Tjernlund Mechanical Draft Wiring Check List

Rev. A

Mark OK or N/A	Draft Inducer Performed Task Description	Step
	Verify: Draft transducer sensing tube manifold locations. • If possible, the sensing tube should be 2 times the diameter of the vent pipe behind the heater farthest from the vent termination, or • If not, tube must be installed with sensing tube flush with the interior wall of manifold vent pipe. Do not install sensing tube in an elbow.	**1** Details Page 3 Fig. A
	Verify: Field wiring of Auto Draft Pressure Transducers. • **(TD-2)** Terminals match **R to R, B to B & G to G** on CPC-3 "RED" inducer terminal block and corresponding TD-2 Transducer terminal block.	**2** Details Page 3 Fig. B
	Verify: Draft TD-2 Transducer Port Connections • Sensing Tube is connected to the "**FRONT"** transducer pressure port • And the "**REAR"** transducer pressure port should be open to mechanical room atmosphere	**3** Details Page 4 Fig. C
	Verify that the **TD-2** or **TD-3** Transducer Wiring does **not share** conduit or junction boxes with any other electrical device.	**4**
	Verify: VSAD Inducer Cooling Fan Wiring Connections • Terminals **F1 & F2 on VFD terminal strip should have leads connected to it.**	**5** Details Page 5 Fig. C
	Verify: VSAD Inducer Motor winding limit Connections to: • Terminals **(S1 & S2) on VFD output terminal strip** • For **vertical** termination of the VSAD Venter, connect the S2 position to the orange wire in the wire whip of the VSAD Venter and cap off the gray wire as shown. For **horizontal** termination of the VSAD Venter, connect the S2 position to the gray wire and cap off the orange wire.	**6** Details Page 5 Fig. E
	Verify Draft Manual Pressure "Switch" wiring • Field wiring of inducer (PSA-1) is connected to the **appropriate** CPC-3 inducer terminal blocks **(P1 & P2)**	**7**
	Verify Draft Manual Pressure Switch (PSA-1) sensing locations. • If the CPC-3 set point is at least -0.10" w.c. use the included plastic tee to sample at the same point as the TD-2 transducer. • If the system set point is less than -0.10" w.c., install sampling tube after heater closest to Inducer and as close as practical to inlet of inducer/ blower keeping 2-3 pipe diameters away from any elbow or "T". Sensing tube should just penetrate inside wall of vent.	**8** Details Page 3 Fig. B
	Verify: CPC-3 Draft inducer VFD(Variable Frequency Drive Wiring) • Is VFD for draft inducer wired to inducer terminal strip on CPC-3?	**9** Details Page 4 Fig. D
	Verify: CPC-3 Draft inducer VFD(Variable Frequency Drive Wiring) • VFD wiring pigtail color coding matches the corresponding CPC-3 Inducer terminal block connections (terminal to terminal) (Reference diagram)	**10** Details Page 4 Fig. D

	Verify: VFD(Variable Frequency Drive) Input Voltage **WARNINGS:** • Verify that the input power voltage matches the VFD's nameplate rating before applying power. Incorrect supply voltages can damage VFD.	**11**
	Verify: that the Inducer/Blower is rated for the same voltage as the VFD. Incorrect voltage can damage motor and VFD. • **[**example =VFD-1H1 **A** 101C3**]**	**12**

