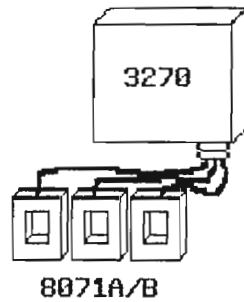
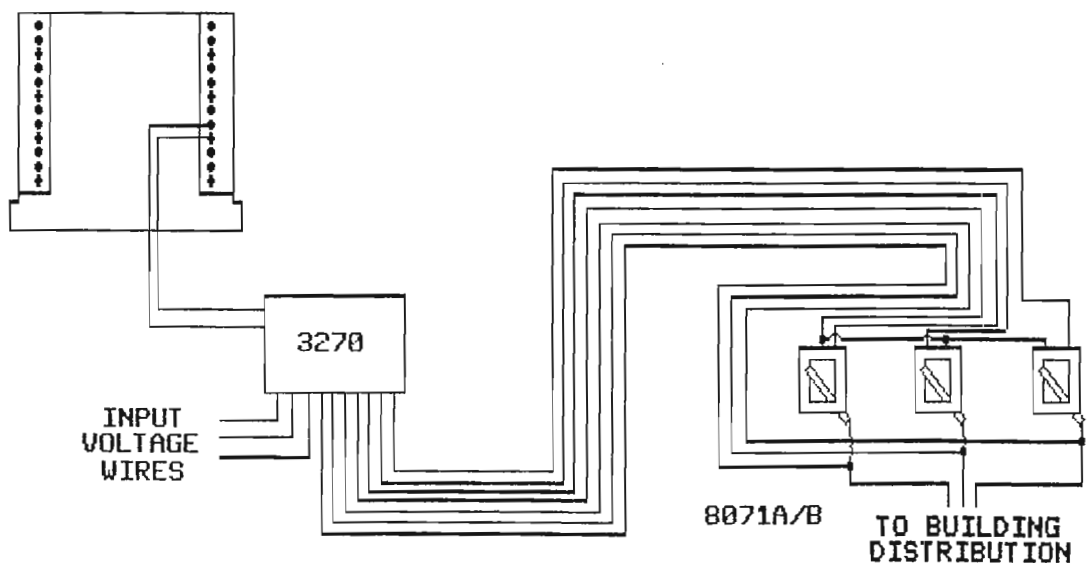


# PRECISION DEMAND CONTROL UNIT



- NO EXTERNAL POWER SUPPLY REQUIRED
- OUTPUT VOLTAGE: 2.415 VDC @-25° F ; 3.832 VDC @230° F
- TIME STABILITY: 0.5° F PER 1000 HOURS OF OPERATION
- INPUT POWER: 120/277 VAC 0.5 AMPS
- ACCURACY:  $\pm 1\%$ ,  $\pm 1$  DIGIT
- CT CURRENT RANGE: MUST HAVE 1 AMP SECONDARY
- MOUNTING DISTANCE: 0-100 FT, 18 AWG; 0-250 FT, 16 AWG
- MOUNTING DISTANCE FROM C.T.'S: 0-50 FT, 18 AWG; 0-100 FT, 16 AWG
- POWER FACTOR RANGE: 65% TO 100%
- TRUE WATT TRANSDUCER. MEASURES VOLTAGE, AMPERAGE, AND POWER FACTOR TO CALCULATE WATTAGE
- ONE, TWO OR THREE PHASE MEASUREMENT FOR 208 TO 480 VAC "Y" POWER DISTRIBUTIONS
- CAN BE FIELD CALIBRATED
- SLIDING WINDOW AVERAGING PERIOD USED TO MATCH UTILITY COMPANIES BILLING PERIOD
- USED IN CONJUNCTION WITH VARIABLE DUTY CYCLE, ANALOG CONTROL, VARIABLE ANALOG CONTROL, ALARM DIAL OUT, ANALOG ENABLE, AND PWM SETPOINTS TO LIMIT DEMAND





1/31/85  
Pub. No. P-PAC 8550

MODEL 3270 - FACTORY CALIBRATION REQUIREMENTS FOR DEMAND CONTROL UNITS

When ordering model number 3270 demand control interfaces, the following information regarding the nature of the electrical service you intend to measure must be given to the order desk before the order can be processed.

