TECH NOTE 101 - Is arcing present?

Magnetic reed switches, rated for 1 AMP or less, have plated precious metal contact surfaces. When switching reactive loads or loads greater than their capacity, plated contacts are vulnerable to perforation and subsequent welding. If conditions, present when the switch opens and closes its contacts, produce an arc, contact surfaces will eventually perforate and fail. The greater the magnitude of arc, the sooner failure can be expected. Permanent failure is usually preceded by transitory sticking, a condition which may be tolerated until it is too late. Despite vulnerability, plated contacts often switch tens of thousands of cycles in circuits where some arcing is present. This apparent success can make it difficult to convince users of the importance of arc suppression circuitry. It is important.

When arcing is present, performance may evaporate at the very next contact closure. On the other hand, a switch may continue on for thousands of successful operations. At best, when arcing is present, continued reliability is uncertain.

Here's a simple test that will tell you something about the arcing conditions you can expect in your application. Power up the load so it will operate. Simulate the operation of the reed switch device by merely closing and opening the circuit to the load with a jumper wire. Now darken the room and switch the load. If you see an arc where you are making and breaking the circuit you should consider using arc suppression. Look carefully. Even a tiny spark is an arc which must be suppressed.

Now incorporate your arc suppression circuit and repeat the above test. If the circuit is effective, the arc will be gone or its intensity substantially reduced. Any noticeable reduction of arc intensity will enhance contact life. See Tech Note 120-A, -B and -C.

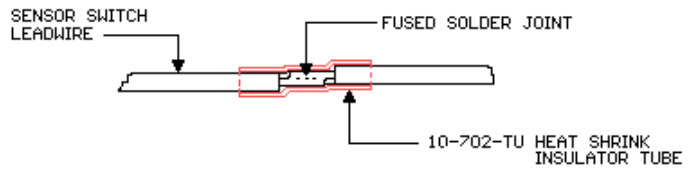
01-08-98

TECH NOTE 102 - Lengthen Sensor Leadwires

It may be necessary to lengthen sensor switch leadwires. The method described here provides a strong joint, occupies minimum space and is insulated for service at 120/240 VAC.

Using UL1007 wire (used on Series 10 switches) or UL1015 wire (used on Series 5 and 20 switches), strip ends so .310 (7.87) of bare wire is exposed. Immerse stripped ends in liquid (rosin) flux. Then, immerse exposed ends in a solder pot containing 60-40 solder. (If a solder pot is not available, use a 35 watt soldering iron and .040 dia. rosin core solder). Apply minimum solder to achieve a smooth, shiny surface.

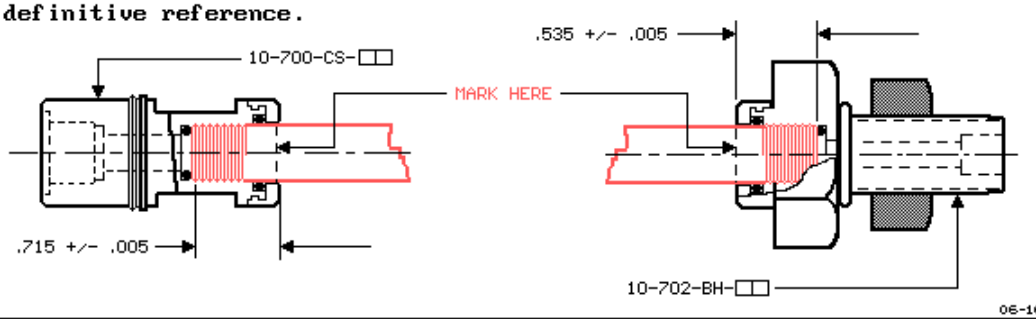
Assemble a 10-702-TU heat shrink insulator tube on one wire. Then position wire ends so the tinned ends are side by side, pointing in opposite directions and tangent at their diameters. Using a 35 watt (chisel tip) soldering iron, apply heat to the joint until the tinned wires fuse together. It may be useful to apply a small amount of solder to the iron's tip prior to fusing the joint. (A smooth, shiny joint, without peaks or whiskers, is the objective). Position the insulator tube over joint and heat shrink it into place with hot air from a 475 watt heat gun. Use one insulator tube for 120 VAC. Use two insulator tubes for 240 VAC.



TECH NOTE 103 - Nipple End Seal Integrity

ERECTA SWITCH accessories, designed to connect to 1/8 pipe nipples, incorporate two O-ring seals. The larger of the two, seals on its diameters. The smaller O-ring, seals on its faces. This is a redundant sealing scheme intended to maximize leak tight integrity and, at the same time, permit hand tight assembly. Either O-ring, correctly assembled, is sufficient to effect a positive seal. When both seals are engaged, seal integrity is maximized by redundancy. This technique transcends the uncertainties characteristic of thread seals.

Nipple penetration into ERECTA SWITCH connectors must be sufficient to engage the face seal O-ring. There is no visual reference on the nipple to control penetration. Engaging the face seal is usually determined by "feel" as the nipple is bottomed. Lubricating the nipple's threads by scoring the threads with a bar of hand soap enhances the ability to "feel" the bottom. However, when maximum reliability is the objective, a more definitive method to determine engagement should be used. Marking the diameter of the nipple, at the correct distance from the end face, provides a definitive reference.

