WORLD'S FASTEST PRODUCT & PRICING INFORMATION SYSTEM



Receiving product / pricing information is no longer affected by time, distance or postal charges. If you have a FAX machine, you can receive vast amounts of powerful, decision making information within minutes.

From detailed technical specifications to OEM pricing, our catalog is a veritable encyclopedia of useful information.

Engineers and purchasing professionals will appreciation this comprehensive work containing several hundred pages of technical descriptions, graphic drawings ERECTA SWITCH construction schemes, tech and application notes. And, equally important, OEM pricing.

Here's how it works. FAX clumps are available on demand via your touch tone telephone. So within a couple of minutes you can get the prices or specs on as many products as you want.

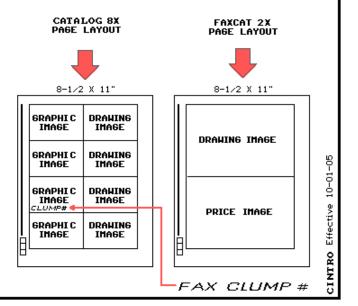
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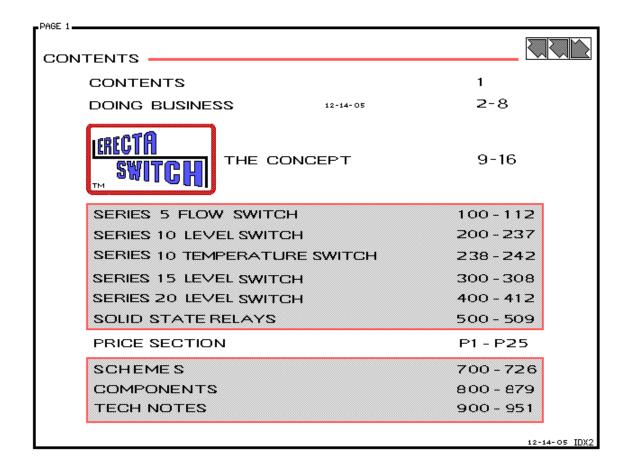
If you don't have our printed catalog, order the index first, Within the U.S.A. and Canada, dial 800-828-9044. Press 2 and follow instructions to order the index.

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THE COMPANY_





Since our inception in 1964, Compac Engineering, Inc. has been a maker of magnetically operated control devices. Over the years, we have been an important supplier to hundreds of the world's most discerning companies. From fast food processing to semiconductor manufacturing equipment, tens of thousands of our products are making their contribution in today's automatic processes.

Our purpose is simple. Make products that perform well. Make them affordable. The products presented in this catalog are indicative of this purpose.

At our Paradise, California facilities, we design products, create the necessary manufacturing processes, make the parts and assemble the products. In short, we do the complete job.

We respectfully invite you to review this catalog. We look forward to supplying you with good, affordable fluid control products.

J. W. Jones - President

12-14-05 CO-1

PAGE 3

CREDIT POLICY -



FIRST TIME PURCHASES

Compac does not extend credit for first time purchases. Initial sales are made only on a COD or prepayment basis. If COD is awkward for you, we accept Visa, Master Card and American Express credit cards.



NET TERMS FOR ESTABLISHED CUSTOMERS

NET TERMS FOR ESTABLISHED CUSTOMERS
For convenience to those planning periodic purchases, we can arrange credit for purchases on which payment can be made within 30 days. Here, "30 days", has special significance because our transaction processing is automated, impersonal and . . . characteristically, indifferent. It's like dealing with a bank ATM machine. That is, account status is considered in real time. So, at the time of sale, what is . . . is. If payment is late, (late meaning not posted to the accounts receivable models within 30 days of shipment) credit store and a house within 30 days of shipment) credit stops and subsequent purchases revert to alternative terms (payment methods) such as, cash up front, COD or credit card.

THE "30 DAY PLUS" HASSLE
If payment within 30 days is inconsistant with your payment system, we suggest that you avoid the inevitable "ATM hassle" and instead, make advance payment, accept the shipment COD or use your credit

APPLYING FOR CREDIT

To apply for credit, after an initial qualification net cash purchase as described above, send us your credit bona fides, a copy of your Company's product brochure and a letter containing the following sample text:

"We are an Original Equipment Manufacture (or, Industrial Distributor) and would like to make periodic purchases on a 30 days net basis. Our brochure is enclosed so that you can see the type of product in which we plan to use your device. We do not anticipate a problem paying your invoices within a 30 day period."

Please follow the wording closely so that you are providing the desired information and assurance. Make credit bona fides accomplish the desired result. Include information which will facilitate follow up.

PAYMENTS FOR FOREIGN SHIPMENTS

Proforma invoices usually precede shipments to foreign countries. This document sets the stage for the contemplated transaction. Sales, payments and fund transfers are (only) quoted in US\$. And shipments are always made FOB Paradise, CA USA.

Instructions for fund transfer are stated on the proforma invoice. Large orders are often based on letters of credit. Compac is adaptable to most of the commonly used payment methods for out of the country shipments.



DOING BUSINESS.



Prices are listed adjacent to the product's dimensional graphic. Prices are OEM net prices prevailing at the time of catalog preparation. The effective date is noted in the lower left hand corner of the price panel. Although price changes are infrequent, they do occur. We reserve the right to make such changes without notice. The price in effect at the time your order is shipped is the price you will be charged.

Requests for quotations involving quantities greater than those cataloged will be answered promptly. To avoid delay, be sure to send such requests on your Company's letter head.

PRODUCT AVAILABLITY

PRODUCT AVAILABLITY
Products are produced in production quantities. Our system monitors OEM sales and anticipates consumption levels. So we can usually ship from stock. Although we manufacture a majority of our product's constituent parts and have good control over the supply line, a rare "out of stock" situation could develop, delaying shipments several weeks. Uncommitted product inventories are subject to prior sale.

Shipments are made on Wednesdays

Terms are net cash, FOB Paradise, CA. Credit is often arranged for qualified OEMs contemplating continuing purchases. See CREDIT POLICY. Interested OEMs should contact us with specific credit requirements and include credit bona fides, demonstrable ability to use the product and agreement to honor our payment terms as described under CREDIT TERMS.

METHOD OF SHIPMENT

Mithin the USA we ship via UPS prepaid and insured.
Outside the USA, shipments are shipped via carrier of choice freight collect.

SHORTAGES

Claims for shortages must be made within ten days of receipt of shipment.

PRODUCT CHANGES

The information in the catalog was current at the time it was prepared for publication. Improvements are made from time to time to increase the value of our products. In order to accommodate the work, we reserve the right to change specifications, design detail and models without notice.

PRODUCT SAMPLES

The best way to get acquainted with our products is to get a sample and try it out. If you are new to Compac or want to evaluate our product for a new application, don't hesitate to ask for a free sample.

COMMUNICATION

Telephone communication : 800-828-9044 FAX : 820-828-9044 Internet : www.compac.com

PLACE ORDERS : Our order desk station operates bewteen 8:00 and 12:00 AM pacific

standard time

: FAX on demand catalog system

operates 24 hours.

INTERNET

: Order our most popular switches and switch sets. Get tech support. Request printed catalog.

01-12-06 DB

-PAGE 5-

DOING BUSINESS (Continued)



WHY SO MANY INVOICES?

In many ways, Compac is organized like a fast food operation. Production and transaction processing occur in "real time". That is, as sales occur, connected events also happen at the same time. This makes our operations quick and efficient which is why we ship within a day or two at bargain prices.

Our TaskMaster system handles everything on "an eye for eye, tooth for a tooth" basis. For instance, each purchased item has its own invoice. So, if you buy ten different part numbers, you'll get ten invoices, ten acknowledgements and ten packing lists. This may sound unusual but offers advantages when performing "real time" processing.

Here's some things you should know about our system: Product part numbers are poised in our database ready for the next "real time" sale. Logical quantity and packaging combinations are part of the data Ity and packaging combinations are part of the data record so packaging instructions, insurance and shipping charges are accessible to the system's routines during the order booking episode. For example, a product may reside in the database in 50 or more combinations of quantity, shipping carton, number of cartons and carton weights. Add to this, value per carton, and the hundreds of combinations of shipping heights and zones and whether the shipment is ground. weights and zones and whether the shipment is ground or air. This all adds to the complexity of the iterations.

With the automatic "smart system" as our objective, processing data on an "eye for an eye, tooth for a tooth" basis has several advantages. For instance, tooth basis has several advantages. For instance, we automatically adjust inventory, update accounts receivable, prepare labels, and create the UPS shipping manifest as the sales event happens. This, in turn, allows automation of related production, inspection and management functions which require "real time" data sources. Equally important, it simplifies the undoing of a transaction should that become necessary.

HHY THO BOXES?

Domestic shipping episodes are normally defined as single carton shipments. However, when content makes this impractical or when value generates a high inwance risk, the shipment may be divided and packaged in more than one carton.

System operations, damage susceptibility, value and count are factors governing the number of cartons

As previously mentioned, logical product sales are stored in our system as predefined potential shipping episodes. So when a particular order is entered into the system, everything about how it is to be packed and shipped is already known by the system. If multiple cartons are defined as the packing method for a particlar product, that is how it will be packed.

WARRANTY -



MARRANTY

The Company warrants that products manufactured or sold by it shall be free from defects in material and workmanship. Any product which shall, within one year from delivery be proven to the Company's satisfaction to have been defective at the time of delivery in these respects shall be replaced or repaired by the Company at its option. The Company's liability under this warranty is limited to such replacement or repair and it shall not be held liable in any form of action for direct or consequential damages to property or person. THE FOREGOING WARRANTY IS EXPRESSLY MADE IN LIEW OF ALL OTHER WARRANTIES WHATSOEVER, EXPRESSED, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS. As there is so wide a variety of conditions under which the Company's products may operate, any greater responsibility then herein set forth can not be assumed by the Company unless a specific warranty is requested by the customer and agreed to by the Company in writing.

CONSEQUENTIAL DAMAGES

The Company shall not be liable to the customer or others claiming through the customer for special consequential damages for any reason whatsoever.

WAR-1

PAGE 7=

RETURN POLICY -



Installation should be performed by qualified tech-nicians. Don't "wing it". As pointed out in this catalog, successful use depends upon "know how". . . from selection to installation.

HE DON'T KNOW IF IT WILL DO YOUR JOB

HE DON'T KNOW IF IT WILL DU TOUR JUB Compac Engineering Inc. does not warrant or authorize the products described in this catalog for use as a critical component in systems which may affect life support or personnel safety without our written consent.

Before using our products, please review the reasons for your selection. If you are not certain your selection is technically justified, then don't use the product. Our products are designed and intended for use in OEM equipment projects in which suitability has been established by empirical testing. This is the purchaser's responsibility.

USE RECOMMENDATION

Compac Engineering Inc. is not in a position to re-commend its products for any specific use.

RETURN POLICY

Our products are manufactured under the highest stand-ards possible for a product of this class. Materials are controlled to their source, designs are the mirror image of sophisticated tools and human assembly is directed and controlled by our panoptic computer "smart system". "It doesn't get much better than this". Never-theless, anomalous production is possible. So we stand ready to supply prompt remedies when appropriate.

Our low prices may seductively tempt users into applications which demand performance beyond our product's capability. Resulting problems are clearly not a matter covered by material and workmanship warranty.

Please do not send "it" back to us without getting a return authorization number.

To get a number, write or FAX us stating specifically how the product fails to meet Compac's material and workmanship warranty. Keep in mind that the warranty excludes use. If the complaint has merit, we will issue a return identification number. At that time, return the item freight prepaid. Subsequent to its receipt, we will promptly review the claim's validity. If the claim is justified, the item will be repaired or replaced at our option.

AUOTO THESE NO LITE STELLATIONS

We do not accept the return of broken items. If received broken, contact your carrier for the remedy. If the item was broken during installation or use, you've got a problem. Do what's necessary to change the procedure causing the breakage.

lle do not accept the return of products which have "welded", stuck closed contacts. Nor do we accept the return of switch products which have "stressed" stuck open contacts, unless they are DDB (dead out of the box) on arrival and otherwise in a new, uninstalled state.

RETURNED 600DS

Returned goods will not be accepted for any reason after 30 days from the shipping date. Only passive products (ltems which do not contain magnets or switches) which are in new, unused condition, will be considered for credit.

LIABILITY INSURANCE

Compac does not provide certificates of insurance to additionally insure its customers against liabilities associated with the use of its products.

3

QUALITY CONTROL



In any discussion about quality, questions relating to ISO 9002 certification is likely to surface. So our comments are framed to assist those participating in the ISO program to understand our system of production. Although Compac is not a certified ISO operation, our system does control these functions and

- Design ControlMaterial purchasesMaterial verification
- Inspection and handling of reject material.

- Manufacturing processes
 Internal quality audits.
 Corrective action for quality problems.

Compac manufactures only the products presented in its catalogs. We do no custom manufacturing. Mork is per-formed at our Paradise, CA factory. We manufacture all of our plastic parts. Switches, stampings, extrusions and screw machine parts are purchased from domestic and foreign suppliers.

COMPAC'S TaskMaster OPERATING SYSTEM

Compac's operating system borrows from established practice. But it is also unique. We use a Computer smart system to control the events of production. Our system does not permit work outside of preprogrammed system does not permit work outside of preprogrammed manufacturing sequences and acceptance parameters. Specifically, pay can not be accrued, processes will not start and machinery will not run without the system's direction. Consequently, if work occurs, it occurs within the system's preprogrammed boundaries or not at all. Although boundaries for a given product can be modified, access is restricted to the highest levels of management. As histories develop, adjustments are made to solve unanticipated problems and otherwise optimize the design replication process. Its structure optimize the design replication process. Its structure will accommodate special needs. For example, we can alter the level of scrutiny, expand or loosen control parameters or add destructive tests. Its programmed

nature seeks to reward success. Conversely, problem production is automatically identified. And, inspecproduction is automatically identified. And, insp tion level or scrutiny is increased accordingly.

Employees are trained to operate equipment and system interfaces. However, preprogrammed code directs events and makes the actual choices required to insure successful production results.

Hand written/typed documents and forms are not used. Rather, control entries are made to the system directly. Digital mircrometers, digital weighing machines and the like output their results directly into the TaskMaster inspection station. Thus, the system incorporates a high degree of input objectivity. Although data covering spoilage, employee production efficiency, inventory, machinery and product performance are on line at all times, the system can not easily be subverted or capriciouslu manipulated. verted or capriciously manipulated.

Human work is programmed in 3.8 hour work chunks. Chunks are controlled by detailed system work plans. The smallest step or handling is described in detail along with the tools and equipment required to do the work. Each 3.8 hour chunk must successfully pass an acceptance audit prior to the issue of additional work. Our experience indicates replication benefits from the short work shift. And when problems do occur, the smaller shift size, smaller production lot, and proscription of new work, forces immediate action to confront problems, implement corrective action and get the project back on course.

Volume users may request copies of inspection reports. However, we are not in position to provide specific procedures or manuals.

We herein CERTIFY, products of our manufacture conform to preprogrammed parameters established by us for the particular product.



INSTRUMENT CONSTRUCTION

BUILDING BLOCK SYSTEM

ERECTA SMITCH is a building block system of parts and assemblies that lets you construct common and not so common sensing instruments. It's a product that reduces cost as much as 90% and allows you to create what's needed in about the time it takes you to read this page.

IT STARTS WITH A SWITCH

Flow, liquid level and temperature switches are the system's sensing elements. This is where things usually start. Specially designed ERECTA SWITCH hardware complements the sensors making a variety of constructions and permutations possible. Projects start with the selection of the sensing switch. Then by attaching ERECTA SWITCH components, geometries are altered, functions expanded and previously expensive functions become practical and affordable.



Like any construction set, what is built and its purpose, is in the "eye" of its designer. That's you. Creations can be freshly imaginative because there are no bounds beyond the physical limitations of the ERECTA components. The factorial combination of size, material, function and geometry is enormous. Anything can be possible. Uses will transcend classical sensing switch applications. ERECTA SMITCH solutions provide many new options for the plumbing or interconnection of liquid, gas and electrical wiring.

IT'S AS EASY AS IT GETS

ERECTA components are precision, screw together, snap together construction parts and assemblies. Wet attachment interfaces are 0-ring sealed. Active components, like the liquid level and flow sensors, are factory assembled so your role is basically one of screwing and snapping a few pieces together.

WORKS WITH ANY PIPE THREAD DEVICE

HORRS HITH ANY PIPE THREAD DEVICE
ERECTA threads are standard NPT and NPS pipe
threads. Although the components are designed as
companions to Compac products, they are usable
with any part or product having complementary
threads. ERECTA SMITCH adapters, bulkhead fittings,
precision nipples, connectors, support brackets,
wiring receptacles and relay housings invite applications having nothing to do with Compac switch
products. For example, they may be used as plumbing
for any compatible fluid or wiring need.

Suppose you need a low cost sight gage. Use our translucent Polypropylene pipe nipple with a couple translucent Polypropylene pipe nipple with a couple of our bulkhead angle connector sets and you have "instant sight gage". Add our wiring receptcale to any device having a 1/8" to 1/2" pipe connection at the pigtail egress and have a weather resistant place to make that splice or connection. Need a low cost 55 gallon drum switch that tells you when the drum is empty? That's easy, Add our extended stem set and 2" adapter to a liquid level switch and you get a drum switch for about \$20.00 in 100 piece lots.

EVEN THE COMPETITION WINS

Many installations can be made more cost effective by combining ERECTA SWITCH hardware with sensing by combining ERECTA SWITCH hardware with sensing switches manufactured by others. If you manufacture control devices which must withstand the effects of a corrosive liquid . . enhance your product while reducing cost by incorporating ERECTA SWITCH. Add your expertise to our wide range of accessories and dazzle your customers with quick, inexpensive solutions.

ERECT-1

PAGE 10.

NO BIG DEAL

There's no need to abuse simple technology by making it a "big deal" to add a switch or change a mounting. With ERECTA SWITCH, changes like this are a matter of buying a box of parts. Make it longer. Make it shorter. Add switches. Mount it where you want it This is what ERECTA SWITCH does.

SMOOTH APPROACH

Before ERECTA SWITCH arrived on the scene, designs which permitted efficient manufacture could not be easily changed to accommodate special needs. So when changes were made, it amounted to a custom effort and fabricated construction. Often expensive and usually not of the same quality as a tooled design, the custom fabricated product is at best, problematic.

ERECTA SWITCH has changed all of this. Established,

COMPONENTS, SETS AND CONSTRUCTION SCHEMES

The expansive nature of a building block concept requires that product possibilities be confined so the line is easy to deal with Our electronic catalogs show the line as switches, components, switch sets and component sets. Sets are shown as dimensioned assemblies accompanied by the list of constituent components. How the components are intended to be put together is portrayed in easily understood graphics.

A collection of suggested plans for the building of frequently encountered instrument constructions are also provided. We call these plans "construction schemes". Schemes are plans for a project rather the a product you can purchase.

NOMENCLATURE INTERPRETATION

For purposes of screen and document display, nomen-clatures are constrained to 12 characters. Although our naming system is rule driven, grouth has pro-duced some stretching of the rules. Nevertheless, the system is consistent and easily understood.

The system first identifies the set's series or family, then the style considerations, then the material option and finally the size selection when applicable. Selectable variable attributes such as material and size are always shown as empty boxes. I.E.;



Here's another example:



PRODUCT ORGANIZATION AND SELECTION

Products are organized as sets, identified by their series number; 5, 15, 20 and so on. Sets are headed by a switch or family of switches which share common attributes. So you must first determine the switch of interest and its series number. Then select from the series component set the particular switch, switch set, parts, or parts sets required.

- Remember. . . .
 - 1. SERIES

 - 2. MODEL/STYLE 3. MATERIAL OPTIONS 4. SIZE OPTIONS

MATERIAL SELECTION

ERECTA SWITCH products are optionally available manufactured of Polypropylene, Acetal or Kynar PVDF.

When material options are offered, two characters are provided in the product's nomenclature for purposes of material selection and specification. I. E.; 15-650-PP (PP denotes Polypropylene)

We suggest material selection be based upon compatability with the application's environment. Pressure, temperature and chemistry will be important factors. Generally speaking, Polypropylene, and Kynar PVDF are suited for water based solutions. Acetal is suggested for hydrocarbon applications such as Gasoline and Lubrication Oil.

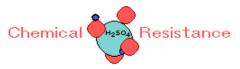
Our Polypropylene products are colored gray, black and blue, 10% glass fibers are added to improve performance at cold temperature and to facilitate our welding process. Polypropylene is often called "poor man's" Teflon because of its low cost and high nobility. "Polypro" is the popular choice for most water based applications.

Acetal products are colored red and characterized by their toughness and smart shiny appearance. When strength and resiliency are important, Acetal may be the best choice. It is compatible with many solvents and will handle alkaline water based solutions over a wide temperature range.

Kunar PVDF is light tan in color. It is characterized by its high nobility in the presence of corro-sive environments. PVDF is a high density material which may limit its application in low specific gravity liquids.

Often, the materials used for other parts of your system will suggest an acceptable selection.

I. E.; If the tank, pump and valves are manufactured of polypropylene, why not use polypropylene for the liquid level or flow switch as well?



Performance data covering over 500 chemicals are presented in our ChemChart program for the PC. This Chemical Resistance chart program, for IBM and IRM compatible computers, provides information about corrosion resistance and the effects of corrosion on mechanical properties of Polypropylene, Acetal and Kynar PVDF. See Product Guide page 61 for ordering instructions. If you are reading this page on your computer screen now, press [Esc] to return to the main index. You can then select ChemChart to review or printout the Chemical Resistance chart.

Keep in mind, temperature and other environmental factors will influence chemistry. For pressure, temperature and specific gravity ratings, select "Application Environment" on the main index.

ANCILLARY COMPONENTS

Springs are Titanium metal or T-316 Stainless Steel depending upon the product selected. O-rings are Viton fluorocarbon rubber.

FINEST AVAILABLE

FINEST AVAILABLE
Only the very best materials are used. Premium switches, manufactured by Yaskawa Electric and OKI Electric Companies of Japan are of the highest quality. Our plastic raw materials are manufactured and formulated by Eastman Chemical, ICI/LNP, General Electric, Celanese and ATOCHEM of North America. Our plastic material options, offer solutions for the widest possible application range. And . . . we do the molding so regrind, contaminant control and process replication is totally under our control. Simply stated, there are no better materials available for this class of product.

03-15-97 ERECT-3

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ANOMALIES

ANUMALIES
Parts are injection molded in the same mold regardless of material. Molds are designed to produce design
dimensions when molding our Polypropylene formulation.
As result, Acetal and Kynar parts have slightly diffeerent dimensions. They are smaller than their Polypropylene counterparts. Assemblies made from parts of like
materials will fit correctly. Mixed material assemblies
will exhibit fit problems, particularly at threads and
span attachments. snap attachments.

SPECIAL CONSIDERATIONS

SPECIAL CONSIDERATIONS

Excluding the effects of chemistry and corrosion resistance, successful operation at high temperature has little to do with the melting point of our plastic materials. Melting points are above 171°C and our products are rated at 90°C. Of greater concern is the relatively high coefficient of expansion of the plastic structures and the impact this has on the stability of the switching device. Kynar PUDF exhibits the largest dimensional excursions. That plastic structures expand and contract several PUDF exhibits the largest dimensional excursions. That plastic structures expand and contract several thousandths of an inch over the 0 to 90 C range suggests application at or near these extremes should be questioned. Consider, for example, the forces likely to occur when a plastic part is mated to a metal part and temperature extremes are encountered. When in doubt, performance verification tests should be considered. be considered.

INSTALLATION TIDBITS

INSTALLATION TIDBITS
Isolate pull stresses when stripping leadwires. Temporarily protect pipe surfaces from tool marks with tape. Dampen male threads and 0-ring seals with liquid soap prior to assembly. Redundant 0-rings enhance seal reliability when all 0-rings are engaged. Diameter seals are engaged by virtue of the assembly dimensions. End seals, however, must be engaged during the act of assembly. Consider a technique to confirm engagement. I.E.; confirm end seal engagement by measurement. An effective end seal can be achieved with .010" to .020" seal compression. Avoid excessive engagement as this may scuff the 0-ring causing it to slide out of position.

When screwing switches to other assemblies, allow the free ends of the leadwire to rotate. If nec-essary, help the process along so that wires do not become twisted.

When posssible, adopt a tentative approach to assembly. That is, first assemble components, in their logical sequence, hand tight. Then methodically tighten joints to achieve correct seal engagement.

ERECTA SWITCH users get more instrument at less cost compared to any other method or product available to the OEM. However, there are inescapable caveats:

- The ERECTA SWITCH concept assumes the user knows what he is doing. This is an OEM product intended for OEM manufacturers. It should only be purchased by those intending to assume responsibility for the construction outcome.
- Use only in those applications which are known to be electrically, chemically and mechanically compatible. Do your homework. Perform tests.
- Deal with reactive loads in whatever way nec-essary to subdue arcing at the switch element
- Make certain 0-ring seals are in fact engaged.
- Avoid assembly or installation procedures which result in bending, stressing or shocking the switching element. In other words, don't drop, bend or squeeze switches.

LEVEL OF DIFFICULTY DEFININTIONS

Essentially, this is a concept in which fully manufactured Multi switch construction. Requires screwing and/or and tested switches and components are shipped ready for snapping several parts together. Several 0-rings may use. They connect to one another so assembly is usually a matter of snapping or screwing elements together.

ERECTA SMITCH constructions do not require glue, solder gether is sequence. Requires open end wrenches, crimp

The level of difficulty to construct a set or scheme is assigned as level 1, 2, 3 or 4. Set and scheme pages show this assignment below the date in the ERECTA SWITCH block at the lower right hand corner of the page.



The assigned level is noted below the edit date in the ERECTA SWITCH block on set and scheme page . Assignments are explained as follws:

LEVEL 1 - * 30 seconds.

Snapping/screwing two or three parts together. One or two O-rings may be part of the assembly. Requires open end wrenches and thread lubricant. Intuitive assembly.

LEUEL 2 - * 120 seconds.

LEVEL 2 - * 120 seconds.

Single switch station construction. Requires screwing and/or snapping several parts together. One or more Orings may be part of the assembly Tapered pipe threads require application of Teflon tape sealant. Requires open end wrenches, thread lubricant and continuity checker. Intuitive assembly. Assembler must interpret Set and Scheme catalog drawings. Dry operational test performed prior to use.

LEVEL 3 - * 240 seconds.

Essentially, this is a concept in which turns meaning and tested switches and components are shipped ready for use. They connect to one another so assembly is usually a matter of snapping or screwing elements together. ERECTA SWITCH constructions do not require glue, solder or part machining. And, our detailed catalog drawings tool, thread lubricant and continuity checker. Disciplined assembly. Assembler must interpret Set and Scheme drawings. Dry operational test performed prior to use.

LEVEL 4 - * 360 seconds.

LEVEL 4 - * 360 seconds. Multi switch constructions with interface devices and or cable assemblies. Requires screwing and/or snapping several parts together. Several 0-rings may be part of the construction. Components go together in sequence. Tapered pipe threads require application of Teflon tape sealant. Requires open end wrenches, crimping tool, thread lubricant, screw driver and continuity checker. Disciplined assembly. Assembler must interpret Set and Scheme catalog drawings. Dry operational test performed prior to use.

* Experienced assemblers easily achieve noted con-

ERECT-5

PAGE 14

CLASSICAL PROBLEMS





INCOMPATIBLE LIQUIDS

Understanding that a chemical may have deleterious effects on our product's plastic structure is essential. Assuming compatibility with the chemistry, consideration must then be given to the nature of the liquid. How does it flow? What's floating around in it?, etc. Is it a saturated solution that may precipitate salts on the float? Is it a high viscosity liquid? is it sticky? Are there iron particles which may be attracted by the magnets? . . . With this in mind, using our product in any liquid other than clear water should be preceded by tests.



HAVE MOTION - TURBULENCE

Single point level switches have small differentials between their on and off states. If installed at the surface of a reservoir of moving liquid, they will respond to the waves and ripples. This means the switch may be switching on and off many time per minute. A situation that may drive the load device "crazy" and contribute to early system failure. To inhibit the effect of wave motion and turbulence use a slosh shield. If this is not practical, inhibit the switch with a time delay relay or use two switches and a latching relay to expand the differential.



RADIANT HEAT

A common application for small level switches is the control of make-up water. As long as the switch is in water, we can assume the ambient temperature is within its capabilities. However, care must be taken to locate the switch so that it is not exposed to heat radiating from or reflected by heating elements. Excessive temperature could warp or otherwise deform the plastic parts.



ERECTA SWITCH assemblies can be configured in endless ways to accommodate just about any need. However, if reliability is an objective, they can only be assembled one way . . . a that's the correct way. O-rings must be present, threads must be correctly engaged and present, threads must be correctly engaged and component's function and the mechanical peculiarities of plastic parts and assemblies.



FAIL SAFE INSTALLATION

FAIL SAFE INSTALLATION

Prudent engineers, like good pilots, always allow themselves a way out. It's good sense to install automatic control devices so that they will fail safe. I. E.; power supply failure should not cause liquids to overflow. Failure of a relay or motor starter should not cause liquids to overflow. And failure of a level, flow or temperature switch should not cause an unsafe condition. Predictable off normal conditions should be satisfied by prudent fail safe design. If this can not be achieved by circuit or component configuration, then a backup scheme must be put into place. Going automatic doesn't abrogate responsibility for the predictable.

CLASSICAL PROBLEMS.





SWITCHING CAPACITY

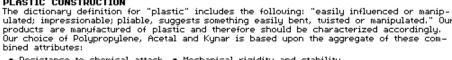
This is, perhaps, the most misunderstood capability of reed switch equipped devices such as our liquid level and flow sensing switches. Switching an incompatible load is an invitation to failure. Please read the pages of this catalog entitled "Electrical Interfacing".



IMPACT SHOCK

He cradle the glass reed switch in a stress relieved support system and then lock it into place with a specially formulated, compatible potting compound. "Reeds" survive reasonable mishandling. This does not include dropping the product. The product may look like it's resilient . . . but it is not. Any fall may damage the unit. A dropped unit may look OK or even test OK but still be damaged inside. The bottom line is . . . don't drop switches. And if it should happen, then discard the suspect switch.

PLASTIC CONSTRUCTION



- Resistance to chemical attack.
 Mechanical rigidity and stability.
 Mechanical stability over a wide temperature range.
 Dielectric strength.

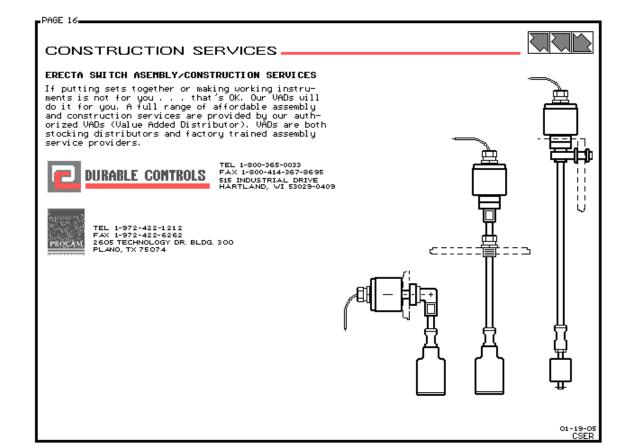
All of our materials can be bent, squeezed or stressed. Stressed materials will exhibit some degree of "cold flow". With this in mind, reasonable care must be used during installation. Use appropriate tools. Apply torque only to the hex. Avoid manipulations that may transmit force into the product. Isolate pull forces on leadwires when stripping wire ends.



CONDENSATION

CONDENSATION
In situations in which conditions make it possible for condensation to form, users must take measures to prevent water from entering suitches at the leadwire egress. Although wires are surrounded by potting compound, the bond between potting compound and plastic parts is basically one of cohesion since our plastic materials are essentially non stick surfaces. If water is present at the egress, sooner or later it may penetrate the switch cavity, resulting in switch malfunction. If there is a possibility for condensation to form, do something about it. Vent a low spot in the conduit so a drain exists and apply a generous amount of sealing compound at the egress as an additional measure of seal integrity.

CP-2





Now you can sense small flows in liquid or gas lines for less than the price of a movie ticket. Series 5 products are a family of small sensors based on a common part set and principle of operation. Pressure differential across a movable magnetic poppet operates a reed switch and/or provides a visible window.

indication of flow through a transparent 5-20, 5-21 and 5-21H are the key elements of the Series 5 ERECTA SWITCH product group. When combined with ERECTA accessory components, switch sets are formed providing additional features and extending application possibilities.

Although 5s are designed for small flow applications (under 3 GPM), they can be used in by-pass lines so flow can be sampled and sensed without impeding flow efficiency. As an "in the flow stream" sensor, 5s are only limited by the I.D. of their internal port diameter.

Switches are preset, at time of manufacture, to close contact upon increasing flow rate. Set points ranging from .01 GPM to 1.0 GPM are in stock so prompt shipment is not a problem. And you can choose the construction material best suited to your needs. 5s are offered in a choice of Polypropylene, Acetal or Kynar PVDF plastics. Except for the 3/8 NPT boss 5-21H suitch, connections to the flow medium are made through accessory adapter fittings. Several pipe thread and hose sizes can be accommodated.

Monitoring coolant flow, activating equipment at flow turn-on, detecting flow in spray/sprinkler systems are excellent applications for this product. "Check 'em out". 5s are the affordable small flow solution.

G520-1A

SERIES 5

Flow Switches & Indicators

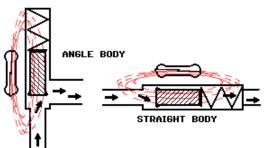
PAGE 101.

SERIES 5 SMITCHES (Water 20 °C)	△P 0 act thres	uation		△P PSI 3 GPM	
∗Set Pointin GPM	0.1	.25	0.5	.75	1.0
5-20	.5 30	.6 30	.75 25	1.2	1.4
5-21	.22	.3	.4	.52 30	.7 30
∗Set Pointin GPM		.30		.75	_
5-21H- <u></u>		5 20	-	.7	_

* + - 10% Characteristic performance.

SCHEMATIC

Differential pressure across magnetic poppet moves the magnet to actuate the SPST normally open switch. The switch remains closed until flow is reduced.



APPLICATION ENVIRONMENT						
Pressure	200 PSI MAX @ 20°C	Derate, Zero @ 90°C				
Temperature	90°C MAX					
Mtg Position	Any W∕Spring	Vert WO∕Spring				
Liquid/Gas	Clear	Low Viscosity				

	ELECTRICAL RATING				
OKI OKI Ser	тм nsor Devi	ce Cor	poration		
		Complete OKI Reed Switch Databook available at http://www.osdc.co.jp/			
Contact rating UL file E70063	91	70 VA*,50W* *Resistive OKI Sensor Device Corporation Reed Switch Model ORD229 Tokyo 193-8550, Japan			
Max Swi	tching Vo	oltage	300AC, 350DC		
Max Swi	tching Co	urrent	AC 0.5AMP*, DC 0.7AMP*		

MATERIALS OF CONSTRUCTION						
All Models	PΡ	(Gray & black)Polypropylene				
All Models	AC	(Red) Acetal				
All Models	ΚR	(Natural) Kynar PVDF				

SERIES 5 MODEL DIFFERENTIATION
5-20 Angle flow pattern; .1 to 1.0 GPM preset (5)
trip points; clean out cap; static area above spring;
poppet moves away from flow path at high flow; can
operate without spring if vertically mounted; accessory thread adapters required; ERECTA SMITCH indicator
trim, low flow trim, wiring receptacle and battery
operated beeper available. Highest price.

5-21 Straight flow pattern; .1 to 1.0 GPM preset (5) trip points; low pressure drop at/or near threshold operate point; large pressure drop at high flow, can operate without spring if vertically mounted; accessory thread adapters required. Intermediate price.

5-21H Straight flow pattern; .30 or .75 GPM preset trip point; low pressure drop at/or near threshold operate point; comparatively lower pressure drop at high flow rate; return spring required; accessory thread adapters not required. Lowest price.

* UL component recognition applies to the OKI switch Model ORD229. Observe applicable electrical codes when using this product. 04-14-06

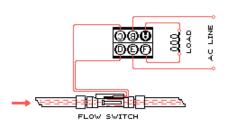
ANGLE OR STRAIGHT BODY?

Aside from the difference in flow path through the body, 5-20, 21 and 21H switches share the same internal parts. Pressure drop, sensitivity and clean out provisions are the differentiating attributes.



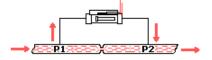
DIRECT FLOW SENSING

DIRECT FLOW SENSING
Liquid or gas flowing through the switch (within
the limits of the product's differential pressure
sensitivity and flow rate capacity) will be detected. Installing the switch in the flow stream is
direct flow sensing. This would be the product's
expected application when the flow rate is between
.1 and 3 GPM. Switch is shown connected to a
Button Pack SS Relay for greater load handling
capacity. capacity.



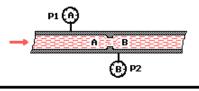
INDIRECT FLOW SENSING

Placing the suitch in a bypass line so only a portion of the system's flow passes through it expands the range of possible applications. Any flow rate within the units pressure rating can be detected when the required pressure differential is present.



VENTURI METER SENSING METHOD

Among the available sensing techniques, the Venturi meter method provides the simplest way to detect the presence or absense of flow in a pipe. This method is based on the principle that different flow velocities produce different amounts different flow velocities produce different amounts of suction. The meter comprises a pipe incorporating a constriction or "waist". The velocity in the pipe just past the waist (B) is greater than the upstream area (A). The suction (lower pressure) is similarly greater in the area just past the waist. Since the difference in pressure between (A) and (B) depends upon flow velocity, it must also depend upon the quantity of fluid passing through the pipe per unit of time. (In the case of water. . . flow rate in cubic ft/sec = cross sectional area of pipe in sq. ft. X flow velocity in ft/sec). Hence this pressure differential provides a measure for the flow rate.



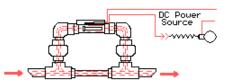
06-30-98 G520-3

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BYPASS FLOW SENSING

As the diagram shows, a small percentage of the system's flow stream is diverted through an unobstructed, close coupled bypass. Using our .1 GPM set point switch, flow, in the bypass, of less than 1 pint per minute at about 3 ounces pressure will cause switch actuation; about 1% of the flow in a 10 GPM system.

Getting the flowing medium into the bypass requires Getting the flowing medium into the bypass requires the bypass be placed across a constriction in the line so that differential pressure, sufficient to operate the switch is available in the bypass. This constriction may be part of the system's plumbing or a cloggled filter or pipe. Considering the sensitivity of our switch, the constriction required is minimal, localized and the resulting pressure drop in the main stream is often insignificant. Switch is shown connected to a current limited incandescent bulb. incandescent bulb.



The chart below shows what can be expected when flow is sensed in a bypass connected to a 1/2" Sch 40 pipe flow stream. Here it can be seen that a constriction of as little as 7% in the flow stream is sufficient to make the bypass technique

5-21 Set For 0.1 GPM Trip								
(Water)	.187	.250	.312	.375	.437	.500	.562	.602
GPM Pull-in								
GPM Drop—out	1.00	1.70	2.5	3.3	4.5	5.75	7.25	

LOW FLOW TRIM

The internal trim of the 5-20 switch can be exchanged with special trim designed to increase the ability to detect small flows. The product is sold as a set cataloged as 5-20-LF-□-□.□. Exchanging trim is a matter of discarding the standard trim (clean out cap and poppet) and replacing it with the LF trim (clean out cap, poppet and orifice). The table below shows performance with and without the return spring installed. Assuming the sensor is mounted in the "poppet up" vertical position, operating without the spring will increase detection sensitivity. This may be useful in pulsating flow sensitivity. This may be useful in pulsating flow applications.

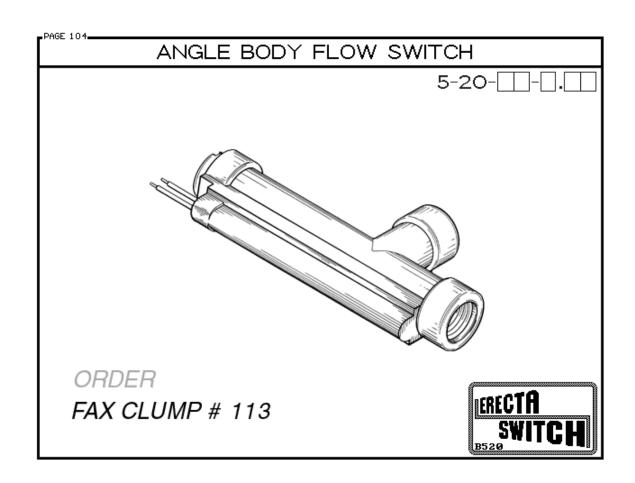
△P PSI	5-20-LF GPM (Water 20°C) .008.016.042.05 .083.116.13 .							
LIQUID							.13	.15
Spring		l	2.0	3.0	5.0	10	15	20
No Spring	.5	1.0	2.0	3.0	5.0	10	15	20
op.a.g				_				
△P PSI				5-20- 1 (Aim		0)		
ΔP	6	9				C) 21	24	27
△P PSI	6	9	SCFM	1 (Ai	20°		2 1 7.0	27 8.6

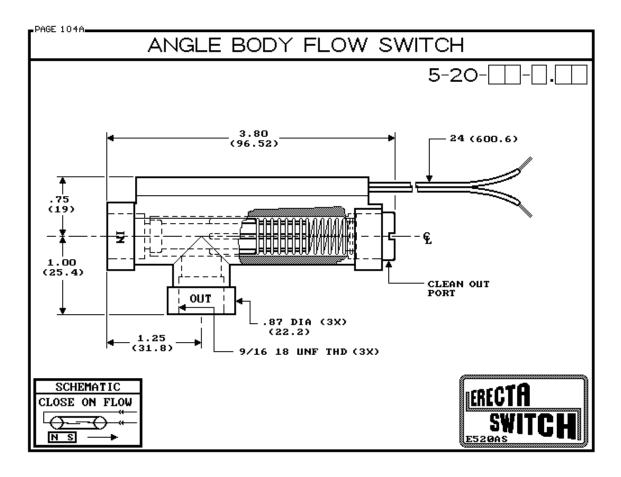
Outlined PSI is $\triangle P$ at switch actuation threshold.

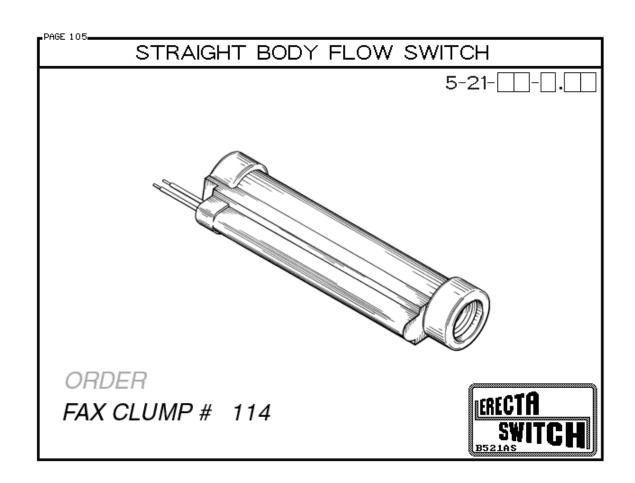
Special trim adds a visual flow indication feature to the 5-20 switch. The product is sold as the 5-19-□□-□.□ indicator flow switch set. Conversion is a matter of discarding the standard trim (clean out cap and poppet) and replacing it with the Indicator trim (Indicator window and flag poppet).

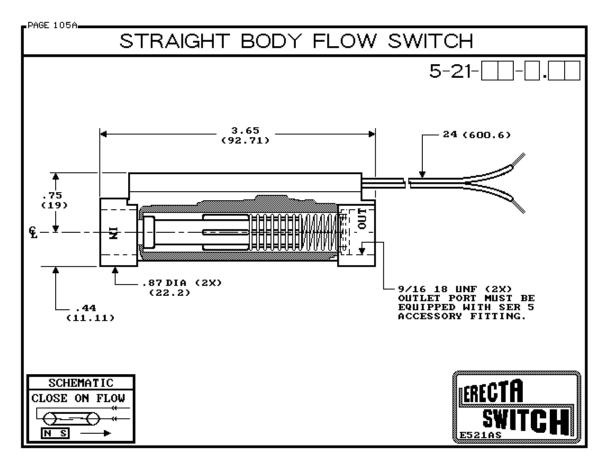
ACCESSORY FITTINGS

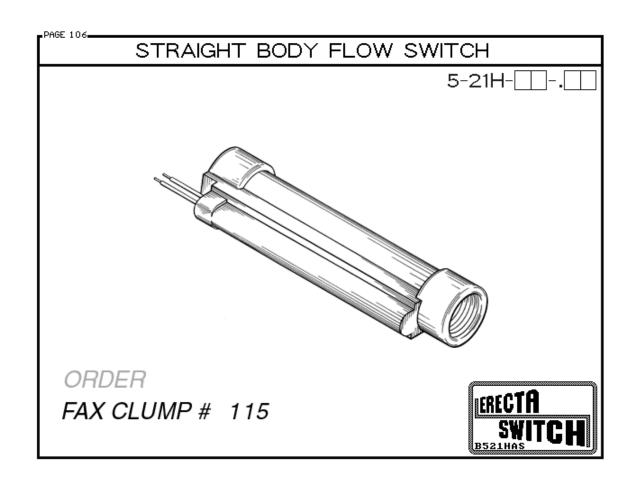
Fittings isolate the body from torque applied to pipe threads as well as providing thread size options. For correct operation, the 5-21 straight body switch must be equipped with our fittings (at least at the outlet boss). See 5-1/Ш-Ш accessory fittings.