SENSING TUBE LOCATIONS FOR MECHANICAL DRAFT INSTALLATIONS

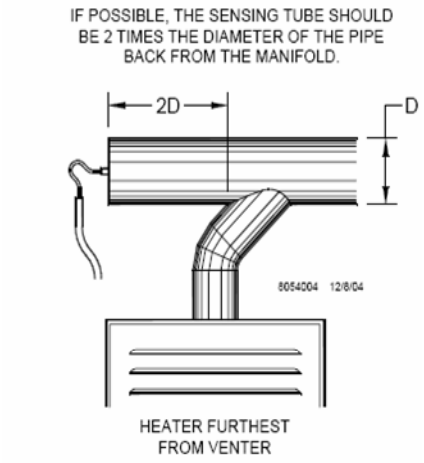
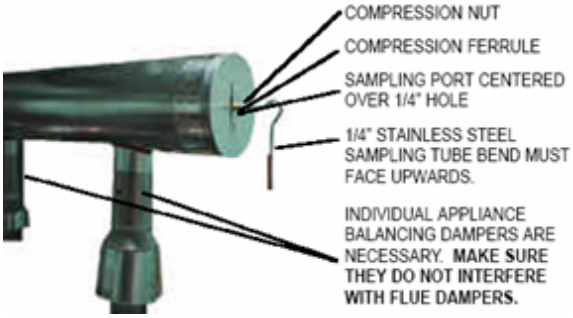


Fig. A

- The TD-2 Transducer sensing tube should be installed in the cap of a tee or rear of a common manifold.
- The tee is necessary so that only static pressure is measured.
- If the transducer sensing tube is installed in the side of a vent pipe it will also measure velocity pressure, giving an incorrect signal back to the CPC-3 Controller.
- If mounting on the side of the pipe is unavoidable, the sensing tube should be flush to the interior wall of the vent pipe.
- Typically, draft applications should sample at a point in back of the vent connection that is farthest from the inducer/blower, See above Diagram.

DIAGRAM A



Pre-Start up field wiring verification

The CPC-3 has two sets of terminal strips across the top of its circuit board. All mechanical draft related connections are made on the "INDUCER" terminal strip located on the top left side of the circuit board. All mechanical combustion air related connections are made on the "COMBUSTION AIR" terminal strip located on the top right side of the circuit board.

IMPORTANT: It is critical that wiring connections below are correct.

Verify **TD-2 or TD-3** Transducer connections (**Red** terminal blocks of Inducer or Combustion Air terminal strip) **G, R & B** are wired to the corresponding letter on the TD-Series transducer terminal strip. ***Failure to maintain proper polarity may damage transducer.**

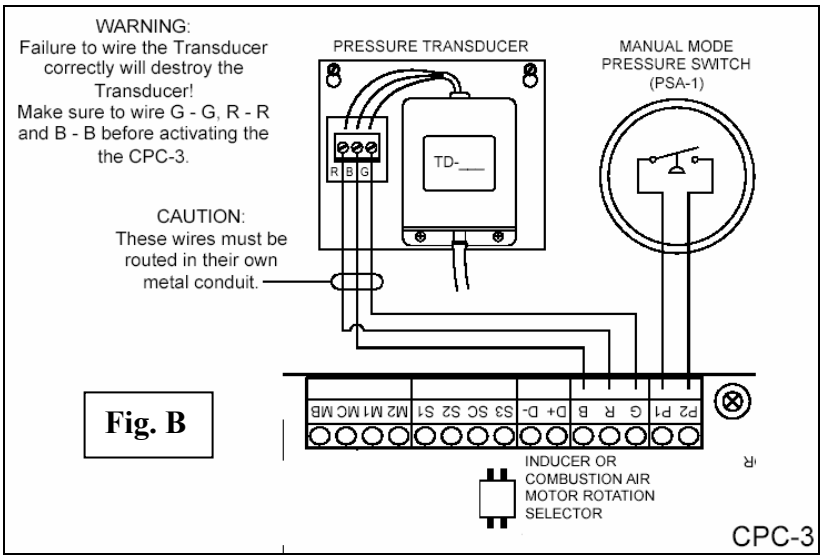
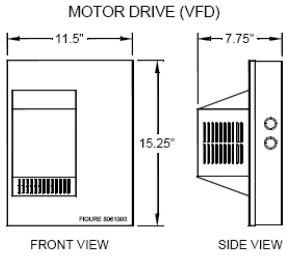


Fig. B



IMPORTANT: These wire leads **must** be enclosed within dedicated metal conduit. Do not run any other power leads in the same conduit or share a junction box with any other leads.