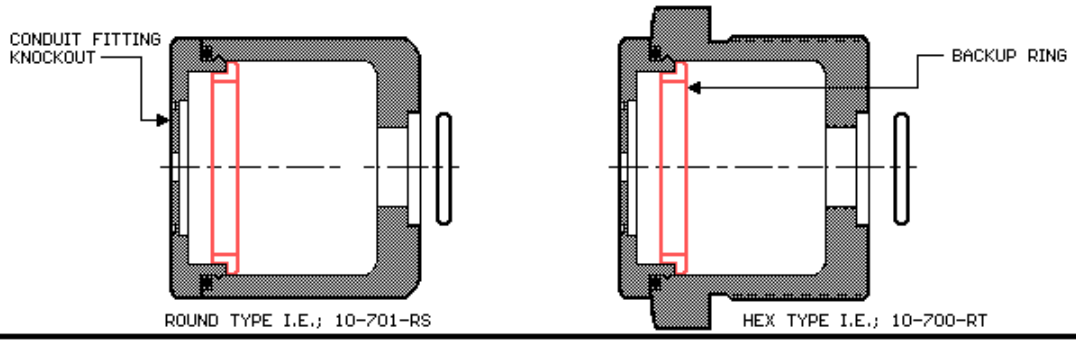


TECH NOTE 104 - Receptacle Cap Attachment/Detachment

The caps of the ERECTA SWITCH 1-1/4 hex and round receptacles are attached by a snap lock ridge and relief scheme molded into the parts. A separate "backup ring" part is included and is necessary to reliably secure the cap.

Applications which use the 1/2" knockout feature, to attach conduit fittings or wiring accessories, must isolate weight and stress loads from the cap attachment by including an external clamp in their installation.

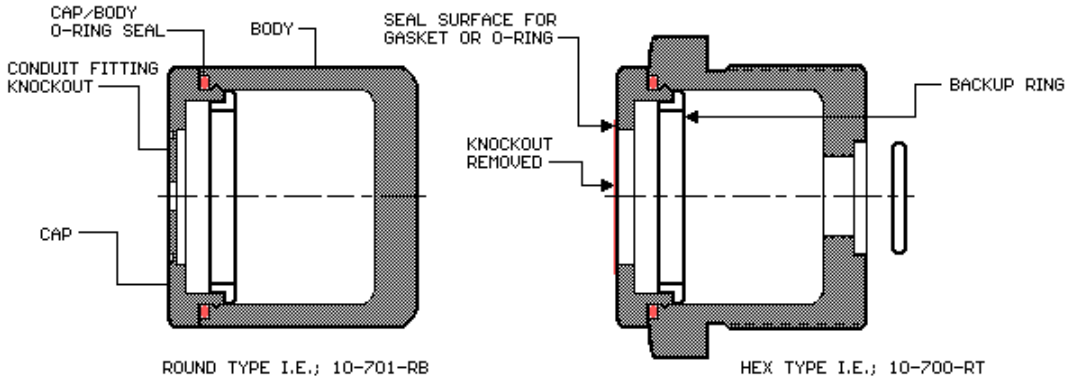
The initial cap detachment force, applied perpendicular to the assembly axis, is > 30 PSI. Successive attachment/detachment cycles of the Kynar and Polypropylene versions may reduce this to as low as 25 PSI. The force required to attach the cap is approximately double the force necessary to detach the cap. (A plier type attachment tool is planned as a future ERECTA SWITCH product addition). A screw driver slot is provided at the cap/receptacle interface to facilitate cap removal. Care should be taken while prying the cap off so as to avoid scaring O-ring sealing surfaces.



TECH NOTE 105 - Receptacle Body To Cap Seal

The seal between the cap and body of the ERECTA SWITCH round and 1-1/4 HEX receptacles is a weather seal. When parts and O-ring seal are correctly assembled, these receptacle structures are weather resistant. They may not, however, be suitable for situations in which the assembly must be submerged in liquid. This O-ring is marginally supported and may not seal in a pressure environment. Further, the reliability of the seal between the cap and outside electrical conduit or appliance is another matter to consider.

Seal integrity may be compromised if sealing surfaces become scared or other wise abused during the installation process. To maximize seal integrity (at this location) users may want to consider lubricating the O-ring with a moist coating of liquid soap.



TECH NOTE 106 - Joint sealants and lubricants

ERECTA SWITCH products use two types of threaded joints. The familiar NPT tapered pipe thread or our specially designed straight threaded, o-ring sealed connectors. Our connectors combine NPS straight threads with precision geometries that accommodate one or more o-rings. When two o-rings are used, the second ring is redundant and thereby adds to overall seal reliability.

Tapered, NPT male and female pipe joints depend upon a sealing compound to establish the seal. Teflon tape, design for this purpose, properly applied to correctly engaged spec threads, will create this seal. ERECTA SWITCH sets and construction schemes use tapered pipe thread seals at joints which are easy to assemble and inspect. For example, connecting nipples to the base of a threaded receptacle. A suitable sealant should be used on all NPT to NPT joints.

