

INSTRUCTION MANUAL

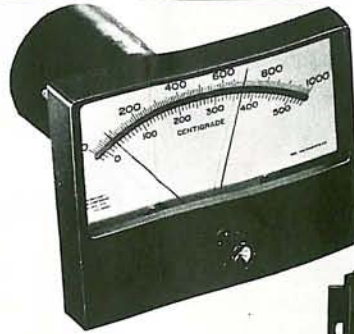
COMPACKS I AND II ON/OFF, ON/OFF PYROMETER

DESCRIPTION

The API On/Off Compack Controller may be used as an alarm or control device for temperature, current, or voltage.

Compack I control components, including solid-state circuitry and output relays, are housed in an integral circular barrel with signal, line, and output connections made to terminals at the rear.

Compack II is a space-saving, edge-reading instrument with all the necessary control components; a convenient rear terminal board permits quick installation.



COMPACK I



COMPACK II

THIS MANUAL COVERS THE FOLLOWING INDICATING CONTROLLERS:

MODEL	SET POINTS	THERMOCOUPLE BREAK PROTECTION (PYROMETER MODELS ONLY)	FUNCTION	LOAD RELAY OUTPUT
Compack I and Compack II	Single High	Upscale	On/Off, Cycling, Limit Control	SPDT Load Relay for each set point.
	Single Low	Downscale		
	Double	Upscale		

FEATURES

Compack operation is based on the API contactless optical meter-relay. These optical meter movements permit a direct and trouble-free approach to temperature, current, or voltage control and alarm applications.

The frictionless taut band movement which is used on all pyrometer types, ignores vibration and is rugged, repeatable and reliable.

Compacts I and II are designed to be fail-safe under most conditions. The load relay is energized when the conditions are "normal"; power or component failure will de-energize the load relay (s).

Electrical cold junction compensation on the pyrometer models assures accurate indication over a wide ambient temperature. If the thermocouple opens, the thermocouple protection circuit drives the meter indicating pointer off scale.

Calibration for a particular thermocouple resistance is accomplished by the adjustment of a balance potentiometer, accessible from the rear terminal board.

The entire Compack I unit is splash-proof from the front when mounted with a special molded gasket.

SPECIFICATIONS

STANDARD DUAL RANGES - PYROMETER MODELS

Type	Thermocouple	Fahrenheit	Centigrade
J	I/C	-75 to + 225 0-300 0-500 0-750 0-1000	-60 to + 110 0-150 0-260 0-400 0-500
K	C/A	0-1500 0-2000 0-2500	0-800 0-1100 0-1370
T	Cu/C	-450 to + 100 -200 to + 100	-265 to + 40 -130 to + 40
R	Pt/Pt 13% Rh	0-3000	0-1650
-	W-5%Re/W-26%Re	0-4000 2000-4000	0-2200 1100-2200

NON-PYROMETER MODELS

Typical Ranges	DC	AC
Microamperes	0-500 0-200 0-100 0-50 0-20 0-10 0-5	0-500 0-200 0-100 0-50 0-20 0-10
Milliamperes	0-1 to 0-1000	0-1 to 0-1000
Amperes	0-1 and above	0-1 and above
Millivolts	0-50 0-25 0-10 0-5	0-250 (min. range)
Volts	0-1 to 0-500	0-1 to 0-500

NOTE: For DC ammeters an external shunt is required.

AC milliamperes and ampere ranges are supplied with transformer; extra transformer required for AC ranges above 50 amperes.

SPECIFICATIONS (CONT'D.)

Power Supply: 115 or 208 or 230 volts \pm 10%; 50/60 Hertz. Specify single voltage, not field selectable.

Power Consumption: 5 watts.

Output Contact Ratings: 5 amperes, 125 volts AC non-inductive. 5 amperes, 25 volts DC non-inductive. NOTE: Relays are conservatively derated by API. The API rating may safely be doubled when the required life span is less than 1,000,000 operations.

Ambient Temperature: 20°F to 130°F.