1. How many phases does the service have? \_\_\_\_\_
2. How many wires does the service have? \_\_\_\_\_
3. What is the phase-to-phase voltage of the service? \_\_\_\_\_
4. What is the expected maximum amperage per phase? \_\_\_\_\_
5. What ratio current transformer do you intend to use? \_\_\_\_\_  
(NOTE: This ratio must be between 100:1 and 4000:1. We cannot accept orders with the second number of the ratio being other than 1, such as 800:5.)
6. At what point is the service grounded? (Circle One)
  - A. Phase A                      C. Phase C                      E. Other (Please specify)
  - B. Phase B                      D. Central Neutral

The standard for Model 3270 is 3 phase, 4 wire, 480 volts (Phase to Phase), 2000 amps, 2000:1 ratio with center neutral. If the standard fits your application, order it under the part number 3270S.

ALL OTHER MODELS: You may include a filled out copy of this sheet with your written P.O. or you may simply enter the answers to the above six questions, separated by commas, in the "DESCRIPTION" section of your P.O., as in the following example:

If a 3270 is to be used on three-phase, four-wire service with phase-to-phase voltage of 480 volts, expected amperage per phase of 300 amps, current transformer with ratio of 300:1, and with grounding at center neutral, the order should be written as follows:

QTY.	Part Number	Description
1	3270	3,4,480,300,300:1,D
		<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>PHASE WIRE</p> <p>VOLTAGE</p> </div> <div style="text-align: center;"> <p>AMPERAGE</p> </div> <div style="text-align: center;"> <p>RATIO</p> </div> <div style="text-align: center;"> <p>NEUTRAL</p> </div> </div>

Standard Cal: 3, 4, 480, 2000, 2000:1, D

## 3270 INSTALLATION INSTRUCTIONS

### 3270 SELF POWERED DEMAND CONTROL UNIT:

The 3270 is a self powered watt transducer that measures both the line amperage and line voltage and electrically calculates an analog signal proportional to the wattage.

The 3270 enables the user to:

- A. Convert multi-phase amperage and voltage measurements into wattage information for use in demand control programs.
- B. Interface many different CT ratios provided they have a 1 amp secondary current at maximum primary (load) current.
- C. Field calibrate the unit to suit requirements differing from factory calibration.

### SPECIFICATIONS

1. Input Power:  
120/277 VAC at .5 amps.
2. Accuracy:  
±1%, ±1 digit
3. CT Current Ranges:  
Accepts CT's with 1 amp secondaries
4. Mounting distance and wire:  
0-100 ft., 18 AWG  
100-250 ft., 16 AWG
5. Mounting distance from CT's:  
0-50 ft., 18 AWG  
50-100 ft., 16 AWG
6. Power Factor Range:  
65% to 100%

CONNECTIONS

- A. White:  
    CT X2 term all CT's
- B. Red w/stripes:  
    CT X1 term phase A
- C. Blue w/stripes:  
    CT X1 term phase B
- D. Black/stripe:  
    CT X1 term phase C
- E. Red:  
    Line voltage phase A
- F. Blue:  
    Line voltage phase B
- G. Black:  
    Line voltage phase C
- H. White:  
    Neutral of power supply
- I. Brown:  
    277 VAC of power supply
- J. Orange:  
    120 VAC of power supply