Straight, NPS threaded attachments use o-ring seals instead of compounds. Sealing surfaces are clean, smooth and geometrically correct. Sealing occurs when o-rings develop a flat as parts are engaged.

Dry lubricant applied to NPS threads reduces the friction present when screwing the parts together. Scoring the male thread a couple of places with a bar of soap works well. Tape or sealing compounds have dubious value on NPS threads and may actually hamper correct o-ring engagement.

It is not beneficial to lubricate o-rings on threaded joints. However, large o-rings used on cam lock assemblies, receptacle caps and cable assemblies are difficult to assemble unless lubricated. Wet lubricants such as compatible oils, silicone sprays or soap, sparsely applied to o-rings reduce friction, scuffing, rotation and assembly forces.

TECH NOTE 107 - Threaded joint assembly torque

Plastic parts are subject to damage or failure when over torqued during assembly. Notched geometries such as threads, thread reliefs, grooves and section changes are vulnerable areas of molded structures. All generate opportunities for stress concentrations which may contribute to part failure when parts are subjected to excessive loads.

Excessive assembly torque may lead to stress and ultimate stretching of material. Parts can break upon installation. Worse, stressed materials may fail later, when temperatures become higher or lower. Excessive torque should, therefore, be avoided. And, in all instances, parts should be supported so that torque is isolated from other joints in the assembly. Similarly, torque applied to external plumbing should be isolated.

O-ring sealed parts incorporate shoulders or stops to limit part engagement. Screw such parts until the mating part contacts the shoulder or is bottomed. Then, add an additional 1/8 turn. For threads of 1/2" or less this amounts to a load of about 10 to 15 inch pounds. Larger parts require more torque. However, in all cases, torque levels will be at inch pound level. Some parts have torque limits molded into the part. Others have limits specified on the catalog drawing or product information card. Do not apply sealant tape or compounds to straight threads. If parts do not turn freely by hand, apply lubricant to the male thread. See Technote 106.

Nipples and components having NPT tapered threads must be sealed with tape or compound. (Some ERECTA SWITCH components have combination NPT/NPS threads on one end. If the seal is to occur at the NPT feature, apply sealant to the NPT male thread. Screw NPT threads until snug. Then add one turn. Usually this amounts to 4 to 5 total turns.

TECH NOTE 108 - Thermal expansion

Plastic structures change dimensions as temperature increases or decreases. Dimensional changes are proportional to temperature changes and the size of the structural section. Small parts and thin sections experience less change. In most instances, excursions are small and insignificant. Nevertheless, cold or hot environments may cause problems. A complete OEM design evaluation should include the confirmation of our product's ability to perform as expected under all anticipated environmental conditions.

Because the expansion coefficient of plastic is quite different from that of metal, special attention must be given to NPT threaded seals and installation torque whenever a plastic part is threaded into a metal part.

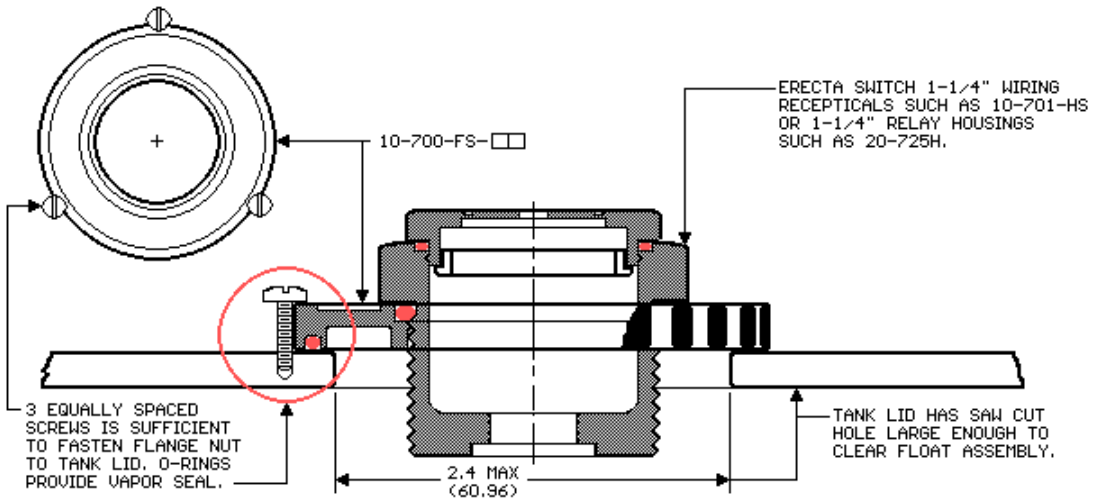
Kynar PVDF grows substantially as temperature increases. In isolated cases, high temperature growth may be enough to cause a shift in sensor switch pull-in or drop-out sensitivity. (Normal performance resumes when temperature returns to room temperature). As a practical matter, there is no way to detect or predict this potential anomaly by room temperature inspection.