Net Weight: 2 pounds.

Set Point Coincidence: Single set point - 1½% max; double set point - 2% max.

Set Pointer Adjustment Range: Adjustable pointer moves full scale; ½% resolution; 3% of each other on double set point.

Indication Accuracy: \pm 2% of scale span at ambient temperature of 25°C or 77°F. (\pm 3% on AC units).

Cold Junction Compensation Accuracy: \pm 150 microvolts from 32°F to 130°F.

CONTROL FORMS AND WIRING DIAGRAMS

The wiring diagrams identify all relay contacts with power removed from the controller. Depending upon the position of the indicating pointer with respect to the set pointer (s), the NO and NC contact condition may reverse when the controller is energized. The contacts for high and low may be wired as the user desires for alarm or load applications. (See Wiring, Page 3.) When using a single set point Compack, eliminate the connection(s) which does not apply.

Load contacts are not internally connected to the AC line and must be powered from the load circuit.

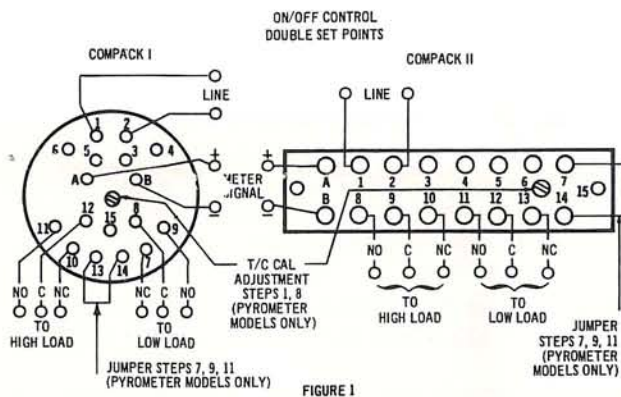


FIGURE 1

1. On/Off Control: API Compack controllers are generally used as On/Off temperature, current, or voltage controllers. (See Figure 1.)

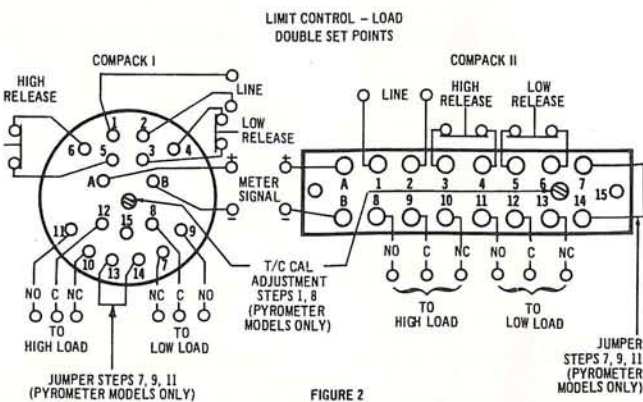


FIGURE 2

2. Limit Control: Figure 2 shows wiring for limit operation. When the black indicating pointer passes the set point, the relay will de-energize and stay de-energized until the limit release switch is opened. To start-up instruments for limit control applications, the external limit release switch must be opened while the black indicating pointer is below the high set point, above the low set point, or between the double set points.

Until this is done, the relay (s) is locked out due to the limit release switch being normally closed. Automatic start-up or sequencing is possible by connecting external relay circuitry in place of the switches. Opening the release circuit will allow the relay (s) to energize on start-up for limit release.