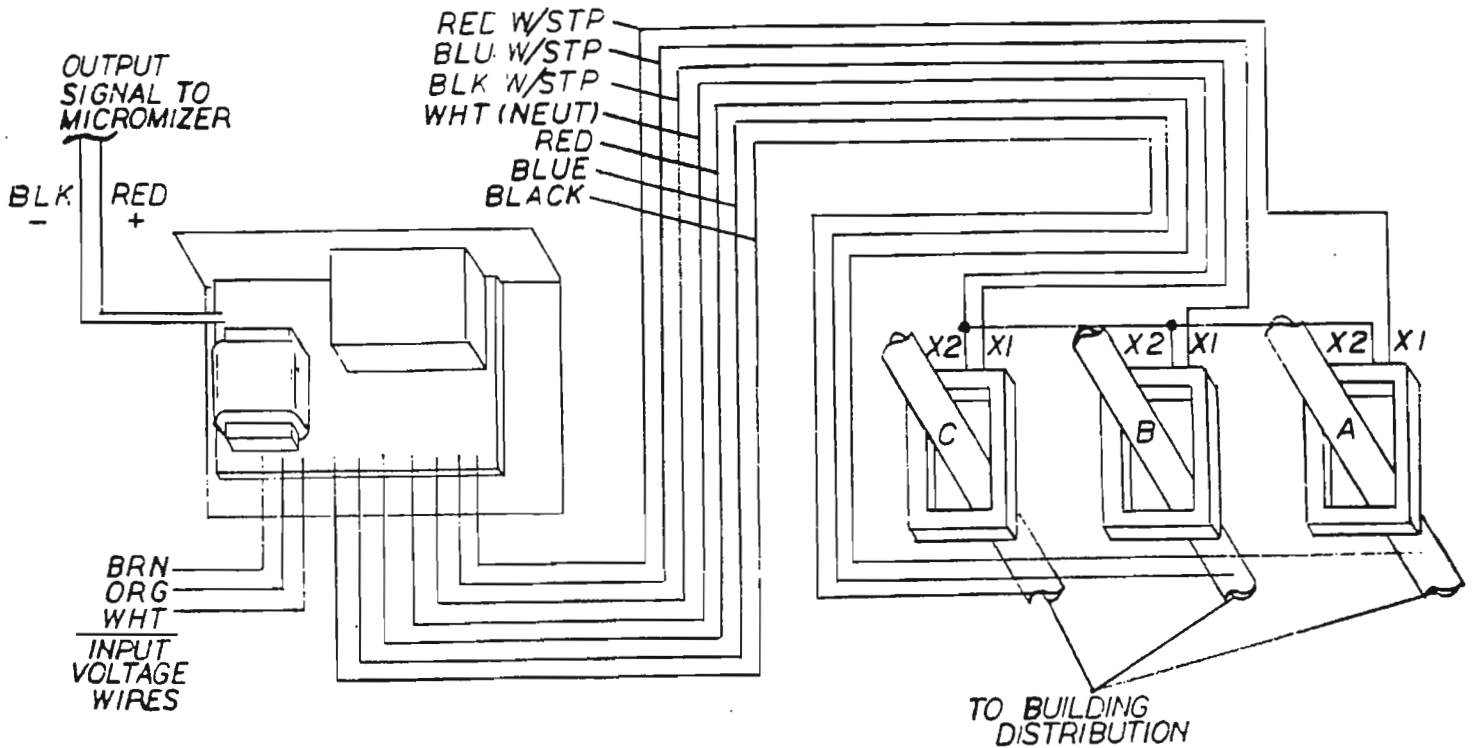
OPERATION

Model 3270 is a factory calibrated watt transducer that converts amperage and voltage measurements into analog signals for use with the Solidyne 3200 and 8002/4002 energy controllers. The 3270 receives a ratio of current from the CT's representing the total current drawn through them plus the voltage from the service being monitored. The unit then multiplies this information together with the power factor information to arrive at the total wattage of the system. The ratio of the CT's being measured is entered into the 3270 during the calibration procedure. The wattage information is converted to the proper voltage for use with either the 3200 series or 8002/4002 series controller.

TABLE OF CALIBRATIONS FOR 3270 & 3281

C.T. RATIO	EACH PHASE SEPARATELY	ALL PHASES TOGETHER	RANGE ON TOLERANCE
200:1	2.618 VDC	2.752 VDC	2.740 to 2.764
200:1	2.685	2.952	2.928 to 2.976
300:1	2.752	3.152	3.116 to 3.188
400:1	2.818	3.352	3.304 to 3.400
500:1	2.885	3.552	3.492 to 3.612
600:1	2.592 <del>2.952</del>	2.672 <del>3.752</del>	2.645 to 2.698 <del>3.680 to 3.824</del>
700:1 ÷ 10	2.598	2.692	2.681 to 2.700
800:1 ÷ 10	2.605	2.712	2.702 to 2.721
900:1 ÷ 10	2.612	2.732	2.721 to 2.742
1000:1 ÷ 10	2.618	2.752	2.740 to 2.764
2 : 1 ÷ 10	2.685	2.952	2.928 to 2.976 =

INSTALLATION



1. Install the 3270 in a weather protected environment as close to the controller as practical.
2. Connect the 3270 to the CT's as shown above.

**IMPORTANT:** Do not place the CT's onto a live circuit while the X1/X2 terminals are not connected to the 3270.

3. Connect the line voltage wires as shown in the accompanying drawing taking care to ensure phase current wiring has the same base color as the voltage wiring. Failure to organize the colors correctly will result in false reading.
4. If the system is single phase or 2 phase, delete the extra CT's and tie the unused line voltage inputs to neutral.
5. Connect the small red wire of the shielded pair originating from the 3270 to the analog input channel of the controller.