Although the expansion coefficients of the three standard structural materials are similar, the actual molded part sizes are measurably different. Polypropylene parts are larger than Acetal and Acetal parts are larger than PDVF parts. (Molds are designed to produce spec threads with Polypropylene). (Extruded parts such as pipe and pipe nipples are dimensionally the same, regardless of material. Similarly, machine drilled and tapped holes in receptacles are dimensionally the same). Thus, mixing ERECTA SWITCH construction materials within an assembly may, or may not be possible or prudent. In all circumstances, the mixing of snap-fit component materials should be avoided.

TECH NOTE 109 - Screw Heads Fasten Flange Nut

Flange nuts can be fastened over rough cut holes in plastic or sheet metal tank tops (ceilings). When the ERECTA SWITCH assembly must be installed from the "outside -> in", the flange nut can be fasten to the surface by screws. Assuming a smooth surface, the o-ring seal will provide an effective vapor seal.

This is a low cost, good looking, size proportional flange attachment capable of hiding an irregularly cut entrance hole.



TECH NOTE 110 - Series 20 Switch Constructions

Constructions described on scheme SCE-426, 7 8 and 9 can be quickly assembled from stock parts contained in the CH/housing, stem/float set and switch set. Schemes reference two switch assemblies. If only one switch is desired, omit the "HS" or top switch. Otherwise, follow the two switch assembly instructions.

(1) Cut stem. 2) Assemble floats (legend down) and stops. (3) Locate and tape switches to rod. (Identify switch lead pairs or crimp-on connectors.) (4) Install and bottom switch assembly in stem. (5) Attach control head or relay housing.

Suggestions:

Tighten collar set screws sufficient to lock stops to stem. Tape a rule to a flat work surface and use the rule as the reference for locating floats and switches according to scheme instructions. Lubricate lead-in bushing and o-ring in control head/relay housing base receptacle. Moisten o-ring and bushing surfaces with liquid soap to facilitate the correct seating of the o-ring seal.

After the unit is assembled, while it is still on the work surface, test it. Confirm switch operational integrity in both directions. Switches in a reliable assembly will pull-in and drop-out 1/8" minimum before contacting a stop.

TECH NOTE 111 - Understanding The Flow Switch Bypass

When the flow rate exceeds the efficient capacity of a small flow switch, installing the switch in a bypass will allow the use of an inexpensive, small switch while avoiding the excessive pressure drop which would otherwise result. An easy way to grasp the concept is to spend a few minutes with and old garden hose in the backyard. Make a 1/8" hole in the hose a few inches back from the open end. Connect the hose and turn the faucet full "on". Using your finger, on and off, as a valve, control the flow coming out of the small hole.

In this experiment, flow coming out of the small hole represents the bypass. To make your experiment more representative, bend the hose so the flow from both the large and small streams are directed to a common reservoir (empty tub etc).

Assuming the normal household water pressure is about 30-40 PSIG, you'll notice the rate of flow entering the reservoir is about the same, whether it all comes from the end of the hose as your finger covers the small hole or, from the combined end of the hose and small hole flow streams. Also notice the stream flowing out of the small hole is significant.

To make our small Series 5 switch work in a bypass, the pressure in the bypass must be greater than .5 psi and the flow rate in the bypass must be greater than about 2 cups a minute. This should not be a problem when we remember what came out of the 1/8" hole in the experiment. A needle valve in the bypass may provide the resolution required for precise set point control.

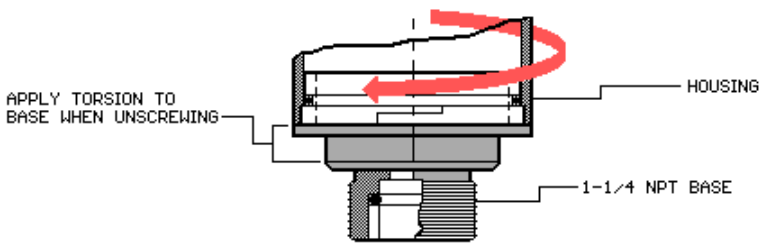
TECH NOTE 112 - 1-1/4 Relay Hsg Cam lock attachment

The attachment mechanism of our 20-725, 20-725-HS and 10-701-XX relay and control head housings has some tricky aspects. The base is attached to the relay housing by a rotating cam lock mechanism. The interface between the two parts is sealed by an o-ring. It's a precision, close fitting assembly.

The o-ring adds considerable friction and makes the assembly process difficult. A light coat of silicone lubricant applied to the o-ring and the mating surfaces reduces this friction to a tolerable level.

The cam lock/o-ring seal feature allows access to whatever is inside the housing. When access is not desired, parts can be sealed and glued together with ABS cement.

If the assembly is not glued together, it is important to apply torsion to the base and not the housing should it be necessary to unscrew the assembly from the tank or piping. If torsion is applied to the housing, the cam lock may disassemble. The cam lock is not affected when screwing-in the assembly.



TECH NOTE 113 - FDA Approved Materials

The plastic molding compounds which form the molded parts and structures of our products meet the requirements stated below:

Polypropylene foam parts - Applicable sections of 21 CFR are 177.1520 and 178.3870.