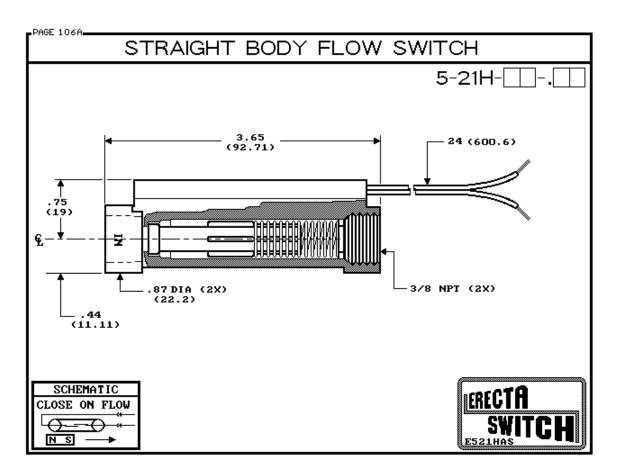


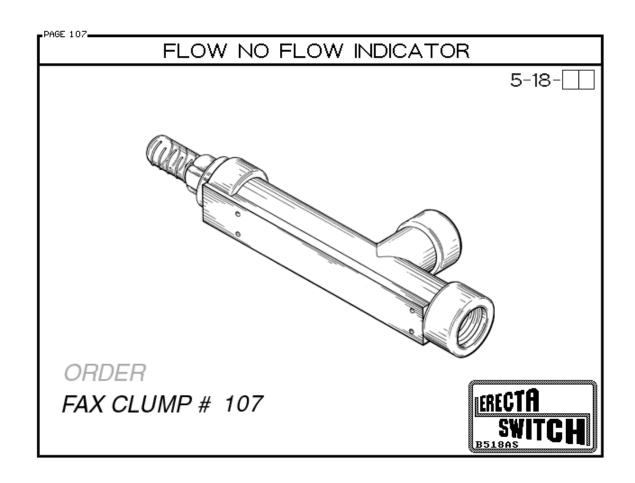


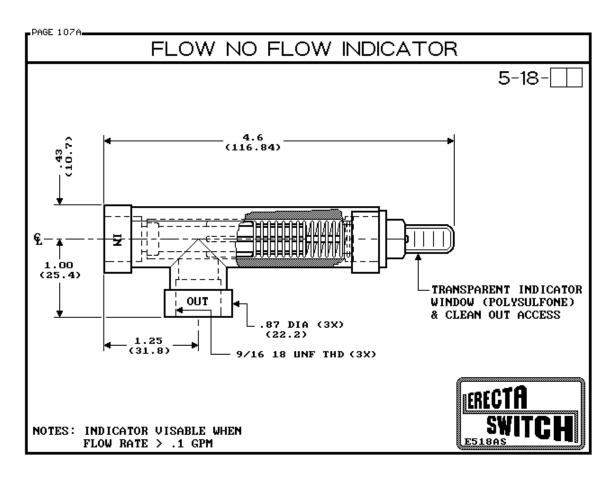


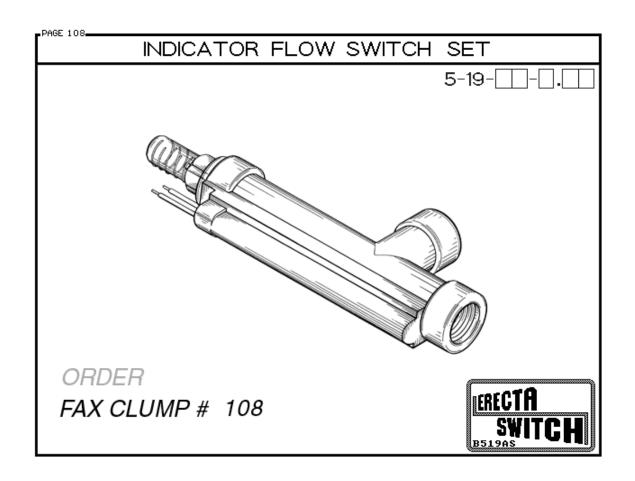


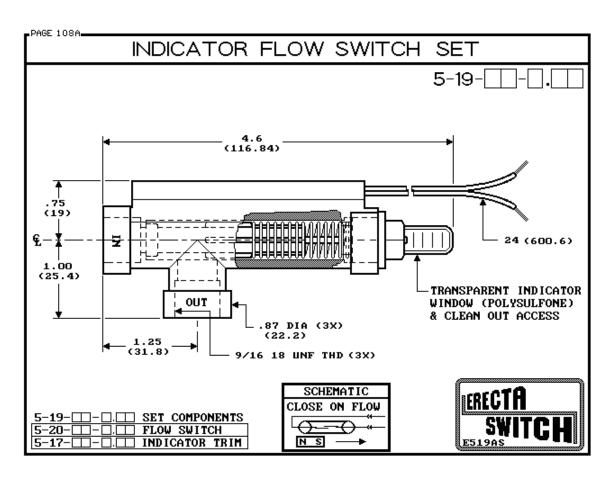


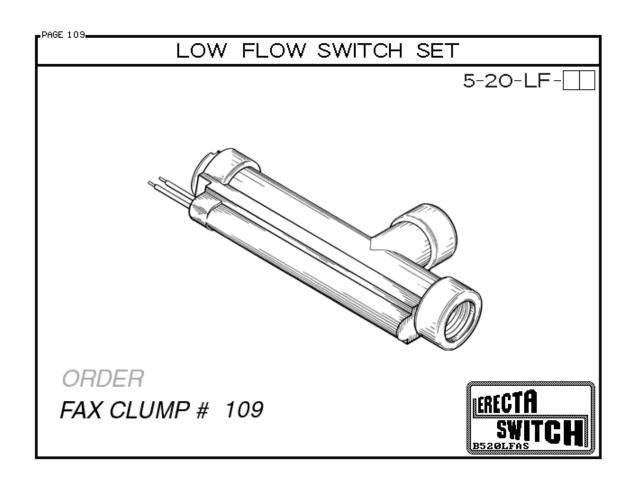


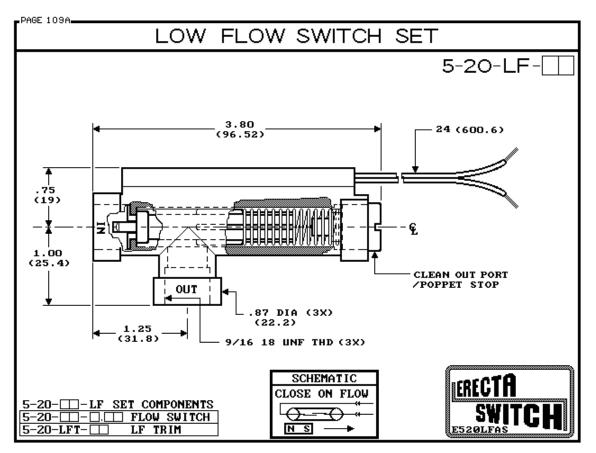


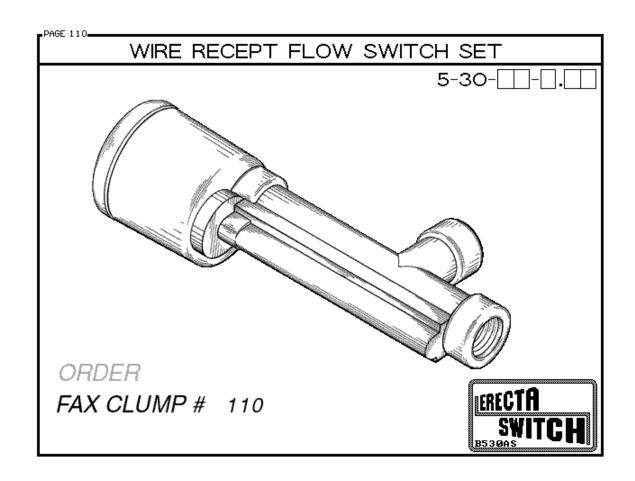


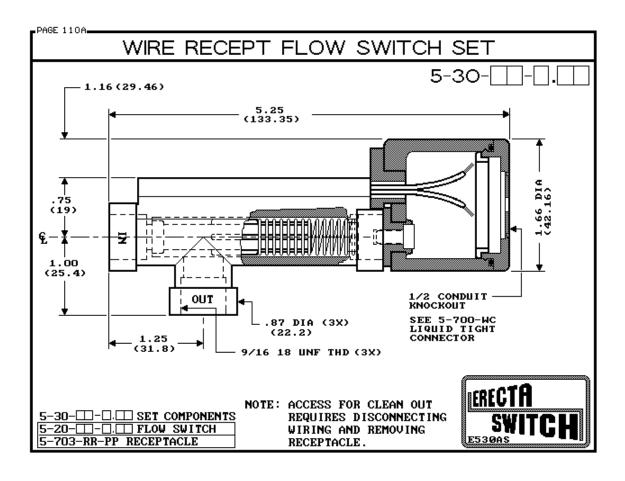


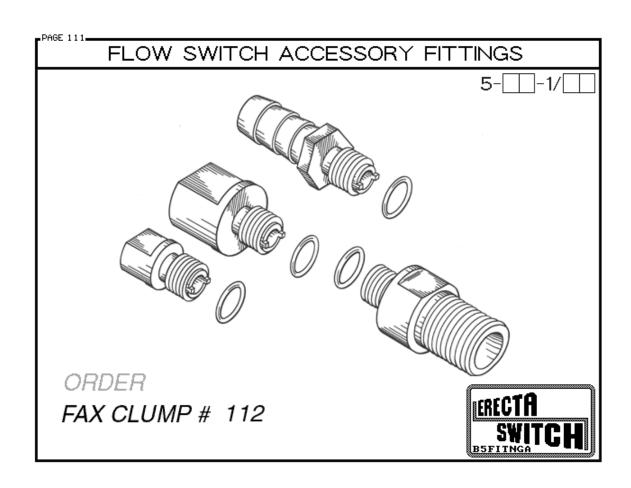


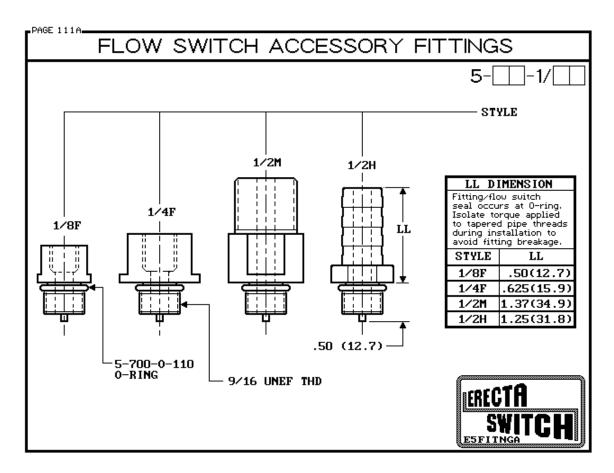








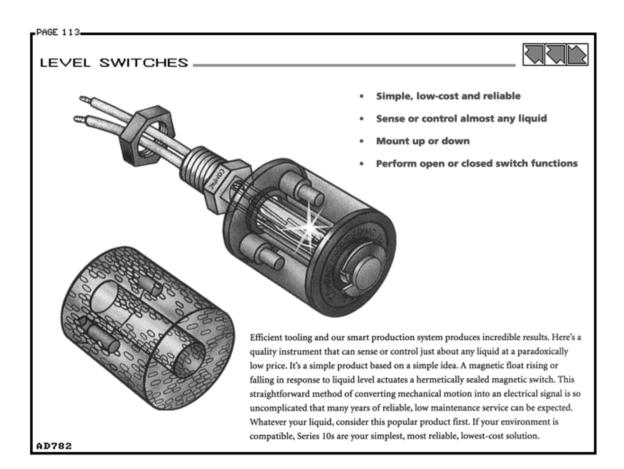




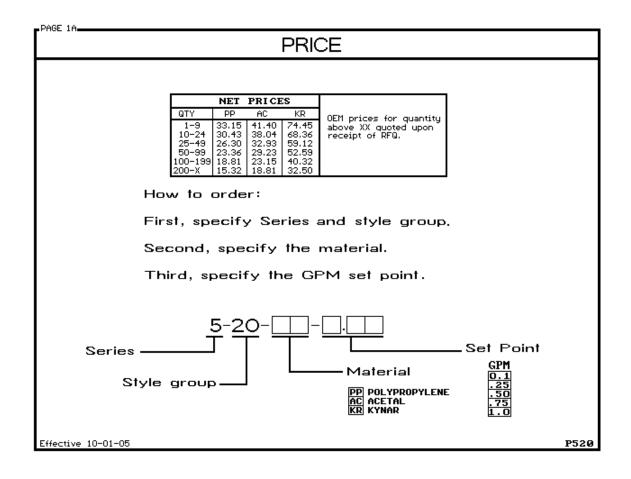
AD520LF

SCFM. Conversion requires exchanging poppets and end caps. The exchange can be

performed in about a minute.



■PAGE P1										
	SER	IES	5	FL	DW SWI	TCH PR	ICIN	G		
5-20-00-0.00	N	ET PF	RICES			5-18-00		NET :	PRICE	s
	QTY	PP	AC	KR			QTY	PP	AC	KR
	1-9 10-24 25-49 50-99 100-199 200-X	33.15 30.43 26.30 23.36 18.81 15.32	41.40 38.04 32.93 29.23 23.15 18.81	74.45 68.36 59.12 52.59 40.32 32.50			1-9 10-24 25-49 50-99 100-199 200-X	14.49 13.24 11.41 10.28 9.24 7.76	18.14 16.55 14.27 12.90 11.18 9.24	32, 53 29, 78 25, 67 23, 06 18, 71 15, 29
5-21-00-0.00	N	ET PF	RICES			5-19-00-0.00		NET	PRICE	S
	QTY	PP	AC	KR			QTY	PP	AC	KR
S	1-9 10-24 25-49 50-99 100-199 200-X	30.32 27.38 24.13 21.19 14.24 13.04	37.93 34.23 30.21 26.51 17.28 15.87	68.36 61.61 54.44 47.71 29.88 27.17			1-9 10-24 25-49 50-99 100-199 200-X	41.40 38.04 32.82 29.23 23.04 18.81	51.84 47.49 41.08 36.62 28.36 23.15	93.14 85.20 73.79 65.86 49.77 40.32
5-21H-00-0.00	N	ET PI	RICES			5-20-LF-00		NET :	PRICE	S
	QTY	PP	AC	KR			QTY	PP	AC	KR
	1-9 10-24 25-49 50-99 100-199 200-X	30.32 27.38 24.13 21.19 14.24 13.04	37.93 34.23 30.21 26.51 17.28 15.87	68.36 61.61 54.44 47.71 29.88 27.17	10-01-05		1-9 10-24 25-49 50-99 100-199 200-X	46.29 42.49 36.62 32.71 25.65 20.76	57.93 53.14 45.75 40.97 31.63 25.54	104.11 95.63 82.37 73.79 55.64 44.67
5-30-00-0.00		ET PI			ě	5-00-1/00	N	ET PI	RICES	
	QTY	PP	AC	KR	Ġ.		QTY	PP	AC	KR
	1-9 10-24 25-49 50-99 100-199 200-X	68, 47 62, 94 56, 00 51, 02 26, 50 23, 03	76, 73 69, 78 62, 19 56, 56 29, 99 25, 64	109, 84 97, 93 87, 08 78, 52 43, 79 36, 42	.R5-1	2000 O	1-9 10-24 25-49 50-99 100-199 200-X	2,72 2,60 2,39 2,17 1,93 1,83	3.48 3.15 3.05 2.82 2.48 2.35	6.09 5.76 5.32 5.10 4.57 4.17





This ubiquitous switch is the *key switching element of the Series 10 ERECTA SWITCH product group.* It can be used alone or as the switching component of a larger ERECTA SWITCH instrument construction. It's a simple product based on a simple idea. A magnetic float rising or falling in response to liquid level change actuates a hermetically sealed magnetic reed suitch. This straight forward method of converting motion into an electrical signal is so uncomplicated that many years of reliable service can be expected.

> Like other Compac products, 10s incorporate design enhancements not found in similar products. Your first look will tell you that this one's different. Nearly perfect parts and nearly perfect assembly gives you a clue that quality is built-in. You'll see that we have shaped the cross section of the stem into a square so that whenever the float and stem are in contact, the area in contact is as small a possible.

This is an important feature that allows the float to scoot up and down the stem (on knife edges) encountering the lowest possible friction; an important consideration in any circumstance that could lead to float sticking.

10s are equipped with smooth surface, hollow lus are equipped with smooth surface, hollow floats. This is the best for use in potable water and beverages because it's the easiest to keep clean and free of bacteria. We've included a mounting nut to expand the number of mounting possibilities. A less obvious but equally important enhancement is our use of a stress relief member at the reed switch leadwire/connection point. This helps to isolate the glass switch from stress during service as well as during the installation process. And, of course, only the best reed switches and construction materials are used.

10s are being used in many ways that touch your everyday life. How about soft drink dispensers, RO water dispensers, ice cream machines, food warmers, coffee makers, chemical etching machines, film processors, poultry feeders, copy machines, dishwashers, equipment lubricators, fuel tanks

10-782 Liquid Level Switch

G782-1A

PAGE 201-

HODES OF OPERATION

TODES OF OPERATION

The switch action of the 10-782 can be configured for either normally open or normally closed switch action depending upon the orientation of the float on the stem. The product is shipped with the float in the "magnets up" normally closed condition. To reverse this action, remove the float and retaining ring, turn the float over and reassemble the float and retaining ring.

FLOAT B	UOY	ANCY	_ IN	SPECI	FIC 6	RAVIT	1.0
	Inches			MM			
Float	PP	AC	KR	PP	AC	KR	Medium
Exposed	.4	.35	.2	10.16	8,89	5.08	air
Submerged	.6	.65	.8	15.24	16.51	20.32	Water
Height	1.0	1.0	1.0	25.4	25.4	25. 4	

	ELECTRICAL RATING						
OKI Ser	OKI TM OKI Sensor Device Corporation						
Contact	Complete	Complete OKI Reed Switch Databook available at http://www.osdc.co.jp/					
Contact rating UL file	RI	70 VA*,50W* *Resistive OKI Sensor Device Corporation Reed Switch Model ORD229					
E70063 Max Swi			193-8550, Japan 300AC, 350DC				
Max Swi	tching C	urrent	AC 0.5AMP*, DC 0.7AMP*				

APPLIC	ENT		
Pressure (Hollow float)	100 PSI MAX @ 20°C	Derate, Zero @ 90°C	
Temperature	90°C MAX		
Specific Gravity	.8 MIN	Clear Liquid	
Position Extreme	30° Cant MAX	Off Vertical	

* UL component recognition applies to the OKI switch Model ORD229. Observe applicable electrical codes when using this product.

TRIP POINT (DRY STATE BEHAVIOR)

NORMALLY CLOSED - Legend toward retaining ring. Switch opens as float approaches the hex and closes as float approaches the retaining ring at the opposite end.

Contacts open when the gap between float and retaining ring is increased to not more than .250/6.35 and recloses when gap is not less than .125/3.18. The characteristic differential between open and closed states is .030/.762

NORMALLY OPEN - Legend toward hex. Switch opens as float approaches the retaining ring and closes as the float approaches the hex at the opposite end.

Contact closes when gap between float and hex is not less than .125/3.18 and reopens when gap is increased to not more than .250/6.35. The characteristic differential between open and closed states is .030/.762.

MATERIA	LS OF CONSTRUCTION
10-782-PP	(Gray & black)Polypropylene
10-782-AC	(Red) Acetal
10-782-KR	(Natural) Kynar PVDF

MODES OF FAILURE

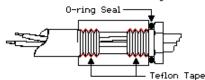
Stuck closed contacts are symptomatic of welded contacts. Contacts will weld and then stick whenever the power switched is greater then the reed's ability to handle the load. Any stick is indicative of a catastrophically damaged, overloaded reed contact. Reed switch contacts are vulnerable to such damage when subjected to reactive loads. When switching solenoid and relations to such damage submodel and relations of the submodel of the submode reactive loads. When switching solenoid and relay coils, include arc suppression in your circuit. See "Is Arcing Present" in Tech Note section in this catalog.

Stuck open contacts are symptomatic of a stressed or otherwise broken switch. Avoid dropping the switch or bending it during the installation process. PAGE 202

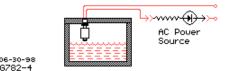
10s can be mounted in drilled and tapped bulkheads, ERECTA SWITCH accessories, 1/8 NPT pipe fittings or fasten to brackets using the jam nut provided. Whatever the method, reliable operation will require space be available for float movement, the stem be free of stress and moisture be prevented from entering the leadwire egress.



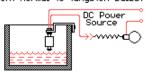
Installations must include provisions to keep moisture out of the product. Unless you are using redundant O-ring sealed ERECTA SWITCH accessories, wetted threaded connections should be sealed with Teflon tape. The use of an O-ring face seal is a redundant measure that will enhance reliablity.



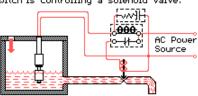
PUC, Polypropylene or fiberglass lids and bulkheads are easily drilled and tapped using common hand tools. ERECTA SWITCH accessories permit hole saw, poke—in and flange mounting as well. This installation shows a 10 controlling an LED indicator at line voltage. The resistor limits the current through the LED.



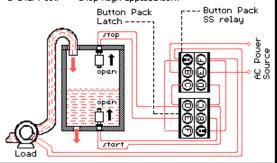
Incandescent bulb controlled by level switch. Current limiting resistor subdues the high in-rush current normal to tungsten bulbs.



ERECTA SWITCH component sets make it possible to position 10s anywhere in a tank. Here an arc suppressed switch is controlling a solenoid valve.

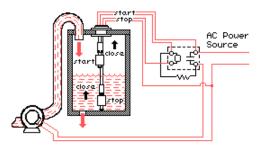


Two 10s and a BP SS relay offer an inexpensive method to achieve wide differential control. Here's a start low - stop high application.



PAGE 203

Our ERECTA SWITCH part sets make multi-level switch applications quick and easy. Here, two 10s are comb-ined with our ERECTA SMITCH wiring receptacle, flange nut, extended stem sets and AC Solid State relay. The single circuit AC Solid State relay is latched "on" through the resistor after the start circuit is completed.



WHAT YOU GET Series 10 ERECTA SWITCH products are packaged in tenpacks. In many instances the box is an essential part of the product's production tooling. It is the part of the product's production tooling. It is the source for lot identification, approval agency marks as well as providing protection against shipping abuses. (We do not authorize out of the box sales or shipment of these products.) The smallest unit offered for sale is one box/package containing ten pieces. I.E.; when you purchase six of our 10-782-PP tenpacks you receive six boxes containing sixty suitches.

ERECTA CONSTRUCTION COMPONENTS

ERECTA SWITCH parts and sets are described on the pages that follow. Parts and part set application ratings are usually the same as that stated for the Series 10 switching device. However, when ratings do differ, applicable information is included in the dimensional matters. ional graphic.

PARADO¥?

You bet, You can pay more but you can't get better. Exploiting this benefit is a "cinch" if you do these things:

- Make sure our product's construction is compatible with your chemistry and environment.
- Check your electrical load/circuit. Do what's necessary to prevent zapping the reed switch. Consider contact protection or an appropriate interface load handling relay.
- If this is your first experience using a reed switch device . . . do your homework. Learn a little about how they work, their characteristic advantages and limitations. Used correctly, "reeds" are a marvel of reliability.

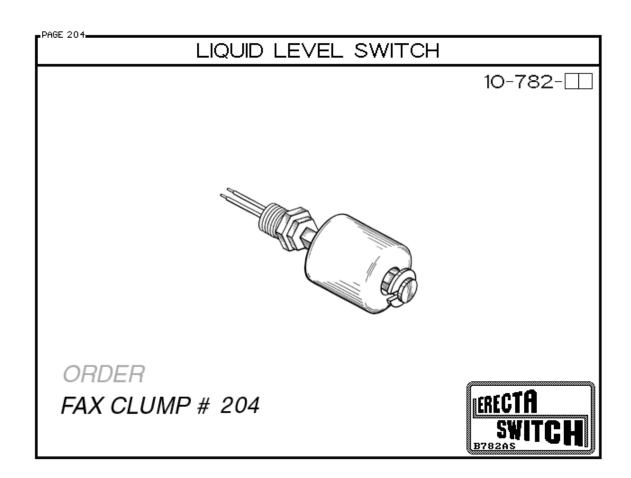
FEATURES:

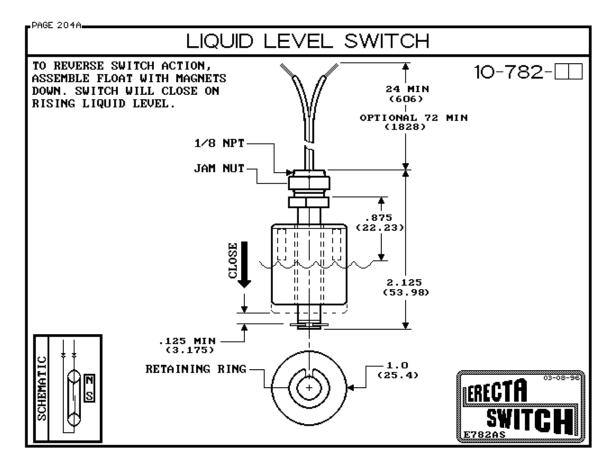
- Unbeatable cost/function ratio.
- Precision components throughout.
 Manufactured under "smart system" controls.
 Reliable, "sealed-in glass" contacts.

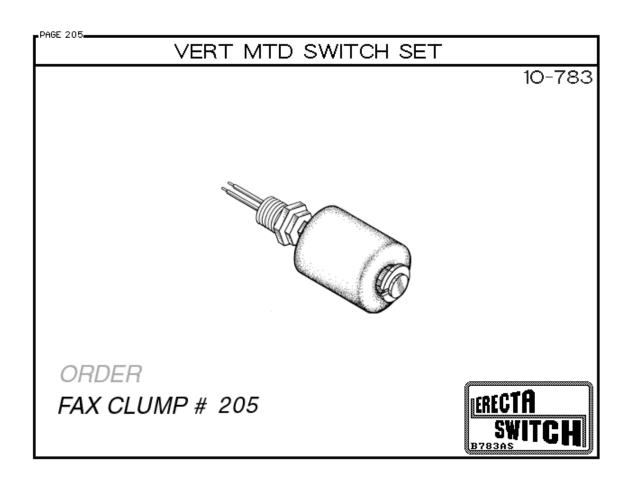
- Very small size.
 Can be mounted in any plane.
 Switches small solenoid valves, lamps and relays.

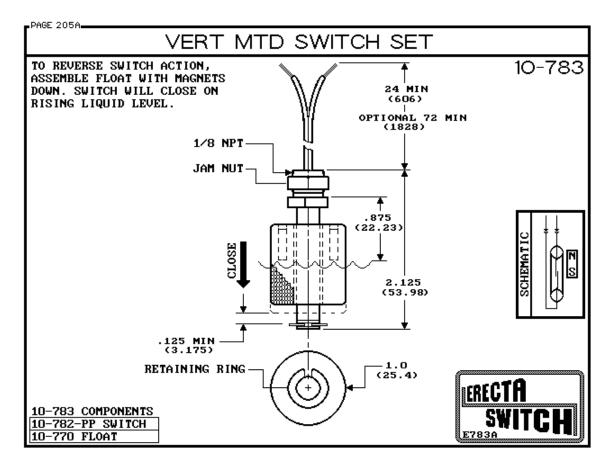
SCHEMES

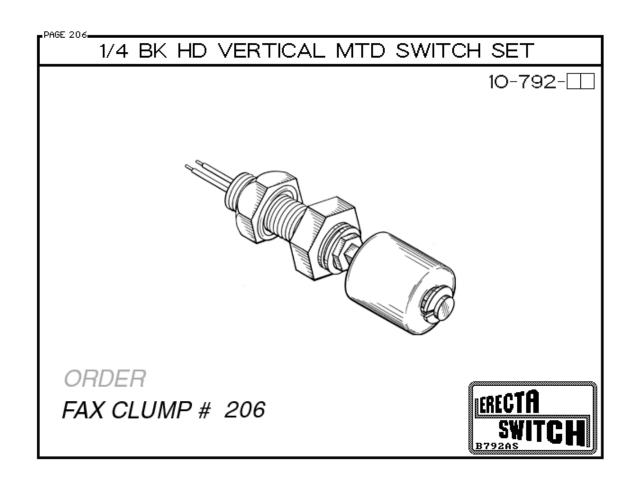
Scheme graphics show schemes to use ERECTA SWITCH construction components rather than a purchasable product. In other words, Schemes show ways to use and combine components to satisfy a particular operational or mounting situation. Schemes present logical instrument construction possibilities and their dimensional and installation characteristics. Constituent construction elements are stated in the lower lefthand corner of the graphic. The reader must extract the appropriate set and subset infor-mation from the Scheme and then order the parts or sets required to implement the scheme.