- The inducer or combustion air manual mode proving switch, model PSA-1 should be connected to terminals **P1 and P2** of the Inducer or Combustion Air terminal strip. These leads may share conduit with other circuits within the mechanical room.
- The free end of the CPC-3/VFD communications cable should be wired to the **blue, black and green** terminal blocks of the CPC-3 inducer or combustion air terminal strip. It is critical that the colored leads be connected to the exact terminals as depicted on the wiring schematic. If the cable has been extended in the field wire labels should have been affixed indicating the terminal block designations.

DIAGRAM B

Fig. C

FRONT NEGATIVE PRESSURE PORT CLOSEST TO JUNCTION BOX COVER MUST BE CONNECTED TO SAMPLING PORT WITH SILICONE TUBING.

REAR HIGH PRESSURE PORT CLOSEST TO MOUNTING BRACKET MUST BE LEFT OPEN TO ROOM ATMOSPHERE.

Mounting of the TD-2 Transducer & Sensing Tube Installation

Connecting the transducer sampling tube:

- The transducer - negative pressure front port **(closest to cover)** is connected to the transducer sampling tube.
- Make sure the silicone tubing has no sharp bends or kinks in it.
- The high pressure rear port (closest to mounting bracket) **must be** left open to room atmosphere, **(See Diagram B).**

The transducer must be mounted indoors within six (6) feet of the vent or chimney transducer sampling tube.

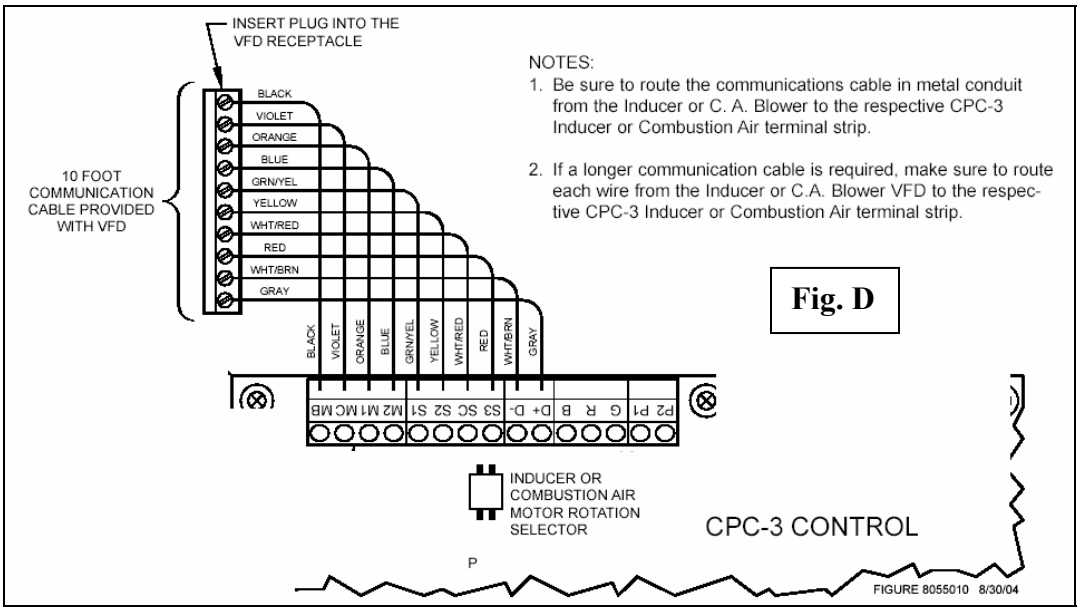


Fig. D

IMPORTANT:
Confirm that the proper **VFD (Variable Frequency Drive)** is connected to the proper CPC-3 Control system.