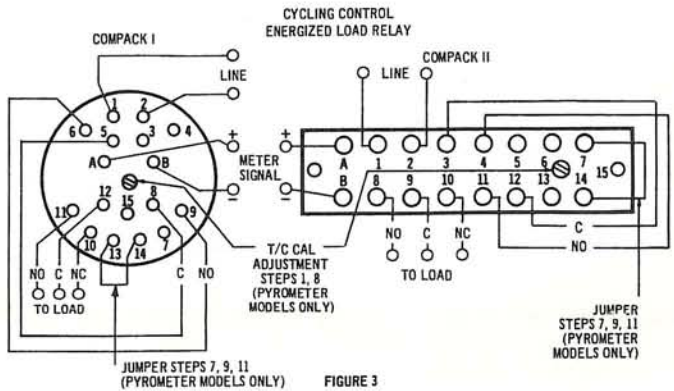


FIGURE 3

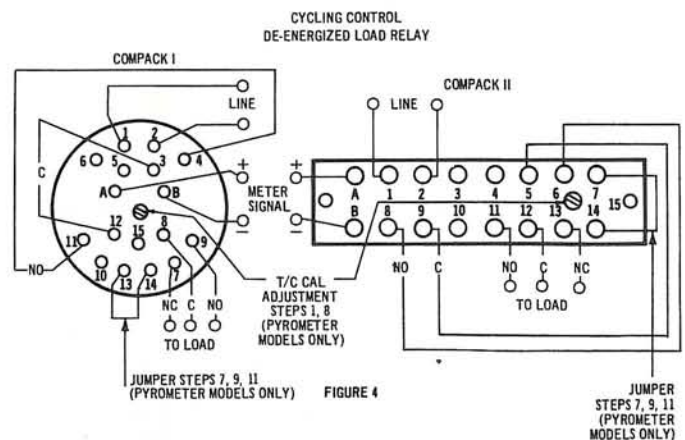
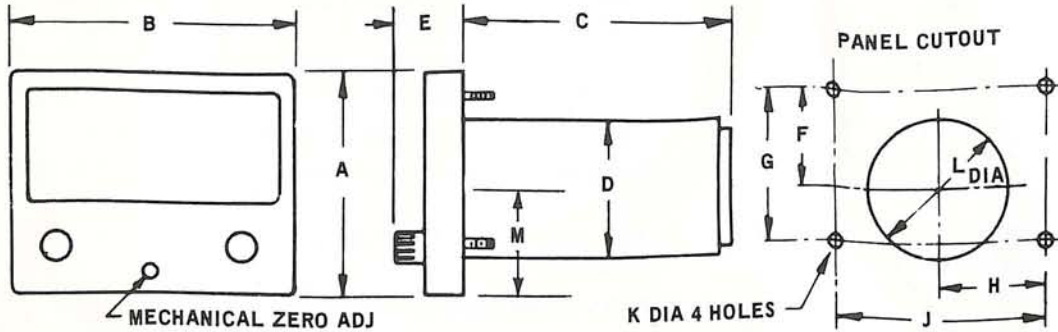


FIGURE 4

3. Interlock or Cycling Control: A double set point Compack may be connected so that the load relay cycles on at the low set point and off at the high set point. This is accomplished by operating one set point in the limit connection while the other relay does the unlatching. (See Figure 3.) NOTE: Difficulty may be experienced if start-up is attempted with the indicating pointer between the two set points. This may be corrected by momentarily moving the low set point above the indicating pointer or by using a start-up time delay relay to open the high release contacts. When connected as shown in Figure 4, relay logic is reversed, cycling on at the high set point and off at the low set point. NOTE: Difficulty on start-up may be corrected by momentarily moving the high set point below the indicating pointer.