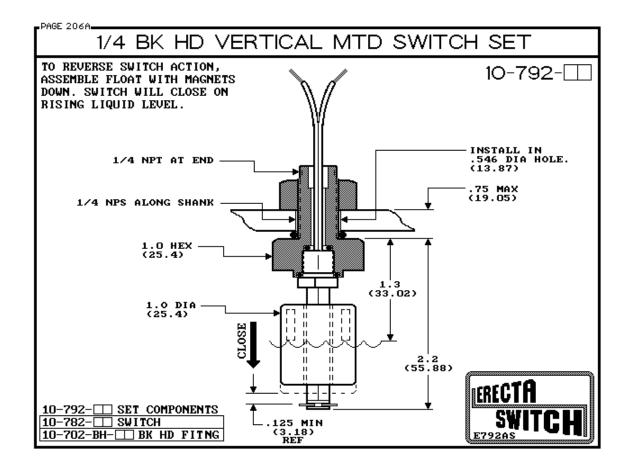


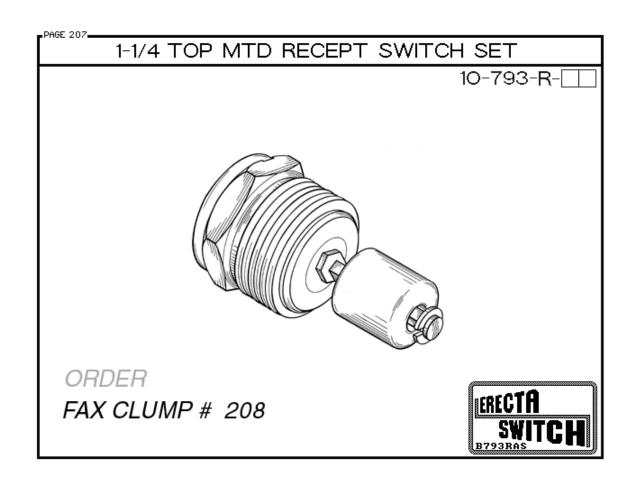


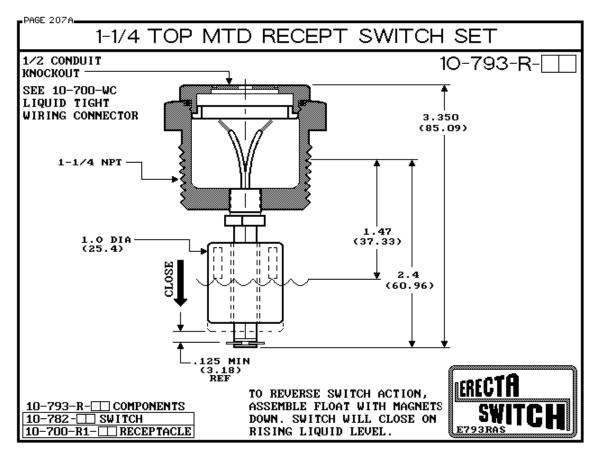


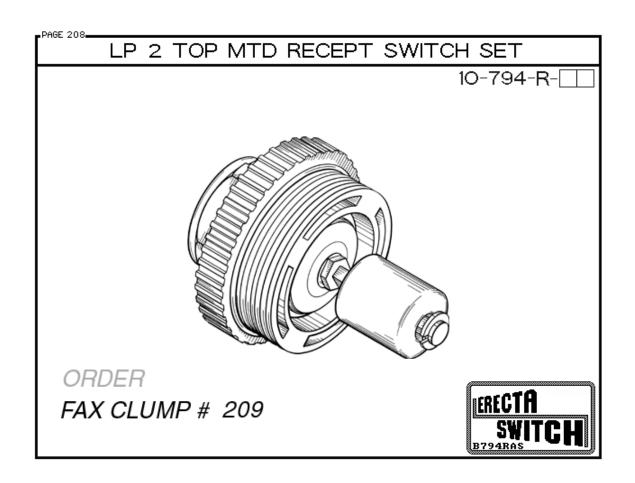


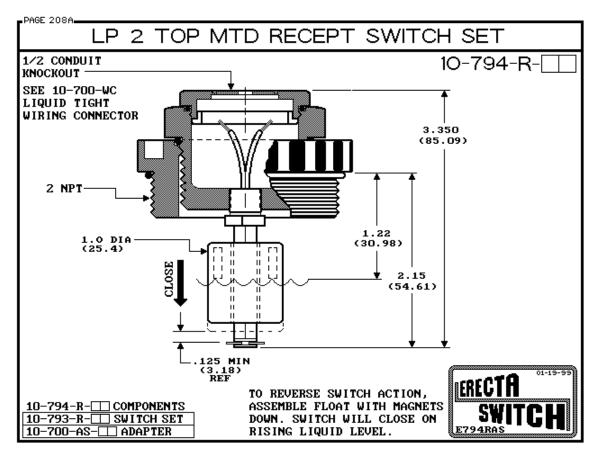


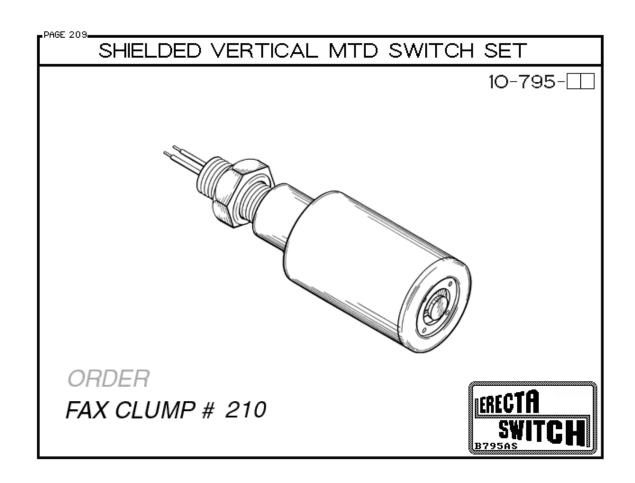


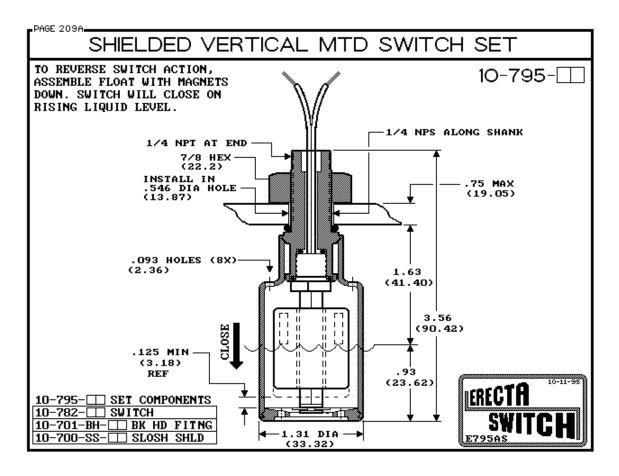


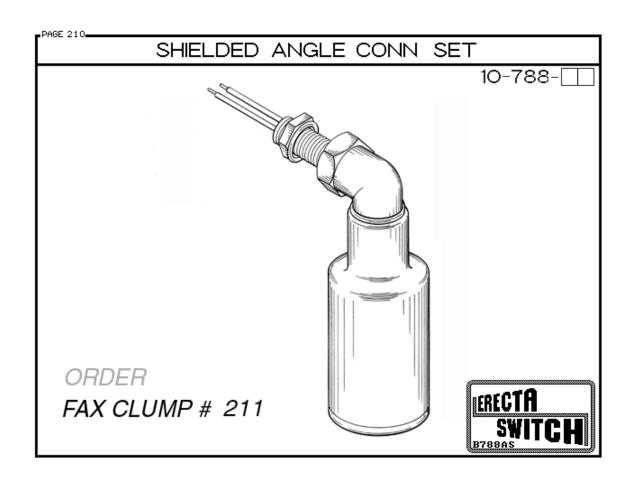


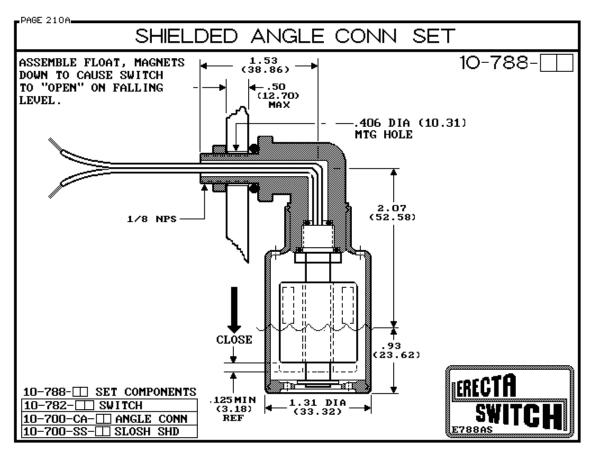


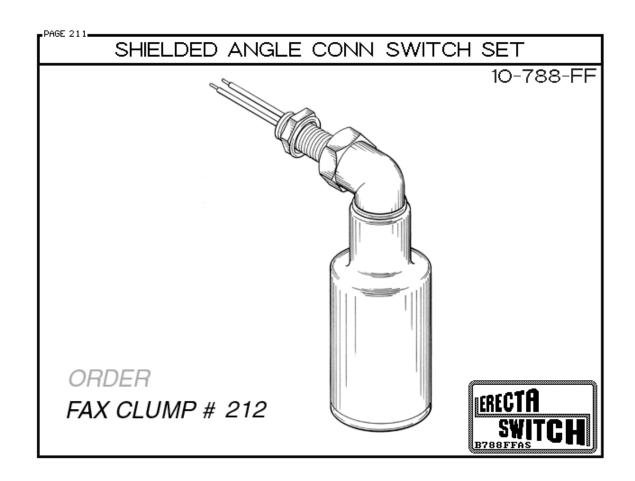


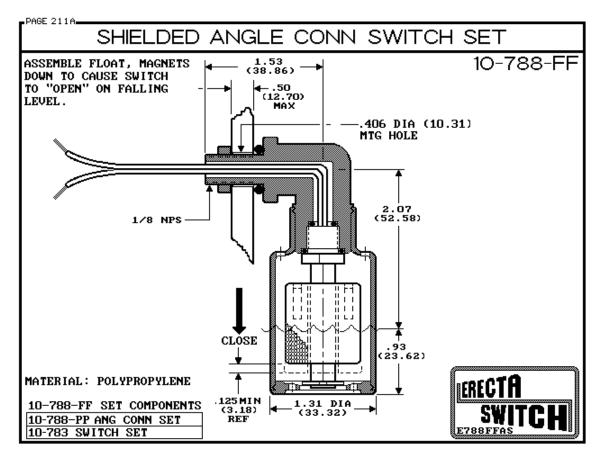


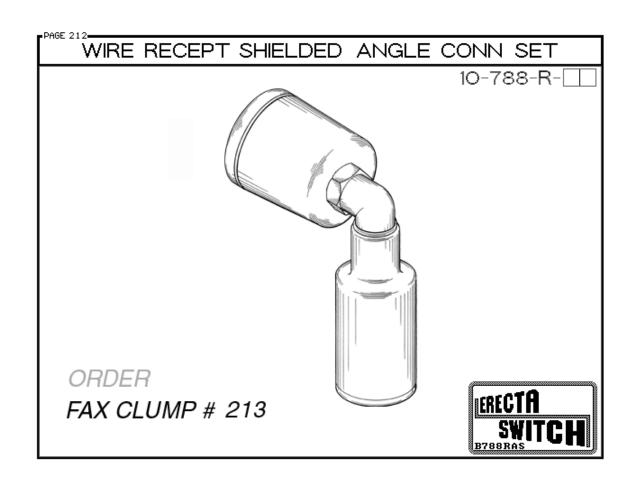


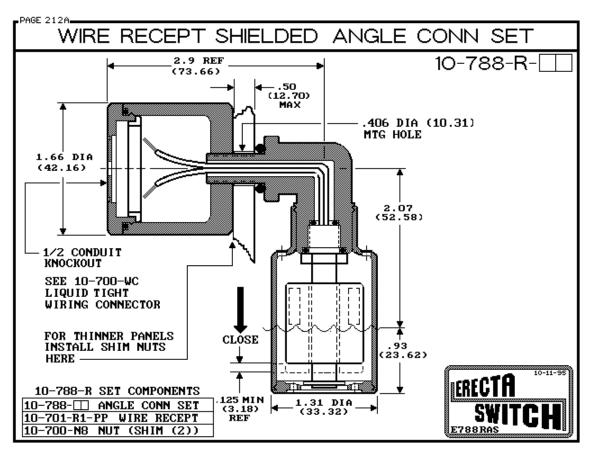


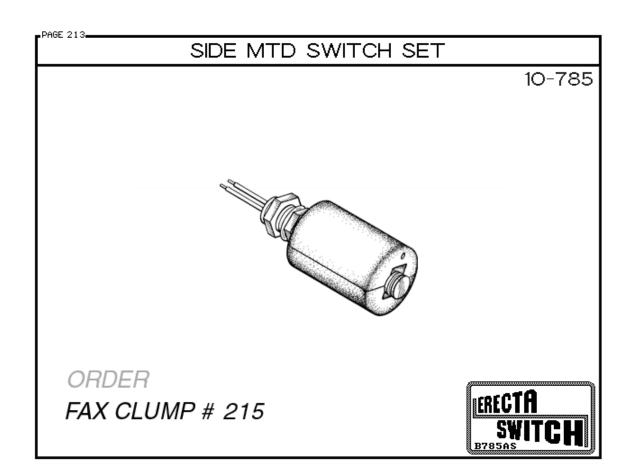


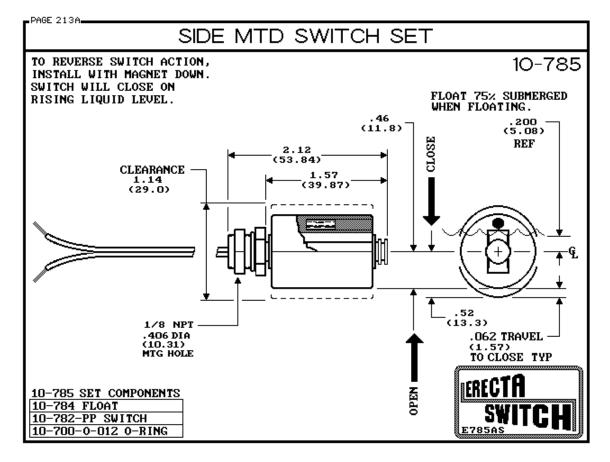


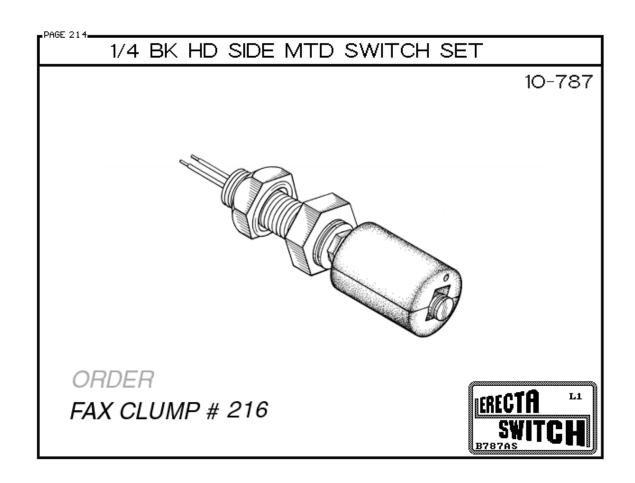


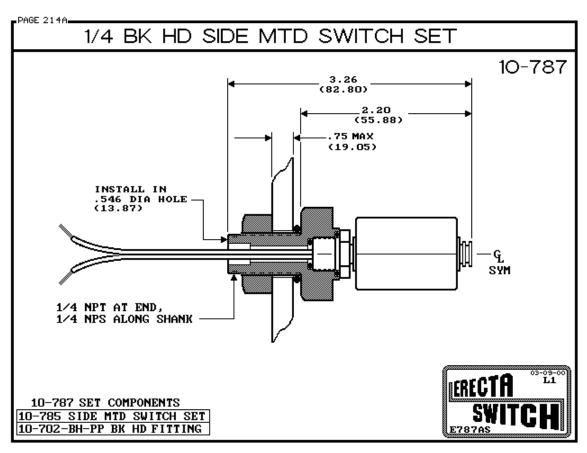


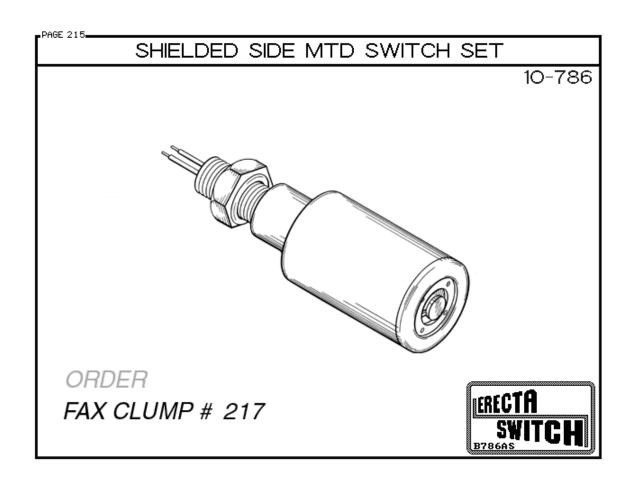


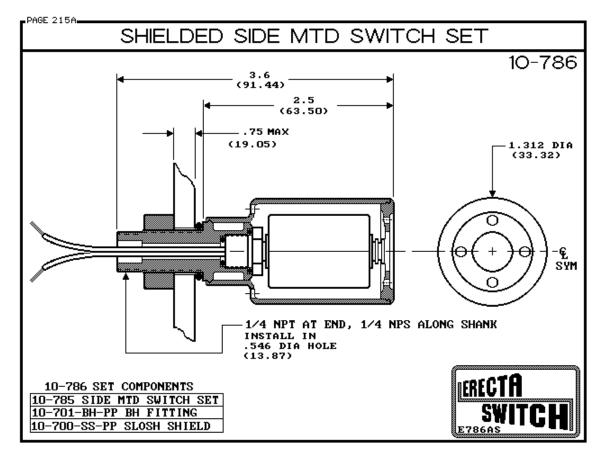


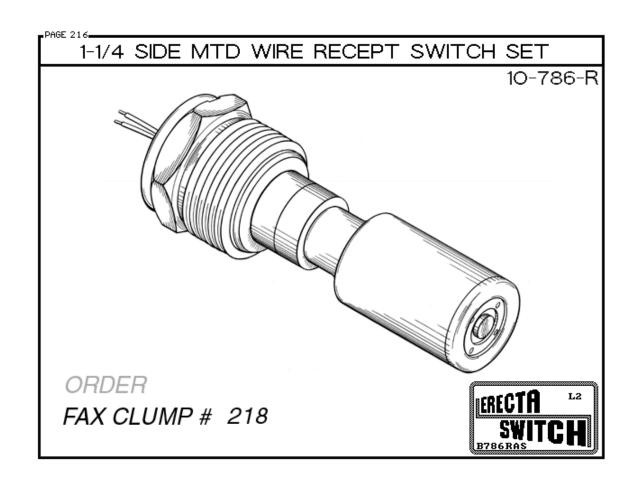


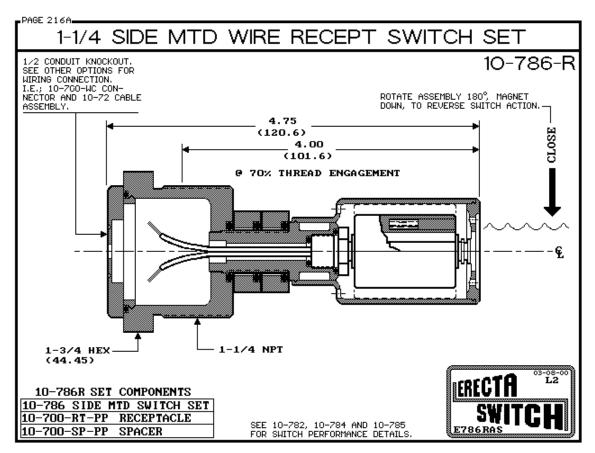


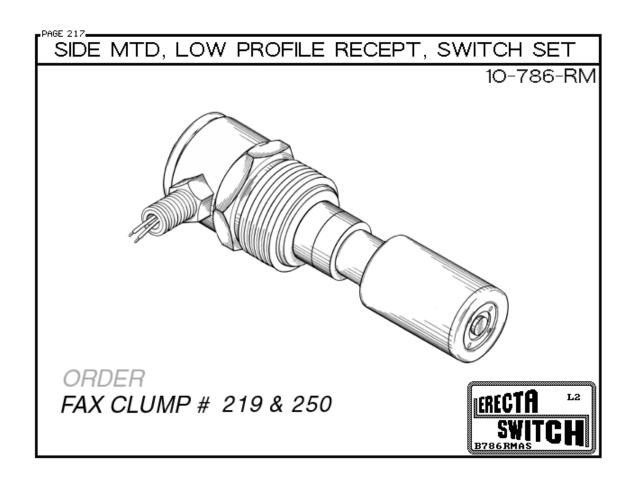


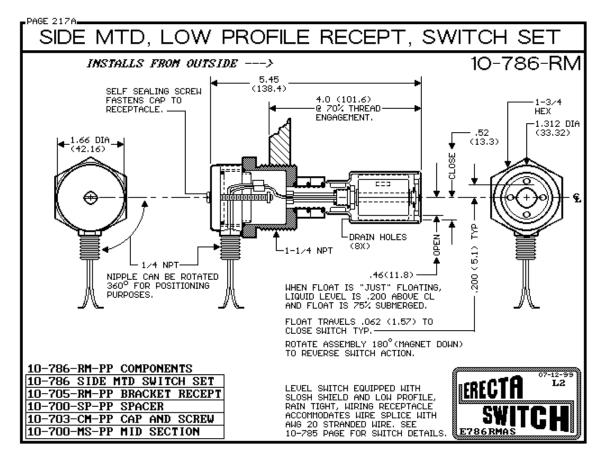


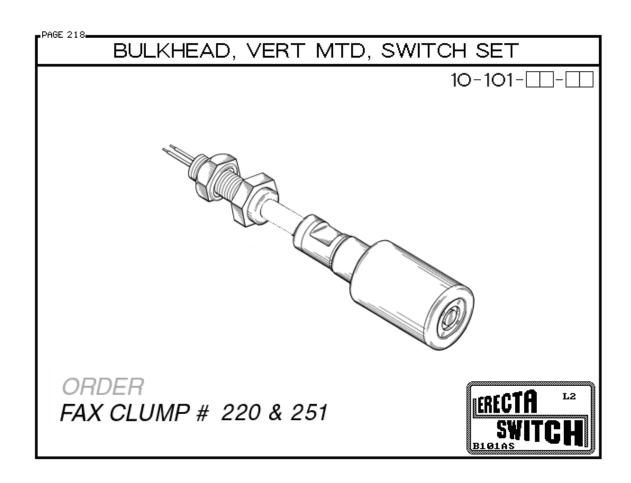


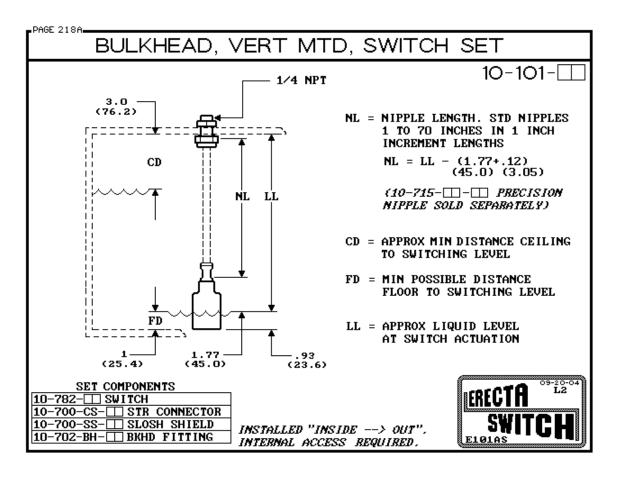


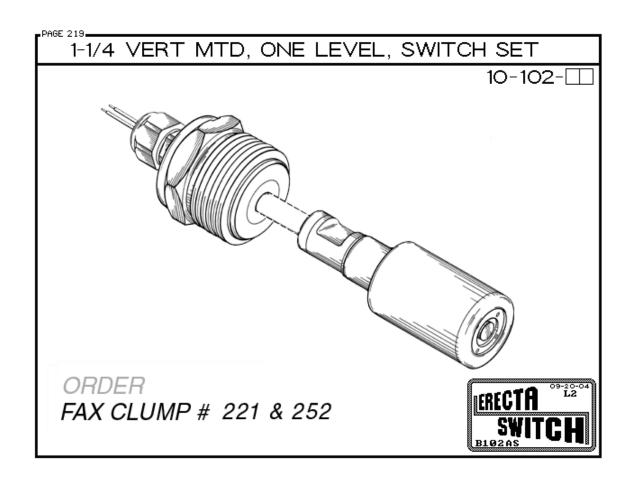


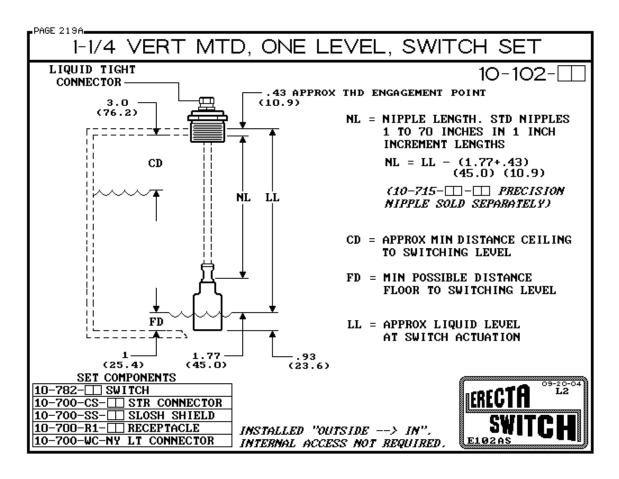


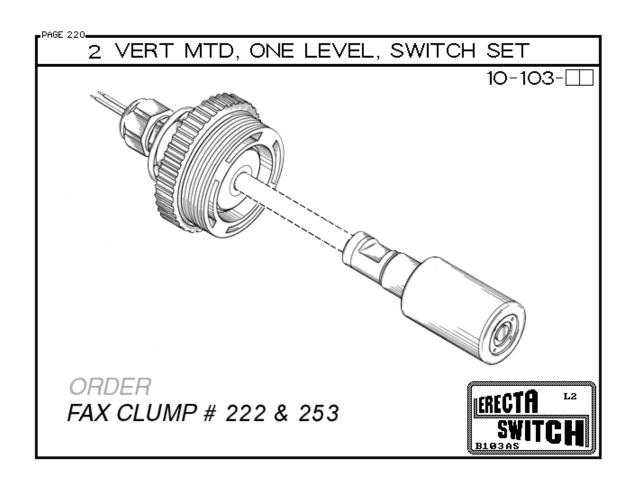


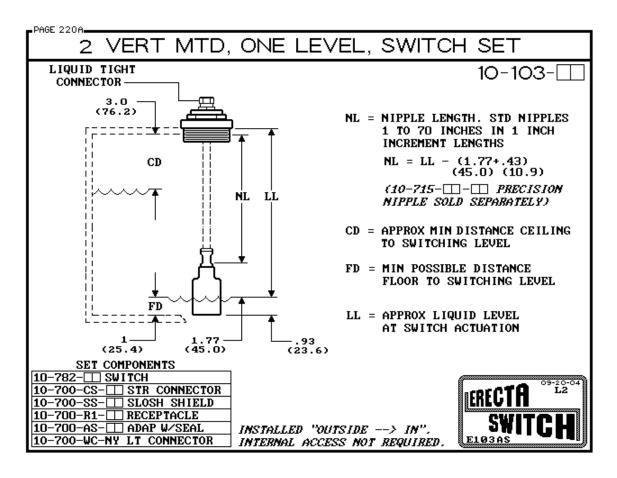


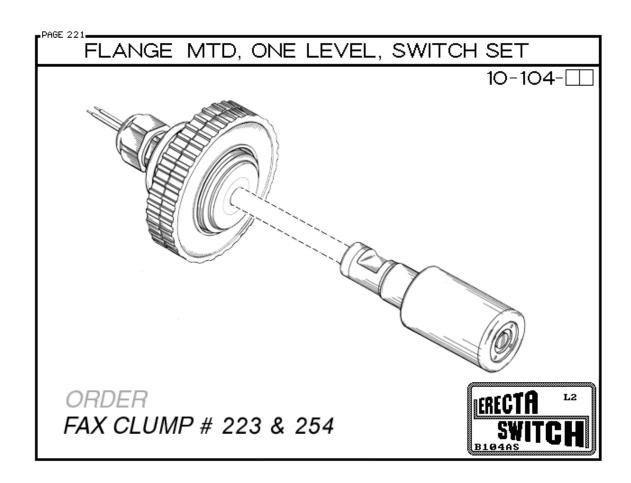


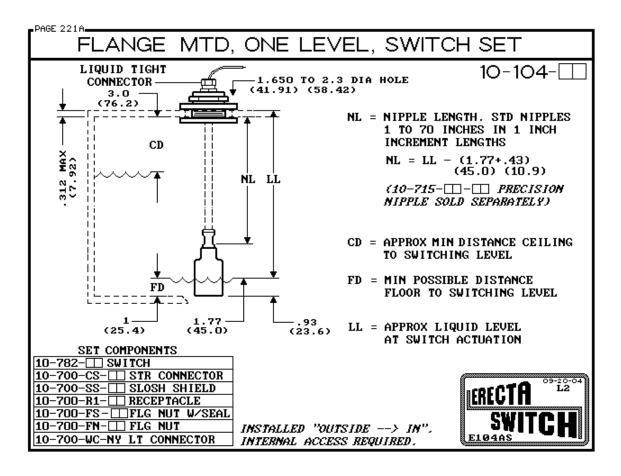


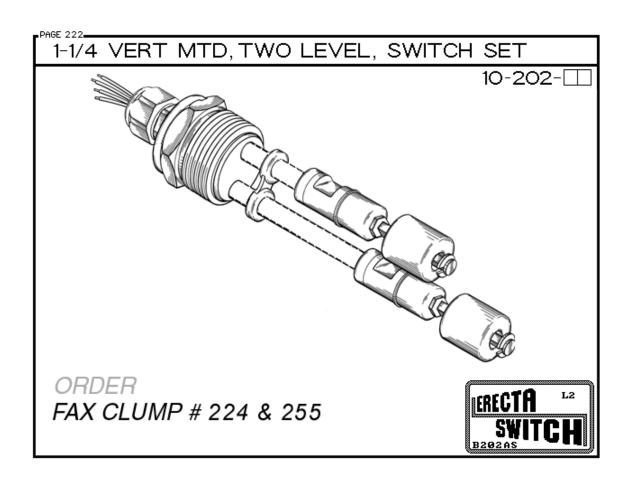


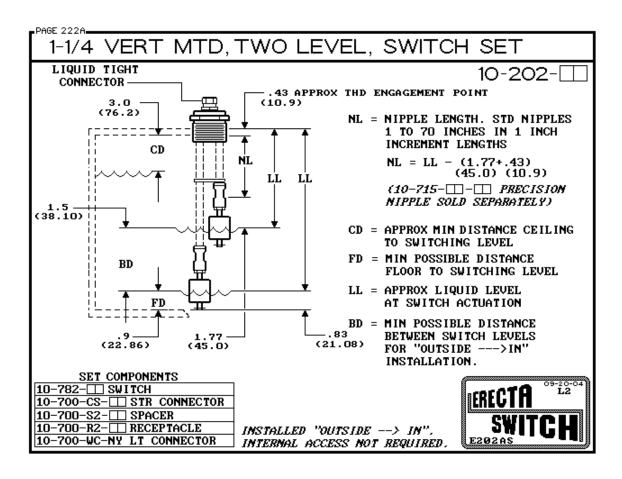


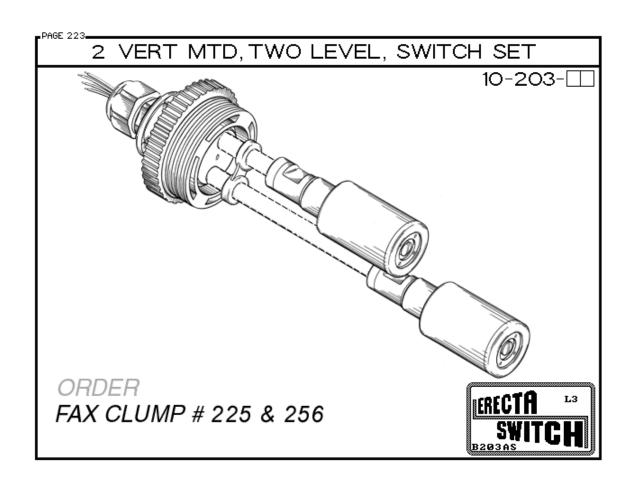


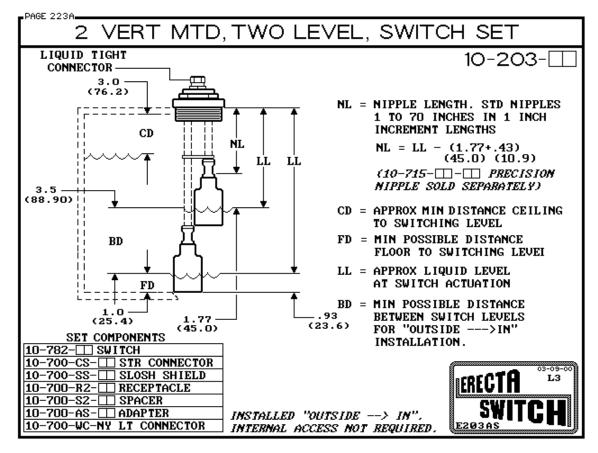


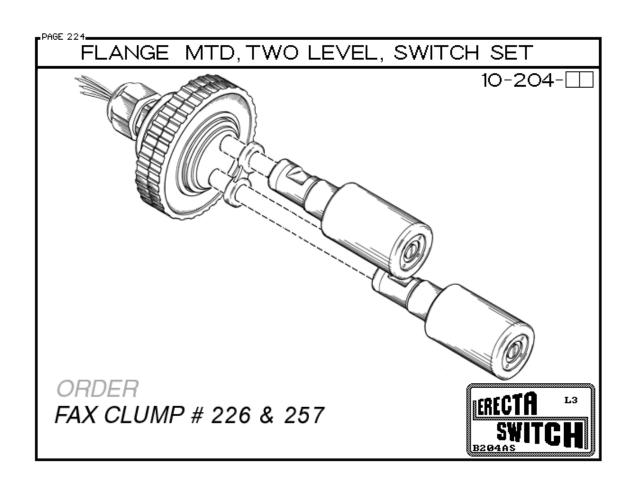


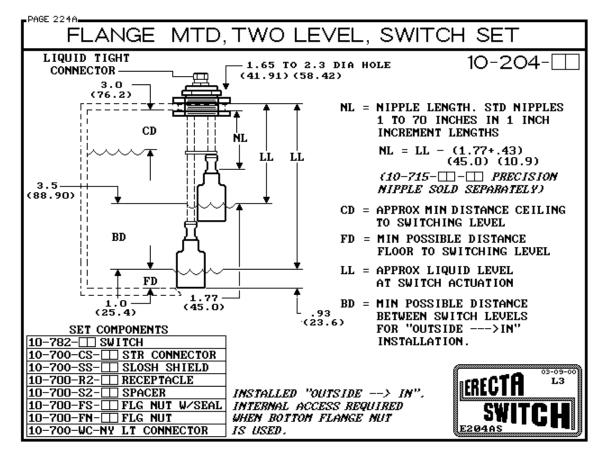


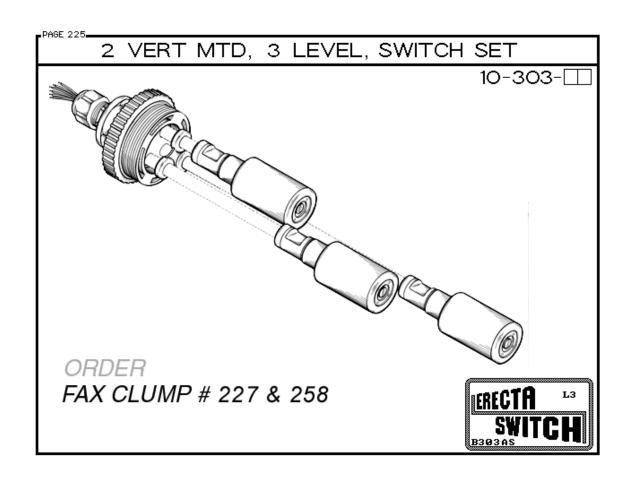


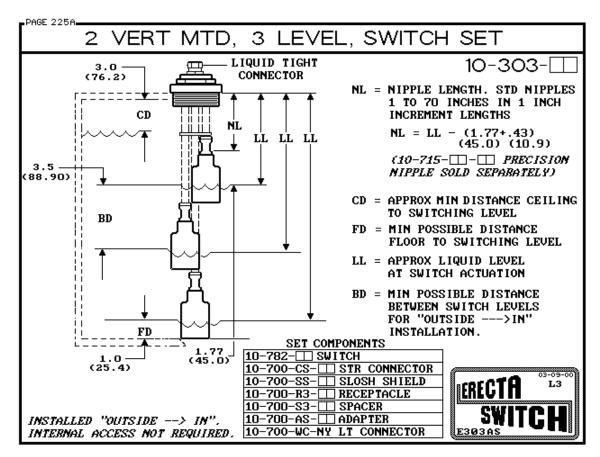


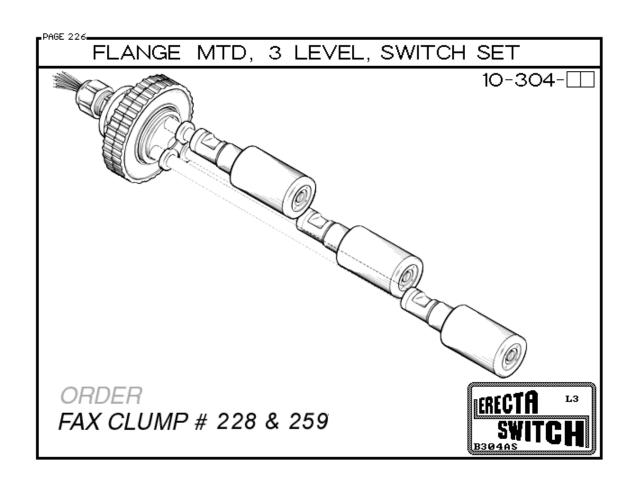


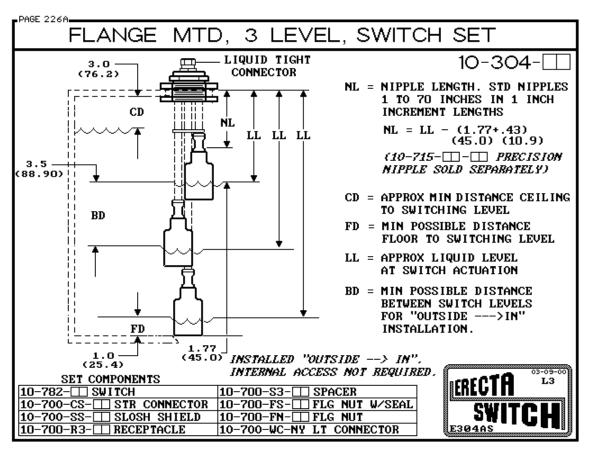


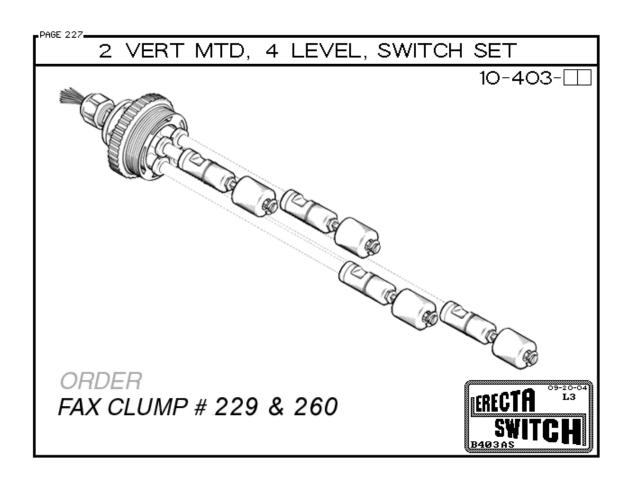


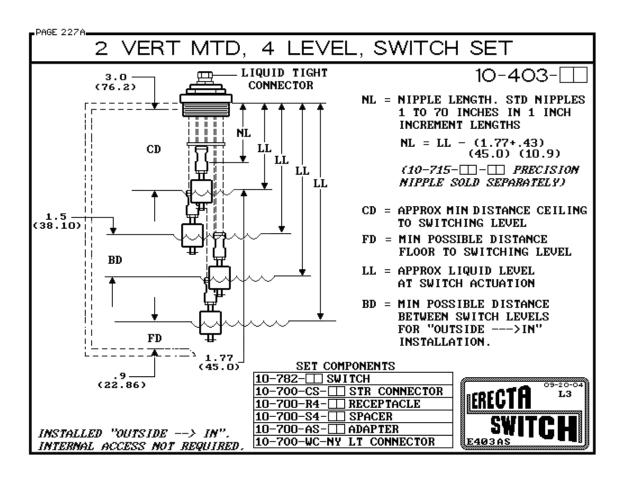


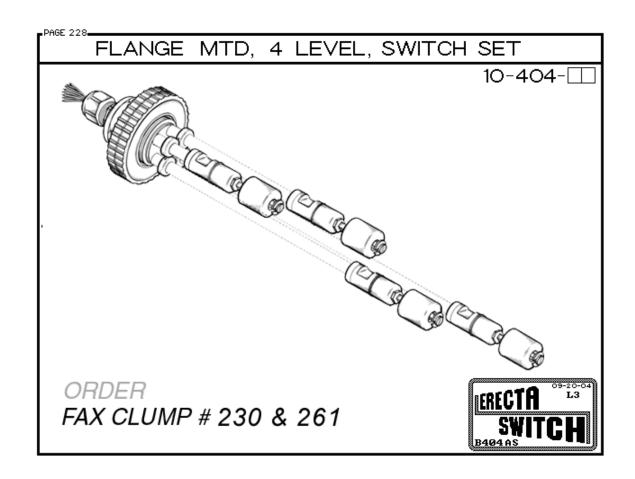


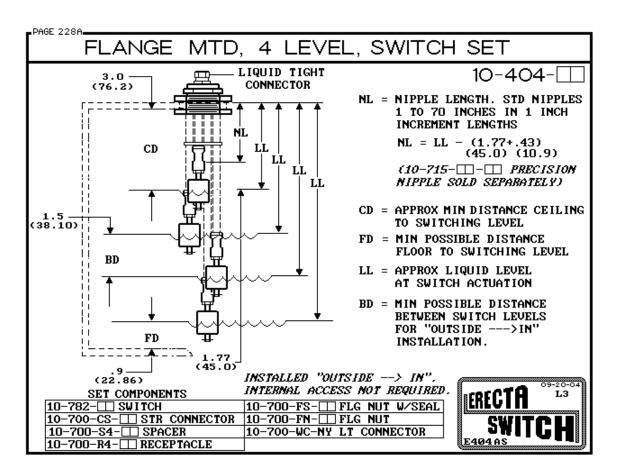


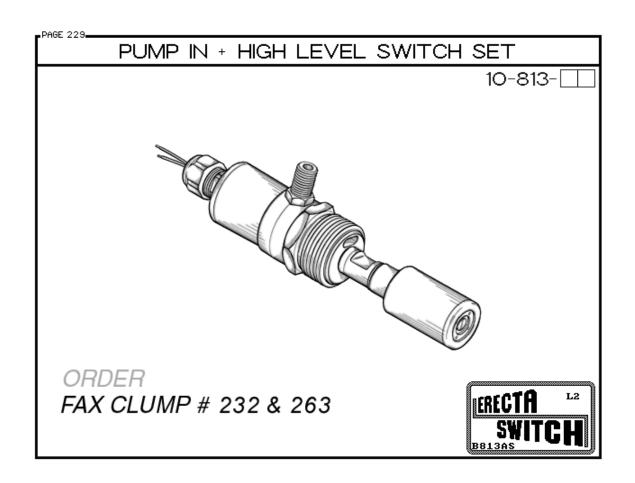


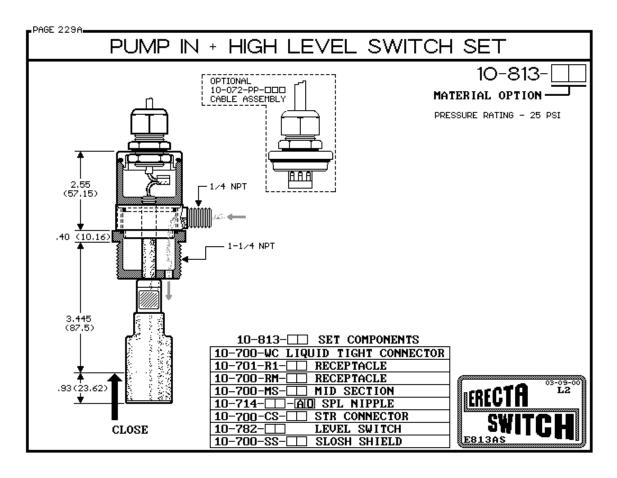


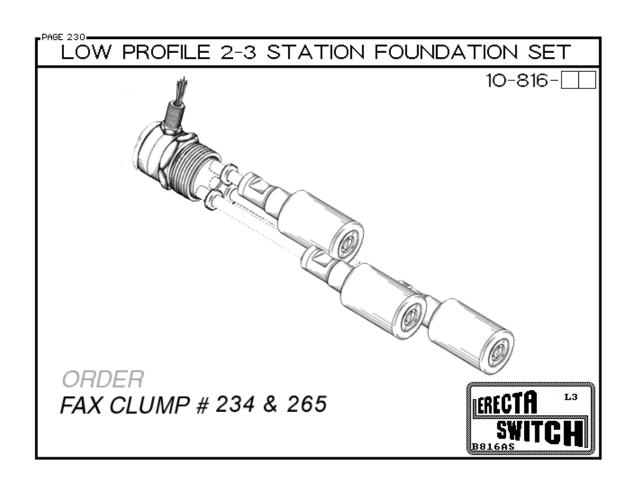


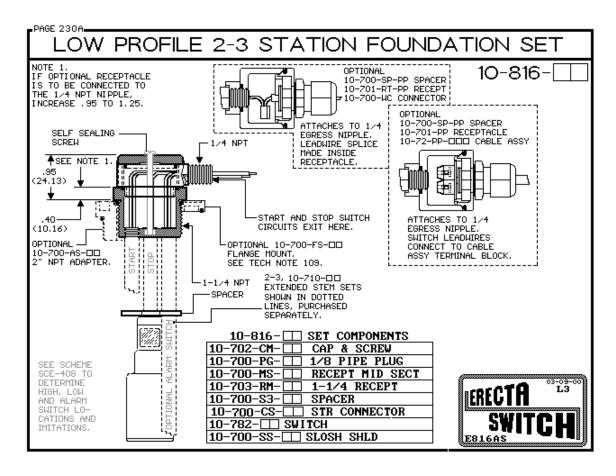


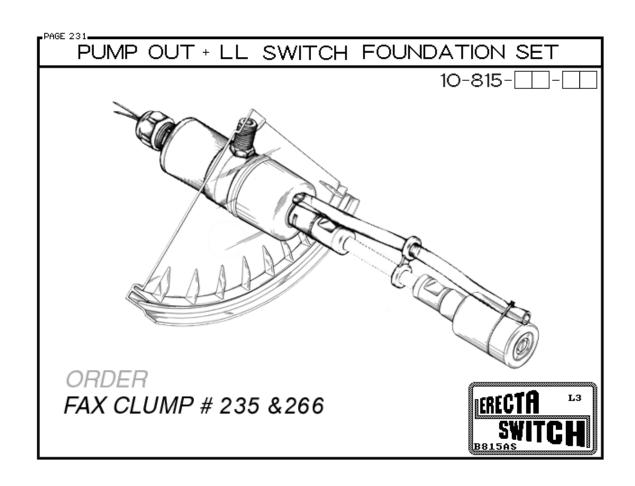


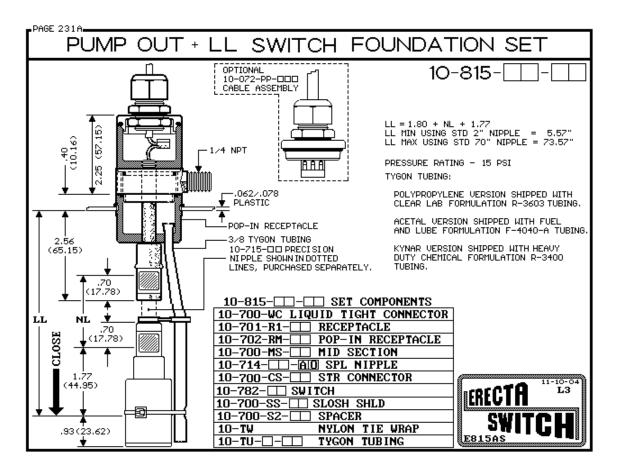


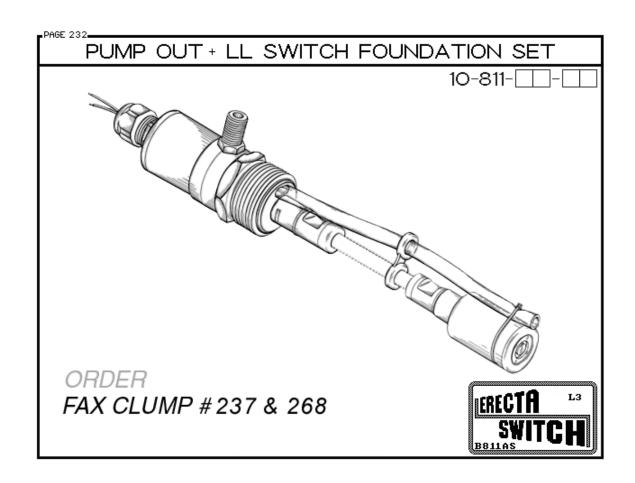


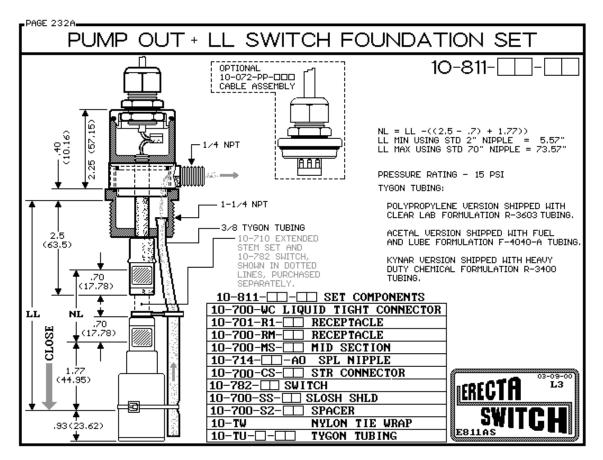


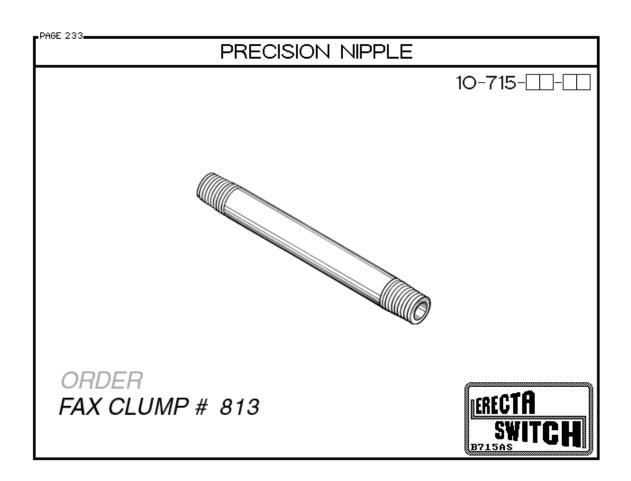


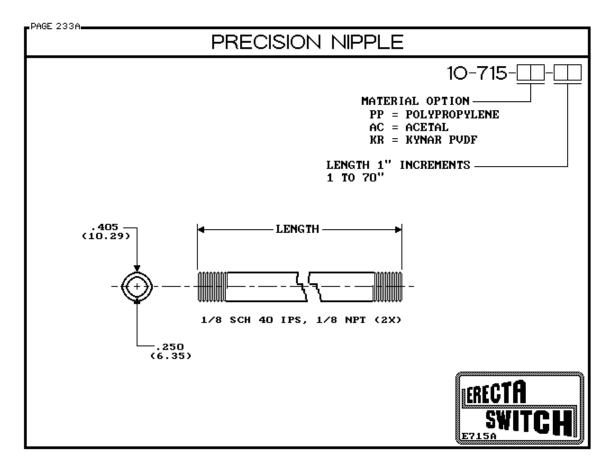












PAGE P2										
SEF	RIES	S 10	LIC	QIUÇ	LEVEL	. SWITCH	H P	RIC	ING	
10-782-00	TEN	IPACK	NET PR	RICES		10-793-R-00	Т	ENPACI	K NET	PRICES
	QTY	PP	AC	KR			QTY	PP	AC	KR
		113.67 98.68 48.14	142, 15 123, 13 60, 21	289, 73 255, 82 221, 80 108, 35 102, 81		Co.	1-2 3-4 5-9 10-14 15-19 20-XX	179, 75 162, 04 73, 79	255.82 224.74 202.89 92.26 92.26 84.44	460, 24 404, 60 364, 39 166, 06 166, 06 152, 69
10-783	TEN	IPACK	NET PR	RICES		10-794-R-00	Т		K NET	PRICES
	QTY						QTY	PP	AC	KR
	1-2 3-4 5-9 10-14 15-19 20-XX	1 1	63, 34 48, 23 19, 22 84, 22 72, 82 61, 29				3-4 5-9 10-14 15-19	293, 53 255, 82 117, 69 117, 69	418.73 367.00 320.16 147.15 147.15 139.32	660, 52 575, 33 264, 84
10-792-00	TEN	IPACK	NET PR	RICES		10-795-00	Т	ENPAC	K NET	PRICES
	QTY	PP	AC	KR			QTY	PP	AC	KR
	3-4	195.07 169.64	243.86 212.46	497. 63 438. 94 381. 56 180. 30			3-4 5-9 10-XX 15-19	248, 87 215, 18 101, 83 101, 83		634.01 559.89 483.93 229.19 229.19 215.83
Effective 10-01-0	05									PSER1 <i>0</i> -1

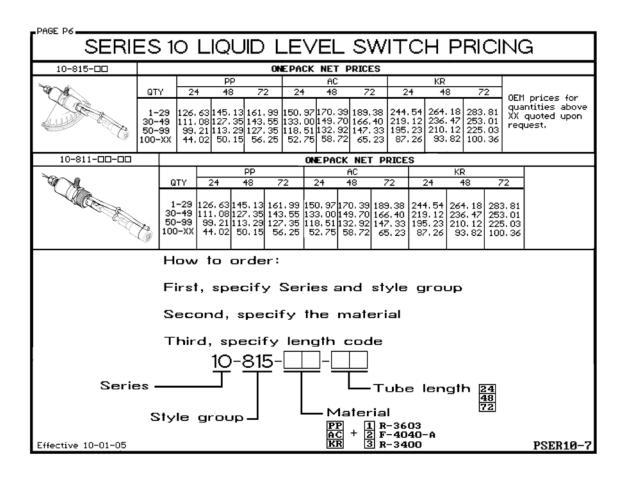
PAGE P2A SE	RIES	S 10	LIC	QID	LEVEL	SWITC	H PI	RIC	NG	
10-782-00	ONE	PACK I	NET PR	ICES		10-793-R-00	01	NEPAC	NET	PRICES
	QTY	PP	AC	KR			QTY	PP	AC	KR
			16.92 14.65	34, 50 30, 45 26, 40 12, 90 12, 24		E.	1-29 30-49 50-99 100-149 150-199 200-XX	21.40 19.29 8.79 8.79	30. 46 26. 76 24. 15 10. 98 10. 98 10. 05	54.79 48.17 43.38 19.77 19.77
10-783	ONE	PACK	NET P	RICES		10-794-R-00	0		NET	PRICES
	QTY						QTY	PP	AC	KR
	1-29 30-49 50-99 100-149 150-199 200-XX		19. 45 17. 65 14. 19 10. 03 8. 68 7. 30			(Co.	1-29 30-49 50-99 100-149 150-199 200-XX	30. 46 14. 01 14. 01		89. 68 78. 63 68. 49 31. 53 31. 53 29. 94
10-792-00	ONE	PACK	NET PR	RICES		10-795-00	0	NEPACI	NET	PRICES
	QTY	PP	AC	KR			QTY	PP	AC	KR
	1-29 30-49 50-99 100-199 200-XX	23, 22 20, 20 9, 54	32. 93 29. 03 25. 29 11. 93 10. 99	59. 24 52. 26 45. 42 21. 46 20. 80			1-29 30-49 50-99 100-149 150-199 200-XX	12.12	37.04 32.06 15.16 15.16	75. 48 66. 65 57. 61 27. 28 27. 28 25. 69
Effective 10-0:	-05									PSER10-2

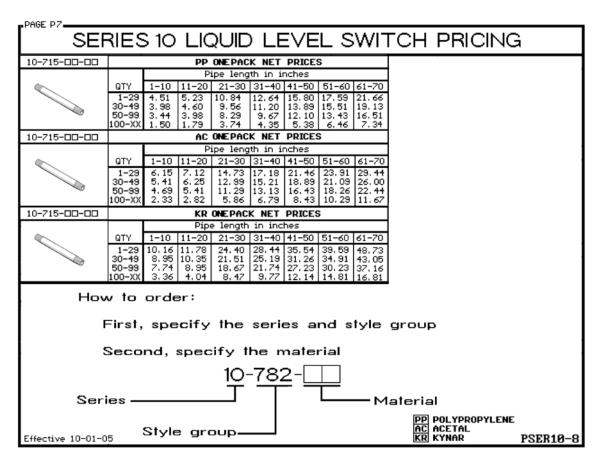
_PAGE P3							
	RIES	10 LIC	QUD	LEVE	L SWITCH	1 PF	RICING
10-788-00	TENPA	ACK NET PR	ICES		10-785	TEN	PACK NET PRICES
	QTY	PP AC	KR			QTY	
	3-4 24 5-9 21	76, 36 345, 38 43, 21 304, 19 10, 28 262, 56 99, 55 124, 44	547, 29 472, 95			1-2 3-4 5-9 10-14 15-19 20-XX	163.34 137.36 119.22 84.22 72.82 62.38
10-788-FF	TENPA	ACK NET PR	ICES		10-787		PACK NET PRICES
1	QTY	PP				QTY	
	1-2 3-4 5-9 10-XX	310.81 277.78 230.82 124.22				1-2 3-4 5-9 10-14 15-19 20-XX	255, 72 229, 64 190, 19 116, 17 104, 76 93, 24
10-788-R-DD	TENDA	ACK NET PR	TOFO		10-786		PACK NET PRICES
10-788-K-LLL	QTY	PP AC	KR			QTY	
	1-2 35 3-4 3: 5-9 22	56.23 438.84 12.88 390.36 76.80 344.94 26.93 158.24	796.34 699.65 618.68	10-01-05		1-2 3-4 5-9 10-14 15-19 20-XX	316.35 283.43 235.71 137.91 126.49 114.98
					10-786-R		PACK NET PRICES
				:tiv		QTY	
				PSER10-3 Effective		1-2 3-4 5-9 10-14 15-19 20-XX	418, 29 374, 27 315, 70 176, 70 162, 04 150, 52

_PAGE P3A								
SE	RIES	3 10	LIC	QIUQ	LEVE	L SWITCI	H PF	RICING
10-788-00	ONE	PACK N	NET PR	ICES		10-785	ONE	PACK NET PRICES
The same of the sa	QTY	PP	AC	KR			QTY	
	1-29 30- 1 9 50-99 100-XX	31.80 27.53	45, 23 39, 83 34, 39 16, 29	71.67 61.92			1-29 30-49 50-99 100-149 150-199 200-XX	
10-788-FF	ONE	PACK N	NET PR	ICES		10-787		PACK NET PRICES
1	QTY		PP				QTY	
	1-29 30-49 50-99 100-XX	3	40, 70 36, 38 30, 23 16, 27				1-29 30-49 50-99 100-149 150-199 200-XX	
						10-786	ONE	PACK NET PRICES
10-788-R-□□	QTY	PACK N	NET PR			calls	QTY	
	1-29 30-49 50-99 100-XX	46.65 40.98	51.12 45.17	81.02	0-01-05		1-29 30-49 50-99 100-149 150-199 200-XX	41. 43 37. 11 30. 87 18. 06 16. 57 15. 06
	100 ///	10.02	20.72	37.11	Ó		200-XX	10.00
		10.02	20.72	37.11	1	10-786-R		PACK NET PRICES
		10.02	20.72	37.11	Effective 10	10-786-R		

■PAGE P4											
SEF	RIES	10 L	LIQU	JID	LEVE	_ SWITCH	1 PF	RICII	ΝG		
10-786-RM	ONE	ONE PACK NET PRICES				10-104-00			ONE PACK NET PRICES		
	QTY						QTY	PP	AC	KR	
A Carried	1-29 30-49 50-99 100-XX	69 62	. 49 . 82 . 24 . 49				1-29 30-49 50-99 100-XX	67.47 59.07	94.05 90.18 72.00 33.05	177.52 161.02 139.34 63.44	
10-101-00		ONEPACK	NET P	RICES		10-202-00	ON	EPACK	NET P	RICES	
	QTY	, bb	AC	KR			QTY	PP	AC	KR	
	1-2 30-4 50-9 100->	9 42.50 9 36.83	60.36 53.15 46.08 21.54	108. 6 95. 6 82. 8 38. 7	55 85		1-29 30-49 50-99 100-XX	82.21 72.62		224, 49 194, 65 170, 13 78, 66	
10-102-00		ONEPACK	NET P	RICES		10-203-00	ON	EPACK	NET PR	ICES	
The carried to	1-2 30-4 50-9 100->	9 55.52 9 48.74 9 43.64	58.88	129.3 119.3 104.9 47.6	₩¥₩ 10-01-0€			101.62 96.82	AC 155, 69 137, 02 118, 98 55, 70	259.84	
10-103-00	_	ONEPACK			Effective	10-204-00	ON	EPACK	NET PE	RICES	
***	QTY	PP	AC	KR			QTY	PP	AC	KR	
A COLOR	1-2 30-4 50-9 100->	9 63.65 9 55.92	88.37 77.52 67.98 31.35	167.7 146.1 132.5 60.5	'2 .4 1 .6 6	Carl Aug	30-49	108.66 102.78	165, 85 145, 83 126, 42 58, 45	316.86 275.68 237.86 110.31	

PAGE P5										
SERI	ES	10 L	LIQU	JID L	EVE	L SWITCH	1 PF	RICII	NG	
10-303-00	ON	EPACK	NET PR	RICES		10-813-00	ON	EPACK	NET P	RICES
	QTY	PP	AC	KR]		QTY	PP	AC	KR
A Carlotton	30-49	112.70	181.31 159.45 138.69 65.05	341, 40 300, 23 260, 07 121, 24			50-99	95, 23 83, 66 75, 30 27, 71	116.28 102.21 91.84 40.92	195. 86 176. 40 158. 19 70. 69
10-304-00	QTY	PP	AC	KR	1	10-816-00	ON	EPACK	NET P	RICES
*0.00					1	1	QTY	PP	AC	KR
"On the Contraction	30 -1 9	133.57 118.66	191. 47 168. 26 146. 14 68. 33	359, 66 316, 07 273, 48 127, 14			30-49	135.89	192.90 170.72 150.14 69.47	347.27 305.60 270.37 124.92
10-403-00	ON	EPACK	NET PR	RICES]					
	QTY	PP	AC	KR]					
OFFICE STATES	1-29 30-49 50-99 100-XX	133.53 117.03	187.77 164.95 144.22 67.50							
10-404-00	ON	EPACK	NET PR	RICES	1					
	QTY	PP	AC	KR	1					
OFFICE OFFICE OF THE STREET	1-29 30-49 50-99 100-XX	140.57 122.99	197. 91 173. 76 151. 67 70. 77	371.27 326.01 302.83 131.55						
						Effective	e 10-01-	-05	PS	ER10-5







Series 10-800 temperature switches are low cost, slow response sensor switches useful for OEM applications where the detection of cold or high temperature limits is required. The product can sense temperature from freezing to 90C, in six narrow differential, preset trip points. SPST contacts actuate when the element's case reaches its preset temperature set point.

10-715---

10-782-



making possible many low cost, efficient solutions to otherwise complex control problems.

> 10-800----10-700-CS-

10-800s are creep mechanisms (having no built-in differential) and are characterized by slow make/ slow/break and rapid cycling capability. As a result they are suited for both control and limit applications.

The suitch is not a snap acting device. So the potential for rapid cycling in certain situations must be taken into account. Similarly, the thermal lag caused by poor thermal conductivity of the plastic sheath limits the device to temperature changes which occur over several seconds/degree change. A time lag of 120 seconds is not uncomon for 60 degree change when immersed in water. As is the case with all Compac products, final design criteria should be based on your testing of our products, in your application, at your facility.

10-700-CS-□□

10-800 Temperature Switch

The sketches shown here depict 10-800 temperature and 10-782 liquid level switches assembled to ERECTA SMITCH extension components. Here's a combination that can solve water level control requirements where hot or cold extremes are of concern.

G800-1A

PAGE 236.

HODES OF OPERATION

Normally open and normally closed versions are available. Normally open is designated as type "C and closes its contacts on rising temperature.

Normally closed is designated as type "C" and opens its contacts on rising temperature. Contact form designation and fixed temperature set point code letter, is embossed on the hex of the assembly.

(Pepi 1 Contacts op	ype C) en on rise	(Pepi Tupe CR) Contacts close on rise		
Temperature Set Point ^O C	Identity Code Letter	Temperature Set Point ^O C		
0-5	A	0-5	I	
40	В	40	J	
50	С	50	K	
60	D	60	L	
70	E	70	М	
80	F	80	N	
90	G	90	0	
100	ш	100	0	

E	ELECTROAL RATING						
	6 AMP, 120V, 60 Hz, Resistive Pepi (R) Models C and CR Portage Electric Products, Inc. North Canton, OH 44720						
Reactive Load	5 AMP 120V, 60 Hz Inductive						
DC	2 AMP MAX @ 240 VDC Resistive						

MATERIA	ALS OF CONSTRUCTION
10-800-PP-	(Gray) Polypropylene
10-800-AC-	(Red) Acetal
10-800-KR-□	(Natural) Kynar PVDF

APPLICATION ENVIRONMENT						
Pressure	50 PSI MAX @ 20°C	Derate, Zero @ 90°C				
Temperature	120°C MAX					

THE BAD NEWS

Bi-metallic thermal sensing switches are not the best choice when fast response sensing is required. At best, even when optimum heat transfer conditions exist, the miniature, bi-metal switch sensor element, requires the miniature, bi-metal switch sensor element, requires substantial time to respond to temperature changes. Response rate is further aggravated by the plastic sheath enclosure and thermal barriers which exist between the inside of the sheath and the metal case of the bi-metal switch element. Clearly, 10-800s are best suited for applications in which temperature change occurs slowly. I.E.; detecting the approach of freeze conditions. Or, detecting the approach of excessive temperature in large mass mediums.

Response rate will be affected by the nature and mass of the medium surrounding the fluted area of the device. Liquid mediums will generally result in faster heat conduction. Keep in mind, before the bi-metal switch will operate, the sheath mass must attain the temp-erature of the surrounding medium. Then, transfer the temperature through internal thermal barriers and finally, to the metal case of the switch element. Since this may take several seconds per degree temp erature change, temperature overshoot can be expected and should, therefore, be included when considering this product.

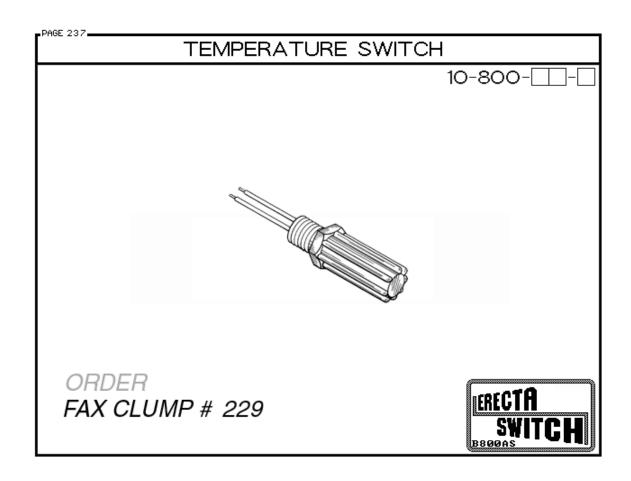
THE GOOD NEWS

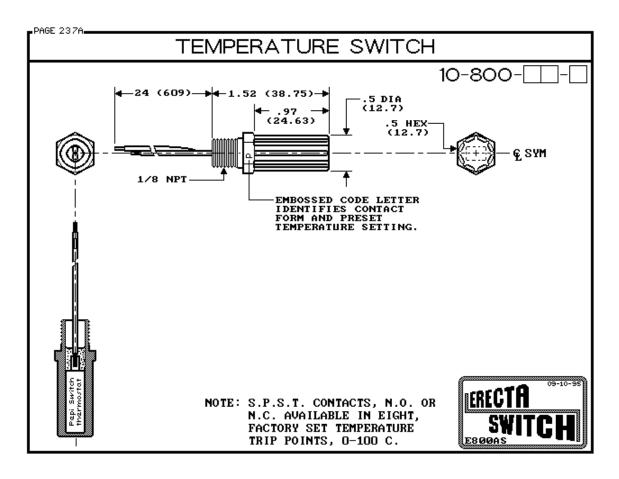
THE GOOD NEWS
Here's an affordable thermostat, packaged for use in either gas or liquid. Its small, handles pilot loads at line voltage and can be mounted in a variety of ways. Moreover, it can be combined with other ERECTA SUITCH components so just about any mounting requirement is possible. And, it can be used in conjunction with our level switches, wiring receptacles, relay housings and beepers in compact, cost effective assemblies.

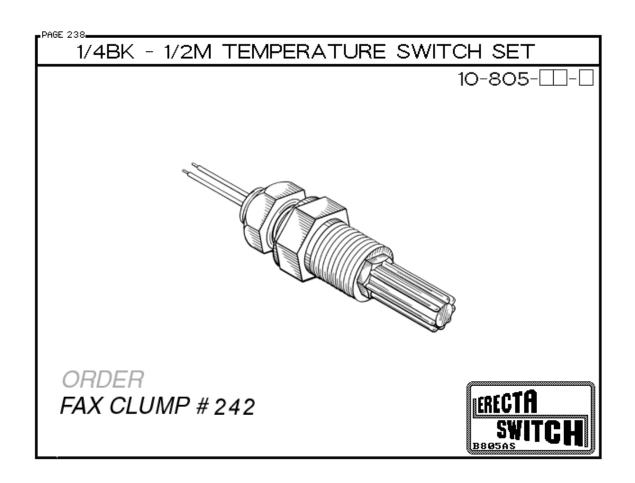
Within the limitations discussed above, 10-800s are unmatched. No other switch offers as much for less. And, each switch is 100% tested to assure quality and

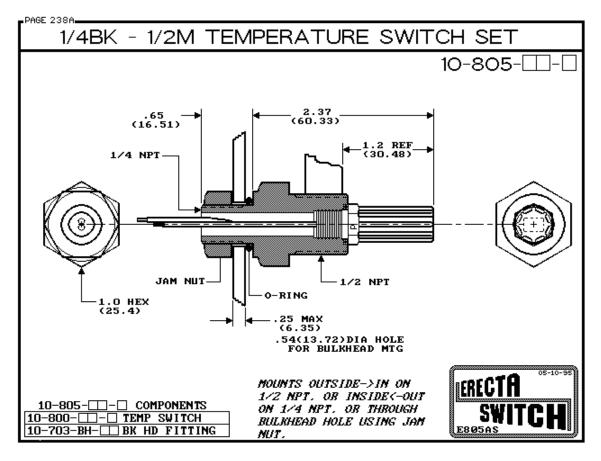
* UL component recognition applies to the Pepi switch thermostat. Observe applicable electrical codes when using this product.

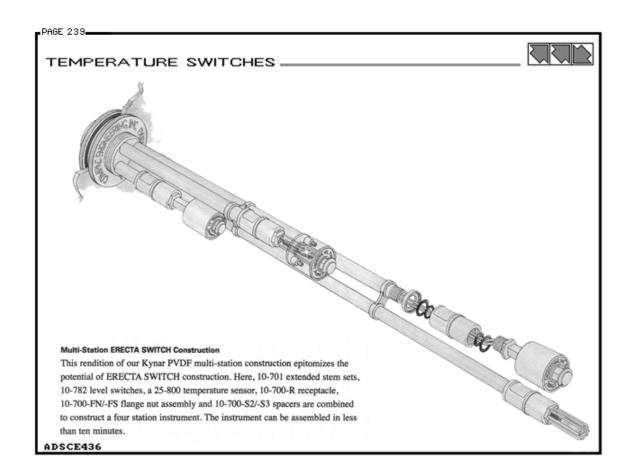
C800-2

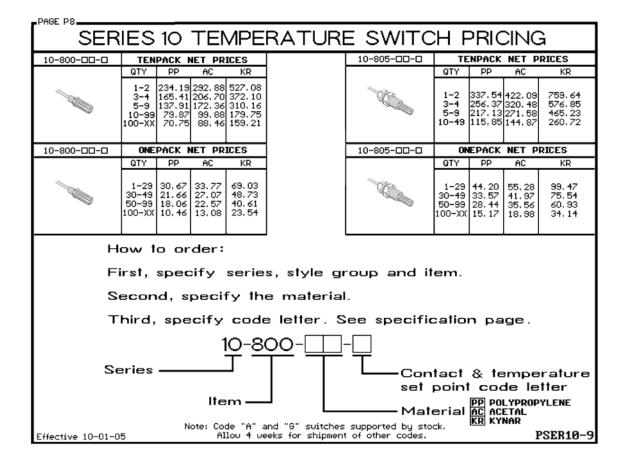












variety of ERECTA SWITCH components extend the choices of installation possibilities. Low cost, weather resistant wiring receptacles provide the place to connect wires. Liquid tight connectors, thread adapters, beeper alarms, and control relay housings (control heads) make up the Series 15 ERECTA SWITCH product group. Used alone or with ERECTA SWITCH components, 15's are the efficient answer for just about any OEM side mount requirement.

This is the quintessential "float - switch" sensor. The simple solution to small tank level sensing problems.

G650-1A

PAGE 301=

MODES OF OPERATION

The switch action of the 15–650 can be configured for either normally open or normally closed switch action depending upon the orientation of the unit at the time of installation. An orientation arrow symbol is molded into the hex. "Up arrow" denotes float is above the unit's centerline. Conversely, down arrow" denotes float is below the unit's centerline.

CONTAC	CONTACT CONDITION VERSUS FLOAT POSITION							
WET	DRY	ARROW	ABOVE ©	BELOW ©				
0pen	Closed	Up	Х	-				
Closed	0pen	Down	-	Х				

POINT OF OPERATION IN SPECIFIC GRAVITY 1.0								
Contact closes as level rises	Contact opens as level falls	Float arc envelope						
(*)		+						
.12 (3.04)	.87 (22.2)	1.75 (44.65)						

TRIP POINT (DRY STATE BEHAVIOR)

NORMALLY CLOSED

Contact opens when gap between float heel and hard point is not less than .015/.381 and recloses when the gap between the clevis floor and close hard point is not less than .015/.381. The characteristic diff-erential between closed and open states is .50/12.7 arc excursion.

NORMALLY OPEN

Contact closes when gap between clevis floor and closed position hard point is not less than .015/.381 and reopens when the gap between float heel and open hard point is not less than .015/.381. The characteristic differential between open and closed states is .50/12.7 arc excursion.

POINT OF OPERATION

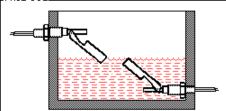
The point at which the changing liquid level will cause switch actuation is relative the unit's center line and the specific gravity of the liquid. Forces acting on the float change over the arc of its excursion and as a function of whether or not the float is above or below the unit's center line. These phenomena are inconsequential when the unit is constant within its rated parameters. is operated within its rated parameters.

	ELECTRICAL RATING			
OKI TM OKI Sensor Device Corporation				
	Complete OKI Reed Switch Databook available at http://www.osdc.co.jp/			
Contact rating			*,50W* *Resistive ensor Device Corporation	
UL file E70063			Switch Model ORD229 193-8550, Japan	
Max Swi	tching V	oltage	300AC, 350DC	
Max Switching Current		urrent	AC 0.5AMP*, DC 0.7AMP*	

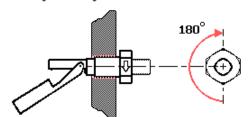
MATERIALS OF CONSTRUCTION				
15-650-PP	(Gray) Polypropylene			
15-650-AC	(Red) Acetal			
15-650-KR	(Natural) Kynar PVDF			

APPLICATION ENVIRONMENT				
Pressure (Hollow float)	50 PSI MAX @ 20°C	Derate, Zero ❷ 90°C		
Temperature	90°C MAX			
Specific Gravity	.8 MIN	Clear Liquid		
Position Extreme	15° Cant MAX	Off center		

* UL component recognition applies to the OKI switch Model ORD229. Observe applicable electrical codes when using this product.

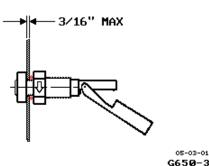


15-650s are equipped with two mounting threads. Its 1/2 NPT thread is intended to enable "outside" ->"in" mounting. In such installations, the available 1/4" thread may be useful connecting ERECTA SWITCH wiring receptacles, audible alarms or conduit fittings. The 1/4" thread is useful for "inside" <- "out" mounting to threaded bulkheads. Tank bulkheads can be drilled and tapped accordingly. With teflon tape applied to the threads prior to assembly, mounting the unit on its own threads makes a clean, uncluttered installation. Drilled threads makes a Clear, uncludered installation of the and tapped mountings are advantages when bulkheads are between 1/2 to 3/4 inch thick. Tanks may be fabricated with threaded bosses to accommodate the level switch. The throat of such bosses may restrict float swing, thereby compromising reliable operation. Compac's ERECTA SMITCH 3/4 NPT adapter fitting eliminates this sectorial problem by providing greater clearance. Other potential problem by providing greater clearance. Other ERECTA SWITCH accessories permit 1-1/4 NPT, 2" NPT and flange mounting.



Whenever sealing is expected on tapered pipe threads, two wraps of teflon tape should be applied to the thread prior to installation. An effective seal will occur when the mating female thread is a "spec" thread and when the switch is installed with a minimum of four full turns after "hand tight" engagement and not more than five turns after "hand tight" engagement. In this case, more is not better. Excessive gagement in this case, more is not better. Excessive torque may ultimately be absorbed in the cold flow (stretch) of the plastic parts eventually causing seal degradation. Or, equally bad, the resulting stress may upset the magnetic properties of the sensing switch causing the switch to fail.