Verify that the CPC-3 Inducer control portion terminal strip is controlling the Auto-Draft Inducer fan VFD model indicator

[Example = VFD-1H1 A 101C3] Draft

INTERNAL FACTORY WIRING OF VSAD-8/10/12

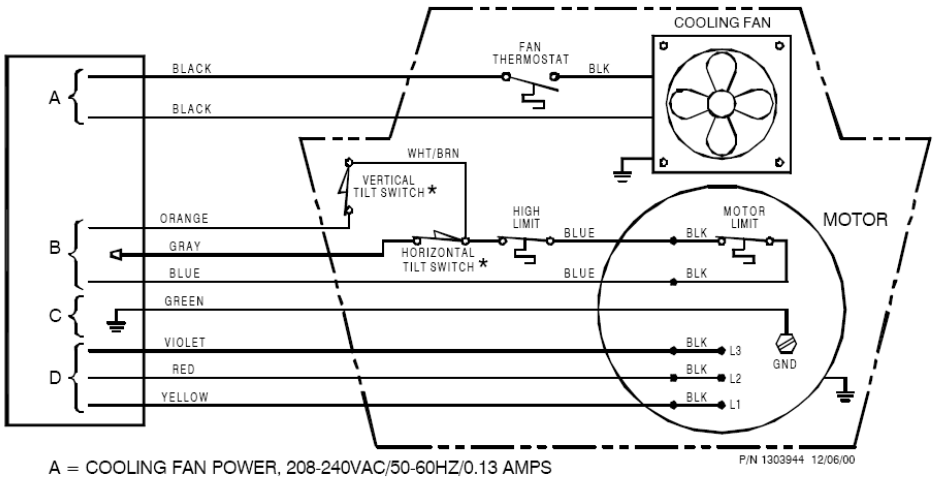


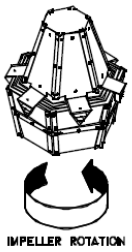
Fig. E

A = COOLING FAN POWER, 208-240VAC/50-60HZ/0.13 AMPS

B = SAFETY/PROTECTION CIRCUIT THROUGH TILT SWITCHES, 10VA MAX LOAD
* For vertical termination of the Auto-Draft ⓟ, connect to orange wire and cap off gray wire as shown.
* For horizontal termination of the Auto-Draft ⓢ, connect to gray wire and cap off orange wire.

