



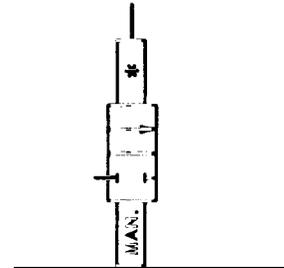
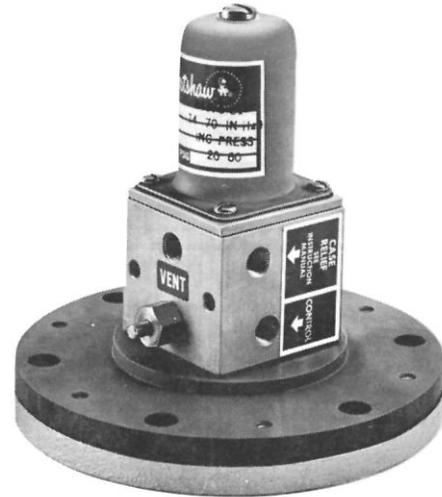
# Crankcase excess Pressure Sensors 84378-C, 84378-E

## GENERAL DESCRIPTION

The patented\* 84378-C and 84378-E Crankcase Excess Pressure Sensors are adjustable, snap-acting valves with manual reset which vent pressure when the measured variable exceeds the setpoint. Model 84378-C has a local manual reset feature. Model 84378-E has remote manual reset. They have provision for piped vent operation. Setpoint is virtually unaffected by control pressure change or in the case of piped vent versions, vent back pressure change.

For correct operation, control pressure must be provided through a .8 mm (.032") diameter, or smaller, orifice.

\*Patent 3,986,524



J.I.C. Symbol

Model Number	Process Pressure Setpoint Range		Maximum Operating Pressure	
	PSI	Millibar	PSI	Bar
84378-C1	0.5 - 2.5	35 - 174	50	3.4
84378-C2	2.5 - 10	174 - 690	50	3.4
84378-E1	0.5 - 2.5	35 - 174	50	3.4
84378-E2	2.5 - 10	174 - 690	50	3.4

## SPECIFICATIONS

- Valve Housing, Housing Plate and Cover: ..... Anodized Aluminum Alloy
- Spring Housing: ..... 316 Stainless Steel
- Springs: ..... Stainless Steel
- O-rings: ..... Fluorocarbon and Neoprene
- Diaphragms and Gasket: ..... Buna-N on Nylon
- Control Pressure: ..... 138 to 414 kPa (20 to 60 psi)
- Maximum Control Pressure: ..... 483 kPa (70 psi)
- Maximum Ambient Temperature: ..... 71° C. (160° F.)
- Maximum Pressure Drop for Manual Reset: ..... 747 Pa (0.1 psi)
- Repeatability: ..... ±1% of Setpoint
- Approximate Shipping Weight: ..... 1.8 Kg (4 lbs.)
- Control Medium: ..... Air, Natural Gas, Nitrogen, CO<sub>2</sub>
- Filtration (Minimum): ..... 25 microns
- Moisture (Pressure Dewpoint): ..... 8° C. (15° F.) less than ambient temperature
- Oil Content (Natural Base): ..... 5 ppm
- Oil Content (Synthetic Base): ..... 0 ppm

*NOTE: These are suggested minimums for control medium quality. For operation under more adverse conditions, consult factory.*

**CAUTION: DO NOT EXCEED MAXIMUM TEMPERATURE/PRESSURE RATINGS.**

## ORDERING INFORMATION

### Specify:

1. Model No. (84378-C1, 84378-C2, 84378-E1 or 84378-E2)
2. Control Pressure - If not specified, sensor is set using 207 kPa (30 psi)
3. Setpoint - If not specified, set at minimum.
4. Tagging Information.