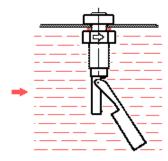
Small tanks are often fabricated of sheet metal or Small tanks are often fabricated of sheet metal or thin wall plastic making sealing on tapered threads impractical. Here, the best option is to punch a hole through the bulkhead and mount the device from the "inside <- "out" using the 1/4" thread, O-ring seal and jam nut provided. This method is suitable for bulkheads up to 3/16" thickness. ERECTA SWITCH flange mounting can also be applied to thin walled tanks. In all cases in which the vessel wall is sandwiched beall cases in which the vessel wall is sandwiched be-tween the sensing switch and jam nut (or flange), a hole of the correct size and smooth sealing surfaces are necessary for leak tight results.



PAGE 303.

The basic hinged design suggests many interesting liquid and air flow applications. The illustration below shows a 15-650 installed in an air duct. Applying the switch in this manner is also useful detecting water flow in open trenches, rivers etc. Considering the product's low cost and versatile mounting provisions, many practical applications having little to do with liquid level sensing will come to mind. Since little force is required to move the hinged float, detecting thread breakage, cam position etc. can be performed by the 15-650 at very low cost. Keep in mind, the many low cost ERRECTA SMITCH building block accessories greatly expand application possibilities by modifying mounting and electrical wiring characteristics. characteristics.

Series 5, 10, and 15 switch products use the same magnetic reed switch for the detection element. All are SPST switches intended to make or break a circuit, thereby switching a suitable electrical load. Diagrams showing popular relay applications presented elsewhere in this catalog are applicable to the 15-650 as well.



QUINTESSENTIAL . . . NOT INDESTRUCTIBLE

- Make sure our product's construction is compatible
- Make sure our product's construction is compatible with your chemistry and environment.
- Check your electrical load/circuit. Do what's necessary to prevent zapping the reed switch. Consider contact protection or an appropriate interface load handling relay.
- If this is your first experience using a reed switch device . . . do your homework. Learn a little about how they work, their characteristic advantages and limitations. Used correctly, "reeds" are a marvel of reliability.

FEATURES:

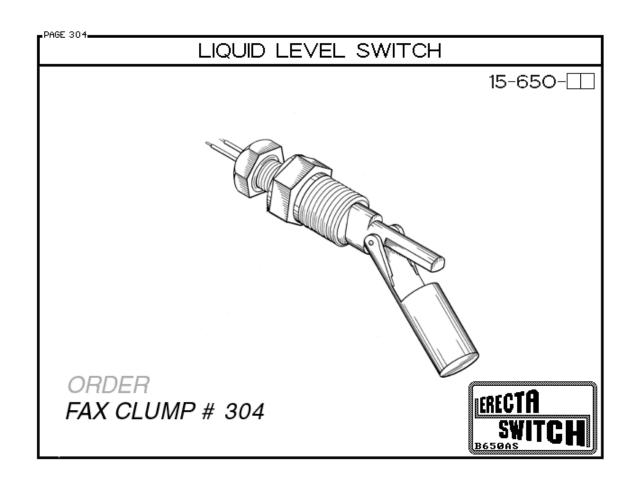
- Unbeatable cost/function ratio.
- Precision components throughout.
 Manufactured under "smart system" controls.
 Reliable, "sealed-in glass" contacts.

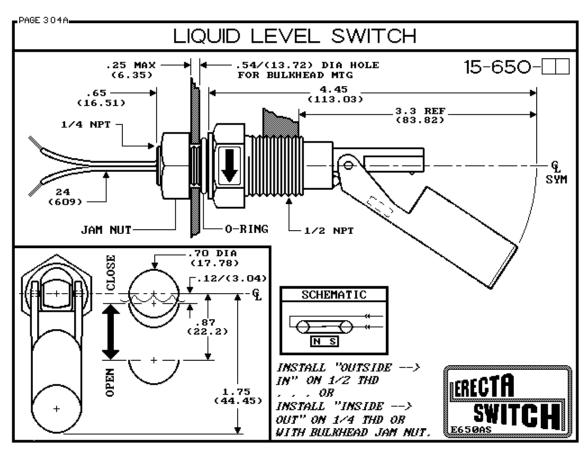
- Very small size.
 Suitches small solenoid valves, lamps and relays.
- Recognized under UL component recognition program.

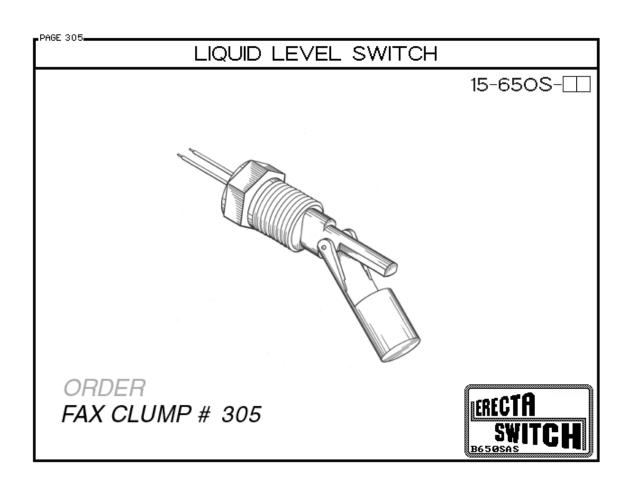
MODES OF FAILURE

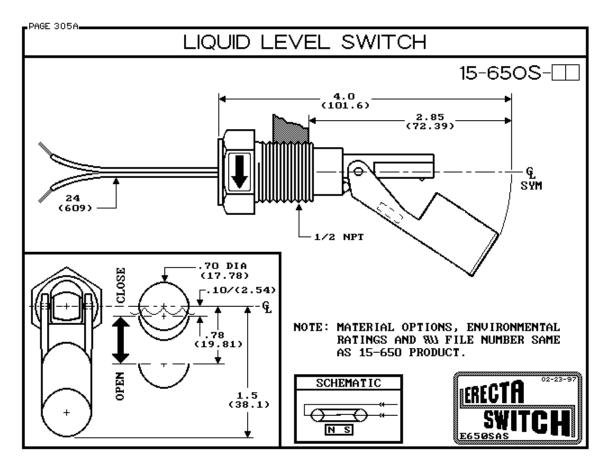
Stuck closed contacts are symptomatic of welded contacts. Contacts will weld and then stick contacts. Contacts will weld and then stick whenever the power switched is greater then the reed's ability to handle the load. Any stick is indicative of a catastrophically damaged, over-loaded reed contact. Reed switch contacts are vulnerable to such damage when subjected to reactive loads. When switching solenoid and relay coils, include arc suppression in your circuit. See "Electrical Interfacing" section in this catalog.

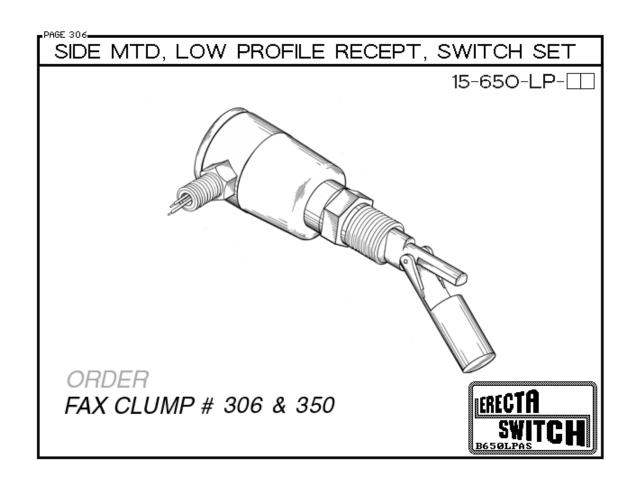
Stuck open contacts are symptomatic of a stressed or otherwise broken switch. Avoid dropping the switch or bending it during the installation process.

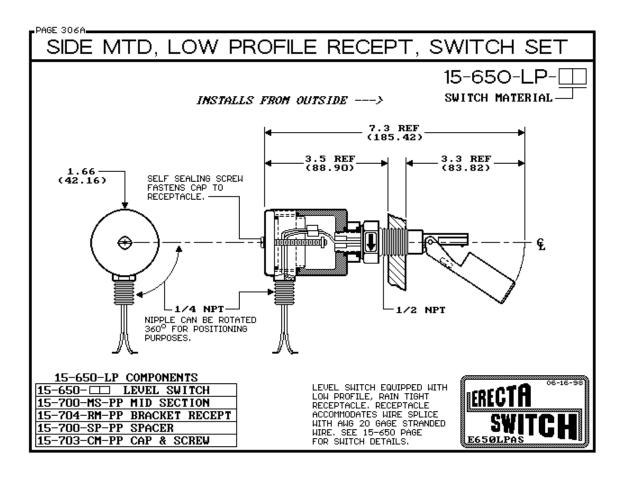


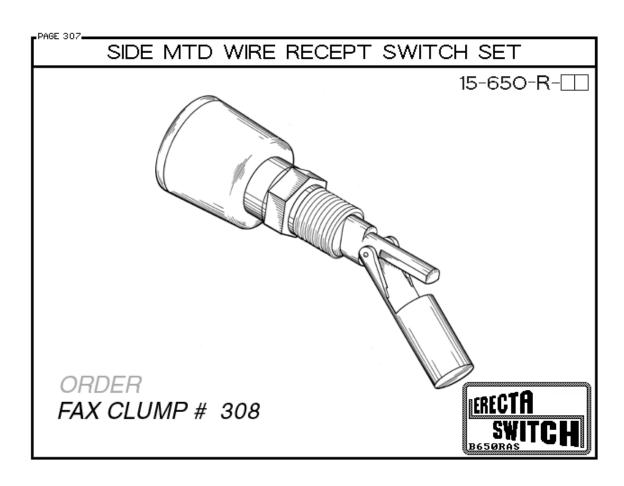


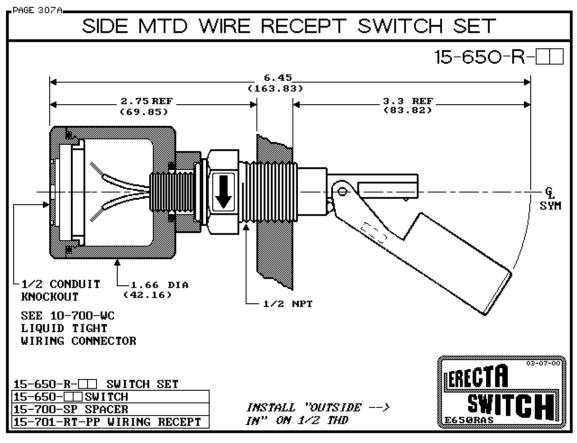


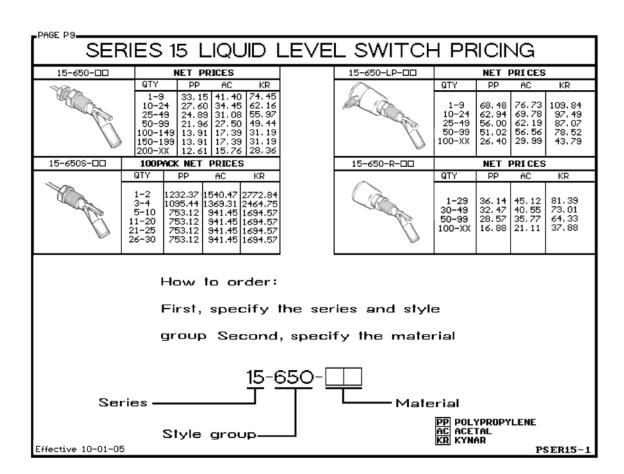














The Series 20 product group is designed to handle industrial control jobs like switching contactors and solenoid valves. 20s use the Yaskawa Control Bestact (TM) hermetically sealed switch element. Hinged armatures, wrought contacts and a wiping action which make reliable inductive load switching possible.

The contaminate free hermetically sealed envelope keeps fumes and particles from interfering with switch reliability so even under difficult conditions,

long service can be expected. A magnetic float rides up and down a double welded, molded stem containing the Bestact switch.

20-611 Liquid Level

20s use a common part set and assembly style. Complementary snap and screw ERECTA SHITCH components make length, suitch action, suitch position, mounting and electrical in-terface a matter of choice. Disciplined assemblies and precision parts make field repairs practical.

If your needs are for a compact, single point switch, the 20-611 switch, shown here, should be considered. On the other hand, if multiple levels or extended lengths are required, you'll find "how to do it" solutions in our library of construction schemes. Select the specified stem/float, switch and housing sets required. Then snap and screw the parts together and in less than ten minutes you'll have a high performance, precision conol instrument at an unbeatable price. trol instrument at an unbeatable price.

20s are valuable in AC or DC industrial control application where compact size, corrosion resistance, long life, and repairability are important considerations. High-low pump control, electroplating, semiconductor processing, diesel day tanks

PAGE 401.

G611-1A

MODES OF OPERATION

HODES OF OPERATION

The 20-611 is offered as either a normally open or normally closed switch. Since the unit can be mounted "threads up" or "threads down", merely specifying NO or NC is insufficient because what is "your" normal is not known to us. The product is identified, at the end of the stem, "WET OPEN" or "DRY OPEN." This signifies behavior accoording to the following definition:

Switch opens as float approaches the hex and closes as float approaches the stop ring at the opposite end.

Switch opens as float approaches the stop ring and closes as float approaches the hex at the opposite

You must specify the mode of operation desired according to the above definition.

DATA IN SPECIFICATION TABLES ARE APPLICABLE TO ALL SERIES 20 PRODUCTS

FLOAT BU	IOYAN	CY IN	SPE	CIFIC	6RA	VITY	1.0
	P	Р	A	С	K	R.	
							Medium
Exposed	1.0	25.4	0.65	16.5	0.30	7.6	air
Submerged	1.05	26.7	1.40	35.6	1.75	44.5	Water
Height	2.05	52.1	2.05	52.1	2.05	52.1	

ELECTROAL RATING Bestact™ Inductive load switching

Contact 240 VAC MAKE 5, BREAK .5 100K OPERATIONS life 115 DC MAKE .3, BREAK .3 300K OPERATIONS Contact

120 VA, 240 VAC Inductive rating Yaskawa Electric America Inc. Bestact model R25 Northbrook, IL

Class 1, Division 2, Groups A,B,C,D. AC 240V .5 AMP, 10 AMP MAX MAKE, 24V 1 MA MIN DC 115V .3 AMP, .5 AMP MAX BREAK, 24V 1 MA MIN

POINT OF OPERATION

The point at which the changing liquid level will cause the switch to actuate can be determined by the float buoyancy, stem dimensions and the switch trip point. You will find that this point is at the approximate center of the device.

TRIP POINT (DRY STATE BEHAVIOR)

Contact closes when the gap between the float and the stop ring is not less than .35(8.9) and reopens when the gap is increased to not more than .75(19). The typical differential between open and closed states is .10 (2.54).

Contact closes when the gap between the float and the hex is not less than .35(8.9) and reopens when this gap is increased to not more than .8(20.3). The typical differential between open and closed states is .10 (2.54).

MATERIALS OF CONSTRUCTION				
20-611-PP	(Gray & black)Polypropylene			
20-611-AC	(Red) Acetal			
20-611-KR	(Natural) Kynar PVDF			

APPLICATION ENVIRONMENT					
Pressure (Hollow float)	20 PSI MAX @ 20°C	Derate, Zero @ 90°C			
Temperature	90°C MAX				
Specific Gravity, PP	.80 MIN	Clear Liquid			
Specific Gravity, AC	.75 MIN	Clear Liquid			
Specific Gravity, KR	.95 MIN	Clear Liquid			

Dimensions, OEM pricing and other Series 20 products are included in this section. See the scheme library for solutions to mounting, length and multi-station applications.

PAGE 403.

One way or another you probably already know about reed switch equipped liquid level switches. But you may not know that only 20s provide these valuable features:

INDUCTIVE LOAD SWITCHING

20s use the Bestact switch expressly created to switch inductive loads such as solenoid valves, contactors and starters. This is important because most industrial control circuits, switched by changes in liquid level, involve inductive loads.

EASY INSTALLATION

20s are available as standard devices with a variety of ways to attach the device to a tank structure. Threads, flanges and jam nut hardware provide a stock selection of adaptation choices.

NOTHING SPECIAL

NOTHING SPECIAL 20s consider virtually any switch position or stem length as being standard. That's because we don't use a threaded attachment to connect an extended stem/float assembly to the housing. Instead, we use set screus and seal the assembly with an o-ring. This permits the customer to cut the stem to the length required, at the assembly sight.

SPARE PARTS ARE NOW MEANINGFUL

No other product of the 20s class is designed with field assembly, disassembly or repair in mind. Custom 20s can be assembled in five or ten minutes. Part replacement repairs are equally fast.

GETTING STARTED WITH 20s

The application solutions shown in the diagrams of this section use standard, inexpensive, "out of the box" components and sets. You'll notice detailed specifications and dimensional diagrams provide complete information so it's usually unnecessary for either of us to prepare additional engineering documentation. (Many customers mark-up our diagrams for record purposes). These documents as well as pricing are available, within minutes, using our FAXCAT or BBSCAT catalogs.

Reading this page means your halfway there because getting started is basically a matter of using our on-line information system to get the details and make the necessary choices.

Specifications for the 20-611 are presented in this section and apply to all Series 20 switch and component products unless otherwise stated on a particular item's catalog page. Be on the lookout for components which may have a lower rating. This is particularly true of mechanical ratings such as pressure and force loads.

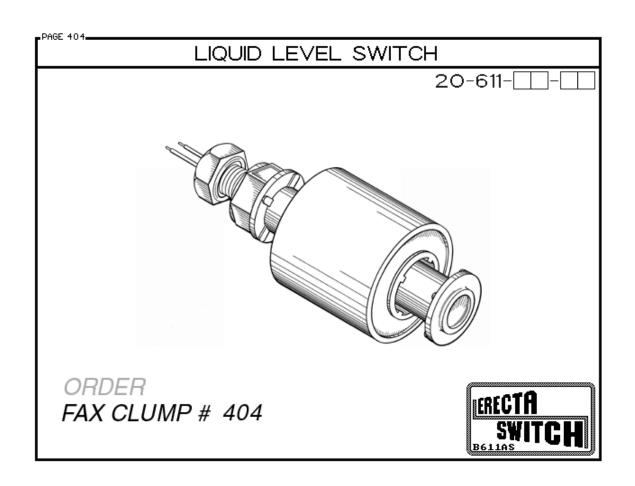
If your application can be satisfied by mounting the 20-611 single point switch directly or in conjunction with ERECTA SWITCH accessory hardware, then specify the items and place your order.

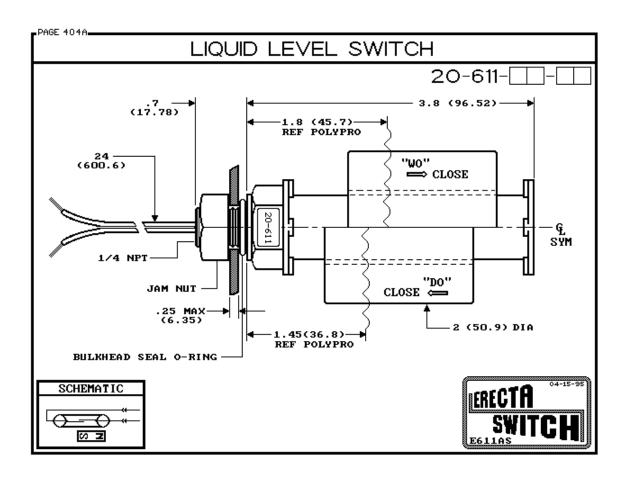
However, if the application requires a longer stem, two switch stations, control head or relay housing, then our scheme and tech note libraries will be helpful. For instance, say you want a switch that will start a pump at low level and stop it at high level. The distance between levels is 31" and the pump is rated 3/4 HP SP at 240 VAC. The switch will mount vertically to the tank's 1/4" thick PVC lid.

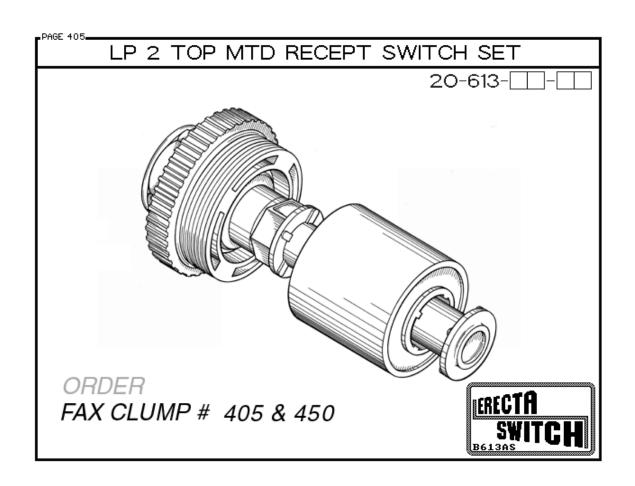
Go to the scheme library, You'll see SCE-428 showing a two station Hi - Low control. This page covers the external components and references SCE-429 which covers the internal components. The required components and sets are specified on scheme pages at the lower left hand corner. Noted items have their own catalog pages, specifications and price pages. So . . . several pages are involved and make up the documentation set.

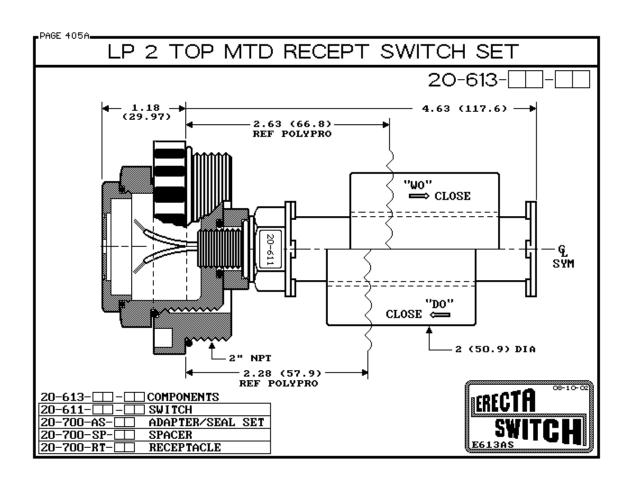


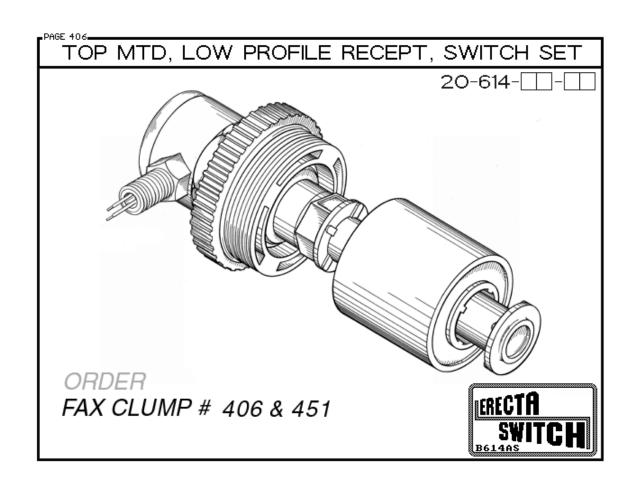
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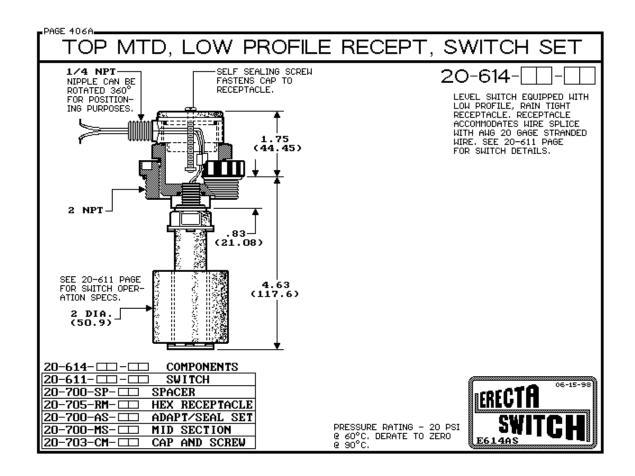


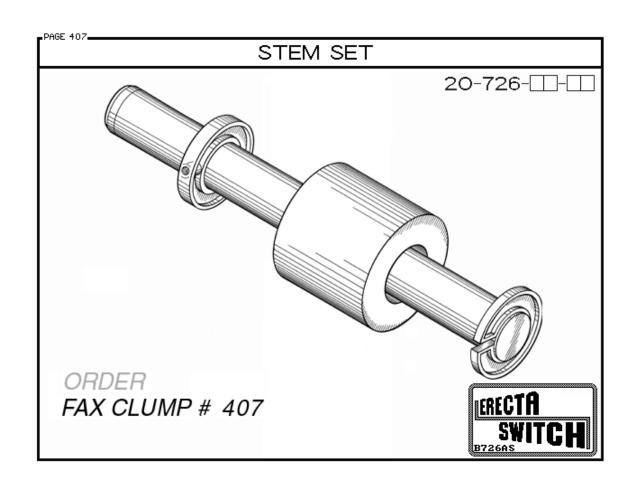


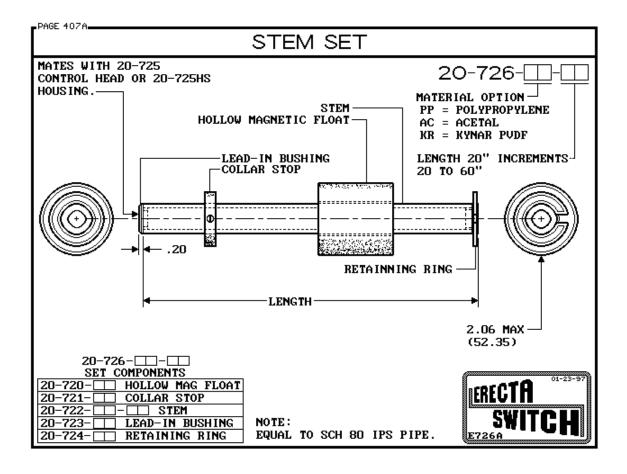


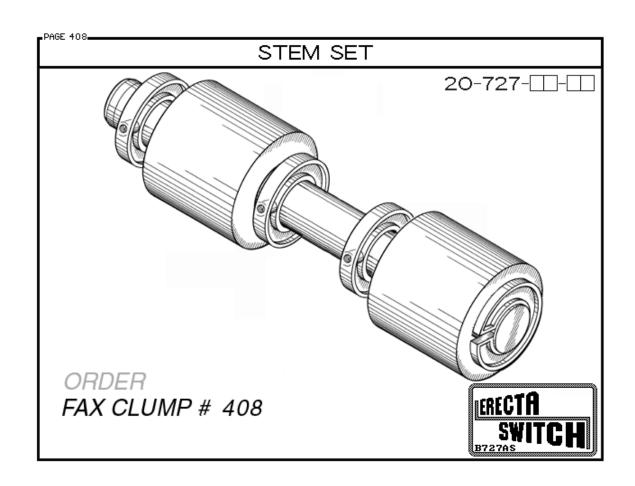


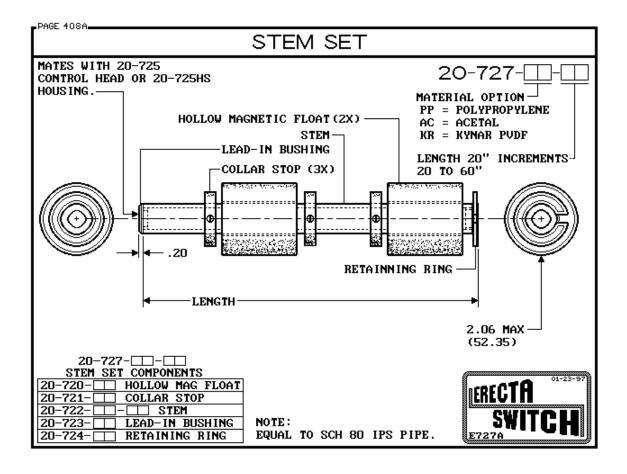


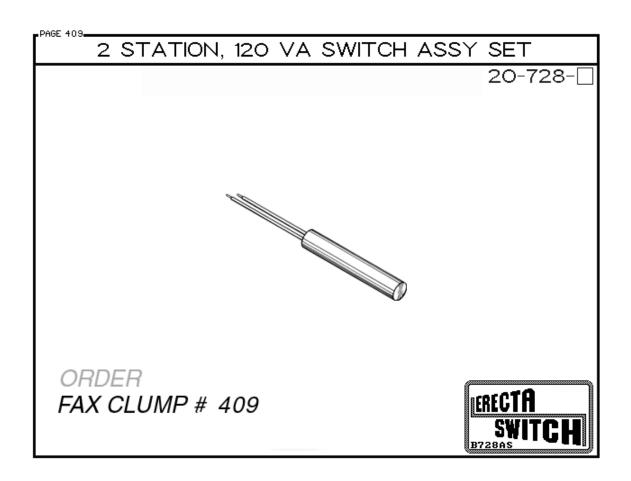


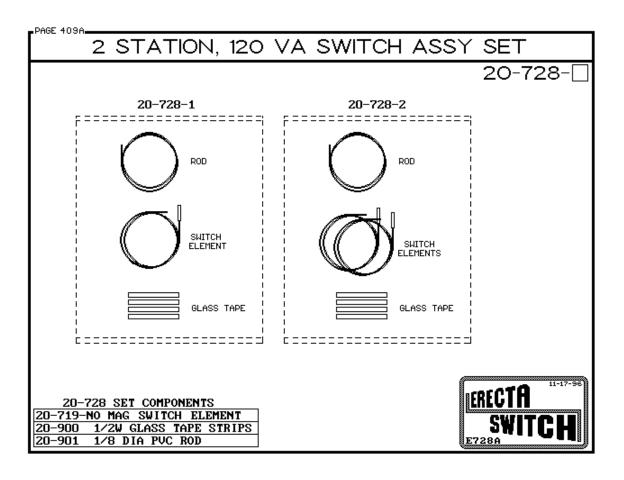


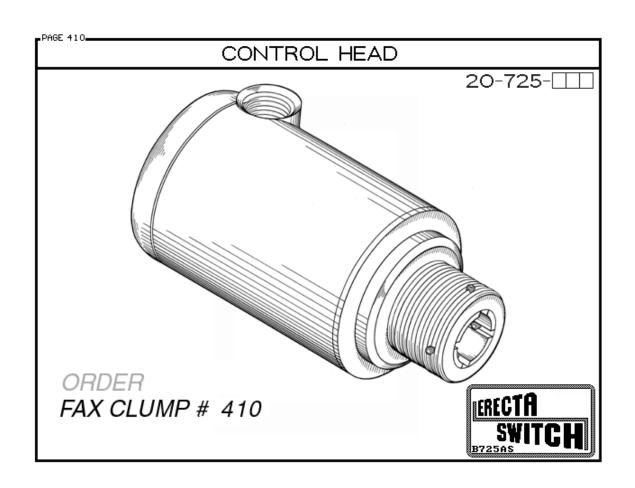


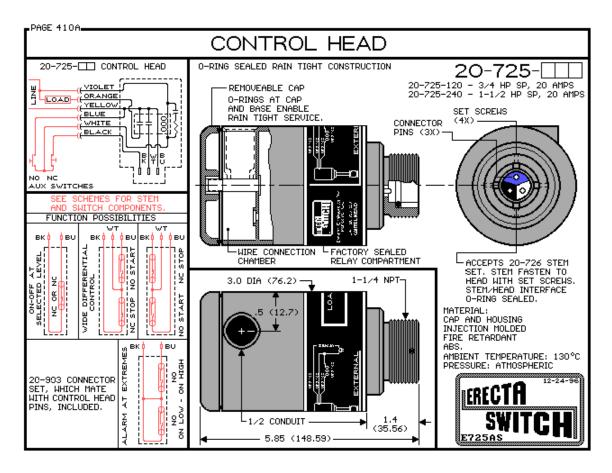


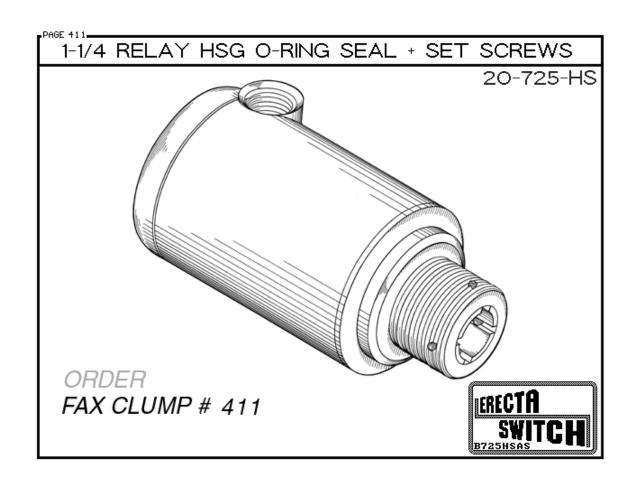


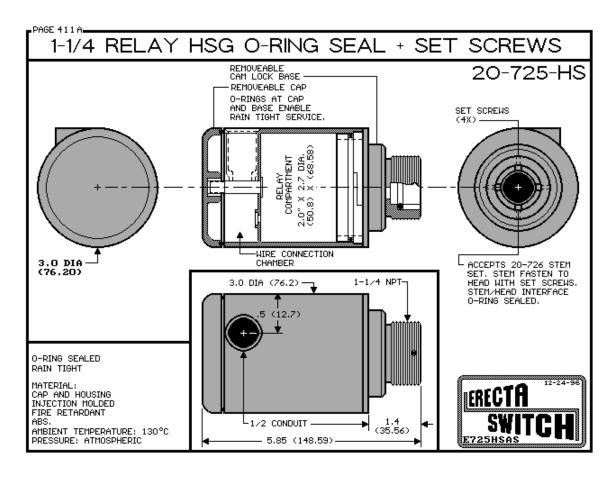


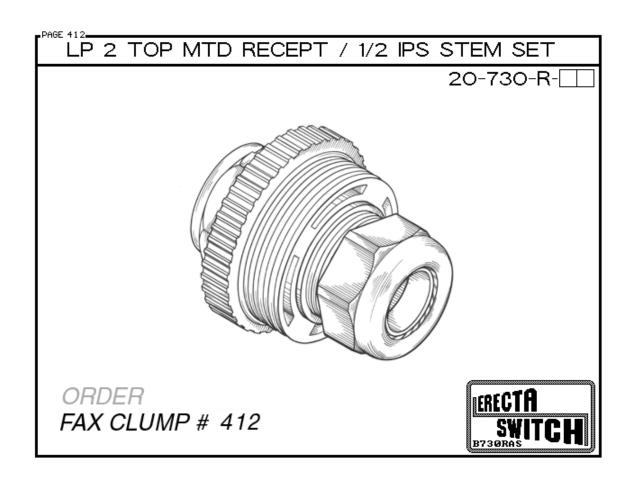


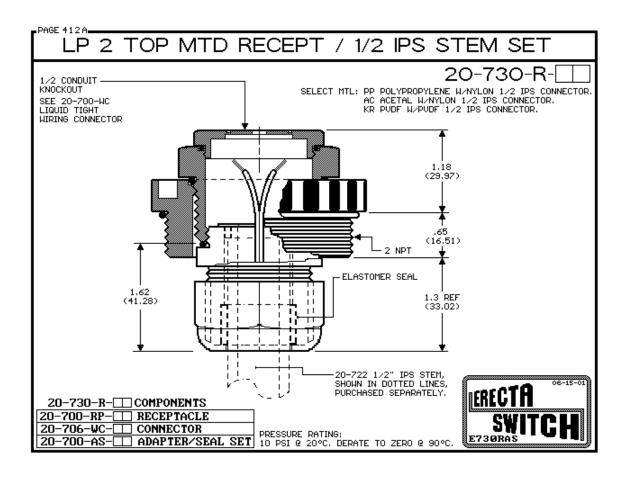


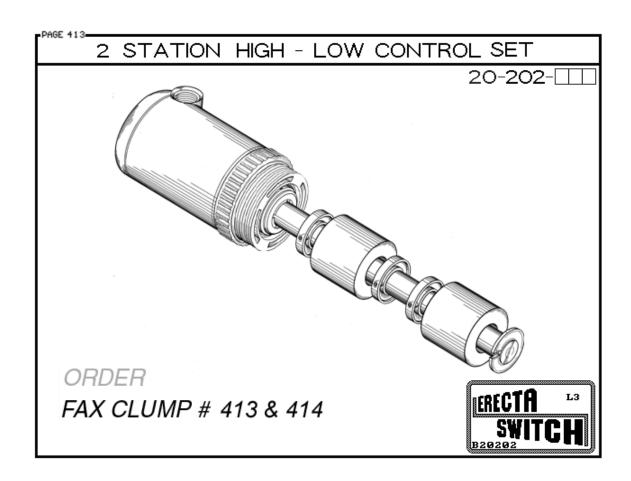


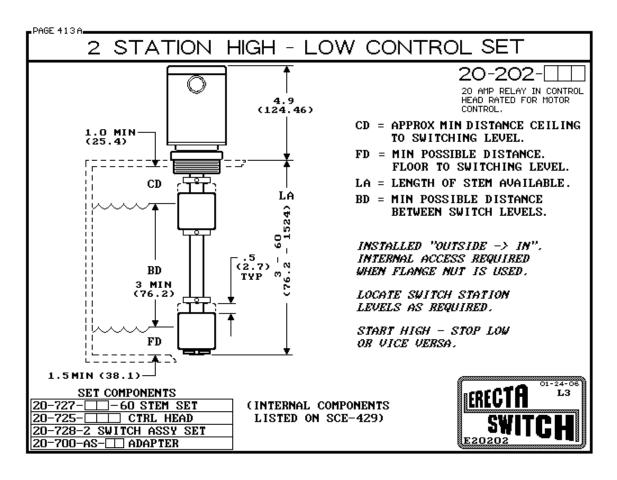


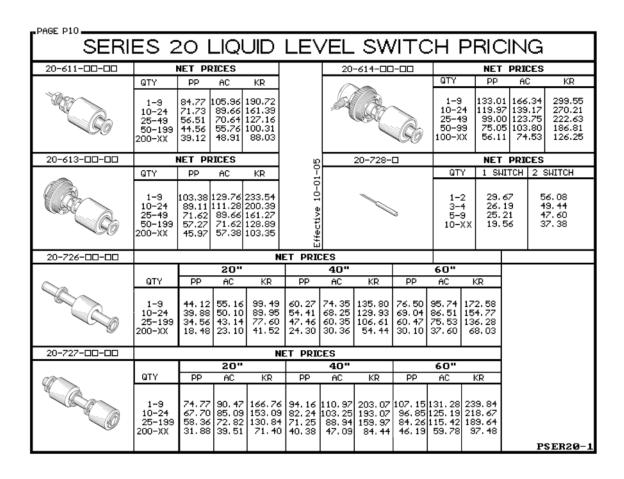


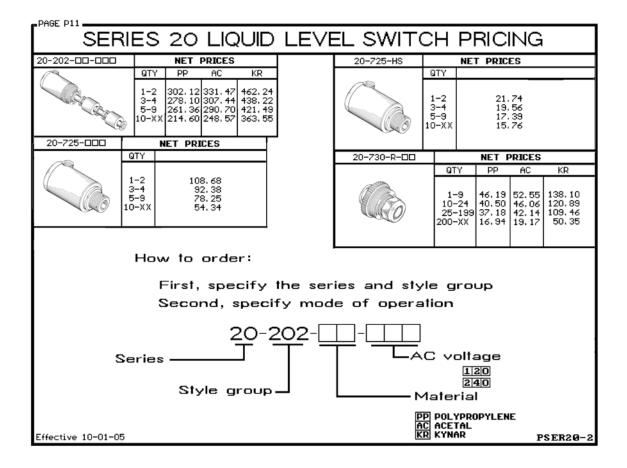














Solid State Relays, Latchers, Heat Sinks and Accessories.

Reed suitch sensors often do not have the suitching capacity to handle pump motors and solenoids. Relays are used to achieve the required switching capacity. The sensor switch pilots the relay which in-turn switches the load. In other words, the relay enables the reed switch sensor to handle a bigger job then it can do by

Button Packs are solid state, AC switching relays expressly designed for OEM use and this purpose. They will switch up to 5 amps, have no moving parts, are silent, easy to wire, easy to mount and low in cost. They are ideal companions for ERECTA SWITCH sensors.

Two modes of operation are possible: The first and most common, is when the sensor switch closes, the load is turned "on" and then turned "off" as the sensor switch re-opens. The second combines two sensor switches with a Button Pack relay and Button Pack latch to provide wide differential control of liquid levels. Here one switch starts the latch, turning a pump or valve "on" and the other stops the latch, turning the pump or valve "off".

Button Pack Relays are continuously powered devices. In the standby mode, they consume a tiny amount of current. (Typically, less than .001 AMP. When activated by a switch closure, supply voltage is switched to the load, turning "on" the lamp, solenoid, motor etc. Circuitry and wiring are intuitive. Erurostyle® screw source, two wires from the voltage source, two wires from the load device to be "turned on" and two wires from the Reed Switch sensor. Optional accessory wiring ferrules fa-cilitate wiring.

Button Pack relays dissipate heat when the load is "turned on". At load currents below .76 AMP, their built-in heat sink is sufficient to dissipate the heat generated. However, at higher current, they must be attached to a supplemental heat sink or any cool metal surface of sufficient area to keep the relay from over heating.

50-BP **Button Pack** SS Relay

Product of Beau Interconnect Systems.

PAGE 501.

BUTTON PACK RELAY HODES OF OPERATION
Two common applications can be efficiently handled
by Button Pack Relays. First, simple "on-off" switching of other AC control devices such as relays, solenoids and fractional HP motors. Second, latching "on" a load with a normally open momentary contact switch and unlatching the load with a normally closed mo-mentary contact switch. A detailed description of each follows:

ON-OFF SINGLE POLE AC SHITCH

When a load is connected to load terminals A & F and line voltage is connected to line terminals B & E, the relay is voltage is connected to line terminals B & E, the relay is in the standby condition, poised for the command to switch. If a connection is now made between sensor terminals C & D, line voltage is supplied to the load as the relay's SS switch is turned "on". The load will remain "on" as long as the connection between C & D is present. Thus, control of the load is accomplished by completing and interrupting the sensor circuit between terminals C & D.

LATCH "ON", REMAIN "ON" UNTIL "UNLATCHED"

LATCH "ON", REMAIN "ON" UNTIL "UNLATCHED"
The operating is the same as described for "on-off"
AC switching except a Button Pack Latch is connected in tandem with a Button Pack Relay. See schematics on product specification pages. Start and stop sensor switches are connected to the Latch as shown in the schematic diagram. When the start sensor switch closes its contacts, the Relay is turned "on" and remains "on" until the stop sensor switch coess its remains "on" until the stop sensor switch opens its contacts. This is a common operational mode for pumpin and pump-out applications.

WIRING CONSIDERATIONS

Eurostyle (R) screw type terminal blocks and wiring ferrles simplify wiring. Use AWG 20 (minimum) stranded wire for sensor circuits and AWG 18 (minimum) stranded wire for line and load circuits. Fuse line and load circuits. Check applicable equipment codes and specifications for other fuse considerations.

ELECTRICA	L RATIN	6S	
BUTTON PACK RELAY	AC5		
50-60 Hz VOLTS	24-240		
MAX LOAD AMPS	5		
MIN LOAD AMPS	.1		
MAX SURGE AMPS	15		
MAX SENSOR CIR OHMS	300		
SENSOR CIR AMPS TYP	.01		
SWITCHING MODE	SP NO		
WATT/AMP DISSIPATION	.92		
HEAT SINK REQ >	.75 AMP		
VDC BASE ISOLATION	1000		

* RESISTIVE LOAD.

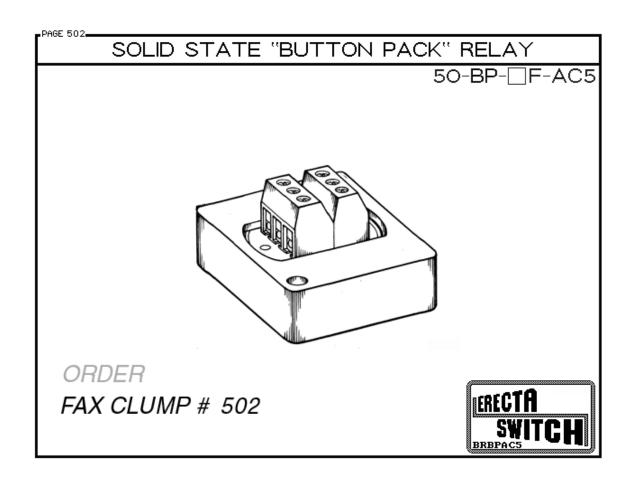
BUTTON PACK LATCH		
MIN RELAY LOAD AMPS		
MIN CYCLE TIME SEC		

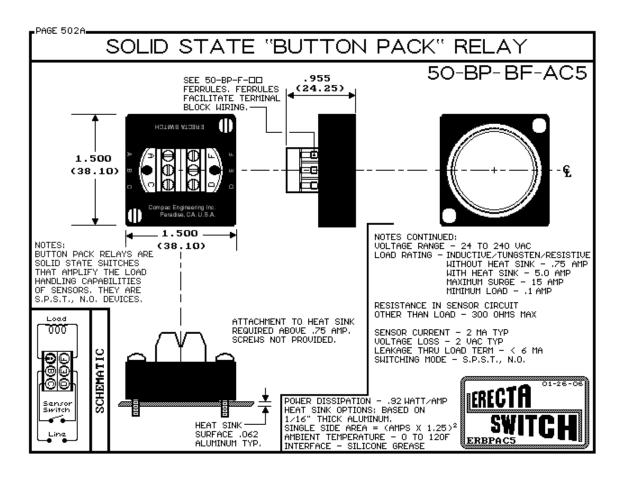
HEAT SINK CONSIDERATIONS

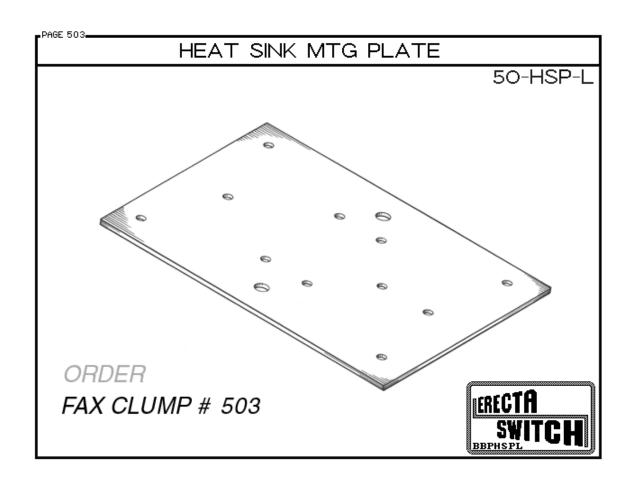
HEAT SINK CONSIDERATIONS

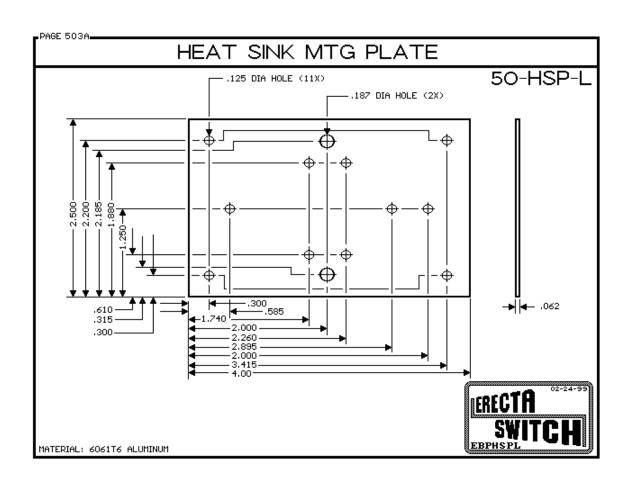
Button Pack relays dissipate .92 watts per AMP switched. If this energy is allowed to raise the temperature of the SS relay beyond a safe level, the ability of the relay to properly turn "off", may be compromised. The bottom of Button Pack is an aluminum heat transfer surface. Factors such as AMPs switched, differential temperature and power "on" time of the switched device temperature and power on time of the suitched device must be taken into account. The energy dissipated will be a function of 12RT. Thus, a short "on" time may not require a heat sink at all. Whereas, 100% duty above .75 AMP will surely require a supplemental heat sink. See product specification sheets for additional heat sink parameters

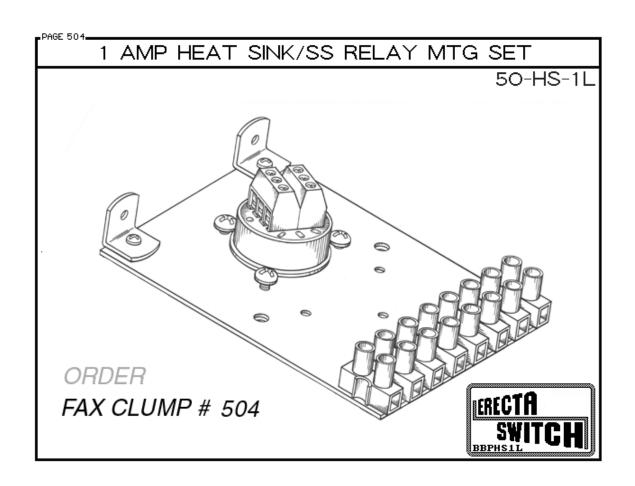
APPLICATION ENVIRONMENT
Button packs will perform (100% duty cycle) over a temperature range of 0 to 49 °C. Assuming the device is temperature range of 0 to 49 °C. Assuming the device is continuously powered and triggered by opening or closing contacts in the sensor circuit, these devices are reasonably tolerant of transient power line noise. However, false, momentary operations are still possible. Consequently, these devices should not be used in any application in which a momentary false operation would cause injury to personnel or equipment.