6. Connect the small black wire of the shielded pair originating from the 3270 to the analog input channel of the controller.
7. The output signal of the 3270 is a voltage source. These 2 wires, red (+) and black (-) (common), must be brought back to any Micromizer analog input. When wiring distances over 100 feet, 18 or lower gauge wire must be used for the Micromizer to receive an accurate signal. This voltage is isolated from the incoming power, therefore, it does not require class I wiring.
8. Connect the shield of the above pair to the chassis of the controller.
9. Power for the 3270 is applied to the brown or orange wires and the white wires. The white wire must be neutral of the service being measured.
10. Energize the 3270 together with the controller. Check the voltage inputs to the 3270 as follows:
  - A. White to orange 120 VAC or white to brown 277 VAC
  - B. X1 to X2 each CT:  
Zero to 2 VAC
  - C. Voltage inputs:  
90 to 280 VAC
  - D. Small wires to controller:  
2.5 to 3.5 VDC
11. Select the controller's analog examine mode and observe the readout for consistency with a known wattage usage. If the controller does not display the expected reading check all wiring for correct connection and polarity.

FIELD CALIBRATION TEST PROCEDURE FOR THE 3270 DEMAND SENSOR:

The 3270 is intended for use with CT's which generate a one ampere output for a full scale input. Example: 2000:1, 600:1, etc. For use with CT's which generate a five ampere output for full scale input please consult the factory.

- A. Begin by setting the Zero adjustment. The zero has been preset at the factory and should not require additional adjustment.
  1. Apply power to the unit, allowing at least a ten minute warm-up time.
  2. Short CT's if the 3270 is connected to the CT's wires leading to the unit. Note: CT's should not be left in an open circuit condition while power is applied to their respective conductor. Wait approximately two minutes and check the reading on the Micromizer. This can be done by pressing the analog channel desired, the analog data key, and then pressing the examine key

twice. It should read between -1 and +1 with the ideal reading being zero. If this reading is not obtained then an adjustment of R7 will be required. R7 is located on the corner away from R4, R5 and R6. NOTE: Adjust a little at a time and wait for the reading to stabilize before adjusting further. Turn the screw CW to increase the reading. Adjust until controller reads "0".

B. To calibrate the 3270, a precision wattmeter is recommended.

1. Set up the wattmeter per manufacturer's recommendations or use a combination of voltmeter will be more accurate since most types automatically compensates for power factor.

The maximum reading possible on the Micromizer is limited to 230, because of this the maximum per phase reading is:

3 phase -	76
2 phase -	115
1 phase -	230

These values are usually scaled to represent kW or kW x 10 or kW x 100, etc.

2. Reconnect or remove the short from the CT for channel A (see attached diagram for control locations and terminal points). Adjust the potentiometer for channel A until the reading on Micromizer display agrees with wattmeter reading for A phase, divided by the scale factor chosen. The adjustment should be made a little at a time, and allowed to stabilize for at least thirty seconds to a minute before readjusting. Turn screw CW to increase reading, CCW to decrease. The pot will make a clicking sound when the end of rotation is reached. Discontinue screw rotation as further rotation may damage potentiometer.
3. When step two is completed, disconnect the A phase CT or replace the short.
4. Repeat step 2 procedure for channels B and C, if used. Use Glyptol resin (available at electronics stores) or clear nail polish on screws to secure adjustment.
5. Remove all CT shorts or connect all CT's and observe Micromizer for proper reading.

This concludes the calibration procedure for the 3270.



**CT-300** continued

**OPERATION**

Output of the CT-300 current transformer can be verified by using a standard clamp-on ammeter.

1. Measure the current flow through the bus bar or cable that the CT-300 is mounted on. (Use caution)
2. Measure the current flow through the wire that is connected to terminal X1 (black w/stripe) of the CT-300. Use appropriate current range on ammeter. Current will be less than 1 ampere.
3. Multiply the value obtained in Step 2 by 300. This value should be equal the value obtained in Step 1.

**12.10 CT-2000 DESCRIPTION**

Model CT-2000 is a split-core precision current transformer capable of monitoring from 100 to 2000 amperes at a facilities incoming service. The current transformer provides a stepped-down current signal (0 to 1 A) to model PDM-2 power demand module for demand monitoring and control.

