

If the chiller is Starter By Others, and is INDP equipped, then the CH530 panel will also be equipped with a three-pole disconnect on secondary potential transformers (1S1).

## Secondary PTs

If the chiller is Starter By Others, and is INDP equipped, then the secondary potential transformers (1T2, 1T3, 1T4) for the CH530 voltage sensing feature are factory installed into the CH530 enclosure.

These transformers take the nominal 120vac signal provided from the (1S1 3-pole disconnect) primary potential transformer (customer supplied) and reduce it to nominal 30vac inputs for the CH530.

It will still be necessary for the customer to provide a line:120 primary potential transformer as defined in the CH530 Starter By Others specification.

## Current Transformers

If the chiller is INDP equipped with the SMP option, and it is also a Starter By Others application, then the SMP enclosure will contain factory installed single-stage current transformers (4T1, 4T2, and 4T3). These transformers provide the motor current sensing needed by the CH530, the customer will not have to provide primary or secondary CTs for this purpose.

## Vacuum Circuit Breaker (CVAC)

If the Starter By Others device provided by the customer employs a vacuum circuit breaker to start and stop the chiller motor, then the INDP chiller CH530 enclosure will contain two relays (1K1 and 1K2) to enable control of the breaker by the unit controls. The relays are 120 vac 50/60hz, as configured 10A 125VDC resistive.

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*MP.factory (A4, European audiences only): Manufacturer's name, address, telephone number, and tax identification number.*