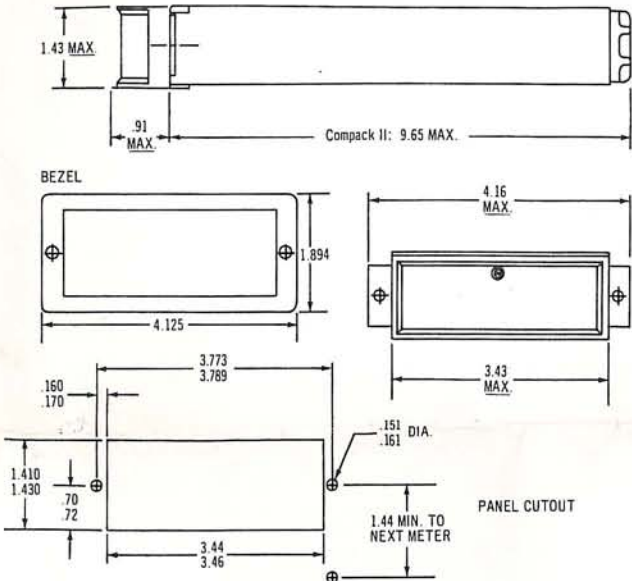
INSTALLATION

DIMENSIONS - COMPACK I



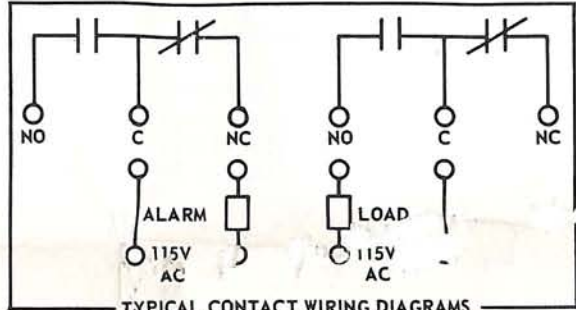
	303-K	503-K	603-K
A	3.15 MAX.	4.27 MAX.	4.35 MAX.
B	3.28 MAX.	4.71 MAX.	5.75 MAX.
C	5.50 MAX.	5.50 MAX.	5.50 MAX.
D	2.70 MAX.	2.70 MAX.	2.70 MAX.
E	1.35 MAX.	1.39 MAX.	1.39 MAX.
F	1.125 ±.010	2.020 ±.010	2.180 ±.010
G	2.290 ±.005	3.560 ±.005	3.000 ±.005
H	1.125 ±.010	2.00 ±.010	2.625 ±.010
J	2.290 ±.005	4.000 ±.005	5.280 ±.005
K	.150 ±.005	.161 ±.005	.161 ±.005
L	2.82 ±.01	2.82 ±.01	2.82 ±.01
M	1.57 MAX.	1.90 MAX.	1.89 MAX.

DIMENSIONS - COMPACK II



WIRING:

Wire the load and input power terminals per the appropriate connection diagram (Figures 1 through 4). Remove the shorting clip from the input signal terminals.



MOUNTING:

Insert Compack I, from the front, into its panel cutout and secure, using the supplied mounting hardware. Panel sealing gaskets are optional.

Model	Gasket Part Number
303-K	1125-171
503-K	1125-172
603-K	1125-173

Insert Compack II, from the rear, into its panel cutout and secure; using the supplied mounting hardware. A black mounting bezel is optional.

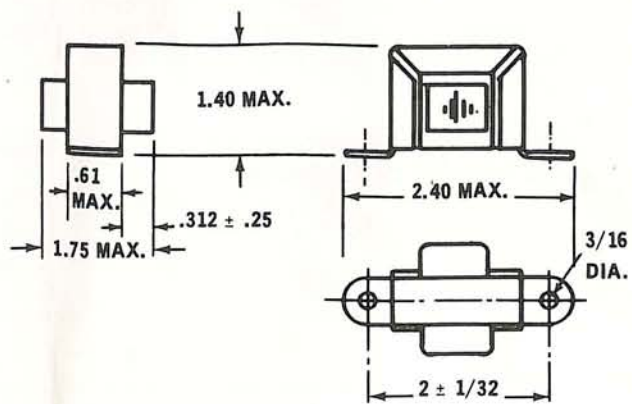
Model	Bezel Part Number
371-K	241-22

PREWIRING:

- Carefully check the following points before wiring:
1. Proper thermocouple type (Pyrometer Models).
 2. Proper thermocouple resistance (0 to 10 ohms standard).
 3. Correct operating voltage (115 or 208 or 230 volts ± 10%).
 4. Appropriate power capabilities for load.
 5. Correct input signal on voltage or current models.