Polypropylene structures - Natural polypropylene formulation. Applicable sections of 21 CFR are 177.1520(c)(1.1) and all other applicable FDA regulations covering additives used in the formulation. The formulation may be blended with gray, black or blue colorants and contain glass fiber sizing ingredients.

Glass fiber ingredients meet requirements listed under 21 CFR 175.105. The components of the colorants meet the appropriate FDA regulations: Gray colorant meets requirements of 21 CFR 73.575, 73.1575, 73.2575, 21 CFR 175, 176, 177, 178, 178.3297 and 21 CFR 175.300 and 175.3297. Blue colorant meets requirements of 21 CFR 175.300 and 178.3297. Black colorant meets requirement 21 CFR 175.300.

Acetal structures - Red color acetal meets the requirements of 21 CFR 177.2470. When reinforced with glass fibers the glass fibers are in accordance with CFR 175.105.

Natural PVDF structures - Natural PVDF formulation suitable for repeated contact with food per title 21 CFR chapter 1, part 177.1520, 2470, 2510 and 3870.

10-30-96

TECH NOTE 114 - Proportionality

ERECTA SWITCH builders are free to create completely unique instrument and control assemblies. Users will be restricted primarily by common sense considerations. For instance, long stem (pipe) lengths may require support to prevent bending or mechanical instability. The availability of extended pipe lengths should not entice the user to create a structure which is not convincing with respect to mechanical integrity.

Generally speaking, small components go with small assemblies, large with large and so on. Well designed constructions tend to look "good" because they are well proportioned. Conversely, constructions which look "odd" should probably be questioned.

General proportionality with respect to the application should also be a consideration. For instance, obtuse size should be questioned. I.E.; A Series 20 Hi-Low pump control mounted on a coffee maker would certainly draw a lot of attention while a 20-701 BP Beeper mounted next to an electric saw would not.

08-28-97

TECH NOTE 115 - Mixed Material Constructions

Generally speaking, assemblies are best constructed using a single material. As mentioned elsewhere, our injection molds are dimensioned to produce Polypropylene parts so our PVDF and Acetal parts are slightly different in size. However, sometimes mixing materials can achieve cost or structural benefits which should not be overlooked.

For instance, structures can be strengthened by using Acetal components because of its greater stiffness. This is particularly true for 1/8 IPS stems longer than 24". Unlike injection molded parts, our precision pipe and stems are manufactured to a common diameter and thread specification so Acetal and PVDF nipples/stems will correctly fit Polypropylene connectors and receptacles.

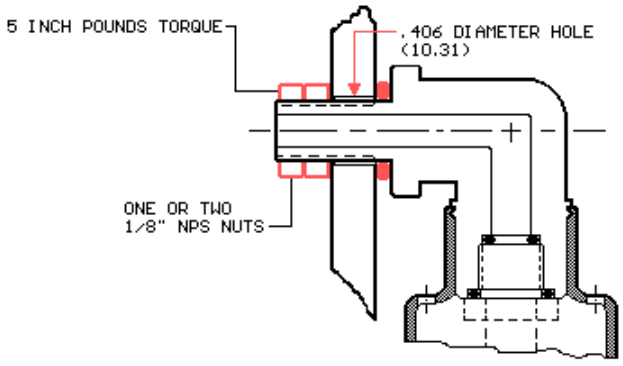
Containing the cost of expensive PVDF assemblies, by using Polypropylene in the dry areas of the assembly, is a practical consideration.

01-13-97

TECH NOTE 116 - 10-700-N8 Torque Limits

The 10-700-N8 is a single thread nut. When installed on Series 10 sensor products, the limiting factor with respect to strength of thread engagement is the shear strength of the molded plastic material of both male and female parts. Avoid excessive torque. This could cause thread failure. Using two nuts will distribute the load on the threads and generally allow higher installation torque.

5 inch pounds applied to single or double nuts is ample to create a flat on the o-ring, effect a seal and make a stable assembly. Higher torsional loads may deform parts.



08-15-97

TECH NOTE 117 - Bulkhead Mtg Hole Seal

O-rings are used as a static face seal to seal our hole mounted bulkhead fittings and assemblies. Creating a seal between the bulkhead and fitting requires: the hole be sized to just clear the male threads, the hole be free of burrs and the surface on which the o-ring is squeezed to be clean, flat and smooth.

The o-ring is not captive so the degree of squeeze requires judgement. Assuming the hole and sealing surface are properly prepared, a seal will result as the elastomer o-ring develops at flat on its face when the jam nut is tighten. This can be accomplished by a finger tight installation. However, additional tightening is usually required to achieve mechanical stability.

Torsion loads should not be more than necessary to create a mechanically stable installation. Avoid excessive torque. Too much torque may result in seal extrusion, part stretching, stress cracking or stripped threads. And, under such conditions, cold flow is invited so leakage or mechanical failure may not be immediate.