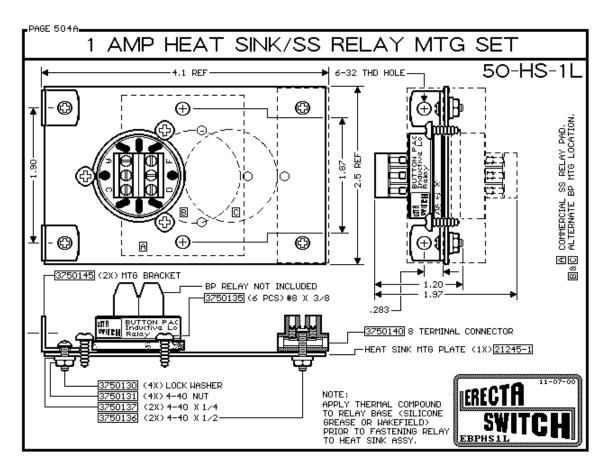


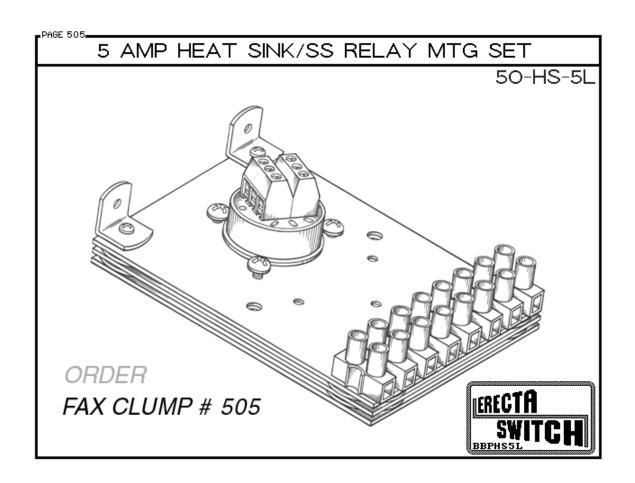


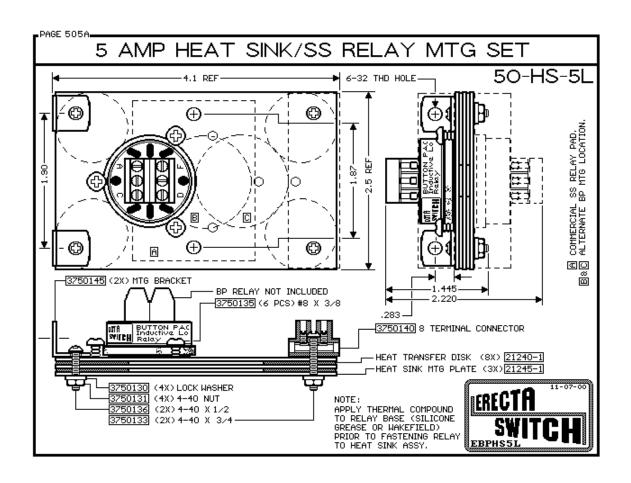


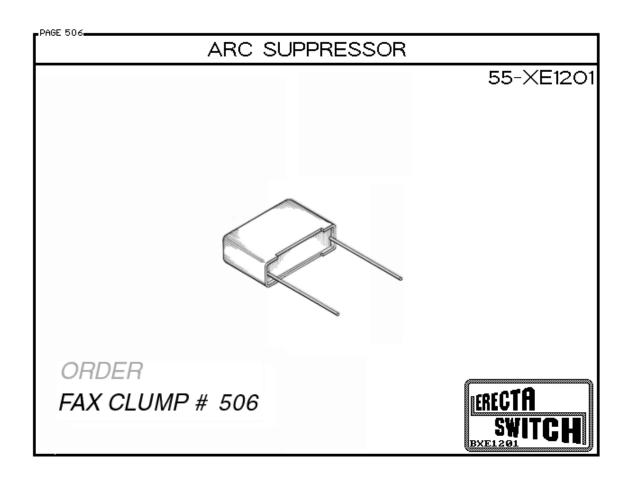


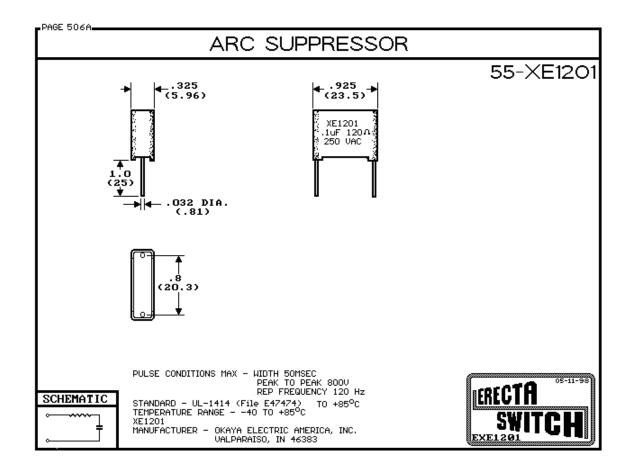


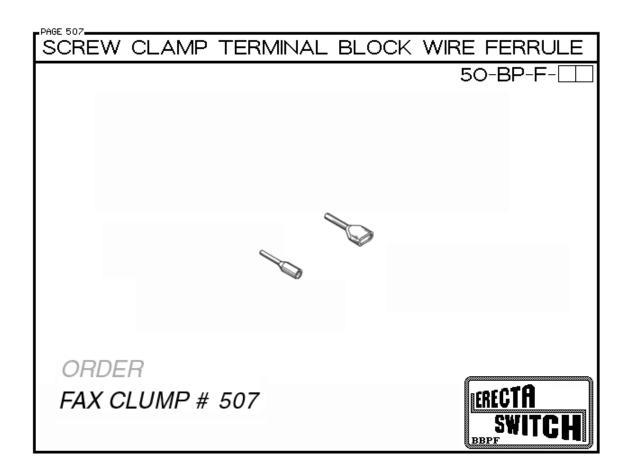


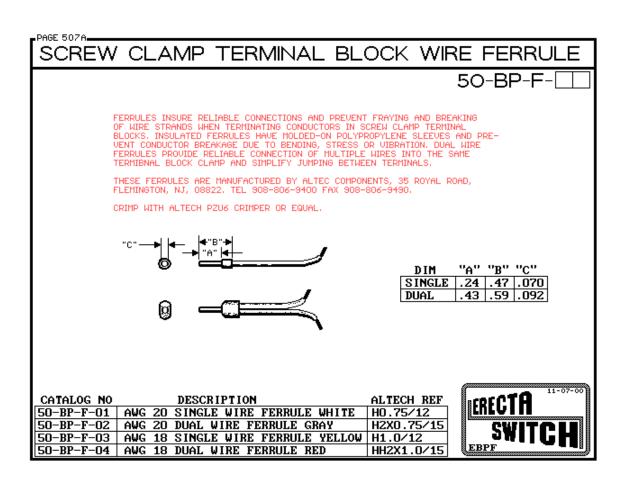


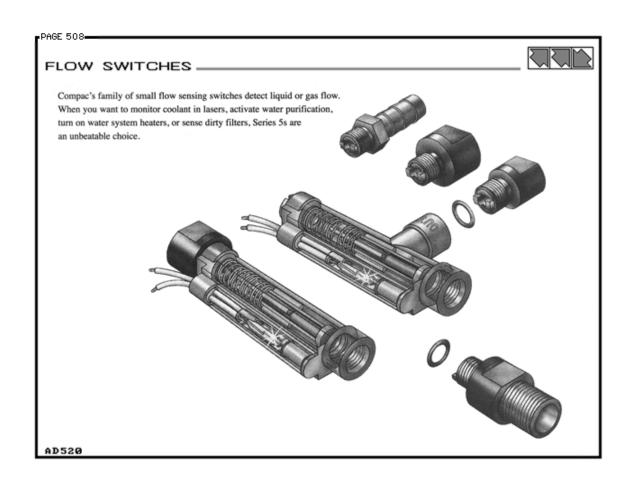




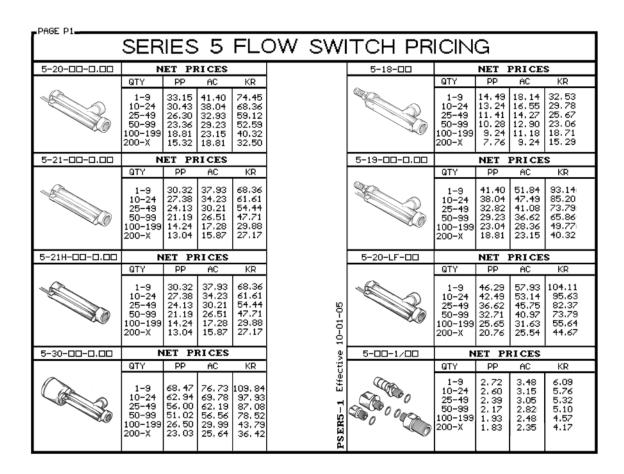


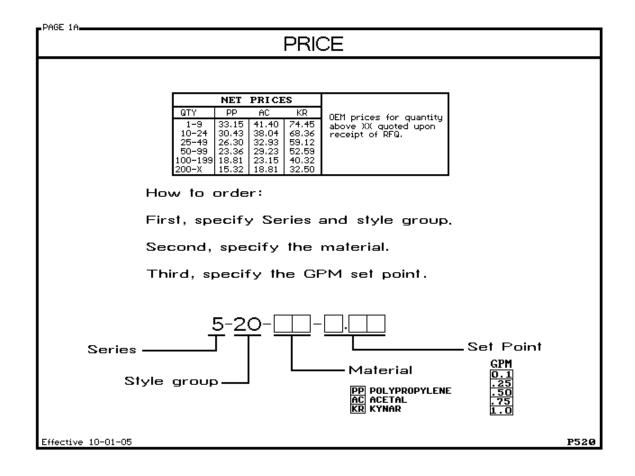






■PAGE P12						
SOLID	STA	TE "BUT	TON F	PACK" R	ELA`	Y PRICING
50-BP-AC5	FIVEF	ACK NET PRICES		50-HSP-L	FIV	PEPACK NET PRICES
	QTY]		QTY	
	1-2 3-4 5-9 10-14 15-19 20-XX	108, 68 104, 19 97, 81 86, 94 76, 07 70, 64			1-2 3-4 5-9 10-14 15-19 20-XX	24. 45 23. 26 22. 01 19. 56 17. 12 15. 76
50-BP-AC5	ONEP	ACK NET PRICES]	50-HS-5L	FIV	EPACK NET PRICES
	QTY]		QTY	
	1-10 11-20 21-49 50-74 75-99 100-XX	27. 17 26. 08 24. 45 21. 74 19. 02 17. 66		BP RELAY NOT INCLUDED	1-2 3-4 5-9 10-14 15-19 20-XX	124, 98 118, 72 112, 48 99, 98 87, 49 81, 24
50-BP-L		ACK NET PRICES		55-XE1201		NET PRICES
	QTY]		QTY	
	1-2 3-4 5-9 10-14 15-19 20-XX	108, 68 104, 19 97, 81 86, 94 76, 07 70, 64			1-49 50-99 100-XX	3, 80 3, 27 2, 17
50-BP-L	ONEP	ACK NET PRICES]	50-BP-F-00	TENE	PACK NET PRICES
	QTY]			01 02 03 04
	1-2 3-4 5-9 10-14 15-19 20-XX	27. 17 26. 08 24. 45 21. 74 19. 02 17. 66		*	1-XX 1.	09 1.35 1.63 2.01 10-01-05 PSER50-1





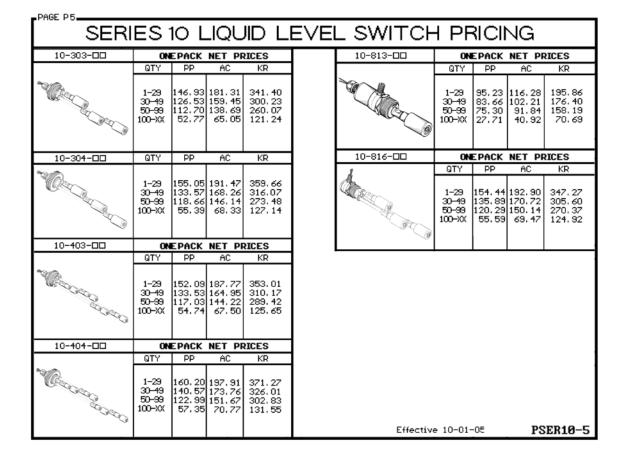
PAGE P2							
SEF	RIES 10 LIQU	ID LEVEL	. SWITCH	1 P	RICI	NG	
10-782-00	TENPACK NET PRICES	;	10-793-R-00	Т	ENPACK	NET I	PRICES
	QTY PP AC KE	2		QTY	PP	AC	KR
	1-2 128.89 161.06 289 3-4 113.67142.15 255 5-9 98.68123.13 221 10-19 48.14 60.21 108 20-XX 46.07 52.38 102	. 82 . 80 . 35	Co.	1-2 3-4 5-9 10-14 15-19 20-XX	204. 63 179. 75 162. 04 73. 79 73. 79 67. 92	224.74 202.89 92.26 92.26	460, 24 404, 60 364, 39 166, 06 166, 06 152, 69
10-783	TENPACK NET PRICES	;	10-794-R-□□		ENPACK		PRICES
	QTY			QTY	PP	AC	KR
	1-2 163.34 3-4 148.23 5-9 119.22 10-14 84.22 15-19 72.82 20-XX 61.29		(Co.	5-9 10-14 15-19	334, 82 293, 53 255, 82 117, 69 117, 69 111, 83	367.00 320.16 147.15 147.15	753, 33 660, 52 575, 33 264, 84 264, 84 251, 48
10-792-00	TENPACK NET PRICES	;	10-795-00		ENPACK		PRICES
	9TY PP AC K 1-2 221. 27 276.58 497. 3-4 195. 07 243.86 438. 5-9 169. 64 212. 46 381. 10-XX 80. 09 100. 20 180.	63 94 56		5-9 10-XX 15-19	PP 281.90: 248.87: 215.18: 101.83 101.83 95.96	311.14 269.29 127.37 127.37	KR 634, 01 559, 89 483, 93 229, 19 229, 19 215, 83
Effective 10-01-0	05					1	PSER10-1

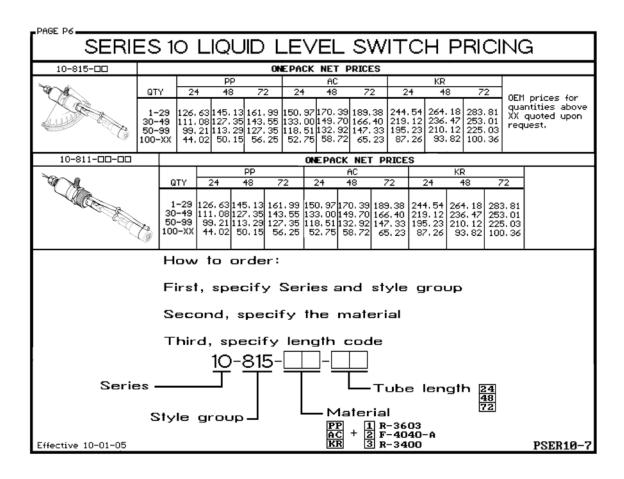
PAGE P2A SE	RIES	S 10	LIC	QUID	LEVEL	SWITC	ΉР	RIC	NG	
10-782-00	ONE	PACK I	NET PR	ICES		10-793-R-□□	0	NEPACI	(NET	PRICES
	QTY	PP	AC	KR			QTY	PP	AC	KR
		14.88 12.93 6.30	21.09 18.61 16.12 7.89 6.86	33,50 29,04		Co.	1-29 30-49 50-99 100-199 200-XX	26, 80 23, 5 4 21, 22 9, 67 8, 90	29. 44 26. 57 12. 08	47.72 21.75
10-783	ONE	PACK	NET P	RICES		10-794-R-00	0	NEPACI	K NET	PRICES
	QTY						QTY	PP	AC	KR
	1-29 30-49 50-99 100-149 150-199 200-XX		21. 40 19. 42 15. 61 11. 03 9. 55 7. 73				1-29 30-49 50-99 100-199 200-XX	38. 43 33. 51 15. 41	54.84 48.06 41.92 19.27 18.25	
10-792-00	ONE	PACK	NET PR	ICES		10-795-00	0	NEPACI	K NET	PRICES
	QTY	PP	AC	KR			QTY	PP	AC	KR
	1-29 30-49 50-99 100-199 200-XX	25. 54 22. 22	27.82 13.12	65. 16 57. 49 49. 96 23. 61 22. 88			1-29 30-49 50-99 100-199 200-XX	36, 92 32, 59 28, 18 13, 33 12, 56	46, 13 40, 74 35, 27 16, 68 15, 65	83. 03 73. 32 63. 37 30. 01 28. 26
Effective 10-01	-05									PSER10-

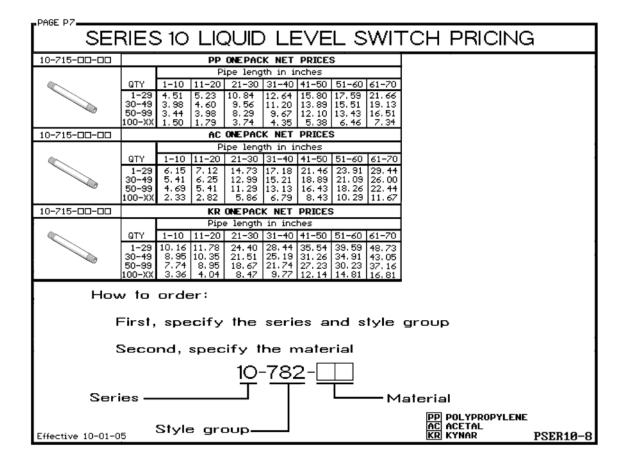
■PAGE P3					
SEF	RIES 10 LIQUID	LEVE	L SWITCH	1 PF	RICING
10-788-00	TENPACK NET PRICES		10-785	TEN	PACK NET PRICES
The same of the sa	QTY PP AC KR]		QTY	
	1-2 276, 36 345, 38 621, 62 3-4 243, 21 304, 19 547, 29 5-9 210, 28 262, 56 472, 95 10-XX 99, 55 124, 44 223, 98			1-2 3-4 5-9 10-14 15-19 20-XX	163, 34 137, 36 119, 22 84, 22 72, 82 62, 38
10-788-FF	TENPACK NET PRICES	1	10-787		PACK NET PRICES
	QTY PP]		QTY	
	1-2 310.81 3-4 277.78 5-9 230.82 10-XX 124.22			1-2 3-4 5-9 10-14 15-19 20-XX	255, 72 229, 64 190, 19 116, 17 104, 76 93, 24
10 700 D FF	TENDACK NET DETOC	-	10-786	TEN	PACK NET PRICES
10-788-R-□□	QTY PP AC KR	-		QTY	
	1-2 356.23 438.84 796.34 3-4 312.88 390.36 699.65 5-9 276.80 344.94 618.68 10-XX 126.93 158.24 283.43	10-01-05		1-2 3-4 5-9 10-14 15-19 20-XX	316.35 283.43 235.71 137.91 126.49 114.98
			10-786-R	TEN	PACK NET PRICES
		ţį		QTY	
		PSER10-3 Effective		1-2 3-4 5-9 10-14 15-19 20-XX	418. 29 374. 27 315. 70 176. 70 162. 04 150. 52

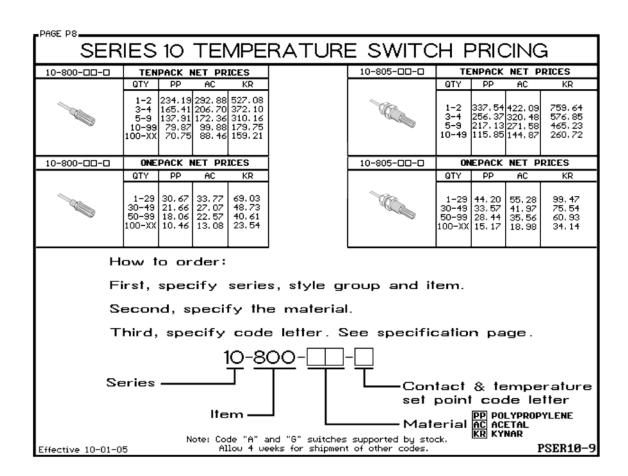
_PAGE P3A								
	RIES	\$ 10	LIC		LEVE	L SWITCI	H PF	RICING
10-788-00	ONE	PACK I	IET PR	ICES		10-785	ONE	PACK NET PRICES
The second second	QTY	PP	AC	KR			QTY	
	1-29 30-49 50-99 100-XX	31.80 27.53	45, 23 39, 83 34, 39 16, 29	71.67 61.92			1-29 30-49 50-99 100-149 150-199 200-XX	9. 54 8. 17
10-788-FF	ONE	PACK I	ET PR	ICES		10-787		PACK NET PRICES
	QTY		PP			4.	QTY	
	1-29 30-49 50-99 100-XX	:	10.70 36.38 30.23 16.27				1-29 30-49 50-99 100-149 150-199 200-XX	13.72 12.21
10 700 5 77	ONE PACK NET PRICES	10-786	ONE	PACK NET PRICES				
10-788-R-□□	QTY	PACK I	AC AC	KR			QTY	
	1-29 30-49 50-99 100-XX	46.65 40.98 36.25		104.27	0-01-05		1-29 30-49 50-99 100-149 150-199 200-XX	41, 43 37, 11 30, 87 18, 06 16, 57 15, 06
					, p	10-786-R		PACK NET PRICES
					:tiv		QTY	
					PSER10-3 Effective		1-29 30-49 50-99 100-149 150-199 200-XX	52, 29 46, 79 39, 46 22, 09 20, 25 18, 82

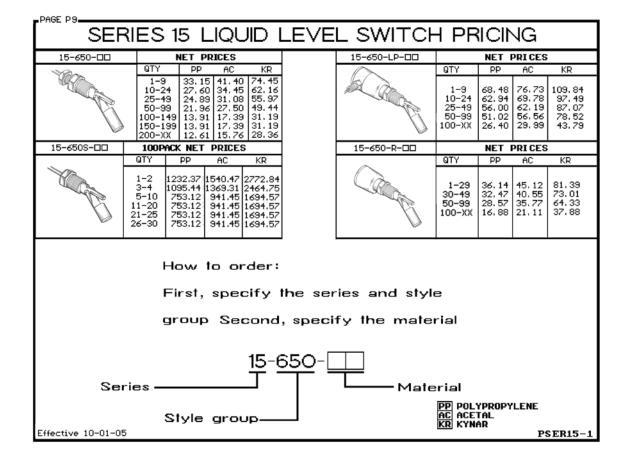
■PAGE P4										
	RIES	10 L	JQL	JDI	_EVE	_ SWITCH	1 PF	RICII	NG	
10-786-RM	ONE	PACK NET	PRICE	S		10-104-00	ON	EPACK	NET P	RICES
	QTY					* 0 *	QTY	PP	AC	KR
Racio	1-29 30-49 50-99 100-XX	69 62	. 1 9 . 82 . 24 . 1 9				1-29 30-49 50-99 100-XX	77.01 67.47 59.07 27.30	94.05 90.18 72.00 33.05	177.52 161.02 139.34 63.44
10-101-00		ONEPACK	NET P	RICES		10-202-00	ON	EPACK	NET P	RICES
****	QTY	PP	AC	KR			QTY	PP	AC	KR
	1-2: 30-4: 50-9: 100-X	9 42.50 9 36.83	60.36 53.15 46.08 21.54	108, 63 95, 65 82, 85 38, 75			1-29 30-49 50-99 100-XX			
10-102-00	_	ONEPACK				10-203-00	ONE	EPACK	NET PR	ICES
We carried	1-2: 30-4: 50-9: 100-X	9 55.52 9 48.74 9 43.64 X 20.23	24.17	129, 34 119, 33 104, 94 47, 63	10-01-06	* Comments		101.62 96.82	AC 155, 69 137, 02 118, 98 55, 70	224.57
10-103-00	_	ONEPACK			Effective	10-204-00		_	NET P	
W.	QTY	PP	AC	KR			QTY	PP	AC	KR
	1-29 72.57 88.37 167.72 30-49 63.65 77.52 146.14 50-99 55.92 67.98 132.56 100-XX 25.98 31.35 60.57	9-4	Cial	30-49	108.66 102.78	165, 85 145, 83 126, 42 58, 45	316.86 275.68 237.86 110.31			



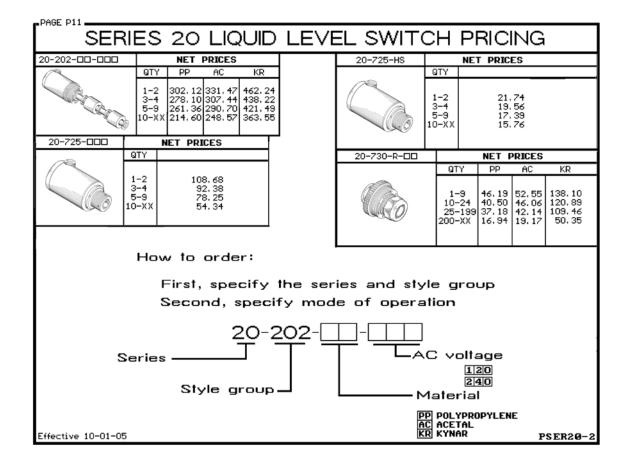








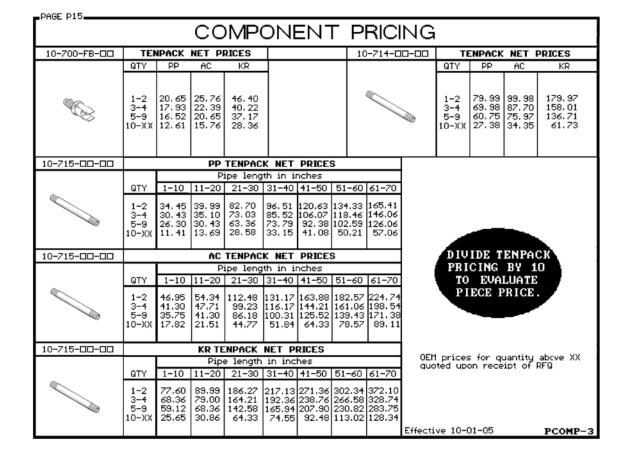
PAGE P10												
SERIE	ES 2	20 L	_IQI	JID	LE\	/EL	SW	/ITC	:H	PRIC	ZIN	G
20-611-00-00	-	NET PR	ICES			20	-614-DC]-00		NET	PRI	CES
	QTY	PP	AC	KR					QTY PP AC			C KR
The Co	25-49 50-199	84.77 71.73 56.51 44.56 39.12	105,96 89,66 70,64 55,76 48,91	161.39 127.16				S Contraction of the Contraction		4 119.9 9 99.0 9 75.0	1 166 7 139 0 123 5 103 1 74	.17 270.21 .75 222.63 .80 186.81
20-613-00-00	ı	NET PR	ICES		ا 5		20-728-			NET	PRI	CES
	QTY	PP	AC	KR	Ţ				OT,	/ 1 SI	4ITCH	2 SWITCH
Co Co	1-9 10-24 25-49 50-199 200-XX		111.28 89.66	200.39 161.27 128.89		Effective 10-01				1-2 29 3-4 26 5-9 25 10-XX 19		56. 08 49. 44 47. 60 37. 38
20-726-00-00				N	ET PRIC							
			20"			40"			60"			
	QTY	PP	AC	KR	PP	AC	KR	PP	AC	KR		
	1-9 10-24 25-199 200-XX	44, 12 39, 88 34, 56 18, 48	50, 10 43, 14	89, 95 77, 60	60, 27 54, 41 47, 46 24, 30		135, 80 129, 93 106, 61 54, 44	69. 04 60. 47	86.51	172,58 154,77 136,28 68,03		
20-727-00-00				N	ET PRIC							
	0.711		20"			40"			60"			
	QTY	PP	AC	KR	PP	AC	KR	PP	AC	KR		
	1-9 10-2 4 25-199 200-XX	74.77 67.70 58.36 31.88	85.09 72.82	153.09 130.84	82.24	103.25	193.07 159.97	84.26	125, 19 15, 42	218.67 189.64		PSER20-1



PAGE P12						
SOLID	STA	TE "BUT	TON F	PACK" RI	ELA`	Y PRICING
50-BP-AC5	FIVE	PACK NET PRICES		50-HSP-L	FIV	EPACK NET PRICES
	QTY]		QTY	
	1-2 3-4 5-9 10-14 15-19 20-XX	108. 68 104. 19 97. 81 86. 94 76. 07 70. 64			1-2 3-4 5-9 10-14 15-19 20-XX	24. 45 23. 26 22. 01 19. 56 17. 12 15. 76
50-BP-AC5		ACK NET PRICES		50-HS-5L		EPACK NET PRICES
	QTY				QTY	
	1-10 11-20 21-49 50-74 75-99 100-XX	27. 17 26. 08 24. 45 21. 74 19. 02 17. 66		BP RELAY NOT INCLUDED	1-2 3-4 5-9 10-14 15-19 20-XX	124, 98 118, 72 112, 48 99, 98 87, 49 81, 24
50-BP-L		PACK NET PRICES		55-XE1201		NET PRICES
	QTY]		QTY	
	1-2 3-4 5-9 10-14 15-19 20-XX	108. 68 104. 19 97. 81 86. 94 76. 07 70. 64			1-49 50-99 100-XX	3, 80 3, 27 2, 17
50-BP-L	ONE	ACK NET PRICES]	50-BP-F-00	TENE	PACK NET PRICES
	QTY					01 02 03 04
	1-2 3-4 5-9 10-14 15-19 20-XX	27. 17 26. 08 24. 45 21. 74 19. 02 17. 66		*	•	09 1.35 1.63 2.01 10-01-05 PSER50-1

■PAGE P13										
		(CO	MPC	NENT	PRICING	ı			
5-20-LFT-00	1	NET P	RICES	;		10-770	TE	NPACK	NET P	RICES
	QTY	PP	AC	KR			QTY			
	1-9 10-24 25-49 50-99 100-199 200-X		16. 63 15. 11 13. 15 11. 74 10. 22 8. 47	27. 28 23. 58 21. 08 17. 06			1-2 3-4 5-9 10-14 15-19 20-XX		103, 35 89, 66 75, 75 57, 06 51, 45	5 5 5 1
5-16-00-0.00	1	NET P	RICES	;		10-78 4	TE	ENPACK	NET P	RICES
	QTY	PP	AC	KR			QTY			
	1-9 9. 12 11. 41 20. 54 10-24 8. 26 10. 44 18. 59 25-49 7. 28 9. 12 16. 41 50-99 6. 42 8. 04 14. 34 100-199 5. 44 6. 42 10. 22 200-X 5. 10 5. 97 9. 45 10. 10. 10. 10. 10. 10. 10. 10. 10. 10.				1-2 103.35 3-4 89.66 5-9 75.75 10-14 57.06 15-19 51.41 20-XX 45.64		6 5 6 1			
5-17-00-0.00			RICES	;		10-700-CA-	TE	NPACK	NET P	RICES
	QTY	PP	AC	KR			QTY	PP	AC	KR
	1-9 10-24 25-49 50-99 100-199 200-X	8. 26 7. 61 6. 52 5. 87 5. 44 5. 10	10. 44 9. 45 9. 12 7. 39 6. 95 5. 97	17. 17 14. 67 13. 26 11. 19	10-01-05		1-2 3-4 5-9 10-XX	86.84 75.75 66.08 29.67	108.57 94.76 82.59 37.05	195.51 170.51 148.77 66.73
10-700-FT-00		PACK N		ICES	a l	10-701-BH-00			NET P	
	QTY	PP	AC	KR	ļ.		QTY	PP	AC	KR
⊘	3-4 5-9		03. 1 6 89. 1 4	210.93 186.27 161.06 71.95	PCOMP-1 Effectiv		1-2 3-4 5-9 10-XX		115.52 101.72 88.79 39.99	207.90 183.12 159.76 71.95

■PAGE P14													
			CO	MP	3NC	ΞNΞ	ГΡ	RICI	NG				
10-702-8H-□□	TEN	IPACK	NET PR	ICES			10)-703-BH	I-OO	TEN	PACK N	ET PR	CES
	QTY	PP	AC	KR						QTY	PP	AC	KR
	1-2 3-4 5-9 10-XX	81. 4 0 70.97	101.72	207.90 183.12 159.76 71.95				C.)	1-2 3-4 5-9 10-XX	89.87 79.12 68.90 35.97	112.37 98.90 86.18 44.99	202.24 178.01 155.07 80.97
10-710-00-00				P TENPA			ES						
				e length									
	QTY	1-10	11-20	21-30	31-40	41-50	51-60	61-70	l				
		159.97 137.91	164.64 142.03	230.17 202.57 174.97 79.87	215.07	235.61 203.98	248.00	275.60				NIDAG	•
10-710-00-00		\vdash	A	C TENPA	CK NE	T PRIC	ES		1			NPACI BY 10	
				Pipe le	ngth in	inches	5		1		EVAL		
0	QTY	1-10	11-20	21-30	31 -4 0	41-50	51-60	61-70]		CE PI		
TTO	1-2 3-4 5-9 10-XX	203.33 175.18	209.75 180.73	296.79 261.25 225.61 109.00	278.21 239.74	306.24 264.95	323.10 278.86	360.58 310.81					
10-710-00-00				R TENPA			ES]				
		L		e length		_			OEM	prices t	for qua	ntity ab	cve XX
0	QTY	1-10	11-20	21-30	31-40	41-50	51-60	61-70	l quo	tea upon	receip	COTRI	4
THE OF THE PROPERTY OF THE PRO	3-4 5-9	359.82 310.05	370.47 319.50	518.16 455.68 393.73 179.97	483.82 417.09	530,23 459,04	558.04 481.97	703.99 620.20 534.90 243.98					
									Effecti	ive 10-01	-05	P	COMP-2



_PAGE P16													
			CC	MP	3NC	ΞNΞ	T PF	RICI	NG				
10-700-CS-00	TEN	PACK N	ET PR	ICES			10-	700-SS-	-00	TE	NPACK	NET P	RICES
	QTY	PP	AC	KR						QTY	PP	AC	KR
	1-2 3-4 5-9 10-XX	86.84 75.75 66.08 29.67		195.51 170.51 148.77 66.73		Effective 10-01-05					53.79 45.54	67.27	136.38 120.96 102.38 48.91
10-700-WC-00	TEN	PACK N	ET PR	ICES		t	10	0-701-W	IC	TENPACK NET PRICES			
	QTY	NY		KR		ž				QTY			
	1-2 3-4 5-9 10-XX	71.83 62.93 59.56 27.93	3 2	:44.52 :15.18 :85.84 :81.94		PCOMP-4				1-2 3-4 5-9 10-XX	1	08.57 95.63 82.59 36.40	
10-700-RD-DD						TEN	PACK N	ET PRI	CES				
RA RA			R1			R2		R3				R4	
	QTY	PP	AC	KR	PP	AC	KR	PP	AC	KR	PP	AC	KR
	1-2 3-4 5-9 10-XX	75, 75 66, 08 63, 36 25, 65	82.59 79.22	170, 51 148, 77 142, 58 57, 71	77. 16 67. 48 64. 77 26. 84	84.34 80.97	173. 45 151.82 145. 73 60. 43	68.90 66.08	98. 13 86. 07 82. 59 34. 88	154.97	70, 20 67, 48	87.92 84.34	158.12 151.82
10-701-RD-DD						TEN	IPACK N	ET PR	CES				
			R1			R2			R3			R4	
	QTY	PP	AC	KR	PP	AC	KR	PP	AC	KR	PP	AC	KR
	1-2 3-4 5-9 10-XX		82.59 79.22	170, 51 148, 77 142, 58 57, 71	77.16 67.48 64.77 26.84	84.34 80.97	173, 45 151, 82 145, 73 60, 43	68, 90 66, 08	86.07	176, 60 154, 97 148, 77 62, 81	70.20 67.48	87.92 84.34	158.12 151.82

■PAGE P17														
			CC	MP(ONE	ΞN٦	ΓР	RICI	NG					
10-702-RD-DD								PRICES						
			R1			R2		T	R3		Т	R 1		
	QTY	PP	AC	KR	PP	AC	KR	PP	AC	KR	PP	AC	KR	
	1-2			195.51	88.24	110.42	198.5	4 89.66	111.94	201.59	90.9		8 204.74	
	3-4 5-9	76.50 66.08		172.14 148.77	67.48			8 79.22 2 68.90	99.11	178.33 154.97	70.2		4 181.38 2 158.59	
To go the fold	10-XX	29, 13	36, 40	65, 53	30, 20	37.82	68.0	3 31.41	39, 23	70.64			5 73.14	
10-700-RB-00	TEN	PACK I	NET PR	ICES			_ 1	0-700-RS		TENP	ACK N	IET PR	ICES	
	QTY	PP	AC	KR						QTY	PP	AC	KR	
	1-2 3-4 5-9 10-XX	60.64 53.14 50.21 20.54	66.40	136.38 119.44 113.13 46.19						3-4 5 5-9	57. 27 19. 67	80.97 71.62 61.95 28.58	145.73 128.89 111.60 51.41	
10-701-RB-🗆	TEN	PACK I	NET PR	ICES			1	0-701-R9	3-00	TENP	ACK N	ET PR	ICES	
	QTY	PP	AC	KR]					QTY	PP	AC	KR	
	1-2 3-4 5-9 10-XX	60.64 53.14 50.21 20.54		136.38 119.44 113.13 46.19			10-01-05	Co		3-4 5	57. 27 19. 67	80.97 71.62 61.95 28.58	145.73 128.89 111.60 51.41	
10-702-RB-□□		PACK I			╛		~	0-702-R9	3-00			IET PR	ICES	
	QTY	PP	AC	KR	4		ů			QTY	PP	AC	KR	
	1-2 3-4 5-9 10-XX	66.83 57.93	83.57	170, 51 150, 52 130, 19 56, 51			PCOMP-5 Effecti	Co		3-4 7	73.03 52.71	103. 46 91. 29 78. 47 34. 23	186. 27 164. 21 141. 28 61. 61	

PAGE P18											
			CC	MPC	NENT	PRICING					
10-700-RT-00	TEN	IPACK I	NET PR	ICES		10-701-RM-00	TE	NPACK	NET F	PRICES	
	QTY	PP	AC	KR			QTY	PP	AC	KR	
Co	1-2 3-4 5-9 10-XX	68, 90 60, 64 52, 38 24, 01	75.75 65.53	154.97 136.38 117.92 54.01		Co	1-2 3-4 5-9 10-XX	75.75 66.08 63.36 25.65	94.76 82.59 79.22 32.06	170.51 1 4 8.77 1 4 2.58 57.71	
10-701-RT-00	TEN	PACK I	NET PR	ICES		10-702-RM-00	TEN	PACK	NET PR	ICES	
	QTY	PP	AC	KR			QTY	PP	AC	KR	
	1-2 3-4 5-9 10-XX	68, 90 60, 64 52, 38 24, 01	75.75 65.53	154. 97 136. 38 117. 92 54. 01			3-4	124.98 109.77 105.42 45.54	137.15	281.25 246.91 237.13 102.48	
10-702-RT-00	TEN	IPACK I	NET PR	ICES		10-703-RM-00	TEN	TENPACK NET PRICES			
	QTY	PP	AC	KR			QTY	PP	AC	KR	
Co	1-2 3-4 5-9 10-XX	86. 84 76. 50 66. 08 29. 13	95, 63 82, 59	195, 51 172, 14 148, 77 65, 53	10-01-05		3-4	109.77 105.42	155.84 137.15 131.71 56.94	281.25 246.91 237.13 102.48	
10-700-RM-00	TEN	IPACK I	NET PR	ICES	e >	10-704-RM-00	TEN	PACK I	NET PR	ICES	
	QTY	PP	AC	KR	ļ.		QTY	PP	AC	KR	
	1-2 3-4 5-9 10-XX	109.77 105.42	137.15 131.71	281.25 246.91 237.13 102.48	PCOMP-6 Effective		3-4	109.77 105.42	155.84 137.15 131.71 56.94	281.25 246.91 237.13 102. 4 8	

			CC	MPC	DNEN	1T	PRICING	G					
10-705-RM-00	TEN	PACK I	NET PR	ICES			10-702-CM-00	\neg	TEN	PRICES			
-	QTY	PP	AC	KR	1			0	TY	PP	AC		KR
lo lo	5-9		137.15 131.71				Q	3	3-4 5-9	109.77 105.42	3 155.8 7 137.1 2 131.7 4 56.9	15 24 1 23	1.25 6.91 7.13 2. 4 8
10-701-SM-PP	TENPA	ICK NE	T PRIC	ES	1		10-703-CM-	+	TENE	PACK	NET	PRICES	
	QTY							10	TY	PP	AC		KR
	1-2 3-4 5-9 10-XX		124.98 109.77 105.42 45.54				Q	3	3-4 5-9	109.77 105.42	3 155.8 7 137.1 2 131.7 4 56.8	15 24 1 23	1.25 6.91 7.13 2. 4 8
10-702-SM-PP	TENPA	ICK NE	T PRIC	ES	1 1		10-701-HD-DD	Т	ENPA	CK N	ET PR	ICES	
	QTY							QTY	′ Н.	1	Н2	нз	Н
	1-2 3-4 5-9 10-XX	3	124.98 109.77 105.42 45.54					1-2 3-4 5-9 10-)	158	3.45 1 7.91 1	72.25	206.70 185.94 165.41 91.29	199. 179.
10-700-MS-UD	TEN	PACK I	NET PR	ICES	1		10-701-HB-□□		TE	NPAC	K NET	PRICE	S
	QTY	PP	AC	KR	Ŕ		-		QTY				
000	1-2 3-4 5-9 10-XX	86.84 76.50 66.08 29.13	95.63	195.51 172.14 142.25 65.53	Effective 10-01-05				1-2 3-4 5-9 10-X)	<	14 12	5.41 4.75 3.99 7.06	

■PAGE P20								
		COM	PONENT	PRICING	ı			
10-701-HS-DD	TEN	PACK NET PRICES		10-700-S3-OO	TEN	PACK	NET PR	ICES
	QTY				QTY	PP	AC	KR
	1-2 3-4 5-9 10-XX	179.10 158.45 137.91 68.47		66	1-2 3-4 5-9 10-XX	12.39 10.97 9.67 4.57	15.54 13.80 11.96 5.76	27.93 24.78 21.63 10.32
10-701-HT-00	TEN	PACK NET PRICES		10-700-S4-00	TEN	IPACK	NET PR	RICES
	QTY				QTY	PP	AC	KR
	1-2 3-4 5-9 10-XX	179,10 158,45 137,91 68,47		60	1-2 3-4 5-9 10-XX	15.11	20. 65 18. 91 17. 28 7. 17	37. 17 34. 02 30. 98 12. 94
10-700-PG	TEN	PACK NET PRICES		10-700-SP-00	TENPACK NET PRI			ICES
	QTY				QTY	PP	AC	KR
0	1-2 3-4 5-9 10-XX	20.21 11.84 8.37 7.07	10-01-05	0	1-2 3-4 5-9 10-XX	15.11 13.80	20. 65 18. 91 17. 28 7. 17	37. 17 34. 02 30. 98 12. 94
10-700-S2-00		PACK NET PRICES		10-700-N4-00		PACK	NET PR	ICES
	QTY	PP AC KE	<u> </u>		QTY			
8	1-2 3-4 5-9 10-XX	12.39 15.54 27.8 10.97 13.80 24.7 9.67 11.96 21.6 4.57 5.76 10.3	š	∅	1-2 3-4 5-9 10-XX		5, 54 4, 89 4, 13 1, 95	

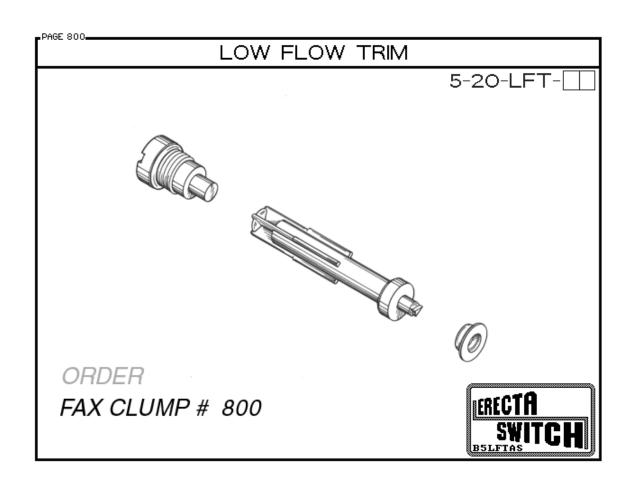
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			CO	MPC	DNENT	PRICING	G .		
10-701-N4	TEN	IPACK 1	NET PR	ICES		10-700-0-00		TENPACK N	ET PRICES
	QTY				1			QUA	NTITY
1							SIZE	1-2 3-	4 5-9 10-XX
©	1-2 3-4 5-9		6.09 5.32 4.45				009 012 019		48 3.15 1.42 45 3.80 1.74 15 11.74 5.10
	10-XX		2.05			\circ	024 026 110	13. 47 11. 8. 26 7.	74 10, 44 4, 57
10-700-N8	TEN	IPACK 1	NET PR	ICES		\mathcal{O}	111	13.47 11.	74 10.44 4.57
	QTY						113 117	6.85 6. 19.99 17.	
@	1-2 3-4		4.13 3.59				128 139 141	14.89 13. 23.76 21. 24.13 20.	15 11.74 5.76 67 19.47 9.56 65 18.59 9.12
	5-9 10-XX		3. 15 1. 7 4				145 148 222	13. 47 11. 15. 11 13. 33. 15 29.	47 11.74 5.10
							231	49.67 43.	
10-701-N8	TEN	IPACK I	NET PR	ICES		10-72-00-000	TI	ENPACK NE	T PRICES
	QTY]		QTY	72"	144"
®	1-2 3-4 5-9 10-XX		5, 25 4, 73 3, 99 1, 89				1-2 3-4 5-9 10-X	352, 43 303, 74	549, 90 483, 71 417, 42 239, 09
10-700-RR-□□	TEN	IPACK N	NET PR	ICES] '				
	QTY	PP	AC	KR]				
g g	1-2 3-4 5-9 10-XX	4.13 3.59 3.15 1.74	5. 10 4. 45 3. 92 2. 17	9. 2 4 8. 15 6. 95 3. 92					
	10-11	1.74	2.17	3.32			Eff	ective 10-0	1-05 PCOMP-9

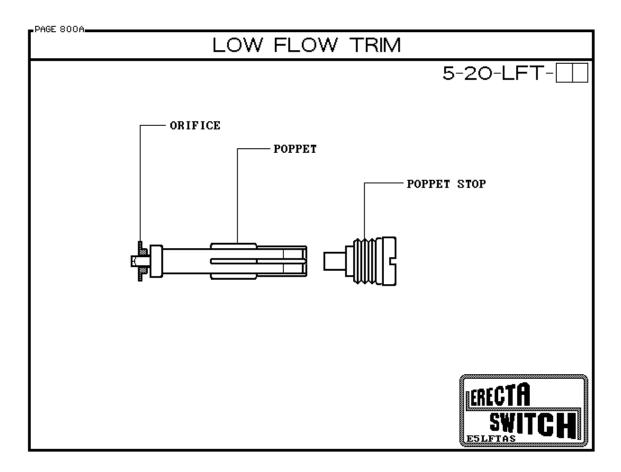
10-712-00 TENPACK NET PRICES 10-700-AS-00 TENPACK NET PRICES 117.15 146.38 263.42 3-4 103.35 129.21 232.56 5-9 86.61 108.24 194.86 10-XX 33.45 49.89 89.76 10-XX 33.45 49.89 89.76 10-XX 43.90 54.88 38.78 10-TU-0-0-0 TENPACK NET PRICES 11.22 144.97 289.95 434.92 149.97 293.94 149.91 394.41	PAGE P22			~~	N AID (7 N II	=		DIC	INIC					
OTY PP AC KR	10-712-00	TEN	IDACK			וויוכ	=14 1	_				DACK	NET DE	ICES	
1-2 117. 15 146.38 263.42 3-4 103.35 129.21 232.56 5-9 86.61 108.24 194.86 10-XX 39.45 49.89 89.76 10-TU-D-DD TENPACK NET PRICES 1-2 130.19 162.91 293.10 3-9 10-XX 43.90 54.88 98.78 10-TU-D-DD TENPACK NET PRICES 1-2 141.28 282.56 411.22 144.97 289.95 434.92 149.97 299.94 449.91 3-4 123.78 247.45 371.24 127.48 254.95 382.43 182.48 264.95 397.49 113.78 142.25 57.49 10-XX 46.74 93.46 140.20 47.82 93.46 143.45 49.99 99.98 149.97 10-700-FN-DD TENPACK NET PRICES 10-701-FS-DD TENPACK NET PRICES 10-701-FS-DD TENPACK NET PRICES 10-701-FS-DD TENPACK NET PRICES 10-702-PUNCH NET PRICE 10-702-PUNCH NET PRICE	10-712-00					┥		H	0 700	10 00					
1		1-2 3-4 5-9	117. 15 103. 35 86. 61	146.38 129.21 108.24	263, 42 232, 56 194, 86						1-2 3-4 5-9	130, 19 113, 78 93, 79	162, 91 142, 25 117, 26	293, 10 255, 93 210, 93	
9TY	10-TU-D-DD					ENPAC	K NET	PRIC	ES						
1-2		QTY	24		72	24		72	24		72	-			
GTY PP AC KR GTY PP AC KR GTY PP AC KR GTY PP AC KR GTY PP AC KR GTY PT AC KR GTY AC GTY		1-2 3-4 5-9	141.28 123.78 107.48	282, 56 247, 45 214, 96	411.22 371.24 322.43	144.97 127.48 109.98	289, 95 254, 95 219, 95	434. 9 382. 4 329. 9	12 149. 9 3 132. 4 14 113. 7	7 299, 94 8 264, 95 8 227, 57	449.91 397.43 341.34	3			
1-2 61.95 77.49 139.43 3-4 53.79 67.27 120.96 5-9 45.54 56.84 102.38 10-XX 19.99 25.00 44.99 10-700-FS-D TENPACK NET PRICES 10-702-PUNCH NET PRICE	10-700-FN-00	TEN	IPACK I	NET PR	ICES				10-701-	FS-OO		IPACK	NET P	RICES	
3-4 53.79 67.27 120.96 5-9 45.54 56.84 102.38 10-XX 19.99 25.00 44.99 316.41 10-700-FS-DD TENPACK NET PRICES 10-702-PUNCH NET PRICE		QTY	PP	AC	KR	7				à	QTY	PP	AC	KR	
		3- 1 5-9	53, 79 45, 54	67.27 56.84	120.96 102.38						3-4 5-9	170.68 140.68	213.38 175.89	383, 89 316, 41	
0TY PP AC KR 1-2 130. 19162. 91 293. 10 113. 78142. 25 255. 93 10 3. 79117. 26 210. 93 10 43. 90 54. 88 98. 78 15.	10-700-FS-□□]			10-702-	PUNCH	NET I	PRICE		<u> </u>	
		1-2 3-4 5-9	130. 19 113. 78 93. 79	162, 91 142, 25 117, 26	293. 10 255. 93 210. 93			Effective 10-01-05				Ę		PCOMP-10	

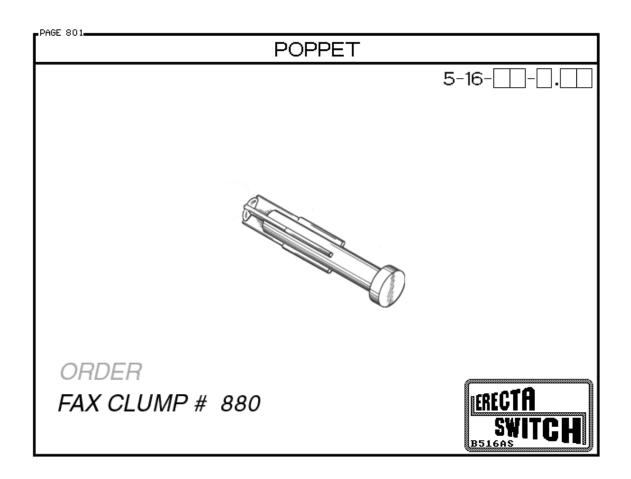
PAGE P23										
			CO	MPC	DNENT	PRICING	ı			
10-702-GAUGE		NET F	PRICE			20-724-00		NET F	RICES	
							QTY	PP	AC	KR
		54	.3 1			Ø	1-9 10-24 25-199 200-XX	2.17 1.95 1.74 .98	2, 72 2, 50 2, 17 1, 20	4, 89 4, 35 3, 92 2, 17
15-600-AD-□□		IET PR	RICES			20-721-00		NET F	RICES	
	QTY	PP	AC	KR			QTY	PP	AC	KR
0.50	10-24 1.85 2.39 4.24 25-49 1.74 2.28 4.02 50-99 1.63 1.95 3.59 100-149 1.30 1.63 2.93 150-199 1.20 1.52 2.72		4. 24 4. 02 3. 59 2. 93 2. 72			1-9 10-24 25-199 200-XX	7.17 6.52 5.76 2.60	9. 12 8. 26 7. 17 3. 27	16. 41 14. 89 12. 94 5. 76	
15-700-RA-00	TENP	ACK N	ET PR	ICES		20-723-00		NET F	RICES	
	QTY	PP	AC	KR			QTY	PP	AC	KR
Co	5-9 10	05. 57 1	26, 68	195, 51 172, 14 148, 77 65, 53	e 10-01-05	©	1-9 10-2 1 25-199 200-XX	2.17 1.95 1.74 .98	2.72 2.50 2.17 1.20	4, 89 4, 35 3, 92 2, 17
15-690-00	TENPACK NET PRICES		ICES	ţţ	20-720-00	QTY	PP	AC	KR	
	QTY PP AC KR		KR	Effective						
	1-2 3 3-4 2 5-9 2 10-XX 1	77.343 44.733	346.68 305.81	713, 78 623, 79 550, 49 246, 26	PCOMP-11 E		1-9 10-24 25-199 200-XX	14.78 12.29	20.32 18.48 15.32 10.22	36, 62 33, 36 27, 50 18, 36