SPECIAL NOTE FOR AC AMMETERS:

All models calibrated for reading AC current from 100 milliamperes up require a small external current transformer (supplied with each unit as standard). The black transformer leads are the primary winding and are connected in series with the load. The white secondary leads are connected to the AC signal terminals of the meter. The white secondary leads may be lengthened if desired with negligible effect on calibration accuracy. Transformer mounting dimensions are shown below. For AC current ranges higher than 50 amperes, an additional "DONUT" transformer is required, operating into a 5 ampere current transformer and meter.



INSTALLATION (CONT'D.)

THERMOCOUPLE CALIBRATION AND WIRING (PYROMETER MODELS):

Before applying power to the Compack make these adjustments:

1. Rotate the T/C CAL adjustment (potentiometer) to the center of its rotation. (See Figures 1 through 4 for the appropriate potentiometer adjust location.)
2. Set the zero adjust until the meter reads 77°F or 25°C. (CAUTION: Make this exact setting regardless of ambient temperature. This step should NOT be taken with suppressed zero meters.)
3. Connect the thermocouple. Thermocouple connections must be clean and tight. DO NOT USE ordinary copper wire to connect the thermocouple to the controller as this makes the cold junction compensation incorrect; thermocouple extension wire must be used. Observe the extension wire polarity and do not exceed 10 ohms total resistance for a standard Compack controller. In special models permitting higher external resistance, observe the resistance as given on the meter dial. Check for proper polarity of the thermocouple - the wire with the red insulation must go to the negative terminal. When wired correctly, the signal pointer will deflect upscale when heat is applied to the tip of the thermocouple.
4. Rotate the red set pointer to the extreme left end of the scale on a high set point model and to the extreme right end of the scale on a low set point model. On a double set point Compack, de-energize the load power source directly or disconnect the load on the terminal strip of the control.
5. Apply power
6. Observe the position of the black indicating pointer.
7. Connect jumper wire between terminals 13 and 14 (Compack I) and terminals 7 and 14 (Compack II). (Use caution when connecting or disconnecting the jumper wire in Steps (7) and (9), since power is applied to the control.)
8. If the meter reading changes, turn the T/C CAL adjustment until the meter indicates original reading.
9. Test for correct adjustment by disconnecting and then connecting jumper 13 and 14 (Compack I) and jumper 7 and 14 (Compack II). Pointer should remain steady.
10. If balance is unattainable, the resistance of the thermocouple may be higher than 10 ohms or lower than the rated resistance for special models. A circuit containing an open thermocouple cannot be balanced and the indicating pointer will be driven past the end scale.
11. LEAVE the jumper wire connected to terminals 13 and 14 (Compack I) and terminals 7 and 14 (Compack II).

THERMOCOUPLE CALIBRATION FOR SUPPRESSED ZERO METERS:

Connect the thermocouple and load circuit. (DO NOT reset the zero adjust on suppressed zero meters.)

1. Rotate the T/C CAL adjustment to the center of its rotation.
2. Set the red set pointer to a convenient temperature within the meter scale.
3. Apply power to the controller, energize the load and allow the system to heat.
4. Follow standard calibration instructions starting with Step (6).

SPECIAL NOTE FOR CUSTOMERS RECHECKING INDICATION ACCURACY (PYROMETER MODELS):

Due to the thermocouple break and cold junction compensation networks, special calibration procedures must be used. Please ask for special calibration instructions. Be sure to specify model and part number of the controller.

SYSTEM START-UP (PYROMETER MODELS)

1. Adjust the red set pointer to the desired control temperature.
2. Apply power to the controller.
3. If using the limit control, open the limit release switch (es).
4. Energize the load power supply.

SYSTEM START-UP (NON-PYROMETER MODELS)

1. Set the zero adjust until the meter reads zero. (CAUTION: DO NOT reset the zero adjust on suppressed zero meters.)
2. Adjust the red set pointer to the desired control point (current or voltage).
3. Apply power to the controller.
4. If using limit control, open the limit release switch (es).
5. Energize the load power supply.

SAFETY INSTRUCTIONS

Do not make any rear terminal connections while power is applied to the system. Be sure to de-energize both the load and the controller power supply before touching the rear terminal strip.