TECH NOTE 118 - 10-72-XX Cable Assy Snap-in Procedure

Installing the Cable Assembly into a mating Polypropylene receptacle without the O-ring installed is straight forward. As insertion force is applied to the cap, assembly occurs culminating in a noticeable "click" sound as the cap is seated in the receptacle. With O-ring installed, the required assembly force increases. This is particularly noticeable when the O-ring is not lubricated prior to assembly. A light coat of liquid soap can make a big difference here.

The function of the O-ring is to provide a weather seal to exclude outside moisture from entering the receptacle cavity. If this protection is not required, omit the seal.

Acetal and PVDF versions are more difficult to deal with. Their molded parts are stiffer and somewhat cramped in the O-ring area. As a practical matter, lubricating the O-ring and/or omitting it altogether will be essential. Allowing one side to engage before the other will also reduce the required force. Dip one side of the cap into the cavity while applying a simultaneous downward and centering force to the cap.

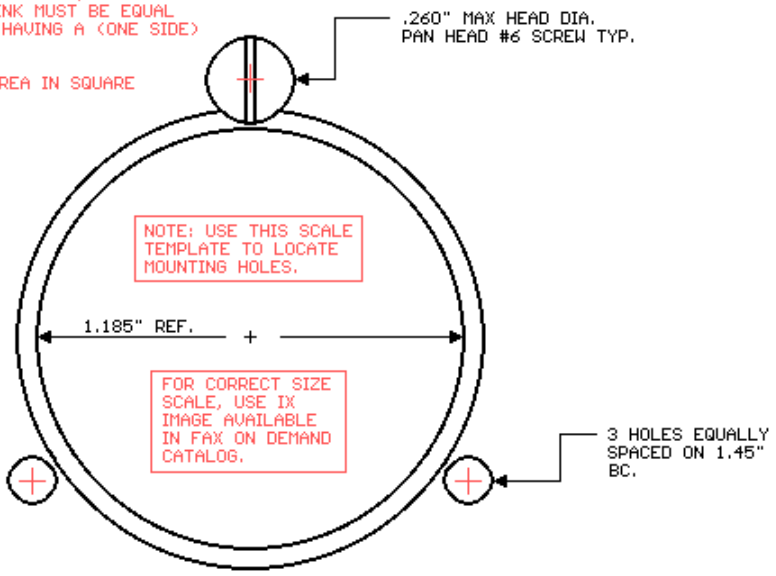
Because of shrinkage, molded parts are not perfectly round. This is part of the reason for problem described above. Some relief will result by pre-engaging the parts and allowing them to soak for a few hours in the assembled condition. A degree of accommondation will result making subsequent assembly and disassembly easier.

TECH NOTE 119 - BP Relay mounting hole template

The 50-BP-□F-AC5 Solid State AC "Button Pack Relay" may be surface mounted to a cool metal surface for heat sink purposes. Use pan head sheet metal or self tapping screws as shown to fasten relay flange base to flat surface. See "Button Pack Relay" specification page.

TO SWITCH CURRENT ABOVE .75 AMP, A HEAT SINK IS REQUIRED. HEAT SINK MUST BE EQUAL TO 1/16" THICK ALUMINUM HAVING A (ONE SIDE) SURFACE AREA OF:

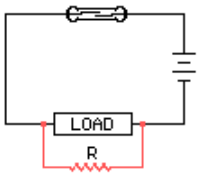
REQUIRED (SINGLE SIDE) AREA IN SQUARE INCHES = (AMPS X 1.25)^2



TECH NOTE 120-A Protecting Relay And Switch contacts

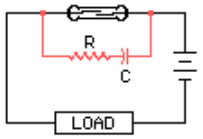
To suppress or eliminate the destructive arc across relay or switch contacts during the switching of inductive loads, various methods are employed. The following methods will suppress or eliminate arcing but at the same time will tend to increase the de-energizing time of the inductive load.

Case 1. DC circuit. Resistor across the inductive load. Peak transient voltage developed when the contacts open is determined by the resistance value. Note, however, the the resistor R consumes I^2R power while the load is energized.



Case 2. DC circuit. Resistor capacitor across the contacts. An initial value of R and C may be calculated from: $R = \frac{E/10}{1+(50/E)}$ AND $C = \frac{I^2}{10}$

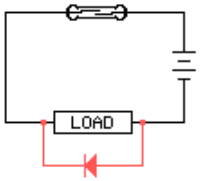
Where R = resistance, Ω
C = capacitance, uf
I = current before closing, mA
E = voltage before closing, V



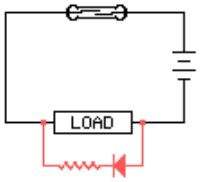
To ensure protection with adequate arc suppression, test the circuit and adjust R and C values as necessary to eliminate arcing at the contacts.

TECH NOTE 120-B Protecting Relay And Switch contacts

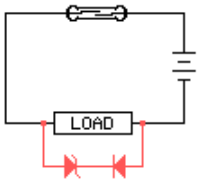
Continued - Case 3. DC circuit. Diode across the load. The diode provides a low resistance path for stored energy in the load when the contacts open.



Case 4. DC circuit. Diode resistor. Treat this case as similar to the diode-zener diode in case 5.