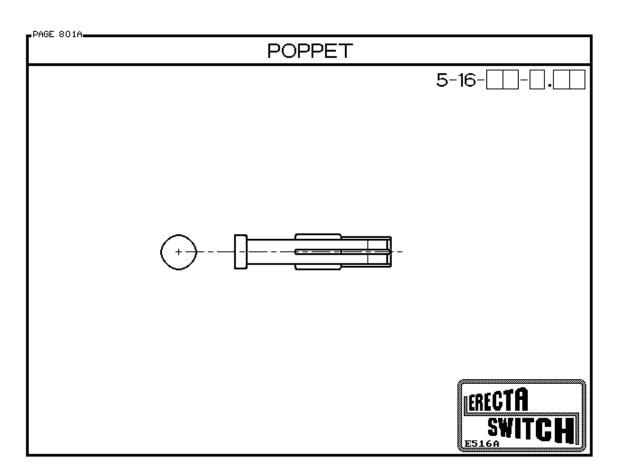
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		(COL	MPC	NE	NΤ	PRI	CIN	IG				
20-722-00-00		NET P											_
10 / 12 00 00		T	20"			40"	6				\neg		_
	QTY	PP	AC	KR	PP	AC	KR	PP	AC	KR			
	1-9 10-2 1 25-199 200-XX		20, 38 18, 36 16, 31 7, 23	33.00 29.35	32, 1 3 29, 20 25, 95 11, 58	40, 56 36, 52 32, 42 14, 49	72, 99 65, 70 58, 36 26, 08	48, 69 43, 82 38, 94 17, 39	54.7 48.6	39 87. 6	30 S		
20-700-RP-00		IET PRI	CES				20-	704-WC		N	ET PRIC	ES	
	QTY	PP	AC	KR						QTY	NY	KR	
Co	1-9 10-24 25-199 200-XX	24 10.97 13.69 24.66 99 10.54 13.15 23.69								1-9 10-24 25-199 200-XX	12.61 11.04 10.44 4.89	70. 05 59. 11 57. 96 27. 17	
20-701-RP-00		NET P	RICES				20-	705-WC		NI	ET PRIC	ES	
	QTY	PP	AC	KR						QTY	NY	KR	
	1-9 10-24 25-199 200-XX		13. 69 13. 15	28. 04 24. 66 23. 69 10. 22		/e 10-01-05		O		1-9 10-24 25-199 200-XX	16.77 14.68 14.09 6.52	76.84 67.16 61.51 29.88	
20-705-SC		NET PR	RICES			ŧ	20-	706-WC	:	NI	ET PRIC	ES	
	QTY					Effective				QTY	NY	KR	
0	1-2 3-4 5-9 10-XX	1	. 63 . 52 . 42 . 60			PCOMP-12 E		O C)	1-9 10-24 25-199 200-XX	20. 67 18. 14 17. 28 7. 98	80. 75 70. 62 64. 67 31. 34	

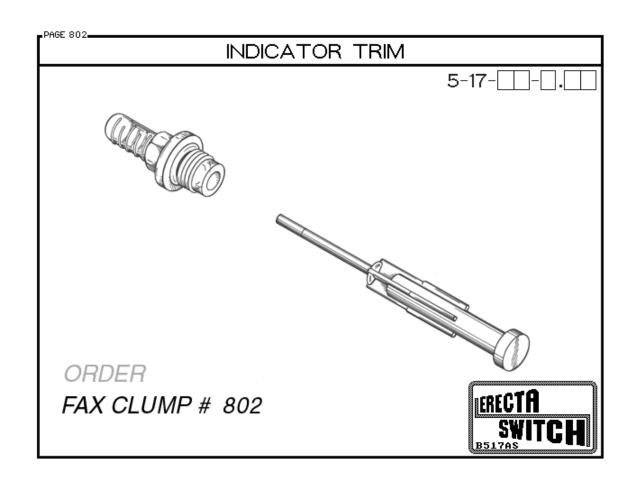
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		(100	MPC	ΝE	NT	PRI	CIN	IG				
20-722-00-00		NET P	RICE										
_			20"			40"			60				
	QTY	PP	AC	KR	PP	AC	KR	PP	AC	KR	_		
	1-9 10-24 25-199 200-XX	13.97	19.41 17.49 15.53 6.89	34.93 31.43 27.95 12.42	30.89 27.81 24.71 11.03	38.63 34.78 30.88 13.80	69.51 62.57 55.58 24.84	46.37 41.73 37.09 16.56	57.9 52.1 46.3 20.7	6 93.9 7 83.4	6		
20-700-RP-00		IET PRI					20-	704-WC		N	ET PRIC	ES	
	QTY	PP	AC	KR						QTY	NY	KR	
Co	1-9 10-24 25-199 200-XX	11.90 10.45 10.04 4.35	14.85 13.04 12.52 5.43	26.70 23.49 22.56 9.73			6	Ò		1-9 10-24 25-199 200-XX	12.01 10.51 9.94 4.66	66.71 56.30 55.20 25.88	
20-701-RP-00		NET P	RICES				20-	705-WC		NI	ET PRIC	ES	
	QTY	PP	AC	KR						QTY	NY	KR	
	1-9 10-24 25-199 200-XX		14.85 13.04 12.52 5.43	26.70 23.49 22.56 9.73		/e 07-01-03	ı	O		1-9 10-2 1 25-199 200-XX	15.97 13.98 13.42 6.21	73.18 63.96 58.58 28.46	
20-705-SC		NET PR	RICES			ŧ	20-	706-WC		NE	ET PRIC	ES	
	QTY					Effective			L	QTY	NY	KR	
0	1-2 3-4 5-9 10-XX	1	.55 .45 .35 .57			PCOMP-12 E		O C)	1-9 10-2 1 25-199 200-XX	19.69 17.28 16.46 7.60	76.90 67.26 61.59 29.85	