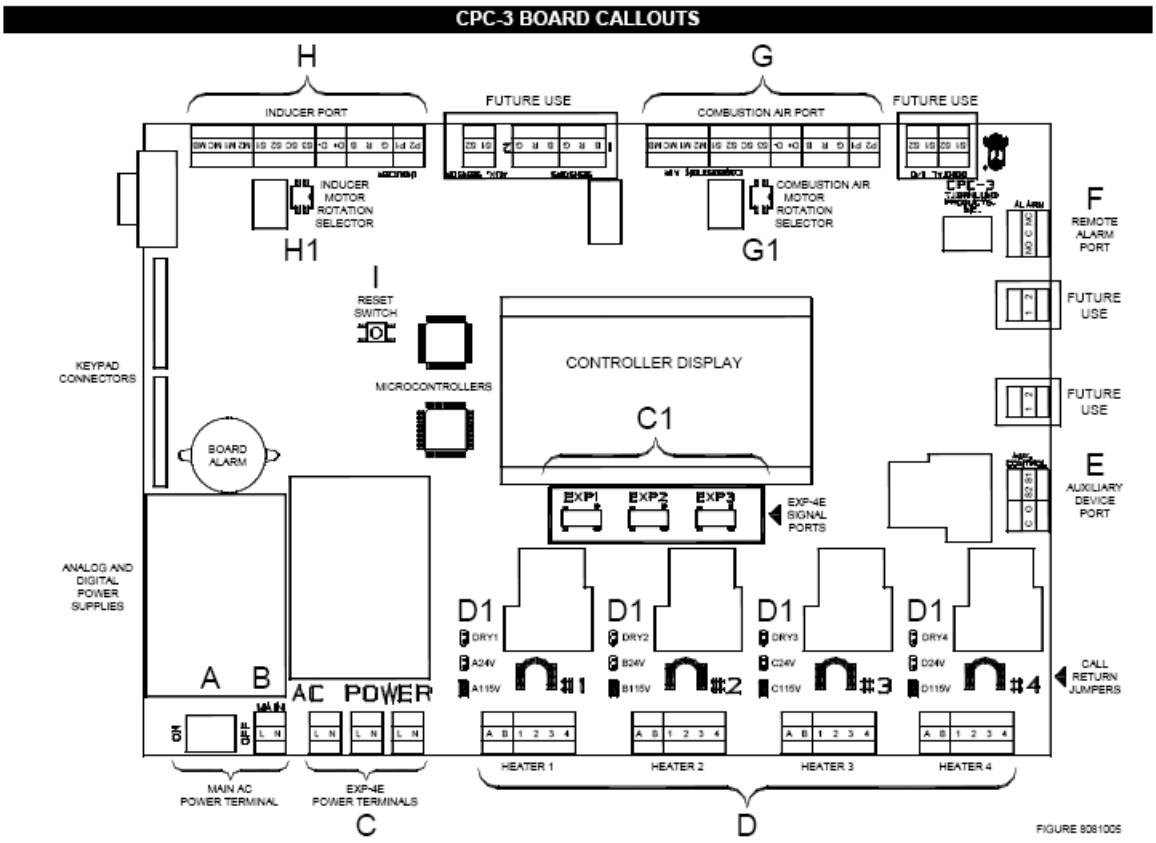
C = GROUND CIRCUIT - USE GROUND RATED CONDUIT

D = MOTOR POWER - MUST ORIGINATE FROM A TJERNLUND VFD



IMPELLER ROTATION

IMPORTANT: Impeller must rotate counter-clockwise. Follow VSAD impeller rotation confirmation in "Wiring" section of these instructions.



A) **CPC-3 Main Power Switch**

B) **Power Supply Input Terminals:** Accepts either 115 or 230 VAC, 50/60 Hz. 230V power can be supplied from VFD L & L Terminals.

C) **Power Supply Output Terminals:** Supply power to accessory EXP-4E Expansion boards.

C1) **EXP-4E Expansion Modules:** Communications connections from EXP-4E Expansion boards.

D) **Heater Interlock Terminal Blocks (Four):**
Positions A & B are for dry contact actuation, with A outputting 5 VDC and B needing 5 VDC to activate the CPC-3. Positions 1 & 2 require either 24 or 115 VAC from a heater control circuit to activate the CPC-3. A factory installed call return jumper wire above each terminal block routes the voltage connected from position 1 to position 3. When the CPC-3 safety circuit is made it switches position 3 to position 4, where the intercepted heater control circuit is routed back to the heater. Positions 3 & 4 are used independent of positions 1 & 2. If the A & B dry contacts are used to activate the CPC-3 (Call return jumper wire must be removed).

D1) **IMPORTANT:** Each six position terminal block includes a RED jumper tab to select the heater interlock voltage that is connected heater terminal block. Place RED jumper tab in Dry for positions A & B, 24V or 115V for positions 1 & 2 depending upon heater interlock voltage)

E) **Auxiliary Device Terminals:** Used to activate a motorized damper/louver in series with the inducer/blower activation by switching power to device through terminal C & O. Position S1 outputs 5 VDC to be switched through a damper end switch and returned to position S2. This incorporates the end switch closure into the overall CPC-3 safety circuit. Positions S1 & S2 may also be used to react to the contact closure of a carbon monoxide alarm. The functions of C & O and S1 & S2 are independently activated through the Auxiliary Device key.