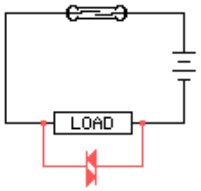


Case 5. DC circuit. Diode-zener diode. This method speeds de-enerization time of the inductive load.



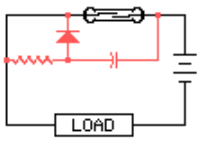
TECH NOTE 120-C Protecting Relay And Switch contacts

Continued - Case 6. DC or AC circuit. Allowing the varistor to carry approximately 10 percent of the load current will limit the transient voltage level to approximately two times the source voltage.

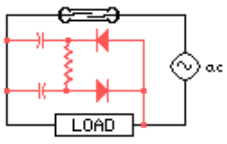


Case 7. DC circuit. Resistor-capacitor-diode. This method is for extremely inductive loads. The voltage drop across the opening contacts is zero. C is chosen so that the peak voltage to which it charges does not cause diode, contact gap or capacitor breakdown.

7.



8.



PEAK VALUES OF VOLTAGE AND CURRENT MUST BE USED TO CALCULATE VALUES OF R AND C TO SUPPRESS ac LOADS. USE CASE 2. FORMULA. ALSO READ TECH NOTE 101.

Case 8. AC circuit. Resistor-capacitor-diode. Also for extremely inductive loads. This arc suppression circuit can be connected across the load or contact gap. Typical component values for 120 Vac applications are diode PIV = 400 V, current rating 1A; C1 and C2 voltage rating 200 V and R1 = 100K, 1W.

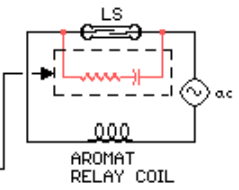
TECH NOTE 120-D Protecting Relay And Switch contacts

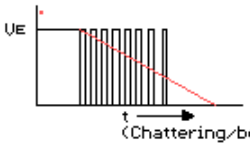
Continued - Case 9. AC circuit. Perhaps the most common application has the reed switch switching a small AC relay or solenoid. For example, in a recent evaluation test, we connected five AROMAT type HL 2-P-AC115V control relays as shown below. The coil of each relay was connected to a Compac 10-782-PP liquid level switch. The floats of the switches were raised and lowered by a mechanical arm connected to a gear motor so as to simulate the rise and fall of liquid. The cycle time was approximately 2 seconds. An electro-mechanical counter was connected to the mechanism recording each rise and fall cycle. Tests with and without contact protection were conducted. Suppression components consisted of a 120 ohm resistor and .1 MFD ceramic disc capacitor. See CEI product 55-X1201 Arc Suppressor.

Five switches without contact protection developed "stuck closed", welded contacts. Three failures were noted at 99672, 157184, and 1222535 operations respectively.

The test was repeated with contact protection. No failures were noted. The test was stopped at 1800100 operations. Clearly, contact protection extends contact life when the load is inductive.

At the moment of switch opening, the RC combination absorbs and suppresses the energy of the arc by letting it bypass the switch.





The RC combination absorbs high frequency oscillations caused by mechanical vibrations as contacts close. Similarly the oscillations created by arcing are also averaged and suppressed by the RC combination regardless of their origin.

01-05-99

TECH NOTE 120-E Protecting Relay And Switch contacts

Customers who wish to provide there own version of arc suppression may find the table and formulas provided below of value.

DETERMINING RC VALUE

SOURCE VOLTS		LOAD CURRENT - AMPERES										R+C VALUES
		0.05	0.1	0.2	0.3	0.5	1.0	2.0	3.0	5.0		
	120VAC or 120VDC	0.01 + 470	0.01 + 470	0.01 + 220	0.01 + 120	0.022 + 120	0.1 + 47	0.3 + 47	0.5 + 47	1.0 + 10	MFD + OHMS	
	240VAC or 240VDC	0.01 + 470	0.01 + 470	0.01 + 470	0.01 + 470	0.022 + 120	0.1 + 120	0.3 + 120	0.5 + 47	1.0 + 47	MFD + OHMS	

$$C = \frac{I^2}{10}$$

$$R = \frac{V}{10\left(1+\frac{50}{V}\right) I}$$

C= Capacitance in MFD
I= Load Current in Amps
R= Resistance in Ohms
V= Source Volatage

In general, the RC determining formula is regarded as quite complex but since the RC combination has the decisive effect of integrating the rapid changes to the waveform to a smoothed average, the determination of RC values by complex formula becomes unnecessary.

It is possible to select a suitable combination using the chart or formula. Keep in mind that there is no one exact value of arc suppressor that will satisfy all applications. Therefore, the chart and formula are merely a starting point. Final selection must be evaluated in the application to determine its suitability.

01-05-99

TECH NOTE 121 - All Series, Polypropylene In Boiling Water

THE BAD NEWS:
Individual product specifications rate our molded polypropylene products for use in 90°C at atmospheric pressure. This is an arbitrary rating intended to alert the user to the limitations of thermal plastic molded structures at elevated temperatures. Any use of these products at elevated temperatures should be preceded by some confidence building tests which explore the exact application parameters anticipated.