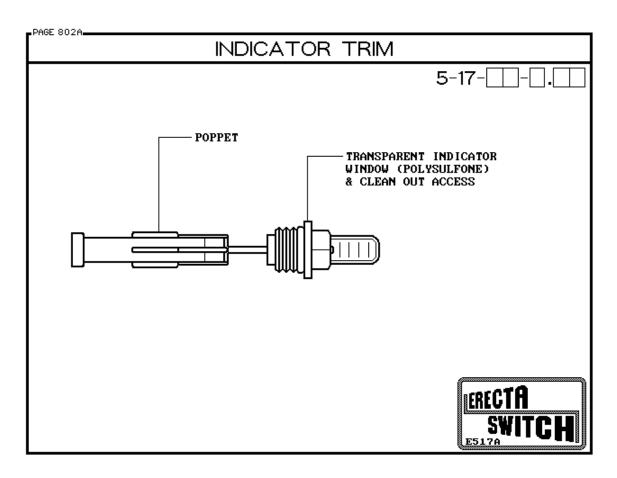


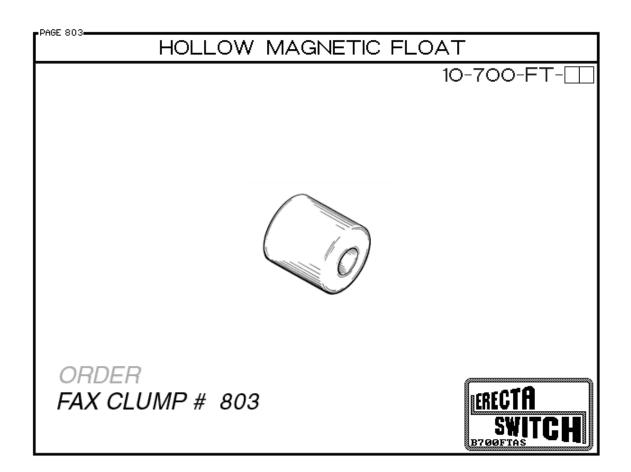


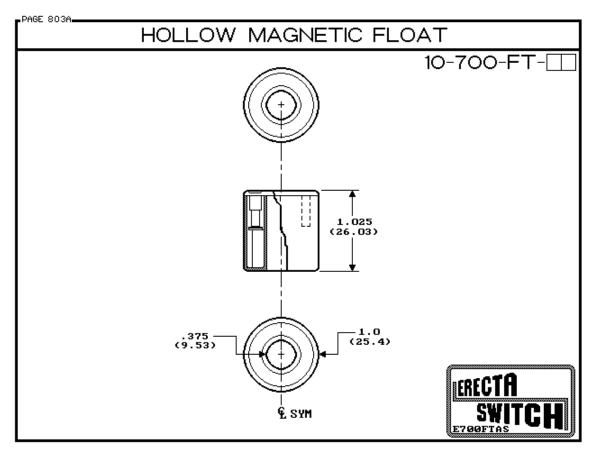


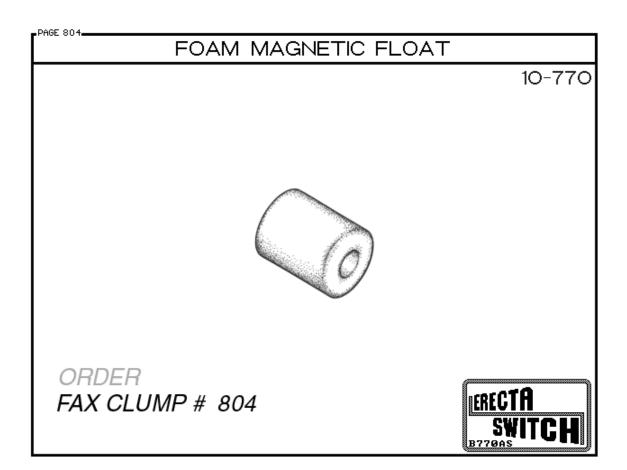


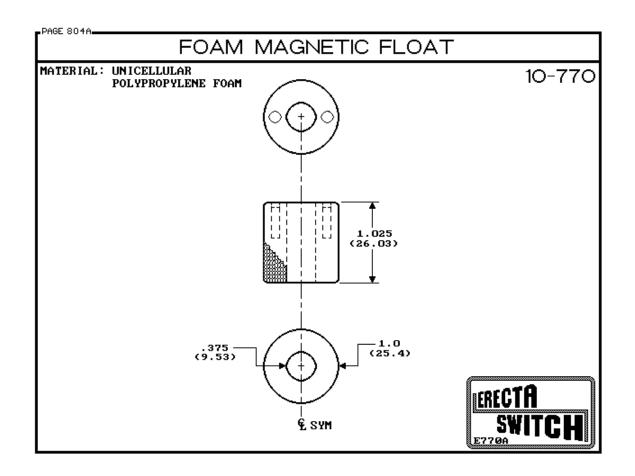


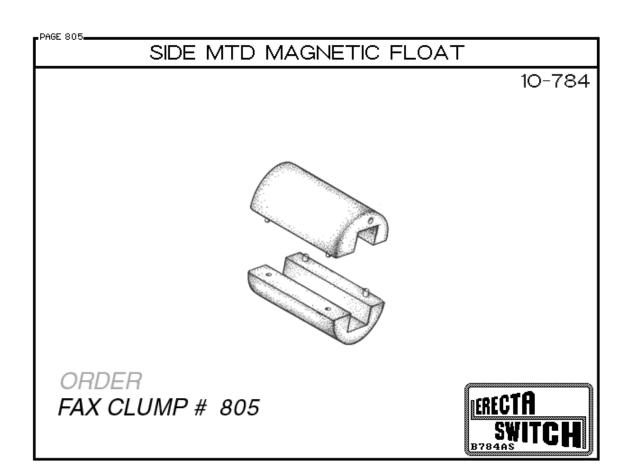


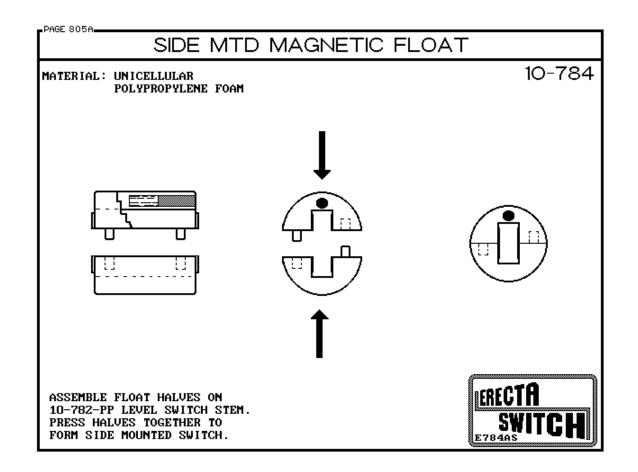


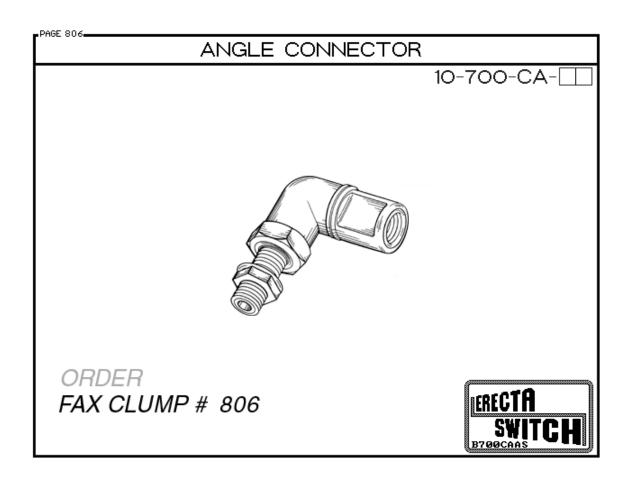


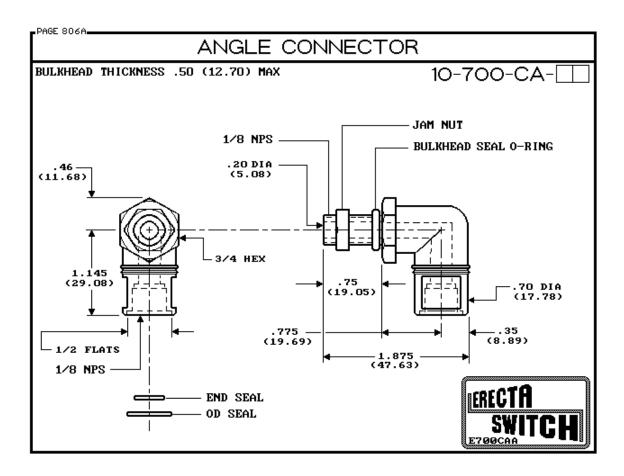


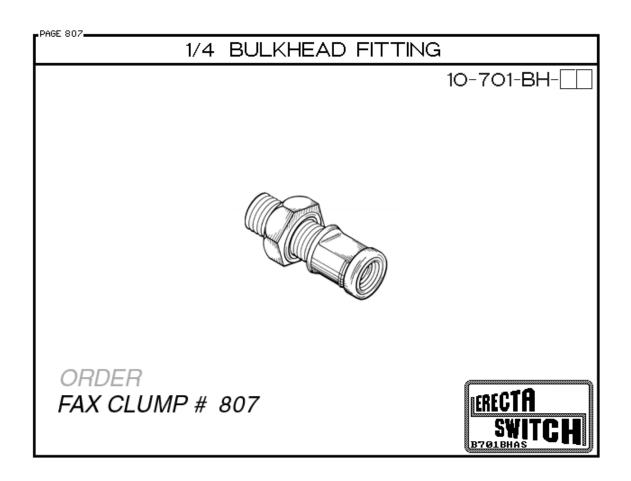


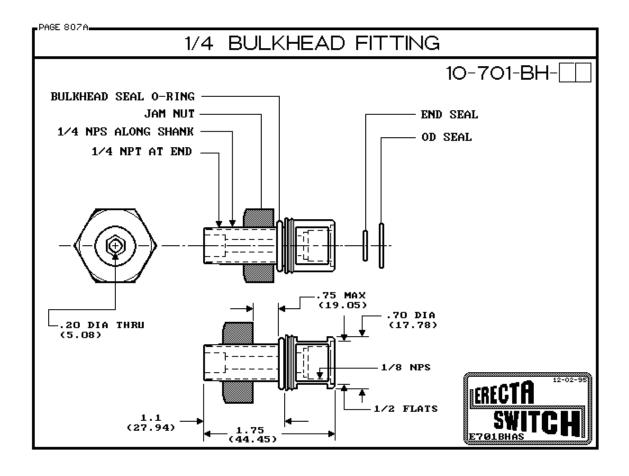


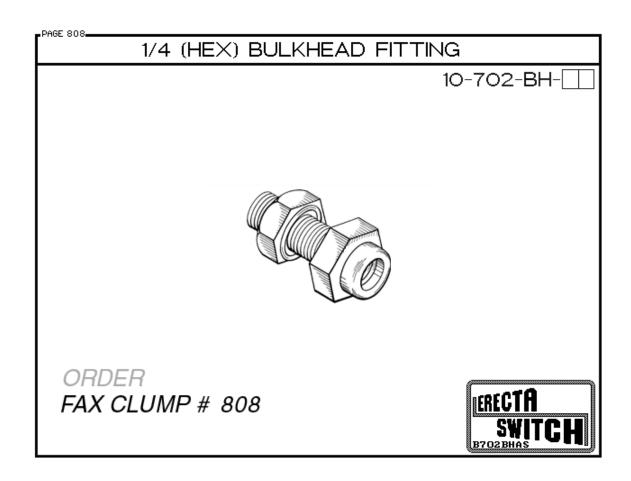


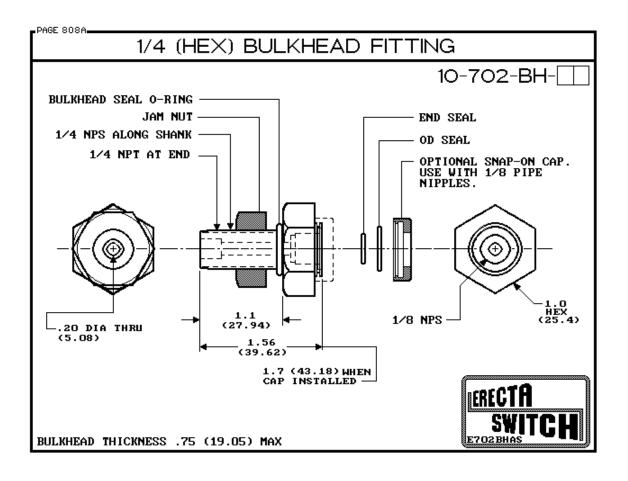


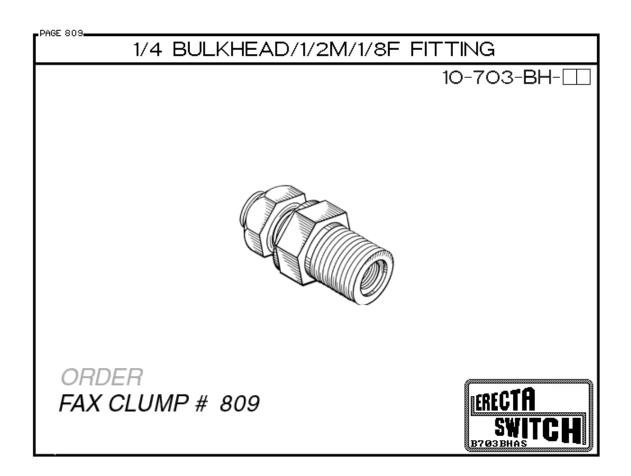


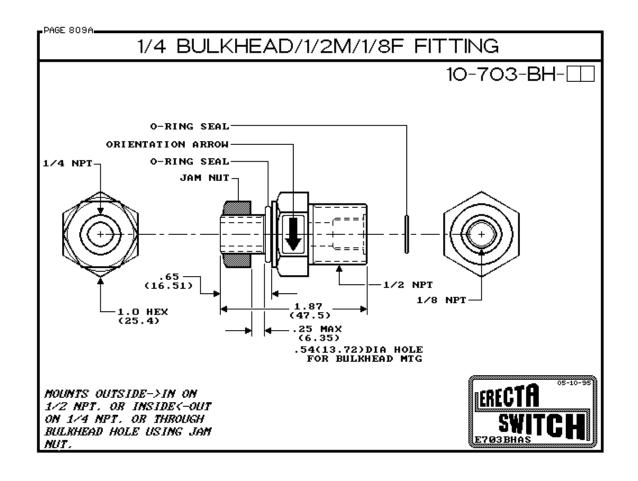


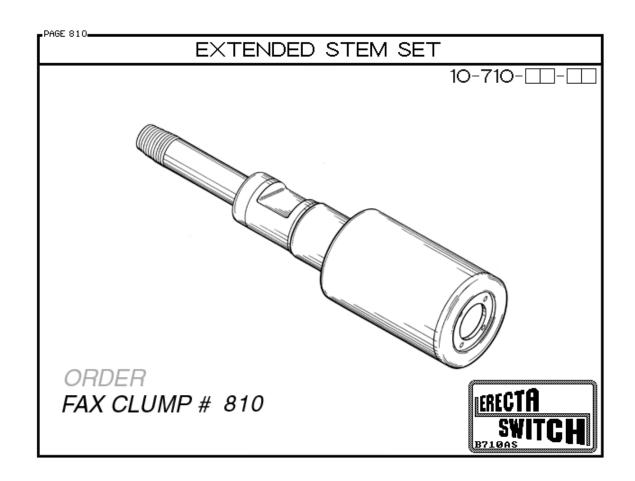


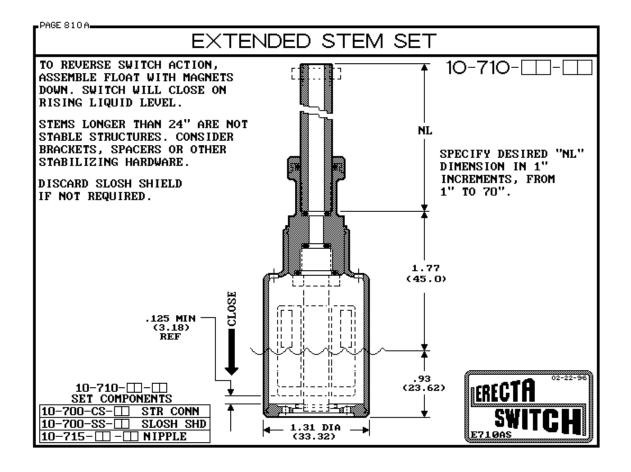


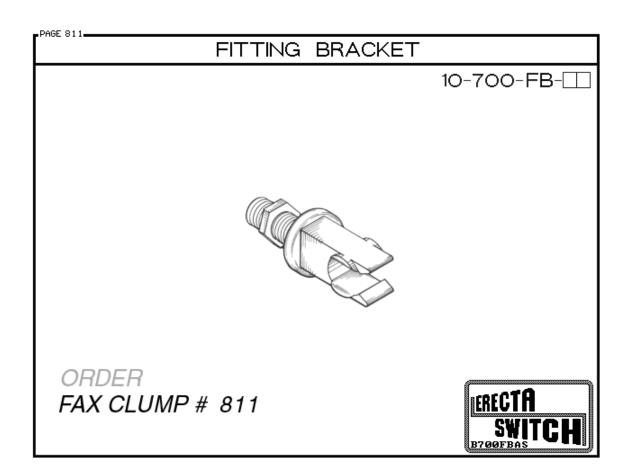


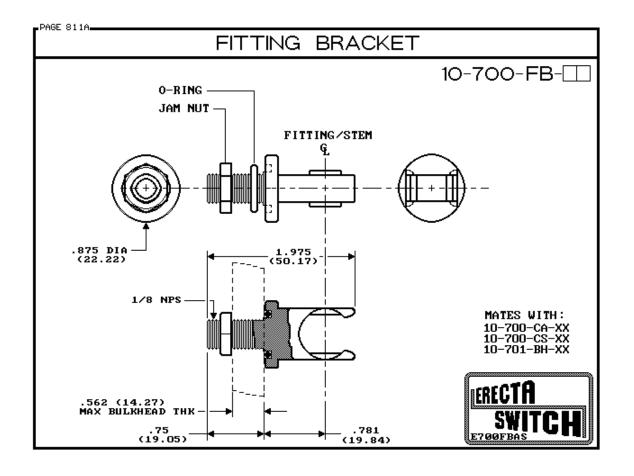


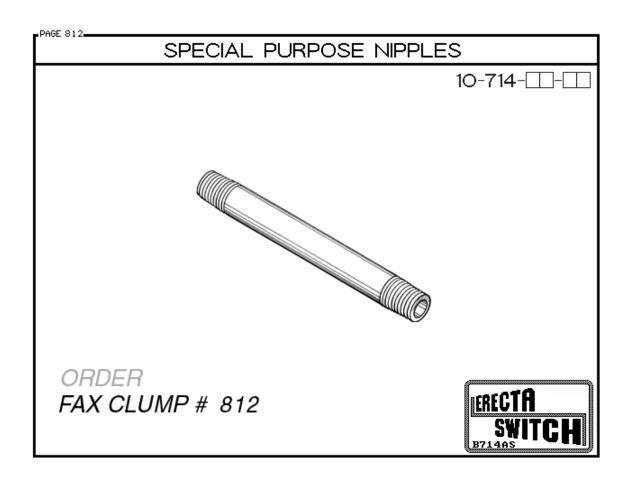


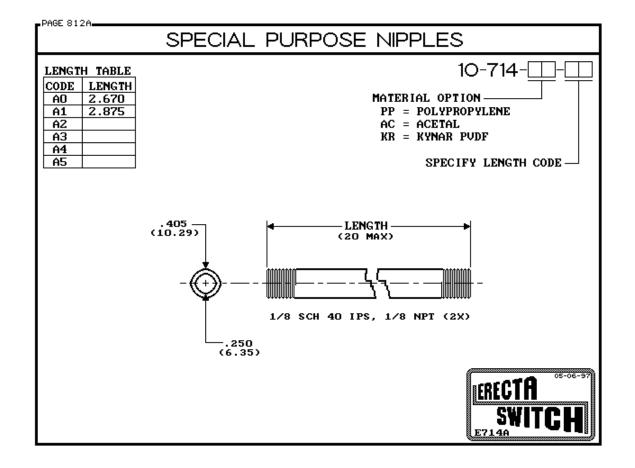


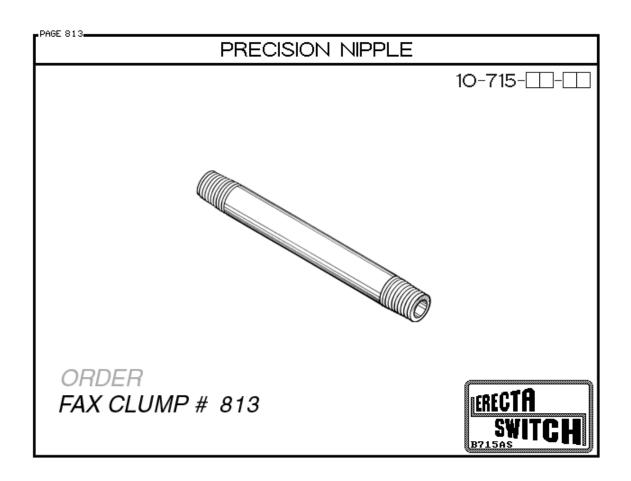


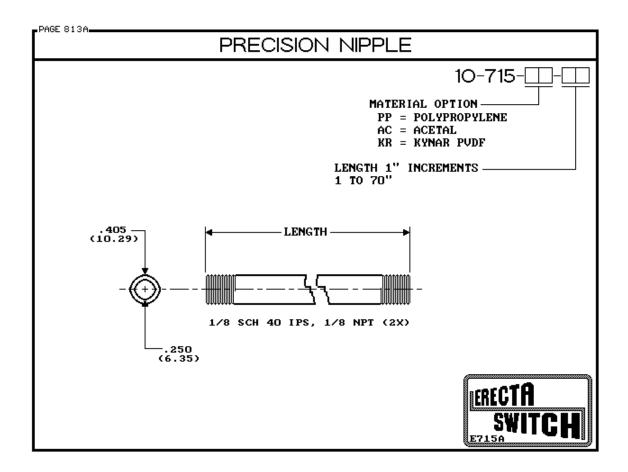


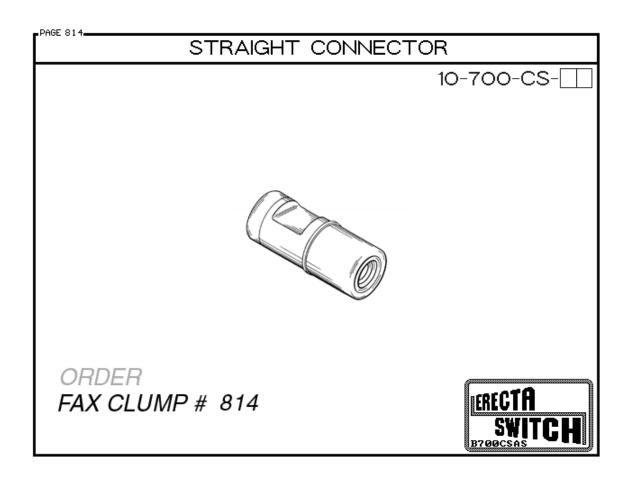


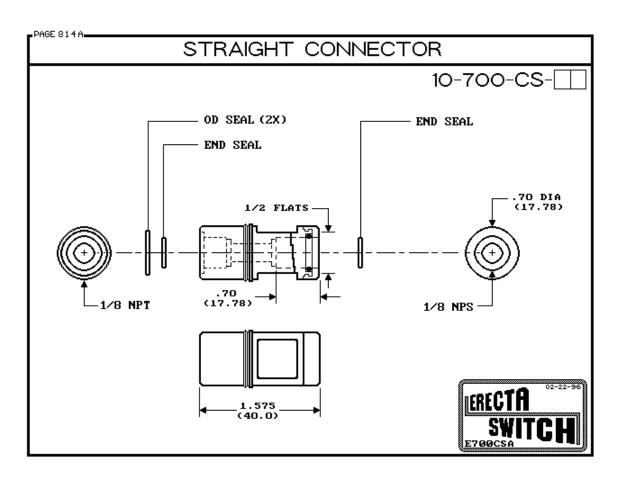


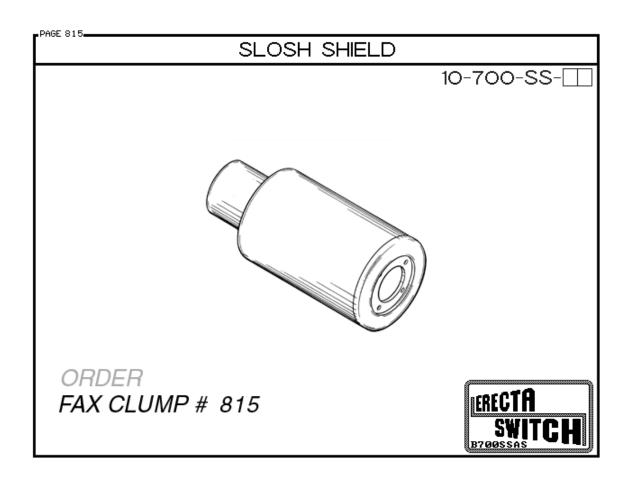


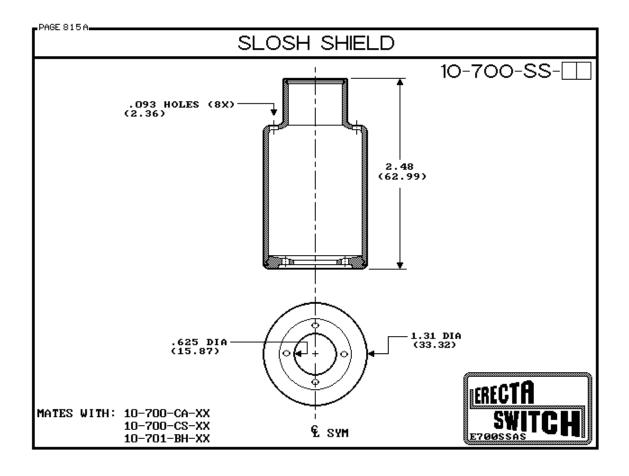


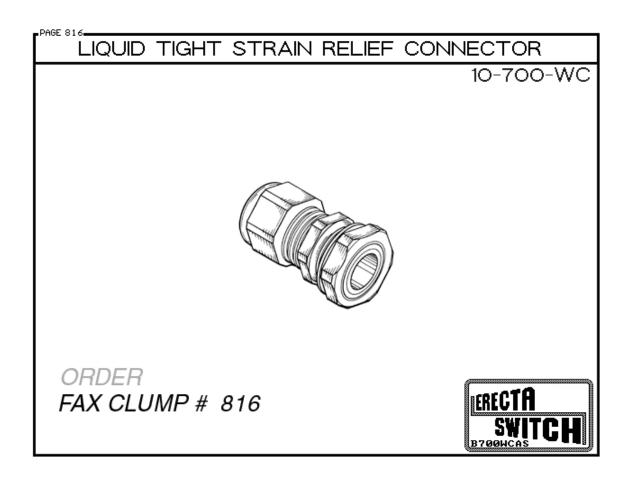


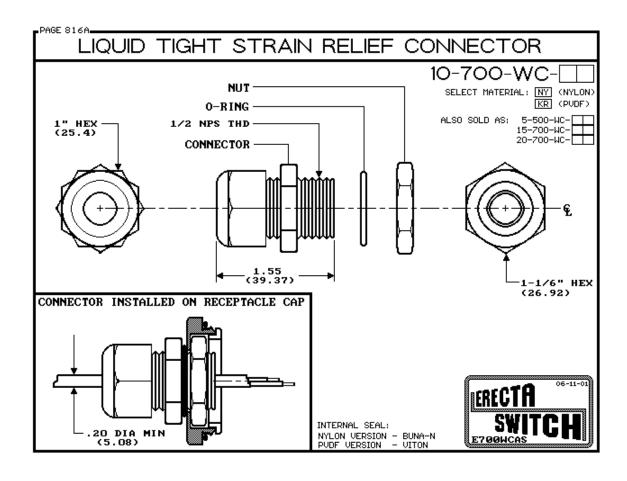


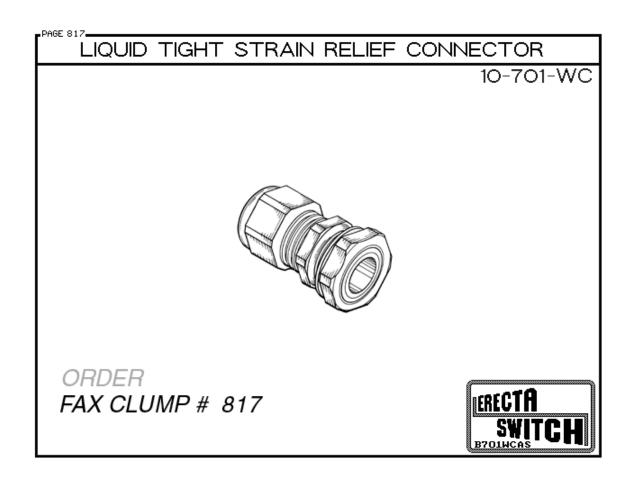


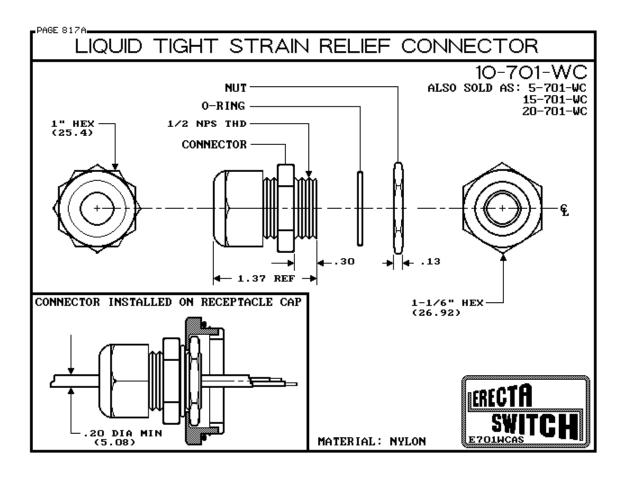


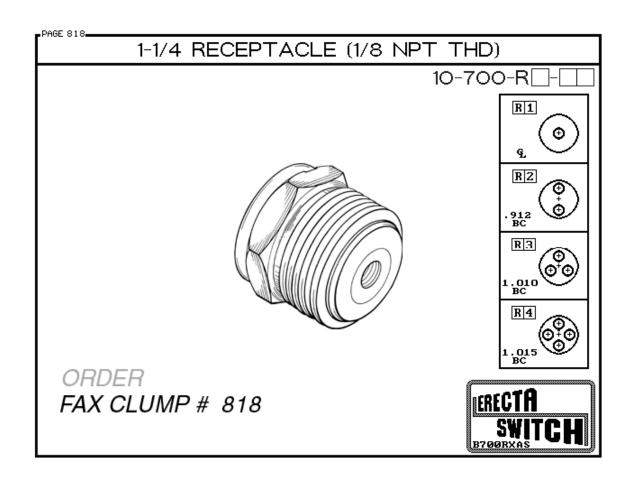


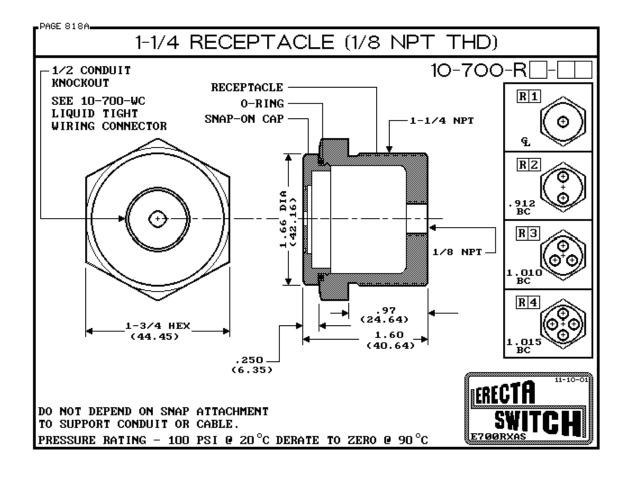


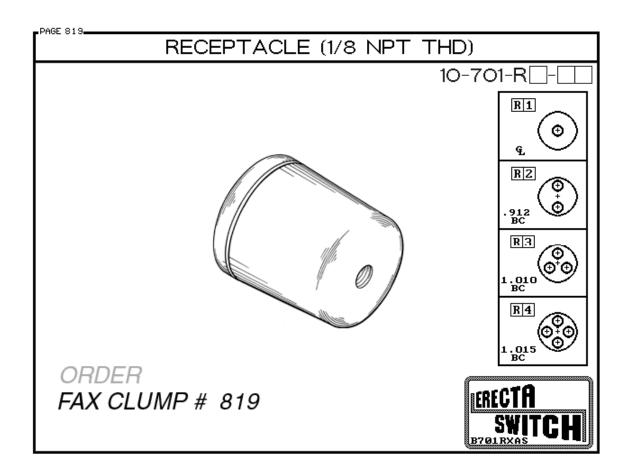


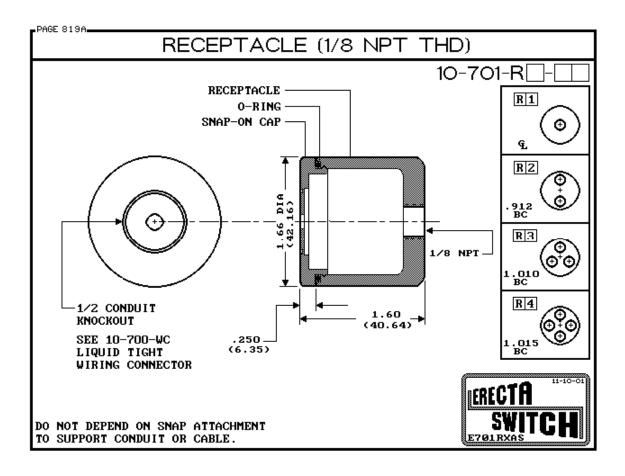


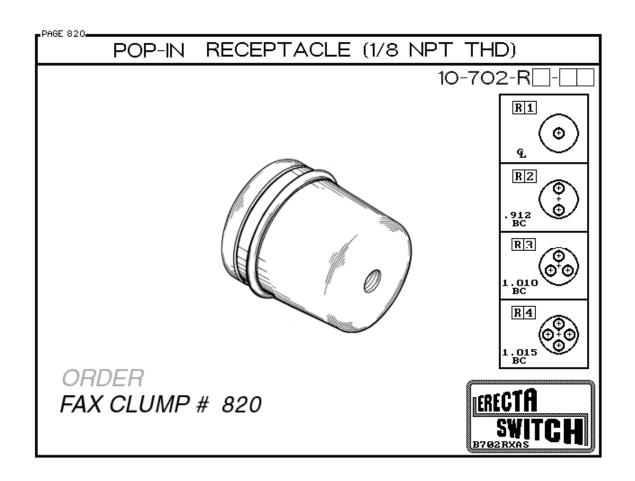


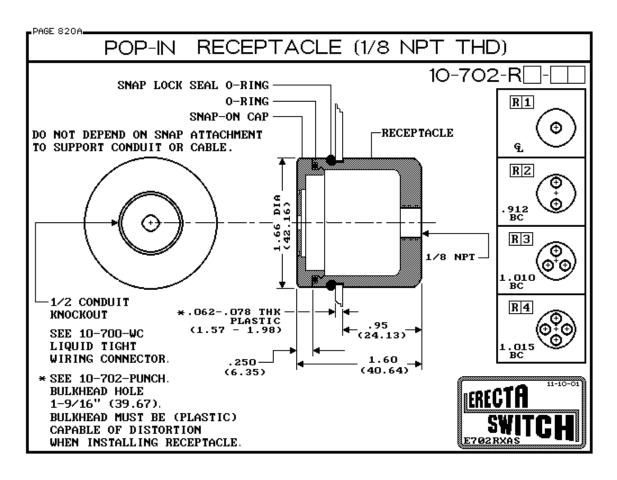


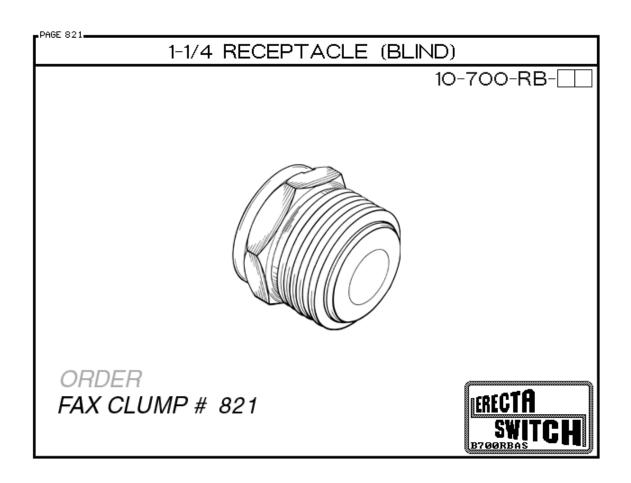


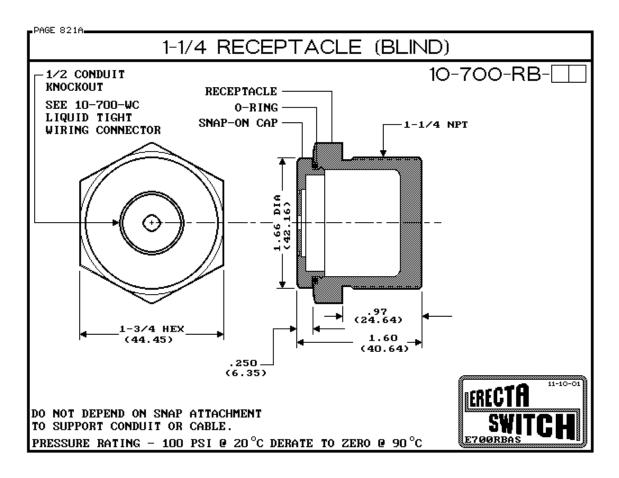


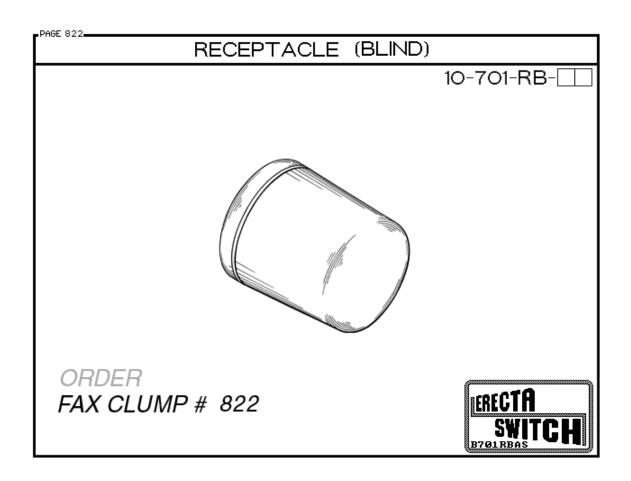


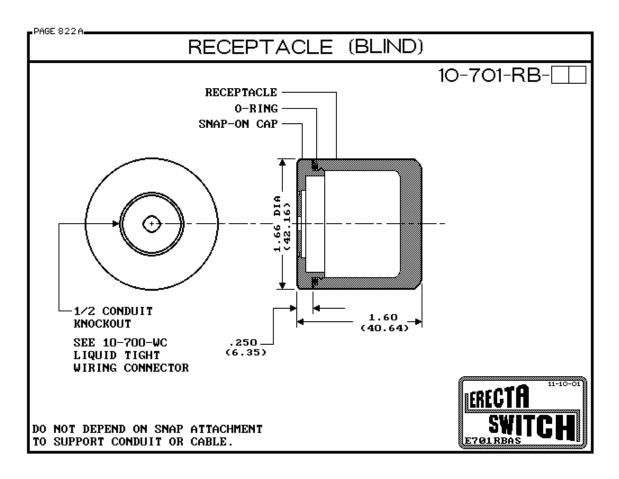


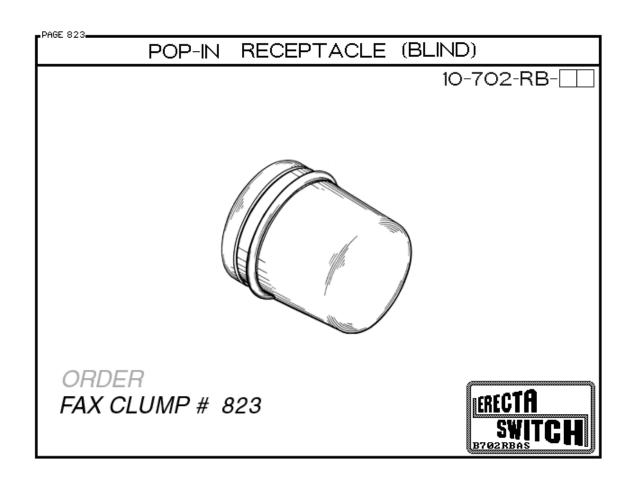


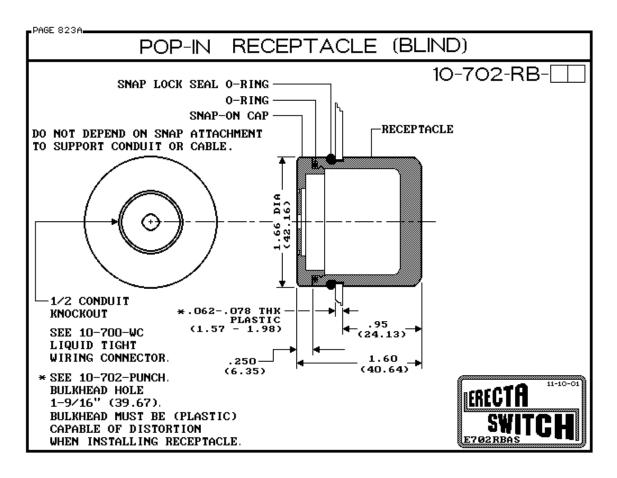


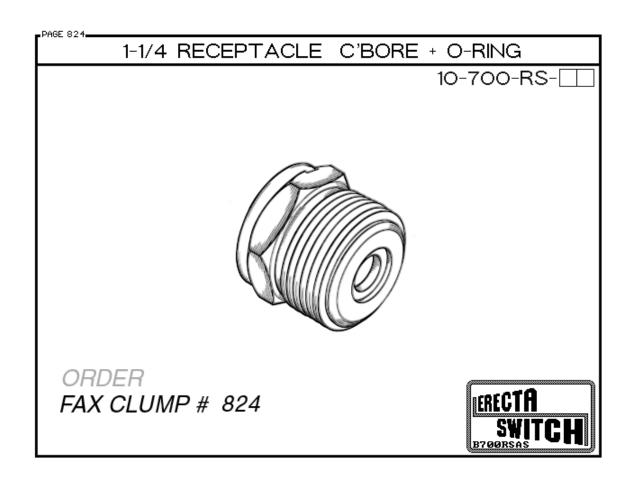


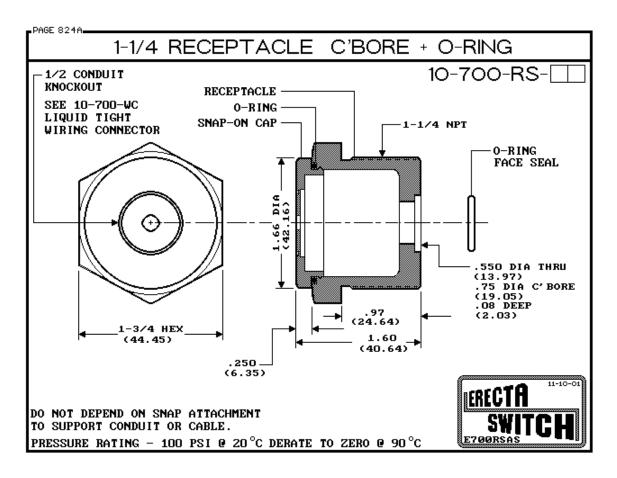


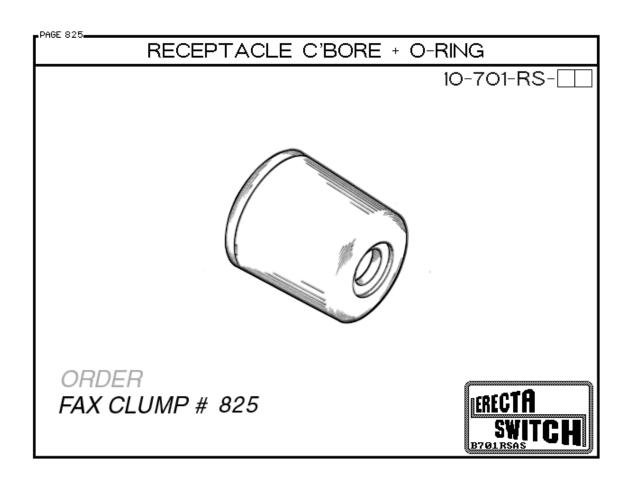


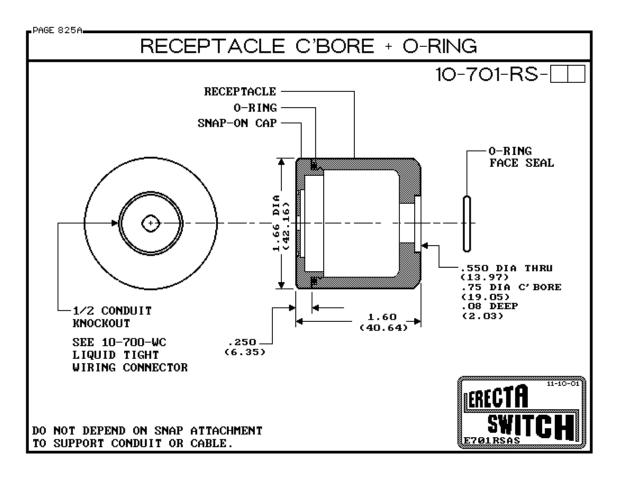


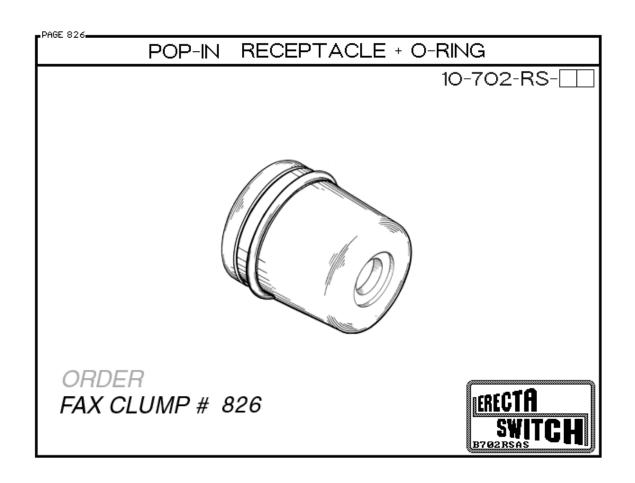


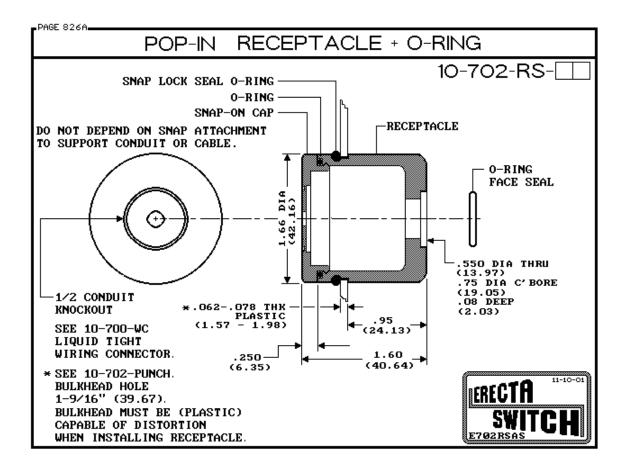


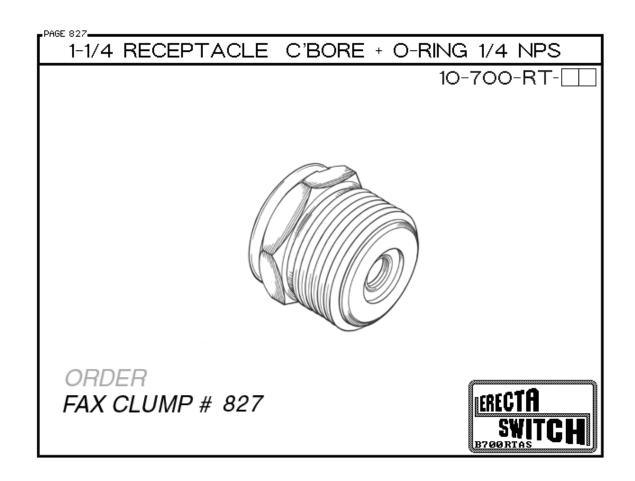


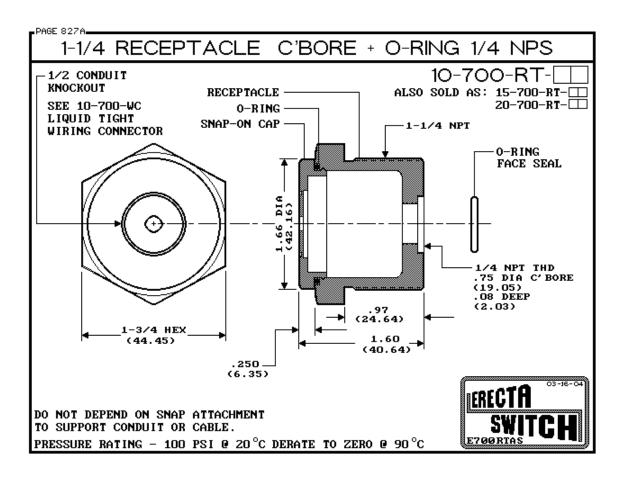


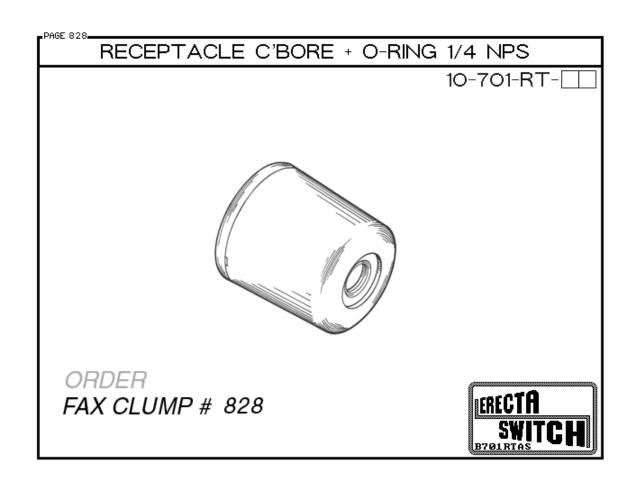


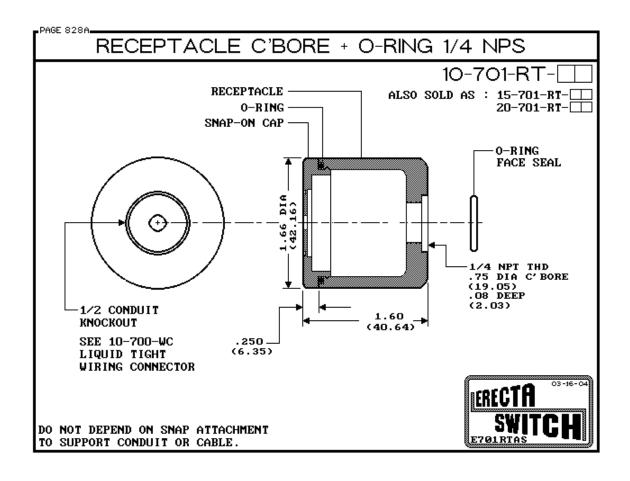


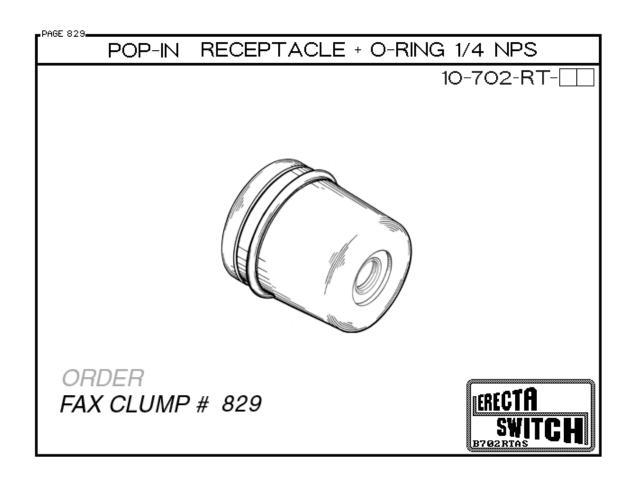


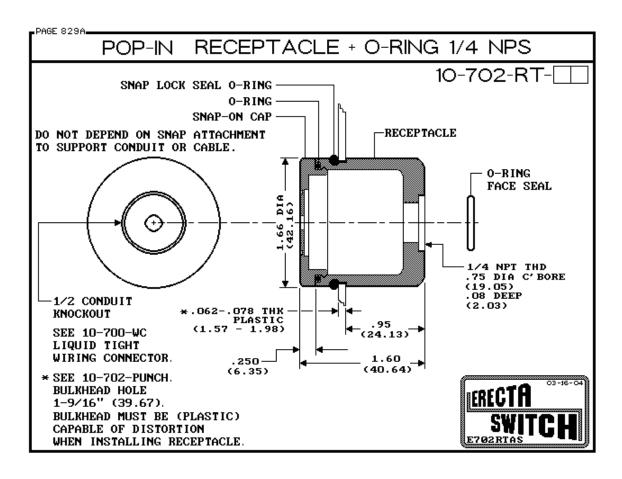


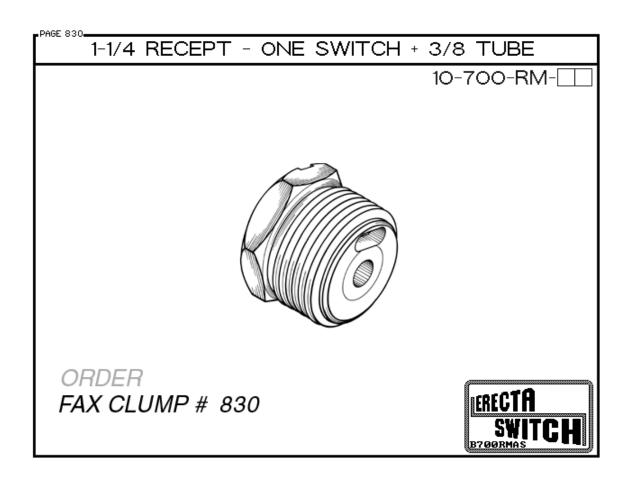


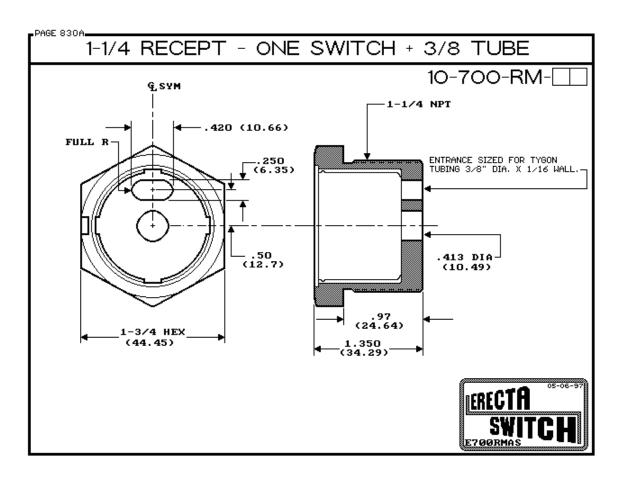


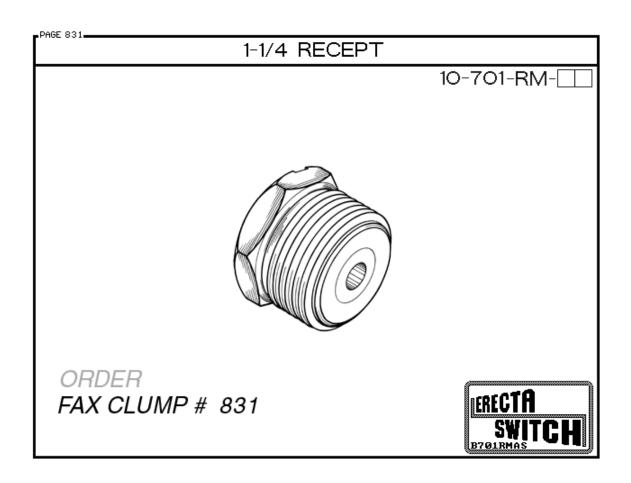


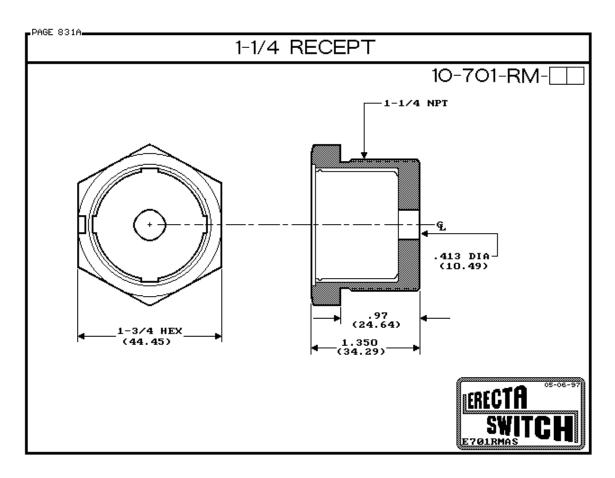


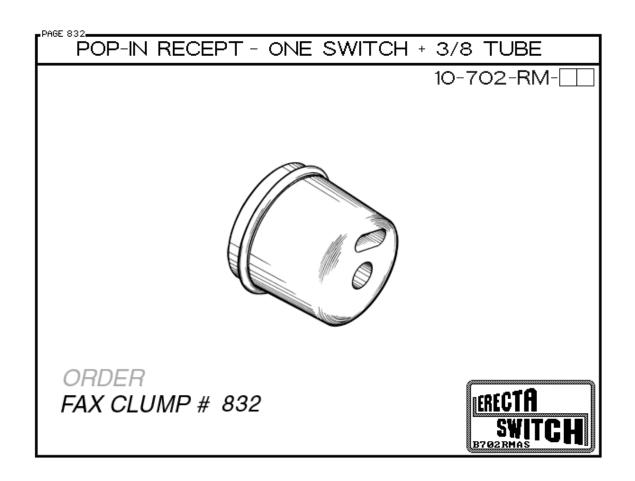


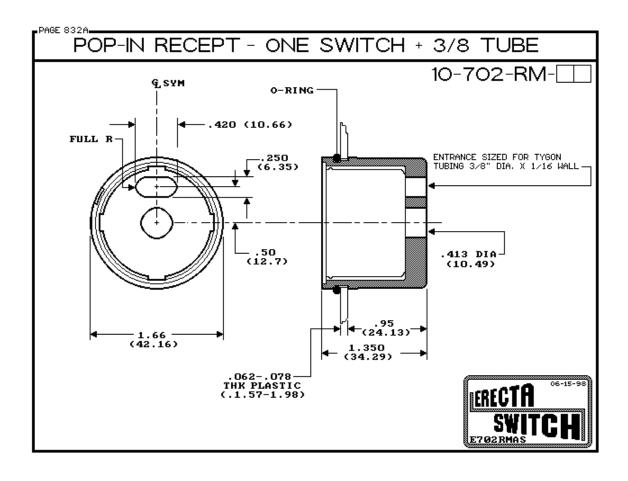


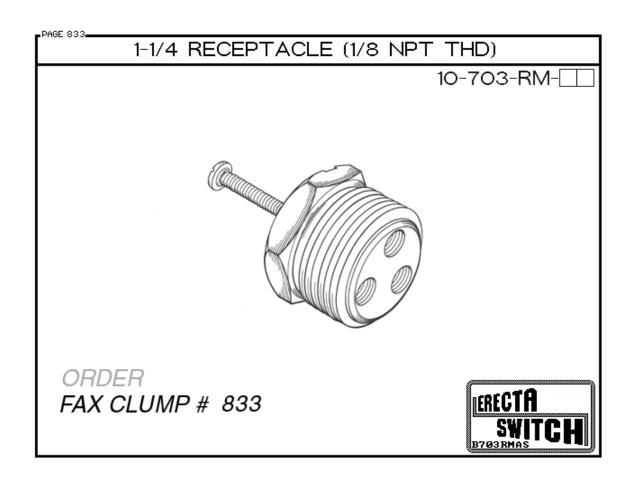


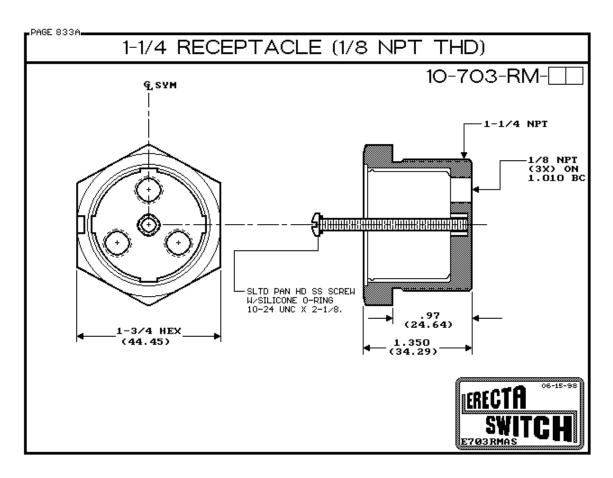


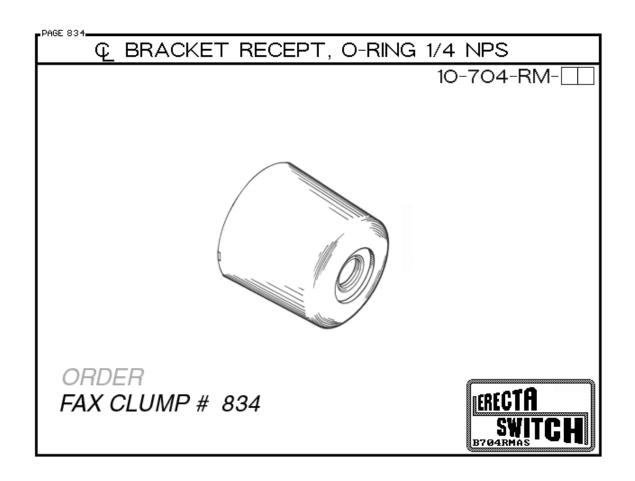


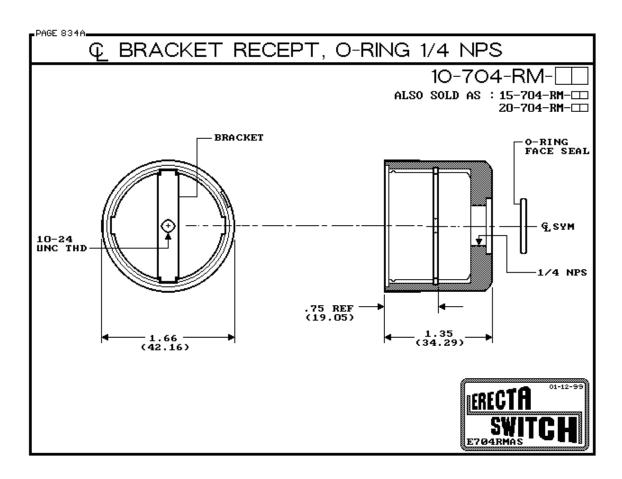


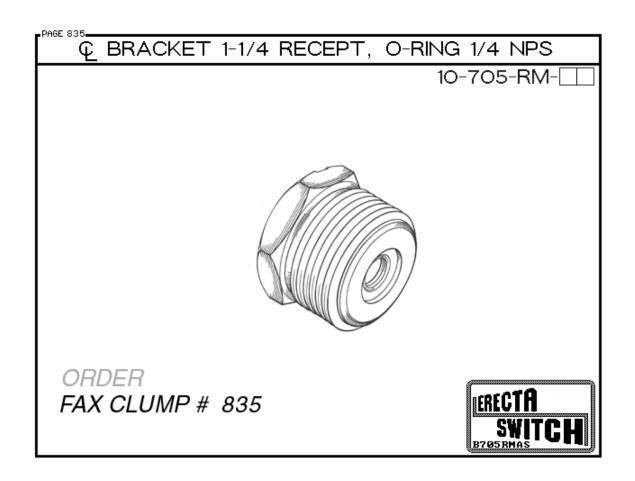


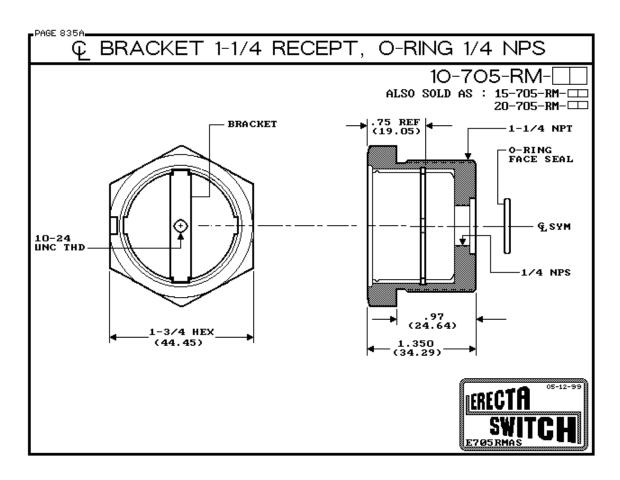


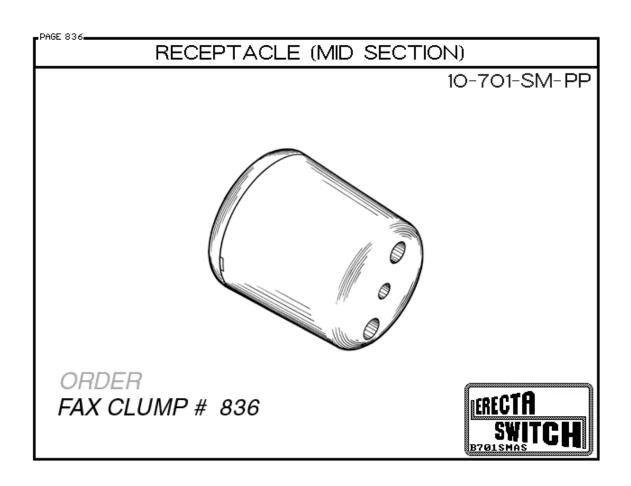


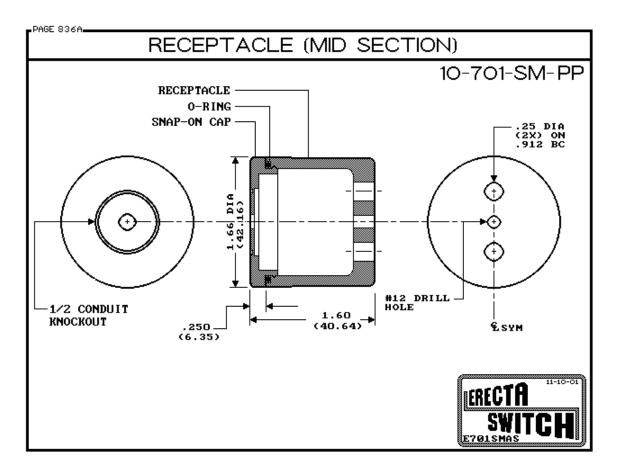


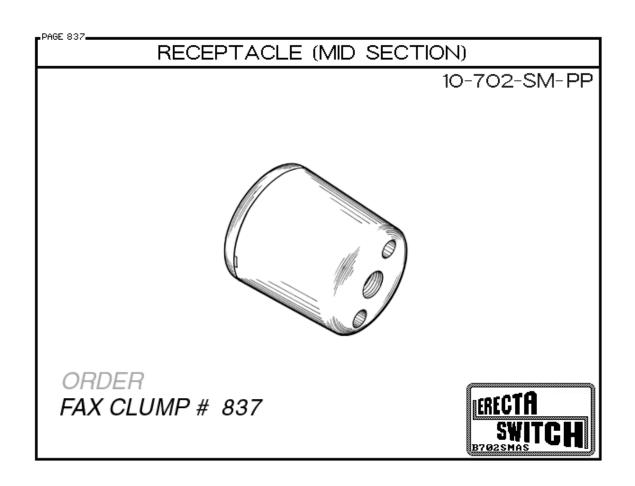


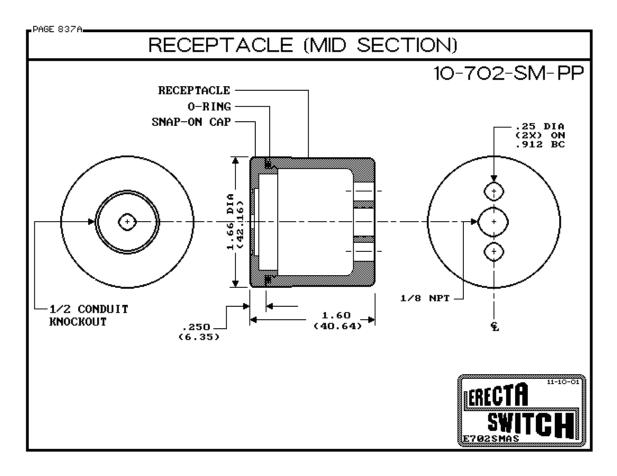


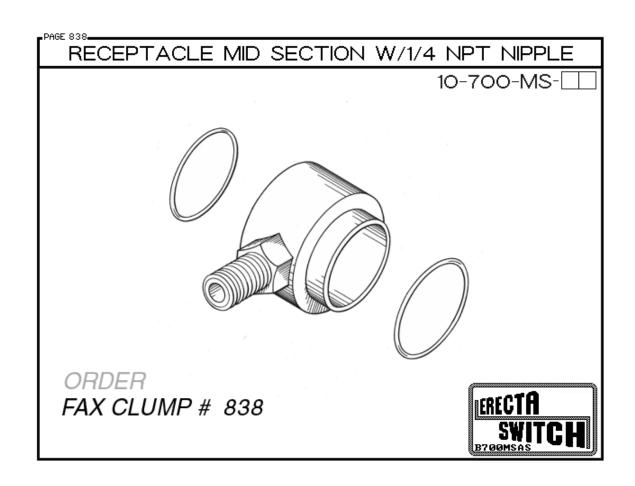


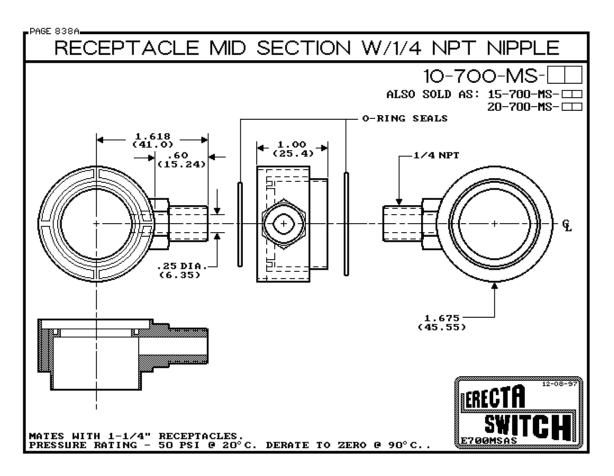


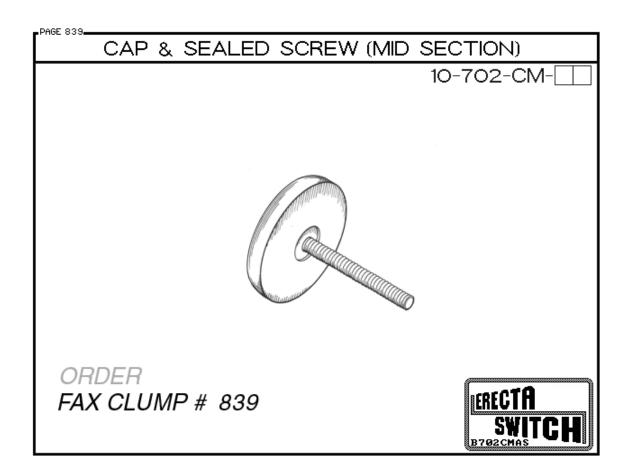


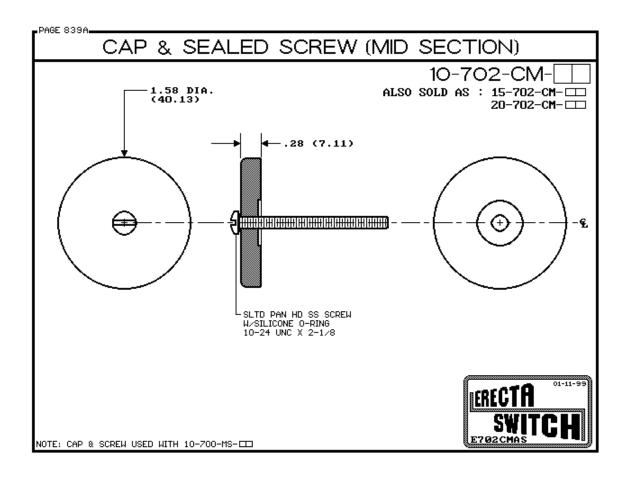