F) **Remote Alarm Terminals:** Used to activate a remote alarm through either normally open or normally closed contacts. A power source is routed to the C position and returned out of either the N/C or N/O positions if an alarm condition exists.

G & H) Draft and Combustion Air Terminals: The CPC-3 can independently control mechanical draft and combustion air inducers/blowers. While the software that runs these functions differs, the communications to the VFD's that control the inducer/blower is identical. The following information is applicable to both the Inducer and Combustion Air terminal strips.

Positions P1 & P2 are for the PSA-1, manual mode proving switch. Position P1 outputs a 5 VDC signal to the PSA-1 Proving Switch. When the switch closes it returns the signal to position P2, allowing interlocked heaters to operate with the CPC-3 in Manual Mode.

Positions G, R & B connect to a TD-Series transducer. Position G receives the 1-10 VDC output from the transducer.
Position R is the 24 VDC power supply to the transducer. Position B is the ground for the transducer. Positions D+ & D- connect to the VFD through the included communications cable. Position D+ outputs a 1-10 VDC signal to the VFD to modulate the inducer/blower. Position D- is the reference ground.

Positions S3, SC, S2 and S1 connect to the VFD through the included communications cable. These connections enable reset of a faulted VFD and reverse the rotation of an inducer/blower from the CPC-3 controller.

Positions M1, M2, MC and MB connect to the VFD through the included communications cable. Position M1 outputs a 5 VDC signal to the inducer/blower limit circuits. This signal must return to position M2 or a mechanical fault will be posted on the display and the Limit Status OK LED will not be lit. Position MC outputs a 5 VDC signal to a N/C fault relay within the VFD. This signal must return to position MB or a VFD fault will be noted in the display and the VFD Status OK Green LED will not be lit.

G1 & H1) Inducer / C.A. Blower Rotation Selectors:
Below the Inducer (Draft) and Combustion Air terminal strips are two sets of dip switches. These dip switches determine the rotation of the inducer/blower being controlled by that particular terminal strip. The two dip switches at each position must always be switched opposite of each other or the VFD will receive simultaneous FWD/REV run commands, causing it to fault. See "Checking Rotation", page 12.

I) CPC-3 Reset Button:
Pressing this button resets the CPC-3 controller with a "soft boot". It can be used in lieu of the power switch to "re-boot" the microcontrollers of the CPC-3 without power spiking the board.

Tjernlund Mechanical Draft Wiring Check List

Wiring

- ☐Low Voltage VFD Control Cable Wiring to CPC-3
- ☐Low Voltage TD-Series Transducer & PSA-1 Manual Mode Fan Prover Wiring to CPC-3
- ☐Remote Alarm / Auxiliary Device Wiring
- ☐VFD to Inducer / C.A. Blower Wiring
- ☐CPC-3 Main Power Input & Heater Interlock Wiring
- ☐Pre-start up Field Wiring Verification

Start Up of CPC-3

- ☐Powering & Initializing CPC-3
- ☐Default CPC-3 Program Settings Unlocking & Locking the CPC-3 Keypad
- ☐Setting CPC-3 Time and Date
- ☐Activating the Draft or Combustion Air

Testing the Operation of System components

- ☐Test Run Set Up
- ☐VFD and Pressure Transducer Response
- ☐Checking for Proper Rotation

Draft Adjustment

- ☐Draft Set Point Adjustment
- ☐Balancing Draft

Auxiliary Devices

- ☐Alarm Buzzer
- ☐Aux Sensor Set up
- ☐Aux Device Set Up

CPC-3 Options

☐Resetting VFD Drive(s) Setting Pressure Units of Measure

☐Viewing & Resetting Fault History

☐Set Stages & Burner Interlock Verification

☐Setting Pre and Post Purge

Manual Mode Operation and PSA-1 Fan Prover Switch Adjustment

☐Switch Adjustment