At or about 100°C, do not expect to see melting or part deformation. (This polymer has a melting temperature of 340°F). Rather, look for evidence of mechanical stress. Plastic is plastic so some degree of stress and cold flow will occur, even at room temperature and atmospheric pressure. Generally speaking, expect plastic to become more plastic as temperature increases. Also, expect the parts to grow. Expansion coefficients for plastic are dramatic as compared to metal. Although excursions remain small, when installed in metal plumbing, thread stretching etc. may be aggravated.

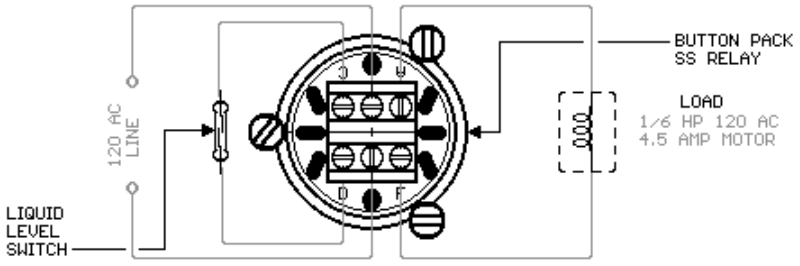
THE GOOD NEWS:
Compac has subjected its 15-650-PP float assembly to two hundred, six hour exposure cycles of boiling water immersion (at atmospheric pressure) without deleterious effects of any kind.

03-03-99

TECH NOTE 122 - Switch Inductive Loads With The 50-BP-□□-AC5

Cyclic switching of inductive loads is difficult for most control devices. This is particularly true for reed switches. Our 50-BP Button Pack SS relay solves this problem. To give you an idea of its capabilities, consider these test results:

A Button Pack was mounted to a 2 X 2 X 1/16" aluminum plate. It was wired as shown below. Our 15-650-PP level switch supplied the "on" - "off" control circuit for the Button Pack. We mechanically connected the level switch to a gear motor driven cam which raised an lowered the float so that the switch was "on" for 2 seconds and "off" for 2 seconds. The Button Pack's load terminals were connected to a 4.5 amp motor. The cam was also connected to an electro-mechanical counter so we could count switching cycles. The test was conducted over a several weeks. (Temperature of the mounting plate increased about 5 degrees over ambient). 1997040 operations were accumulated on the counter when we decided to stop the test. Upon inspection, the Button Pack's parameters conformed to original specifications.



03-03-99

APPLICATION NOTE 100 - Drum/Pail Level Sensing

Series 10 and 20 vertical mounted switches are natural candidates for sensing liquid levels in drum containers. Equipped with our 1-1/4" receptacles and/or 2" adapters for mounting to the drum's bung, single or multiple levels can be detected or controlled. Wetted components are available in Polypropylene, Acetal or PVDF. Unit pricing shown below is approximate and applies to OEM shipments of 100 pieces of Polypropylene construction.

Drum fill indication can be accommodated by our Series 10-782 switch and 10-701-BP, battery operated Beeper module. When the rising level reaches the float location, the beeper's sound and flashing LED lamp tells the operator to stop filling. Drum empty level can similarly be detected and noted by our beeper or other other signaling device. See schemes SCE-400, 401 and 418. Price $36.00.

Automatic drum level control can be accomplished by our Series 10 in combination with and external latching relay. See schemes SCE-404,405 and 406. 50-R-A2410 shows how to latch a standard solid state relay for this application. 20-725 shows the wiring diagram for a latching electromechanical relay. Pricing for Series 10 construction components (less relay) $30.00.

High-low wide differential control can also be achieved by using our Series 20 ERECTA SWITCH component set. See schemes SCE-425 and 428. This approach integrates the control function relay into an attractive control head assembly which screws into the drum's bung. Price $120.00.

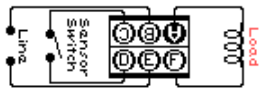
Liquid level control can also be adapted to small plastic pails and containers. Any container having a plastic lid of a thickness range of .062 to .078 inch can incorporate our pop-in level control concept. See scheme SCE-417. Price $12.00.

01-13-97

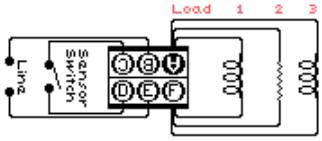
APPLICATION NOTE 101 - Button Pack Relay

The Button Pack SS Relay is an efficient accessory which reliably expands the capacity of reed switch sensor devices. It is a continuously powered device poised to provide power to a load device connected between it's A and F terminals whenever a connection is made between its C and D terminals. See products 50-BP and 50-BP-L.

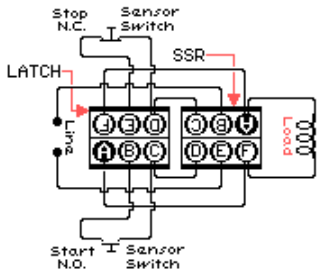
Single sensor switch on - off control of a 5 amp (maximum) load.



Single sensor switch on - off control of multiple load devices, which collectively, are not greater than 5 amperes.



Dual sensor switch, on -> latch, stop -> unlatch control of a 5 ampere (maximum) load.



05-03-01