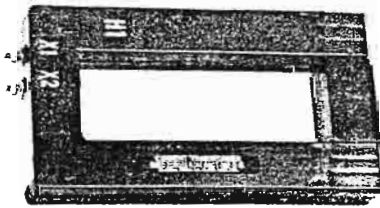


Figure 36. Model CT-2000 Current Transformer

**SPECIFICATIONS**

- Measurement Range: 100 to 2000 A
- Current Ratio: 2000 to 1
- Current Output: 0 to 1 A
- Frequency Range: 50 to 400 Hz
- Rated Voltage: 600 V
- Construction: Split-core rectangular
- Dimensions: Window:— 5.5" x 2.0"
  - Overall— Width 4.250"
  - Height 7.750"
  - Depth 1.125"

- Temperature: Operation— 0°F to +120°F
- Storage— -40°F to +150°F

**INSTALLATION**

**WARNING:** Do not place current transformers on or near a live circuit when secondary is open. Dangerous voltage is present on open circuit secondary terminals.

1. The CT-2000 current transformer should be located on the load side of the main disconnect switch. This will enable the service technician to de-energize equipment with the main disconnect switch during installation and servicing. The current transformer is designed for indoor use and must be mounted in a area protected by the weather.
2. See installation instructions for the PDM-1 power

demand module, for wiring the X1 and X2 terminals. Be sure the current transformers are wired for proper polarity. Wiring must comply with local electrical codes and ordinances.

3. Remove the split core and place current transformer around the bus bar or cable so the side of the current transformer marked H1 faces the source of power; see Figure 37.

4. Replace the split-core and secure the current transformer with brackets (not provided). Make sure that the current transformers are mechanically secure so they cannot shift position accidentally.

**OPERATION**

Output of the CT-2000 current transformer can be verified by using a standard clamp-on ammeter:

1. Measure the current flow through the bus bar or cable that the CT-2000 is mounted on. (Use caution.)
2. Measure the current flow through the wire that is connected to terminal X1 of the CT-2000. Use appropriate current range on ammeter. Current will be less than 1 ampere.
3. Multiply the value obtained in Step 2 by 2000. This value should be equal the value obtained in Step 1.

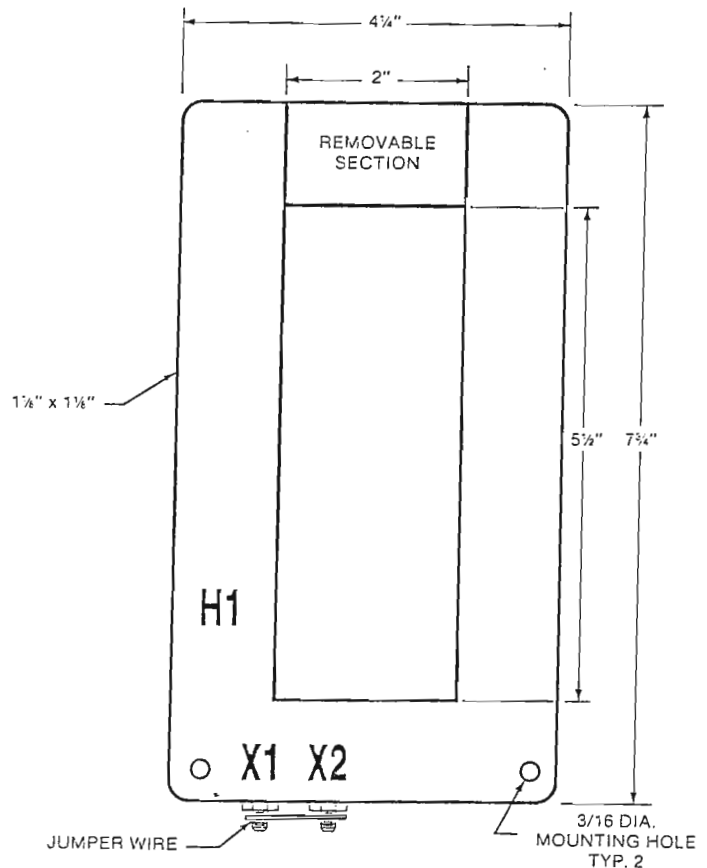


Figure 37. Model CT-2000 Current Transformer