## DIMENSIONS

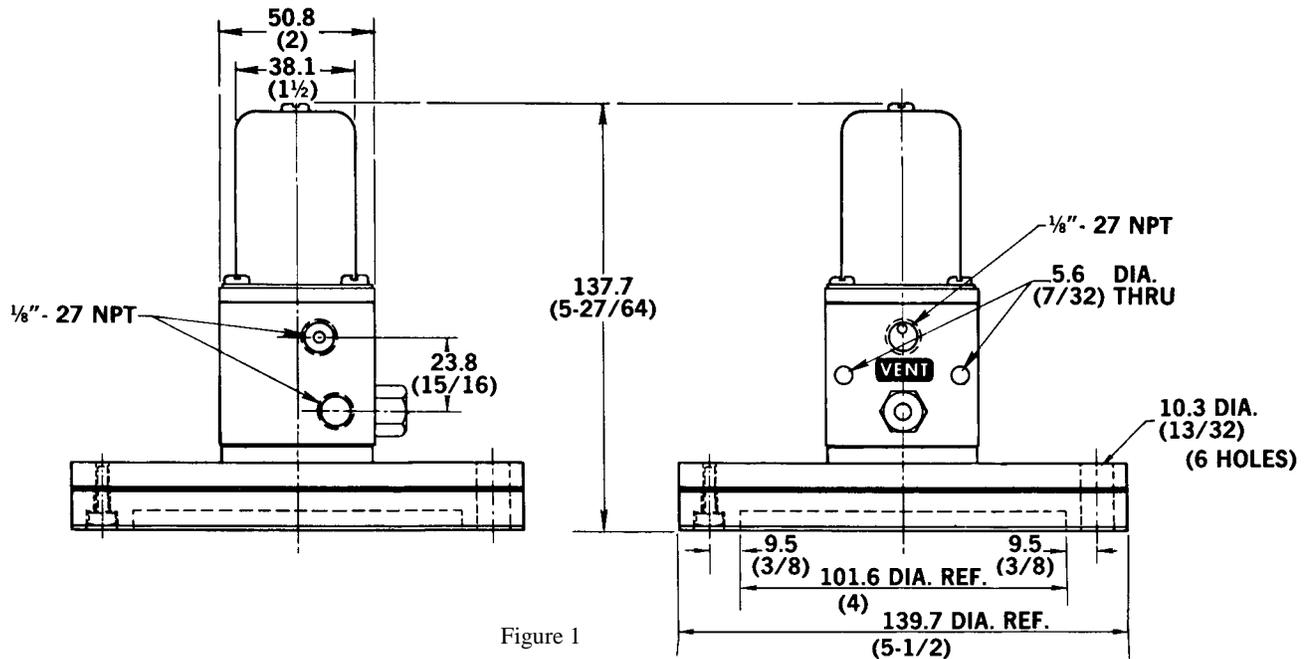


Figure 1

## INSTALLATION

**Mounting:** The 84378 Crankcase Pressure Sensor may be mounted in any position. It should be securely mounted with six 3/8" diameter bolts or studs through the 13/32" diameter holes in the sensor flange. A 1/16" thick mounting gasket is furnished with the sensor.

Care should be taken to prevent any foreign matter from entering the sensor. Vent openings should have fittings turned down.

**Connection:** The sensor has three 1/8" - 27 NPT connections; one for control pressure, one for vent pressure, and one for case relief pressure.

**CAUTION: Do not pipe or plug case relief connection.**

**The vent pressure connection from the sensor cannot be used as a supply or control source for any other equipment. Vent back pressure should be held to as low a level as possible**

Control port pressure must be provided through a .8 mm (.032") diameter or smaller orifice using 6 mm (1/4") or 9.5 mm (3/8") O.D. tubing. Using excessive lengths or other than the specified tubing is not recommended.

Tubing and fittings used to connect the sensor must be free of chips, dirt, moisture or other foreign matter.

On fittings, it is recommended that a non-hardening, "anti-seize" type thread compound be applied to the threads in moderate amount. The first thread should then be wiped of excess to avoid compound being deposited inside the relay. Thread sealing tape is not recommended.

## OPERATION - (See Figure 2)

As shown below, the 84378-C1 & C2 are in the venting configuration. With air supplied at the control port, it will pass through the bellows head, around the stem and sleeve, and exit the vent port.

Pushing the reset button will lift the O-ring in the bellows head into contact with the stem sleeve. When this occurs, the air will be sealed around the stem and the venting will stop. Then the pressure on the outside of the bellows will cause the bellows to compress, carrying the sleeve upward with the bellows head, until the tubular portion of the bellows head contacts the diaphragm seat. The sensor will be in the reset position and will remain in this position until the crankcase pressure exceeds the setpoint.

As the crankcase pressure rises to the setpoint, the pressure on the lower (process) diaphragm will push the stem upward until (at setpoint) it lifts the sleeve off the bellows head O-ring. When this happens, the pressure inside the bellows will equalize to that outside the bellows and the bellows will recover to its original length. This will lift the tubular portion of the bellows head off the diaphragm seat and the sensor will be returned to the venting position.

The sensor must be reset each time it trips and vents. The reset will not work without pressure at the control port.

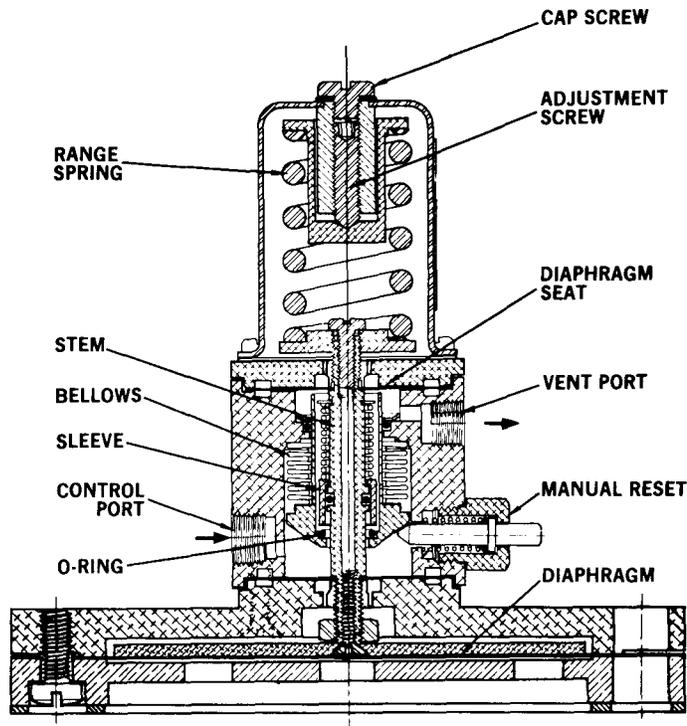


Figure 2  
 (Control port shown rotated 90° from true position)  
 Models 84378-C1 and 84378-C2 shown

**MAINTENANCE - (See Figure 4)**

**WARNING: USE CARE WHEN DISASSEMBLING,  
 SPRING FORCES PRESENT**

*CAUTION: Do not subject O-rings, gasket, or diaphragms to cleaning fluid, acetone, or any halogenated hydrocarbons such as degrease liquids, etc. Clean only with a soft, dry cloth. Metal parts can be cleaned with a suitable solvent then dried thoroughly before reassembly.*

**PRESSURE ASSEMBLY**

Remove the six screws (detail 27) securing the lower flange. Remove the flange and diaphragm. Remove screw (detail 32) and diaphragm shoe. Replace defective parts and reassemble.\*

**BUSHING**

To replace bushing O-ring (detail 28), remove bushing and replace defective O-ring. Reassemble\* and replace in housing assembly.

**HOUSING ASSEMBLY AND STEM**

Remove cap screw (detail 1) and turn adjustment screw (detail 5) counterclockwise to bring the range spring to free length. Remove the four screws (detail 10), spring housing, spring seat (detail 4), range spring (detail 7) and gasket (detail 11). Remove the pressure assembly as previously described.

Prevent the spring seat (detail 9) from turning and remove the locknut (detail 30). Remove the four screws (detail 33) and flange. Again holding the spring seat, remove the exposed diaphragm clamp and diaphragm. Remove the stem by pulling the remaining upper flange (detail 13) from the valve housing.

Prevent the stem from turning and remove the retaining screw (detail 8) and spring seat (detail 9). Remove the flange (detail 13). Remove the remaining diaphragm clamp and diaphragm.

To remove the O-ring (detail 17) in the valve housing, remove the retaining ring (detail 16) and defective O-ring (detail 17). Replace the O-ring and then the retaining ring.

To remove the O-ring on the stem, remove retaining ring (detail 15) and spring. Slide sleeve from stem. Remove and replace the exposed O-ring (detail 23).

To replace the O-ring (detail 25) in the bellows head, remove the defective O-ring with a knife or other sharp pointed tool. Carefully remove oily residue from the O-ring seating area and clean with a suitable solvent. Dry thoroughly. Place a few drops of liquid Viton (Pelmor Laboratories' PLV-2000 or equivalent) on the seating area just cleaned. Clean and bond replacement O-ring to its seating area. Allow to cure for one or more hours.

With all O-rings, diaphragms, gaskets and defective parts replaced, reassemble\* as follows:

Being certain that all parts are clean and free of foreign matter, install stem assembly, diaphragm and diaphragm clamps. Tighten clamps hand-tight and then, while holding each clamp with a wrench, turn approximately 1/4 turn more. Install an automatic reset screw† and bushing (for calibration purposes)† and both end flanges (details 13 and 29). Snug flanges down. Install nut (detail 30) on lower end of valve housing. Install spring seat (detail 9) and locking screw\*. **DO NOT** tighten screw yet.

See Figure 3. Turn differential adjustment screw inside automatic reset bushing until the tubular part of the bellows head contacts the upper flange. (The screw will become difficult to turn. Do not over tighten.) Apply an approximate one pound force at point P and turn spring seat to obtain dimension "A." Lock spring seat in place with screw\*. While holding .065" feeler gage (in Repair

Kit 82665-G1) in place to maintain dimension "A," turn nut (detail 30) to obtain dimension "B".

Remove the four screws securing the top flange and reassemble\* the spring, spring seat, housing and gasket to the valve housing. Reassemble\* the pressure assembly. Remove the automatic reset screw and bushing and replace it with the manual button and bushing or the remote manual reset assembly.

\*NOTE.- The following should be fitted using only Loctite Sealant "H" or equivalent applied before assembly:

Threads on screw (detail 8), Diaphragm Clamps, Spring Housing screws (detail 10), Bushing, Flange screws (detail 27), Housing Plate screws (detail 33), Diaphragm Shoe Screw (detail 32).

†NOTE: For automatic reset kit, order Kit No. 82665-S1.

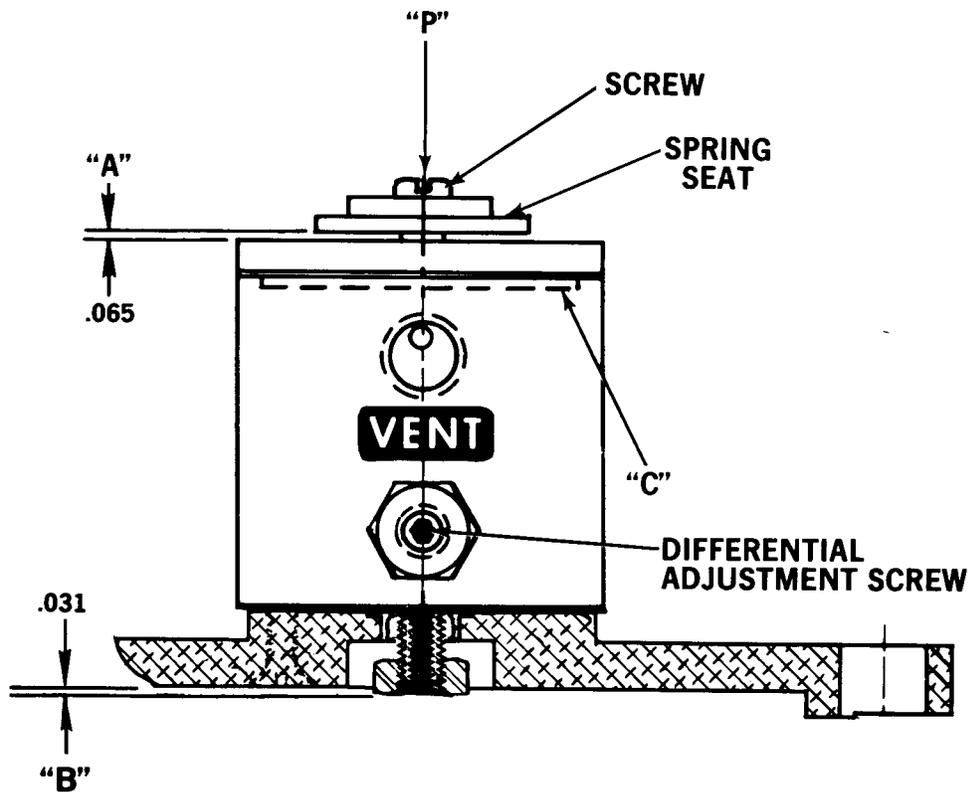
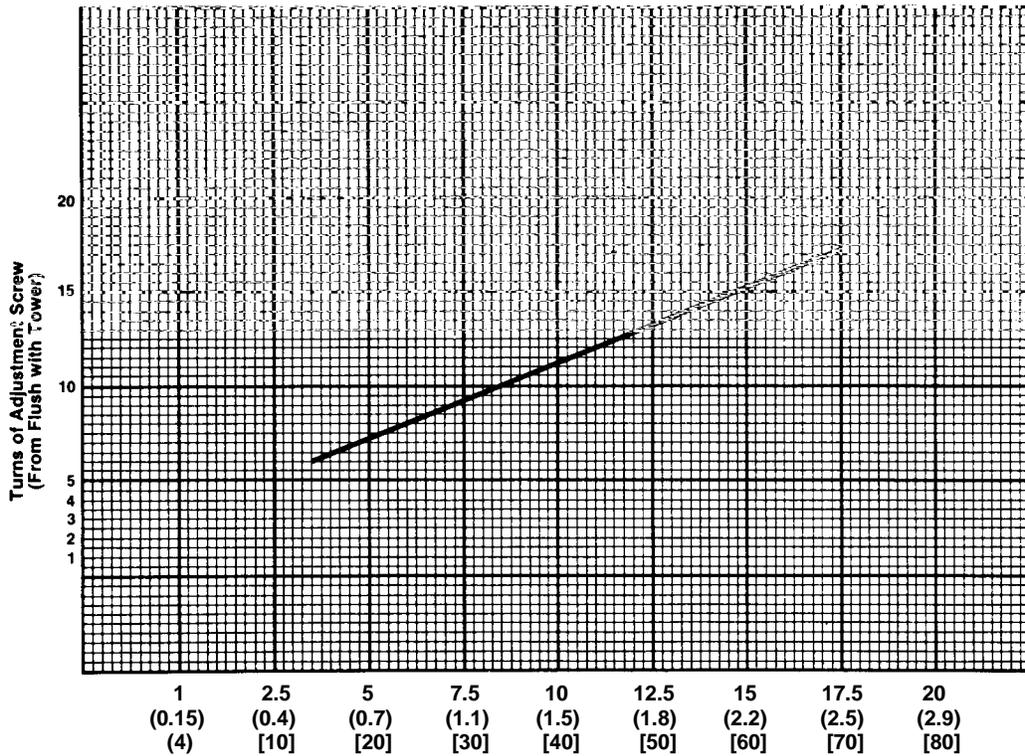


Figure 3

### ADJUSTMENTS, SETPOINT

1. Remove cap screw.
2. Insert an 1/8" hex wrench into the adjustment screw and turn counterclockwise until the top of the adjustment screw is flush with the spring tower. Then turn the adjustment screw clockwise six (6) full turns ( $\pm 1/4$  turn). This will provide for minimum setpoint (14 inches of water). Continue to turn the adjustment screw clockwise, using the graph below as reference to obtain the desired setpoint.
3. Replace the cap screws.



**SETPOINT - kPa (psi) [in. H<sub>2</sub>O]**  
 Accurate within  $\pm .25$  kPa ( $\pm 0.04$  psi) [ $\pm 1$  in. H<sub>2</sub>O]

**PARTS LIST**

Det. No.	No. Reqd	Description	Production Part No.
1	1	Cap screw	33718-G0509
2	1	Washer	24425-A1
3	1	Spring housing	84366-A1
4	1	Spring seat	24557-B1
5	1	Adjustment screw	24558-A2
6	1	Nameplate (for 84378-C1, E1)	33970-B88
		Nameplate (for 84378-C2, E2)	33970-B89
7	1	Range spring (for 84378-C1, E1)	33980-A1
		Range spring (for 84378-C2, E2)	33980-F1
8	1	Screw	33713-G1109
9	1	Spring seat	33968-A2
10	4	Screw	33713-G1309
*11	1	Gasket	33971-A1
12	2	Diaphragm clamp	33969-A1
13	1	Upper flange	33966-B1
*14	2	Diaphragm	33972-A1
*15	1	Retaining ring (Incl. in Det. 20)	36605-B2
*16	1	Retaining ring	36605-Q9
*17	1	O-ring (Incl. In Det. 20)	36240-V0016
18	1	Spring	33975-A1
19	1	Stem	33973-A1
20	1	Housing assembly	84364-A1
21	1	Sleeve	33974-A2
22	1	Spring (for 84378-C1, C2)	33965-A1
*23	1	O-ring	36240-V0010
24	1	Reset plunger (for 84378-C1, C2)	33962-A2
*25	1	Quad O-ring (Incl. in Det. 20)	36243-V0012
26	1	Reset bushing (for 84378-C1, C2)	33964-B2
27	6	Screw	33716-J1300
*28	1	O-ring (for 84378-C1, C2)	36240-V0007
29	1	Flange	33966-D1
30	1	Lock nut	36602-E1809
31	1	Diaphragm shoe	27462-B1
32	1	Screw	33713-G1309
33	4	Screw	33713-L1509
†34	1	Gasket	39385-F6
35	1	Flange	30152-A1
†36	1	Diaphragm	27464-B1
37	1	Reset plunger (for 84378-E1, E2)	85357-A1
*38	1	O-ring (for 84378-E1, E2)	36240-N0013
*39	1	O-ring (for 84378-E1, E2)	36240-C0019
40	1	Reset body assy (for 84378-E1, E2)	37063-A1
41	1	Cap (for 84378-E1, E2)	37065-A1
42	1	Decal (not shown)	33979-A1
43	1	Decal (not shown)	30613-A1
44	3	Protector plugs (not shown)	20516-A5

NOTE: For kit containing all O-rings, gaskets, diaphragms and retaining rings to service one valve body, order Repair Kit 82665-G1. Kit contains details marked \*.

For kit containing gasket and diaphragm to service one Pressure Assembly, order Repair Kit No. 82665-Q1. This kit contains details marked †.

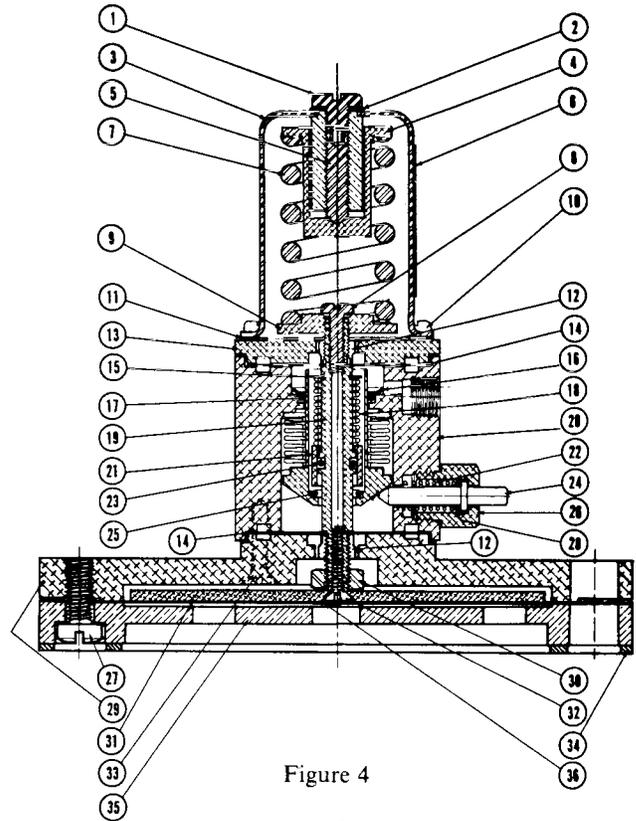


Figure 4

**Remote Manual Reset Assembly For 84378-E1  
(85274-A1)**



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Q-3967 (2/19)

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