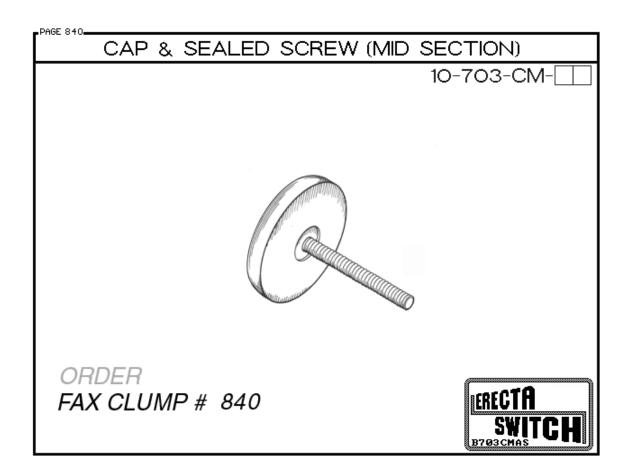


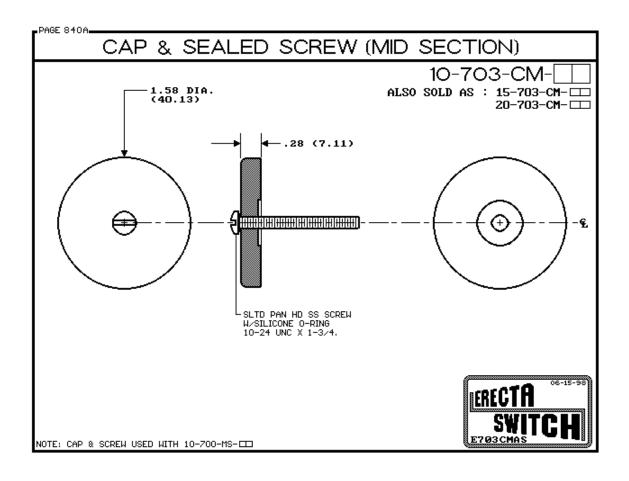


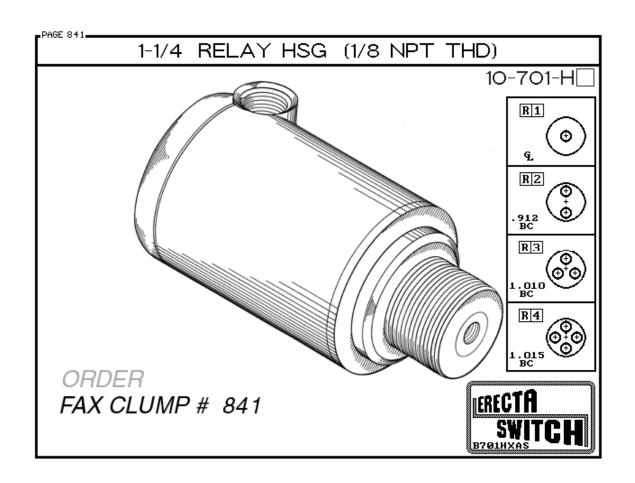


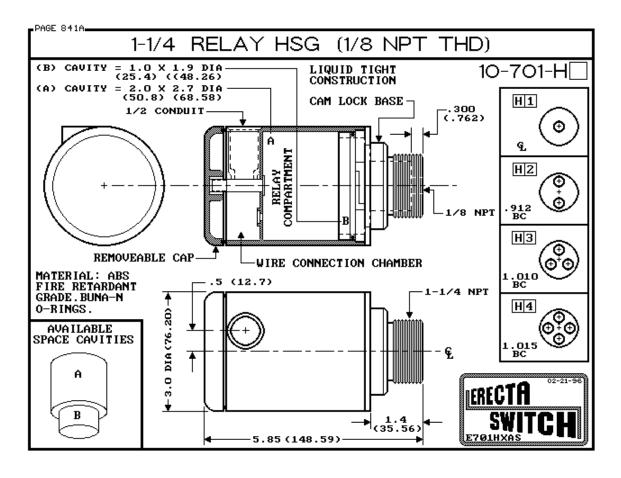


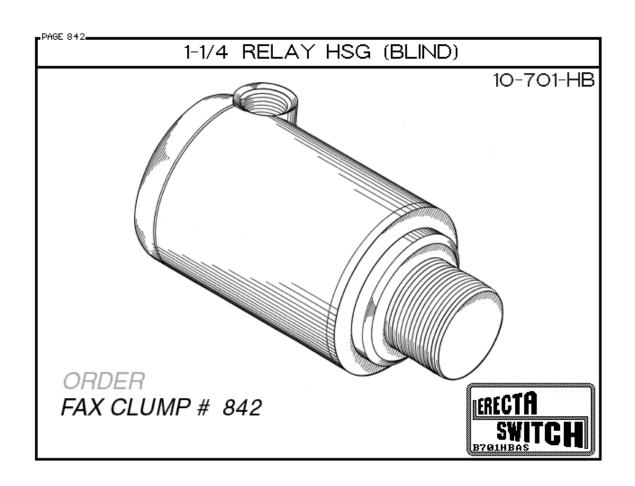


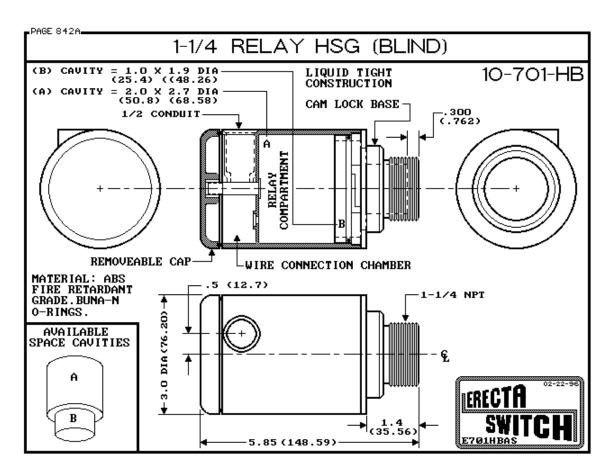


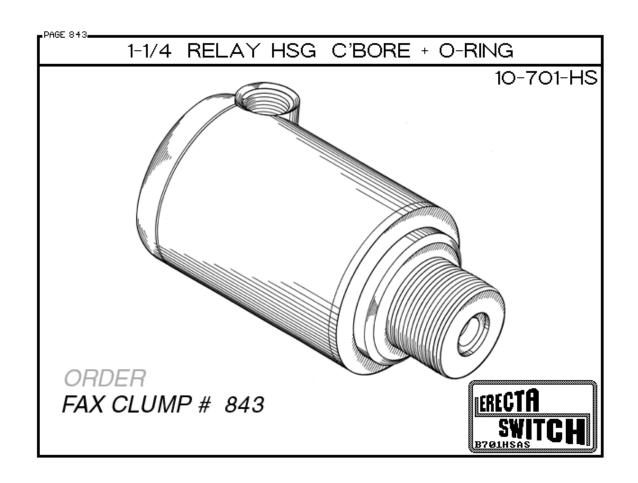


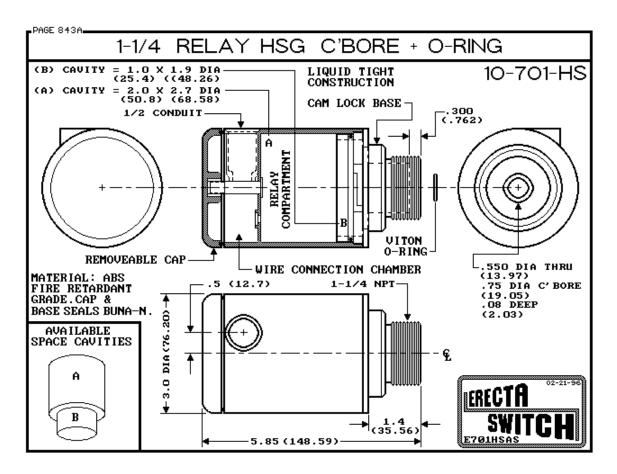


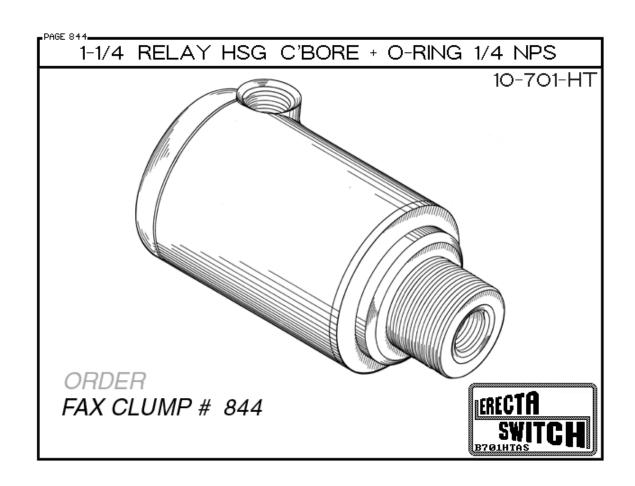


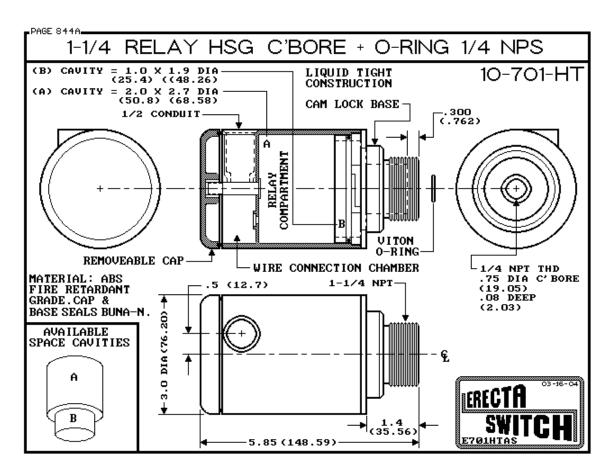


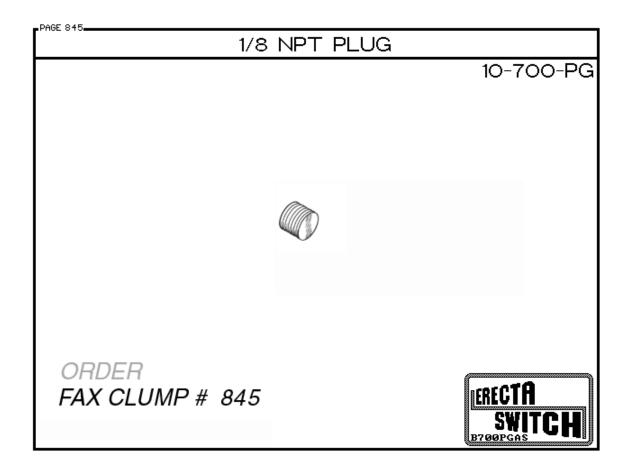


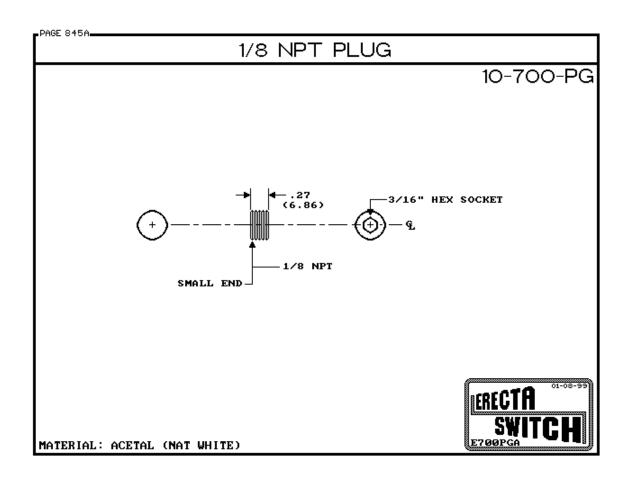


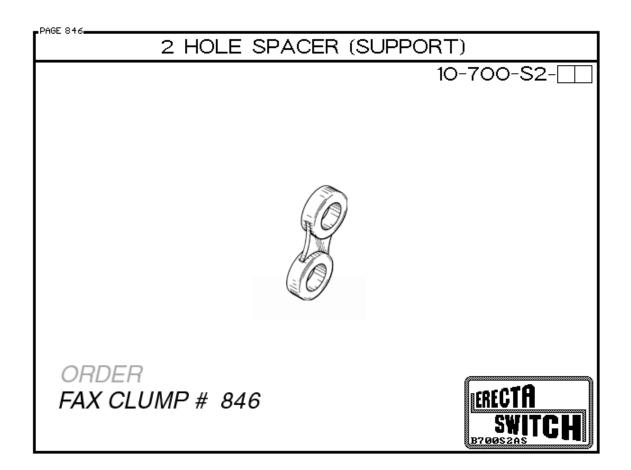


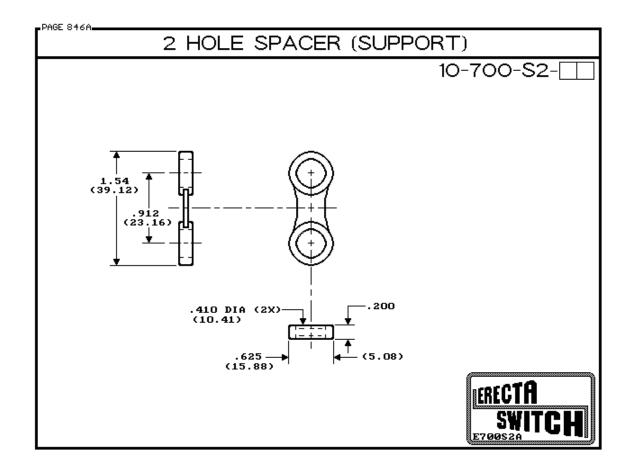


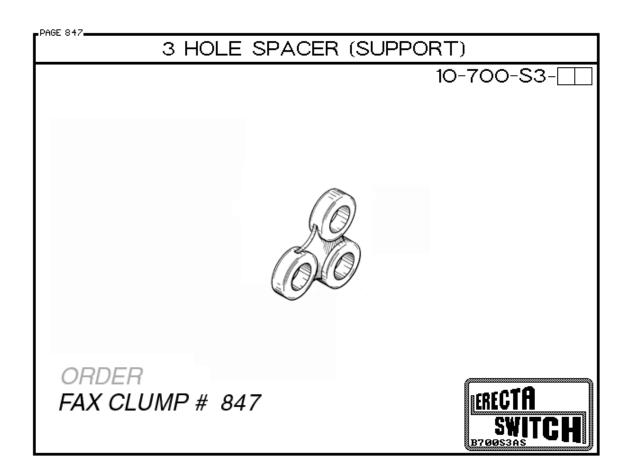


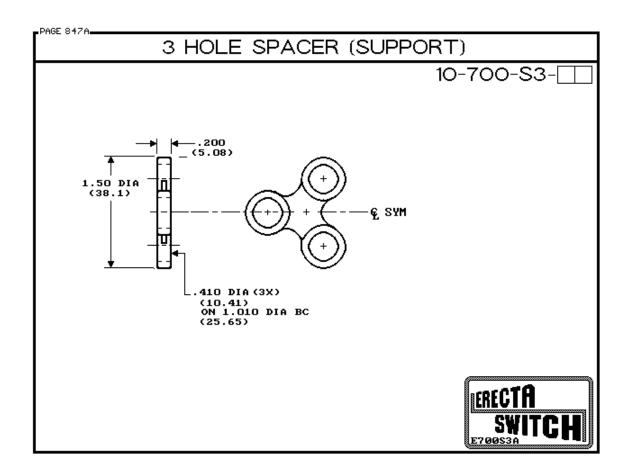


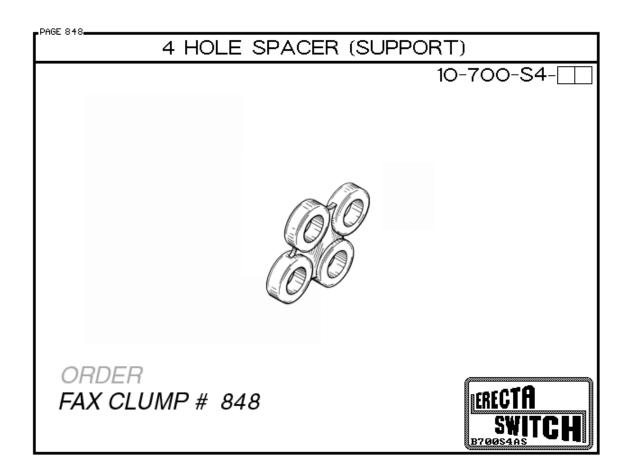


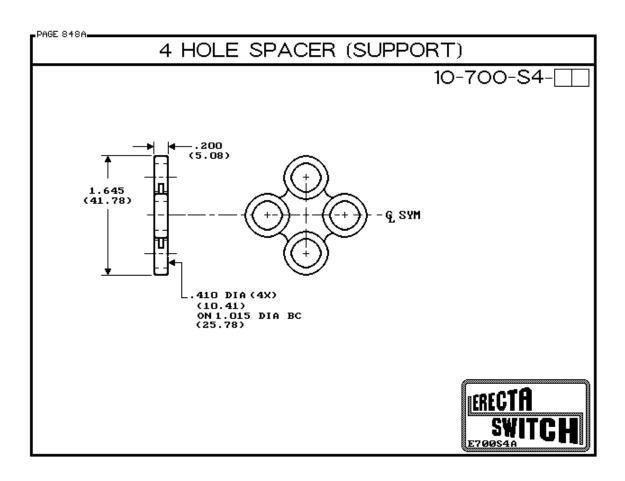


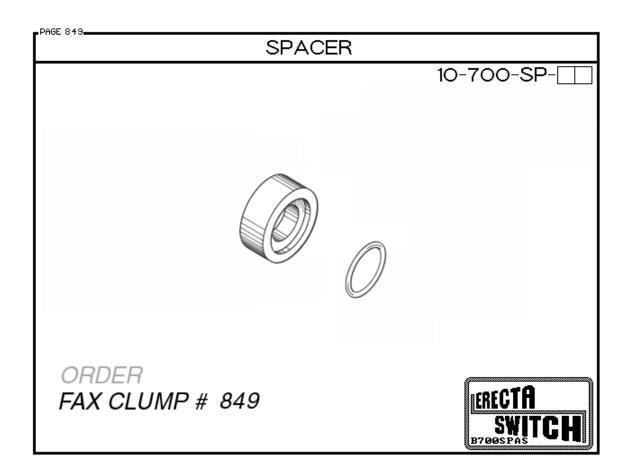


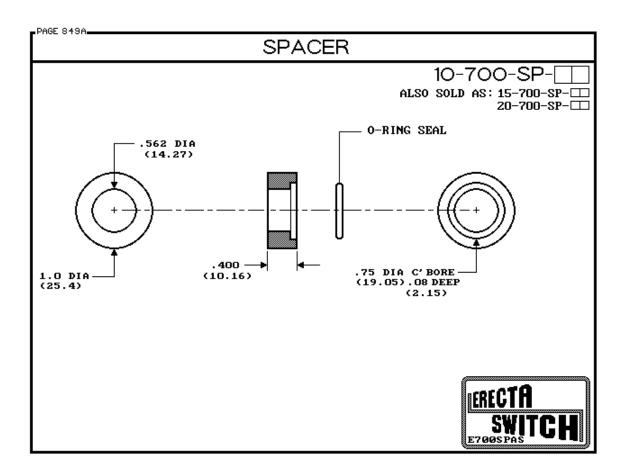


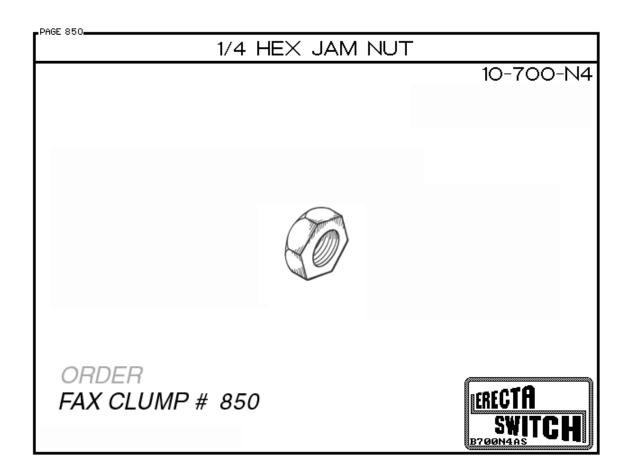


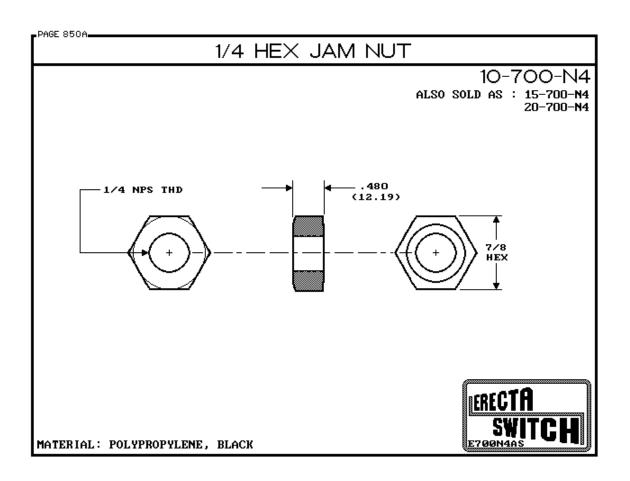


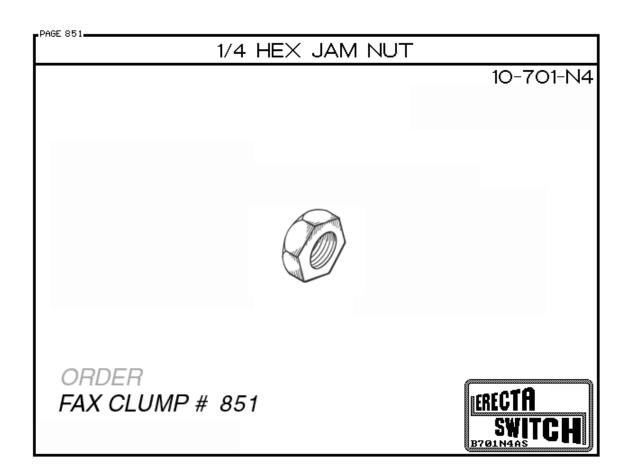


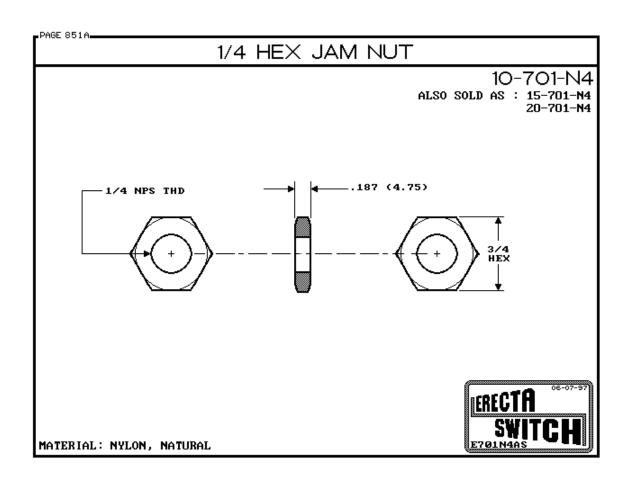


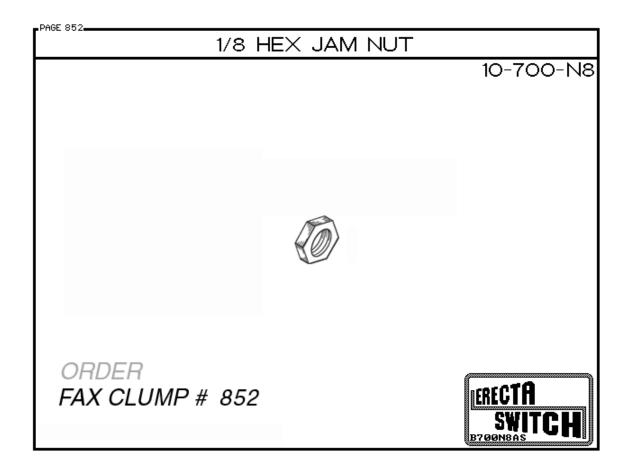


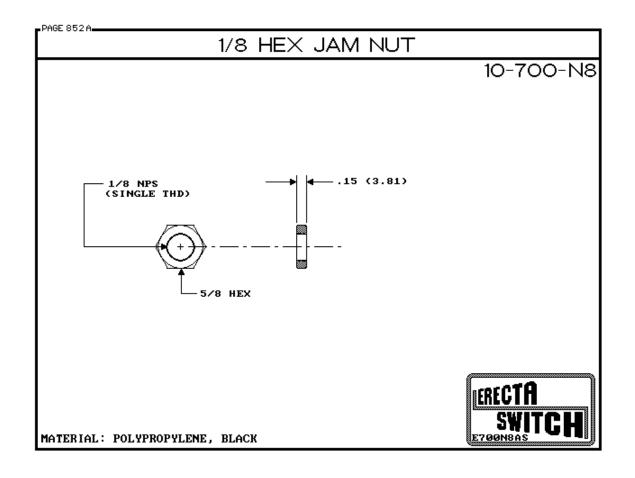


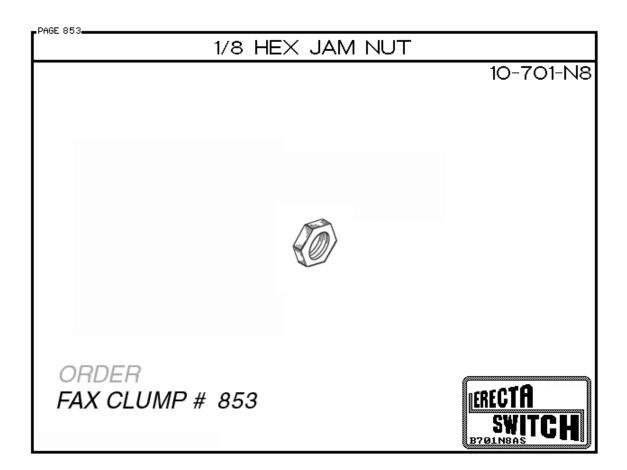


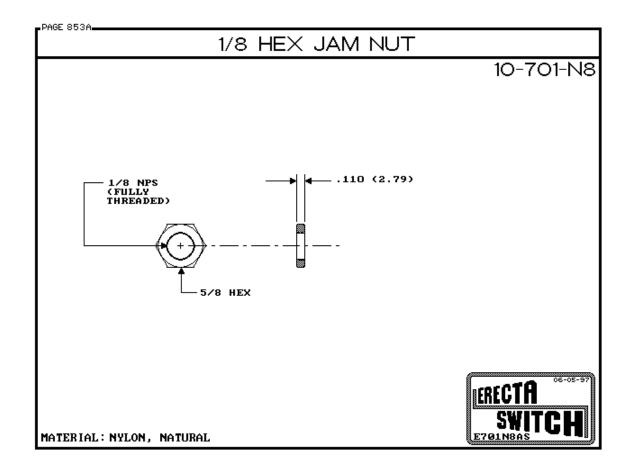


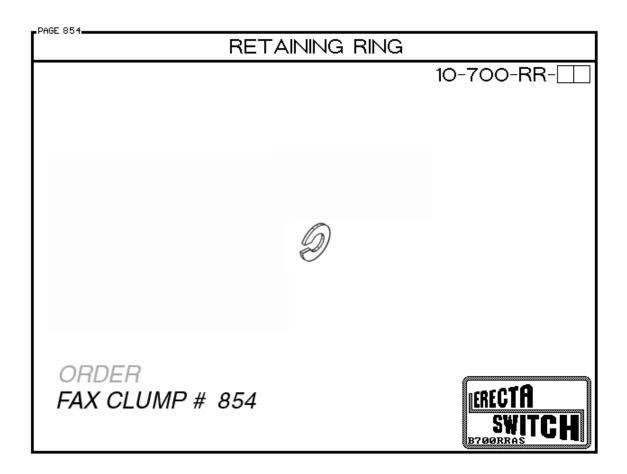


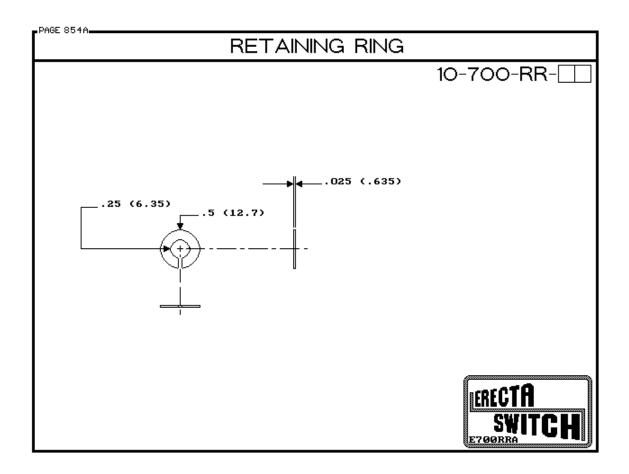


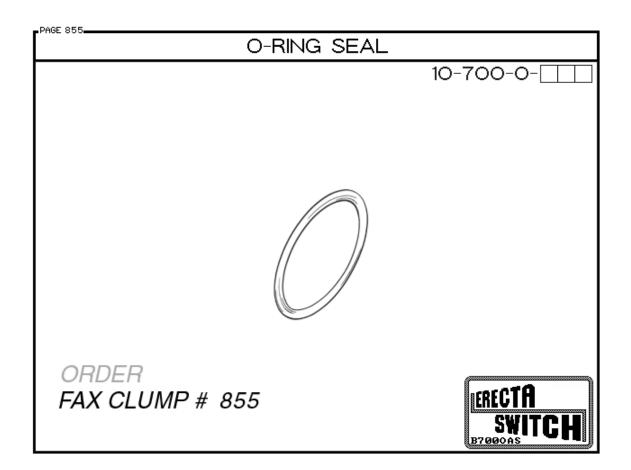


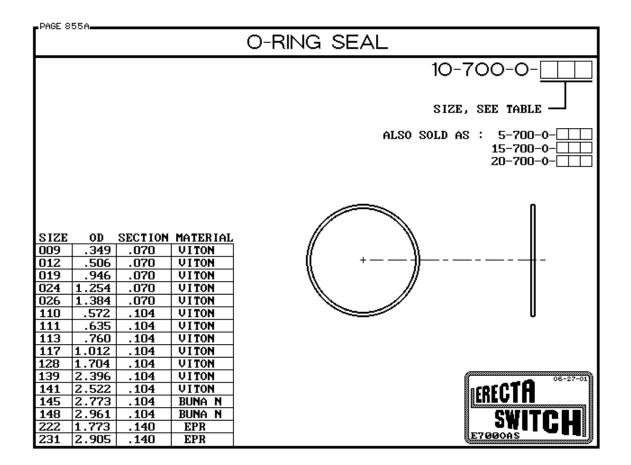


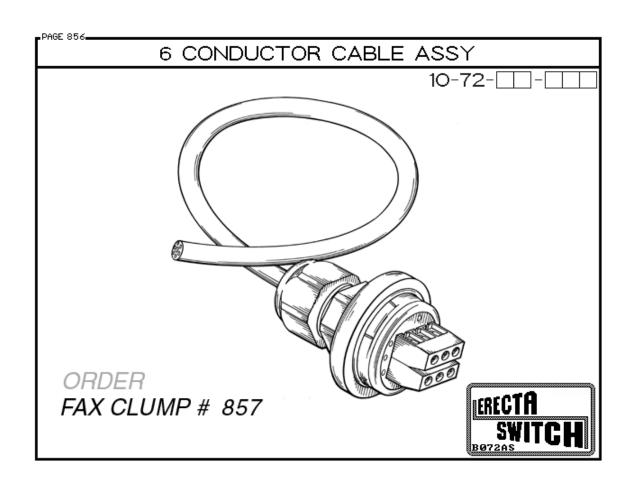


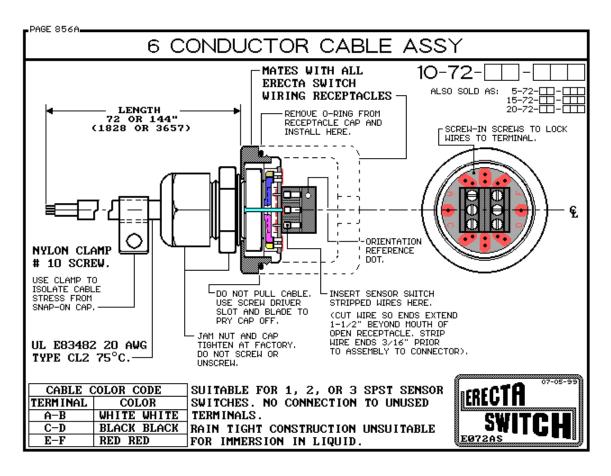


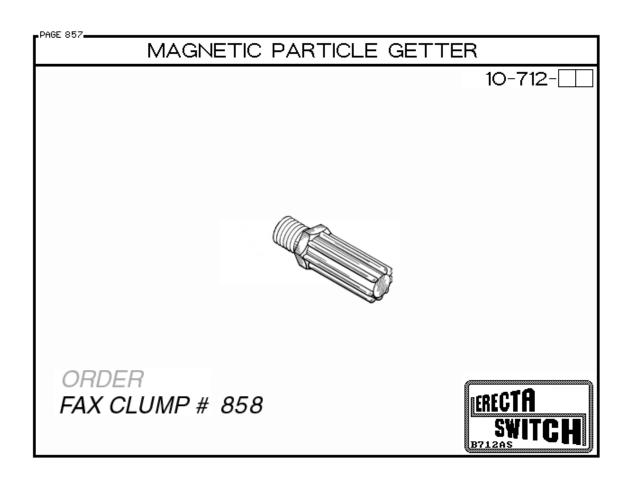


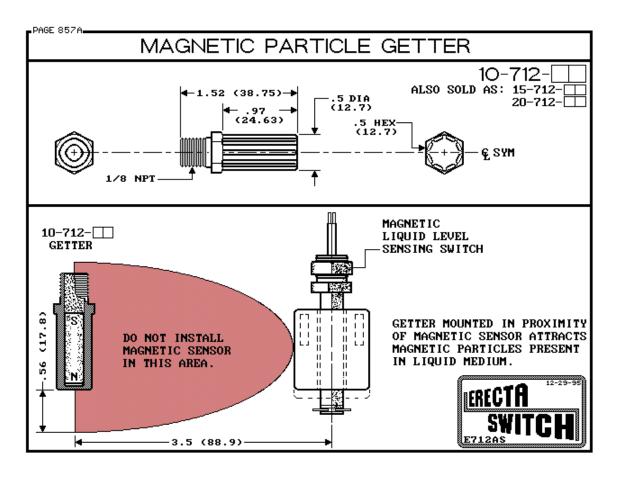


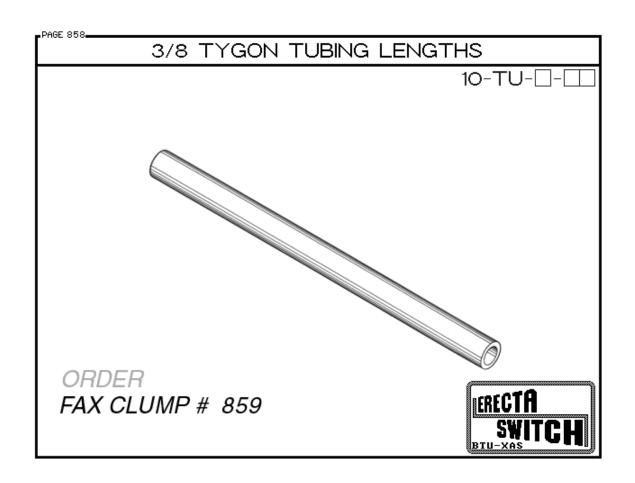


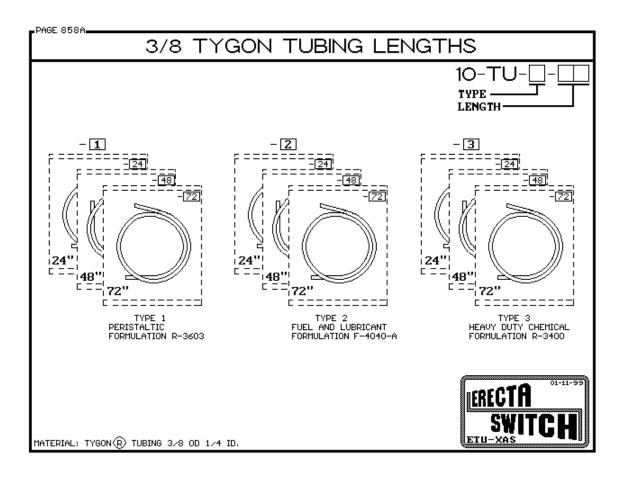


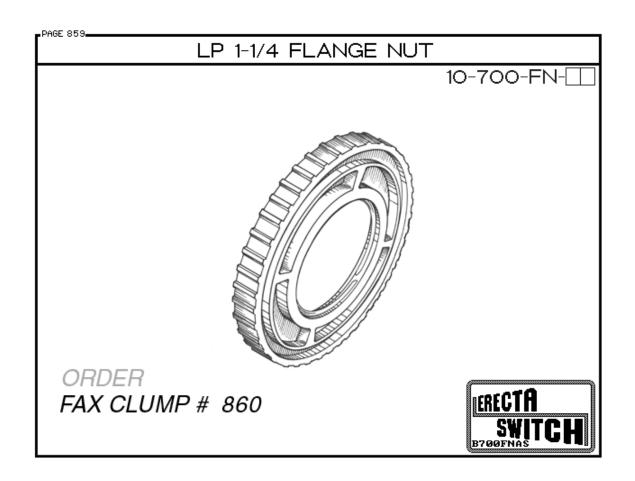


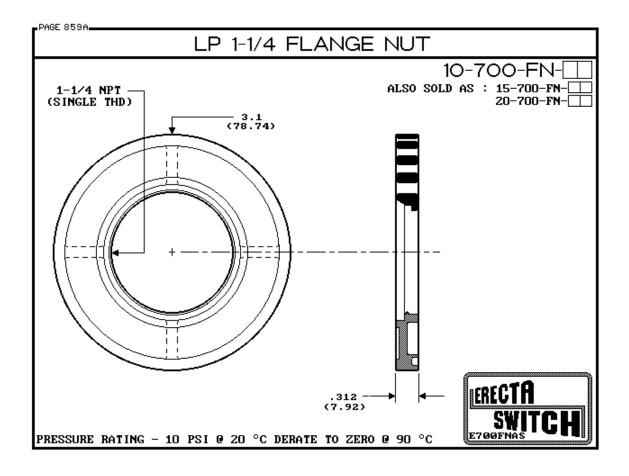


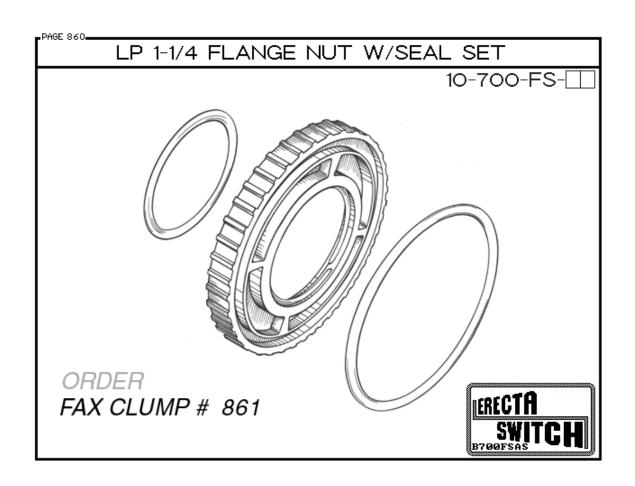


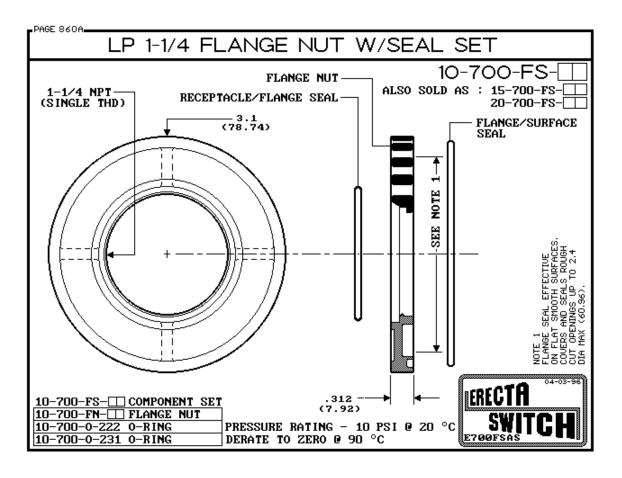


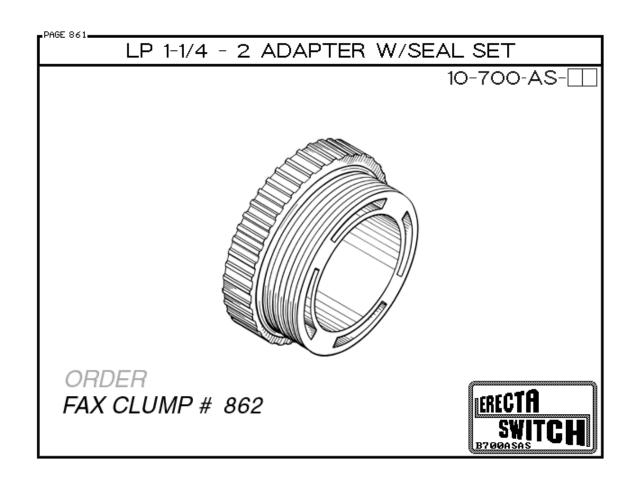


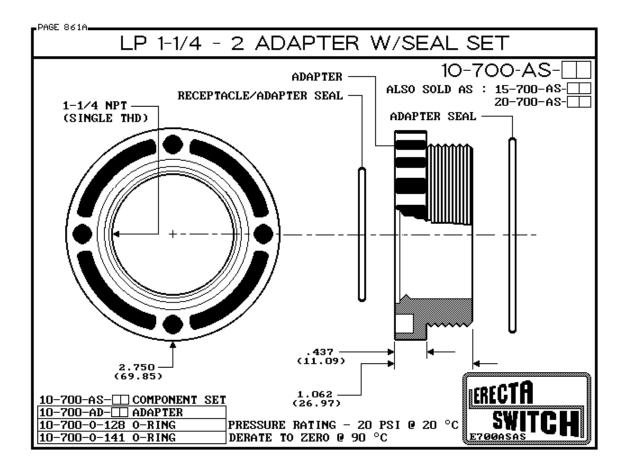


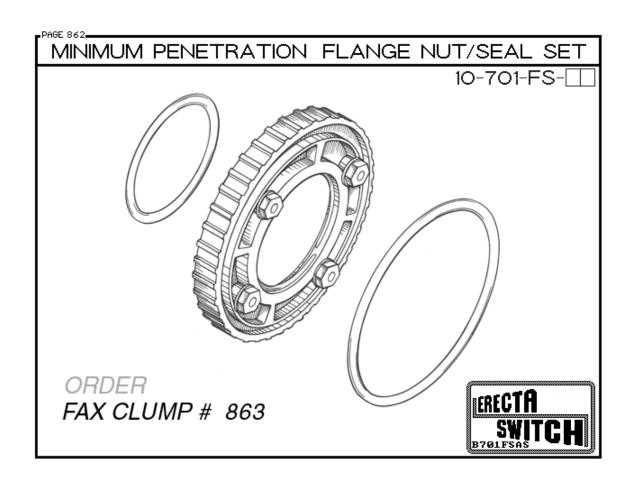


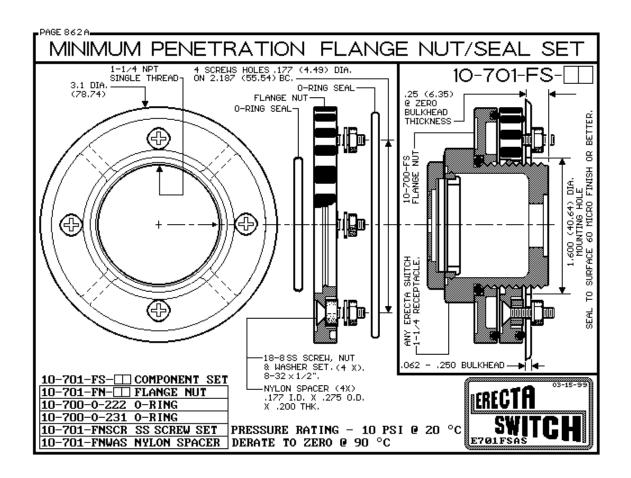


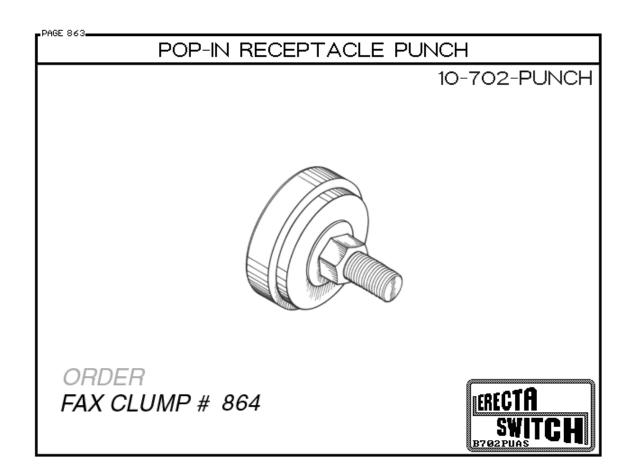


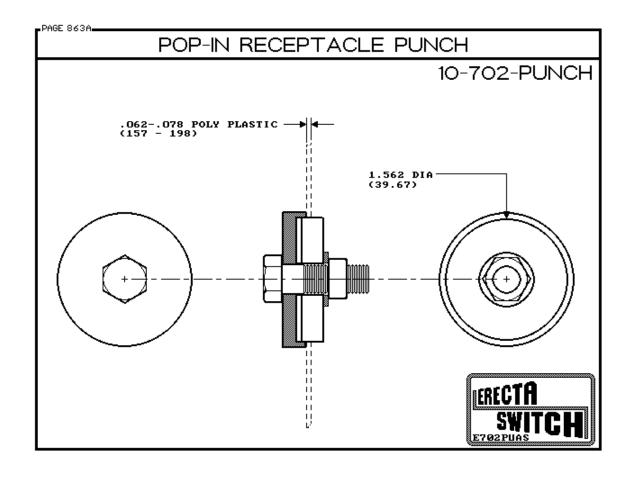


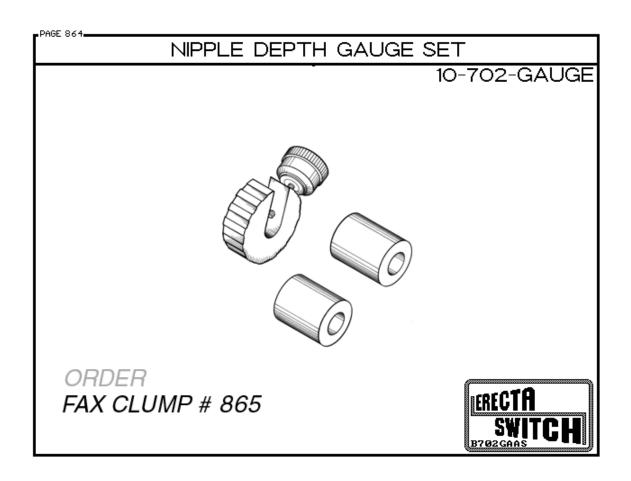


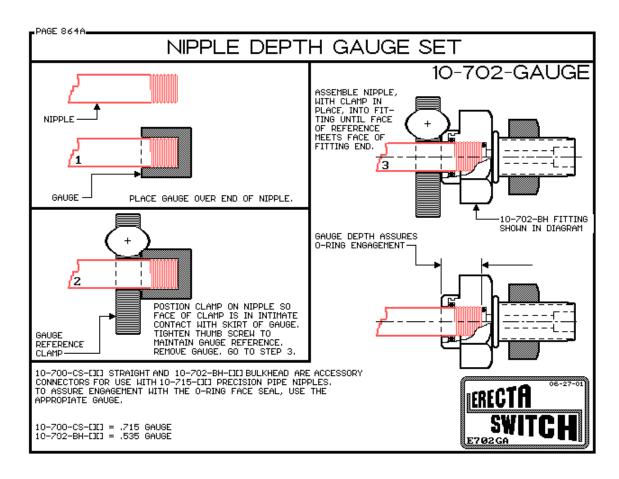


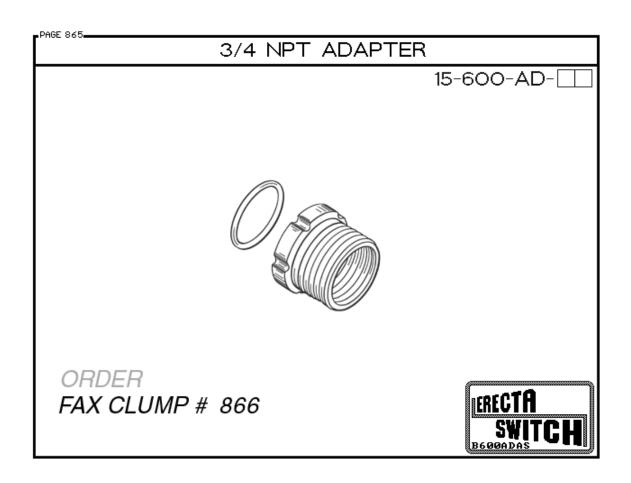


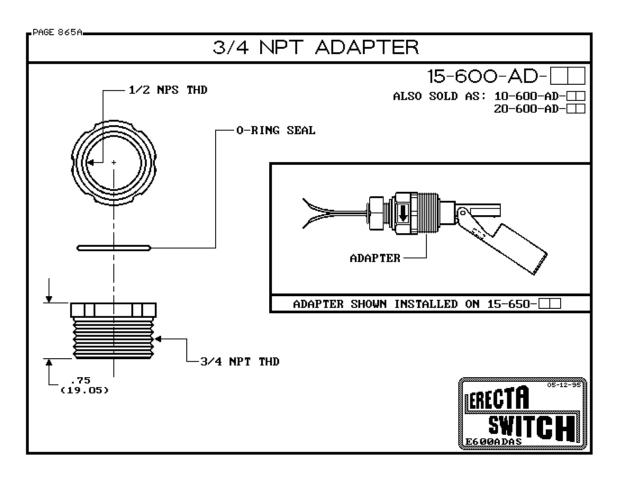


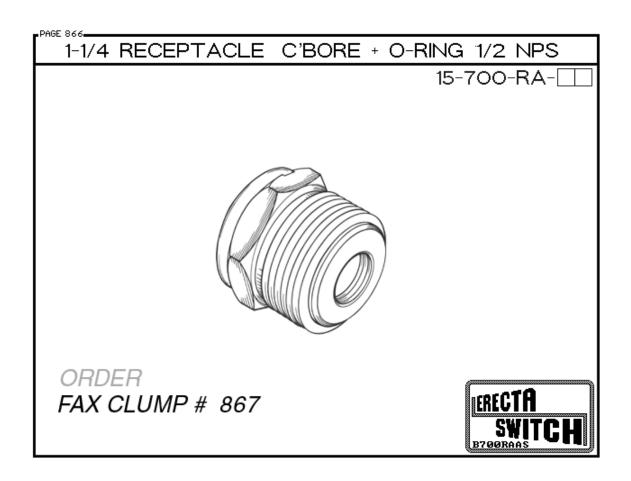


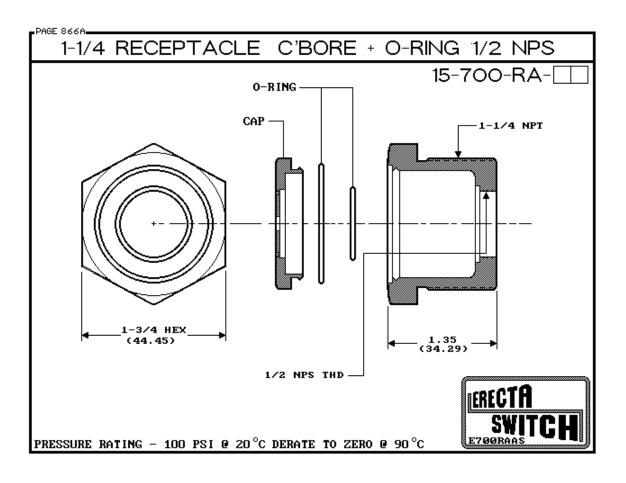


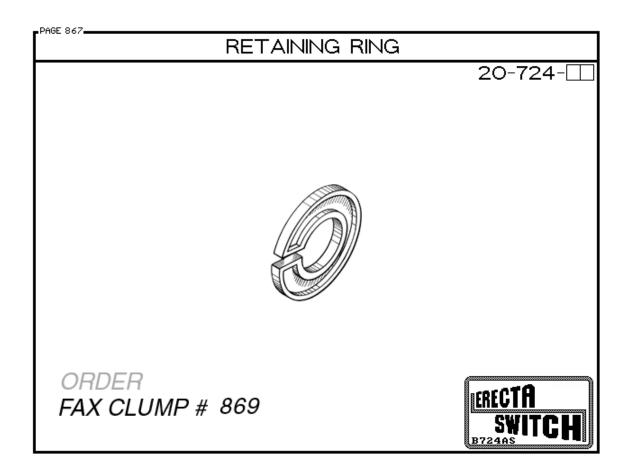


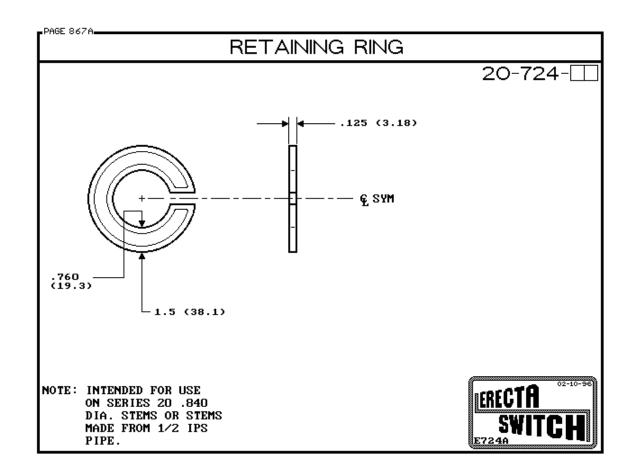


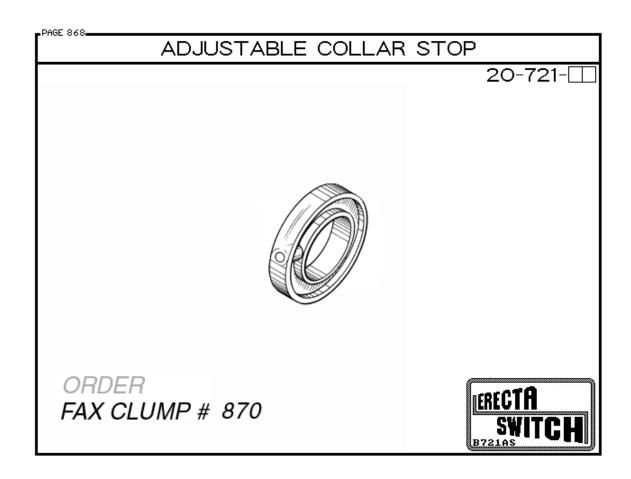


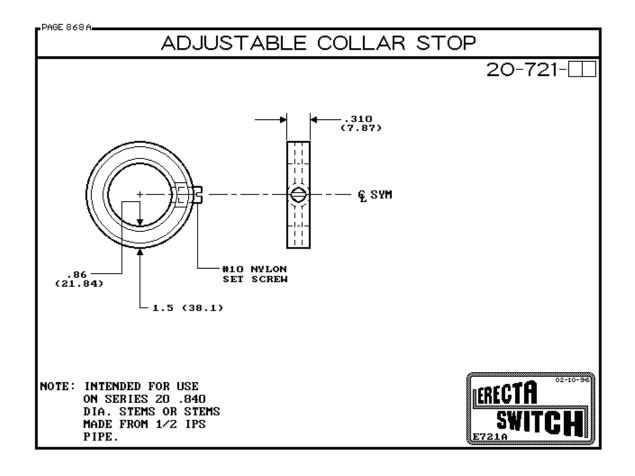


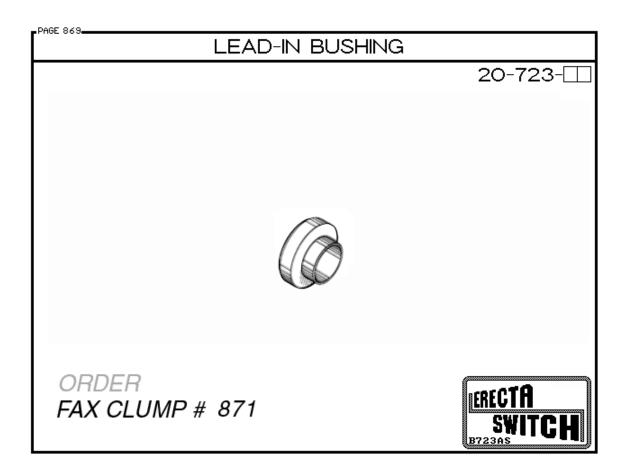


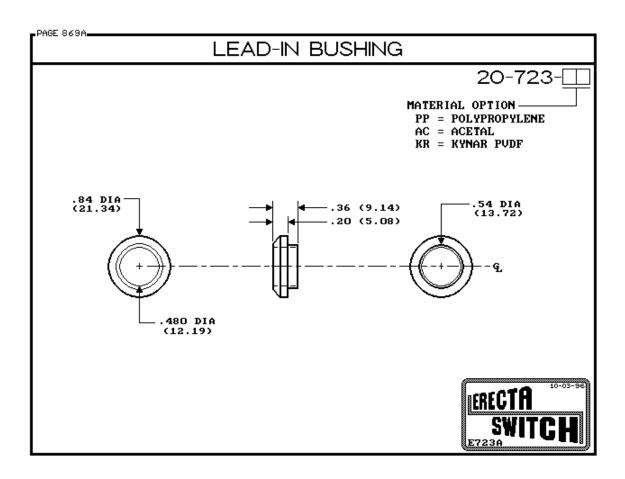


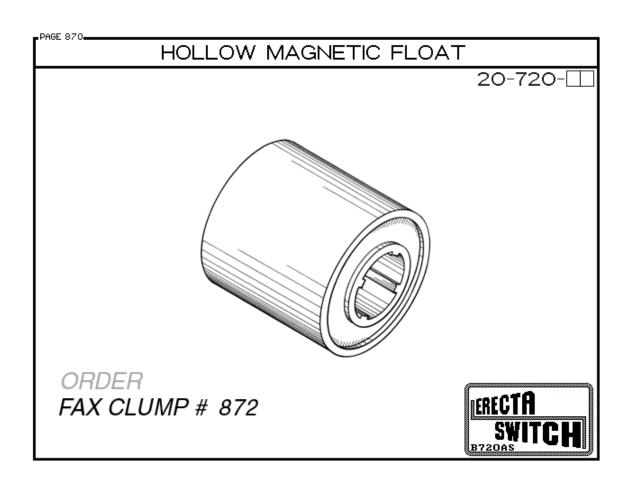


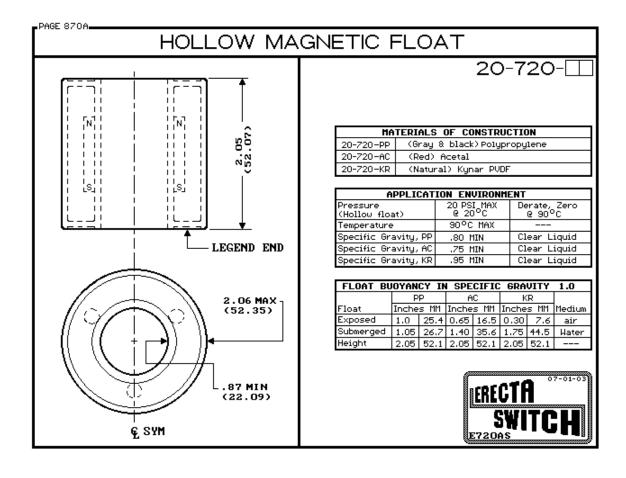


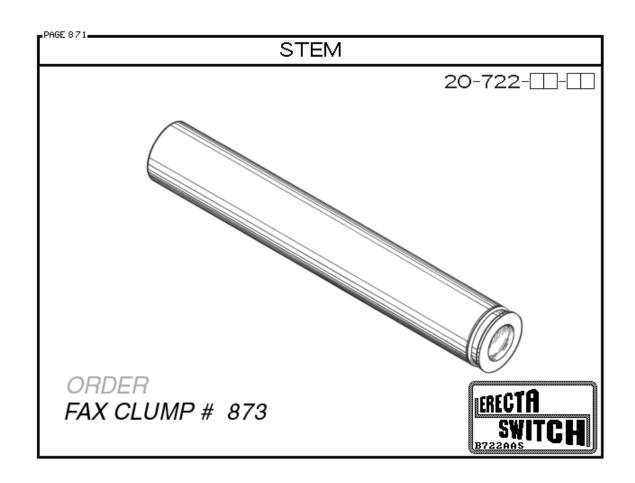


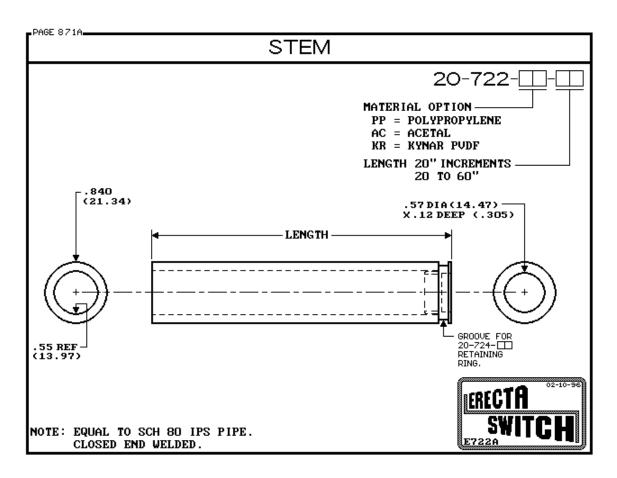


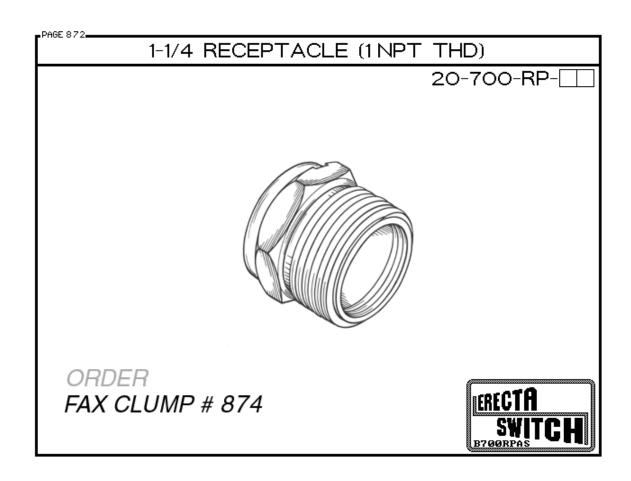


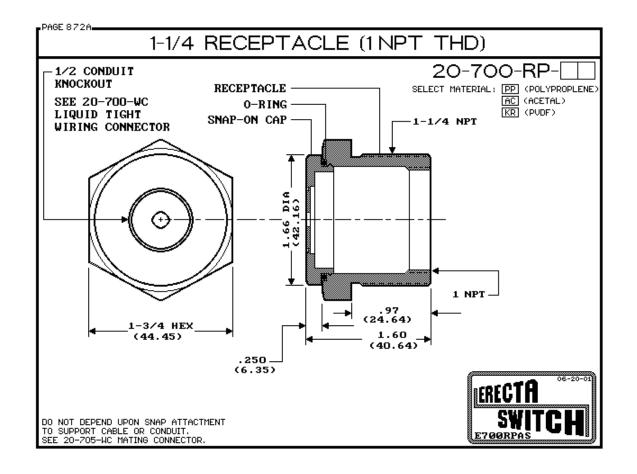


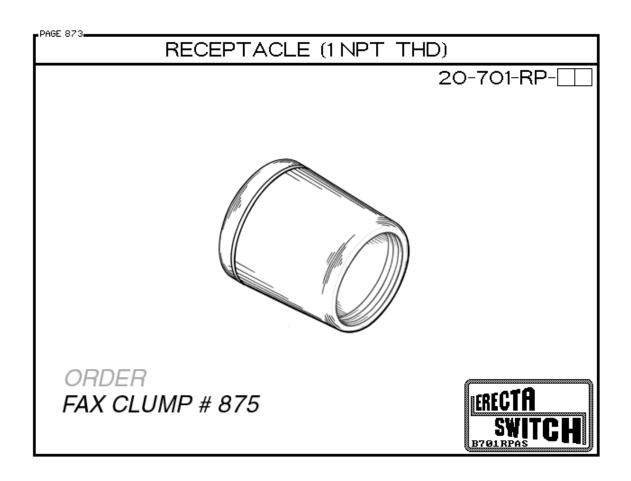


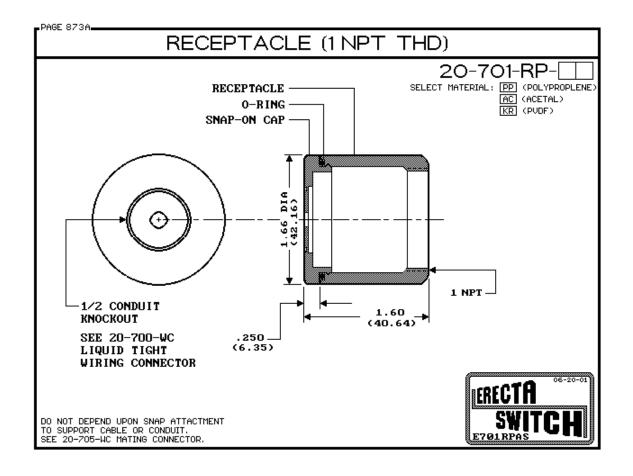


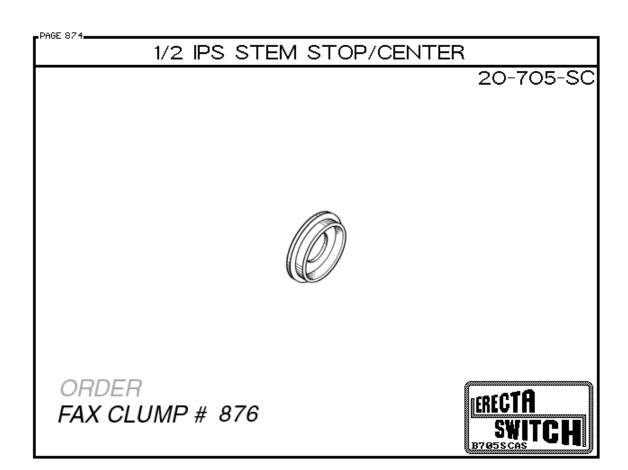


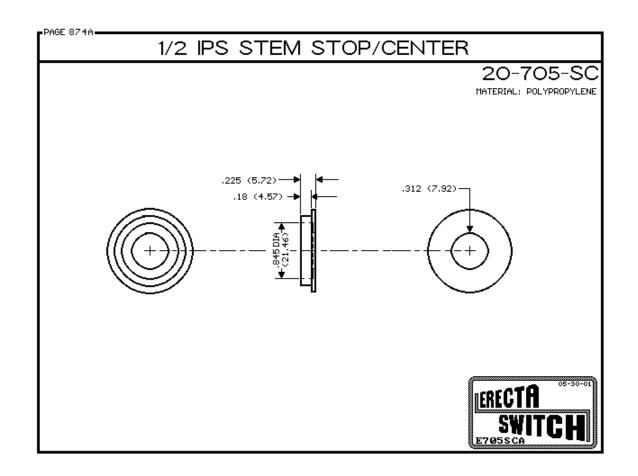


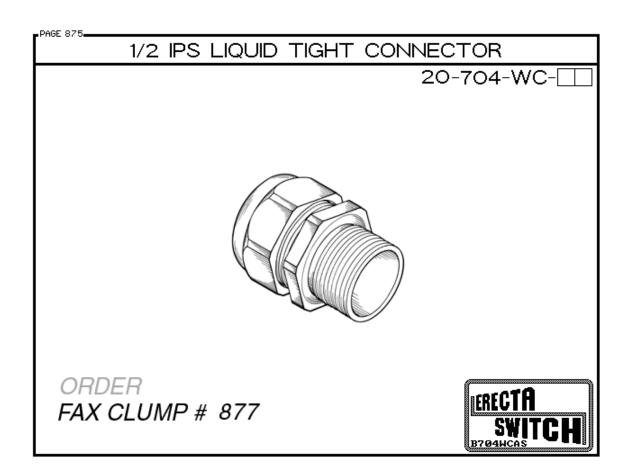


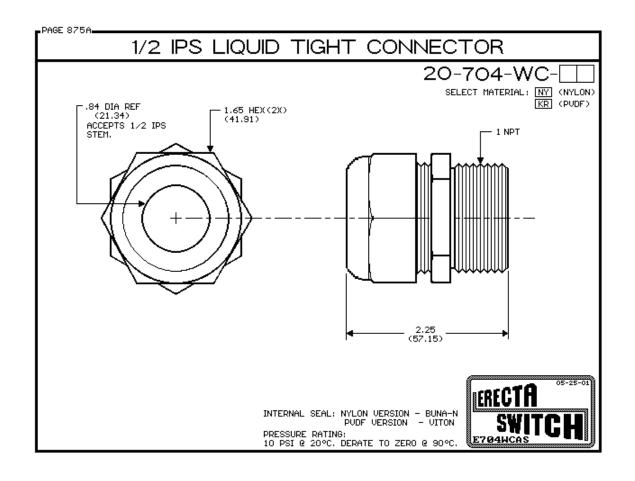


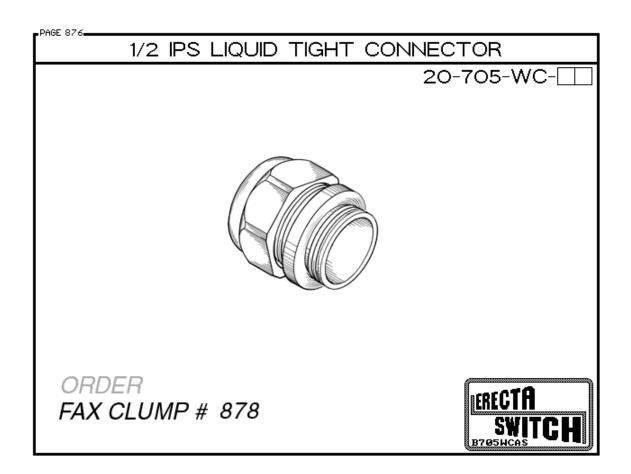


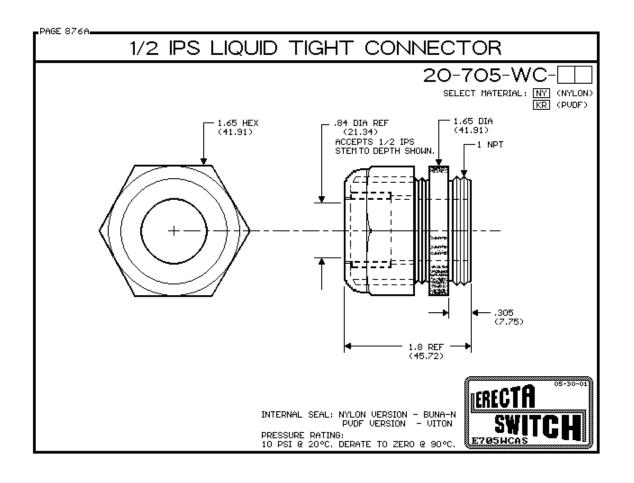


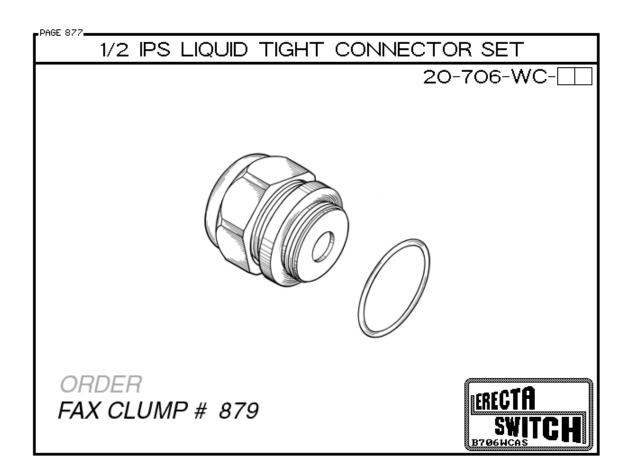


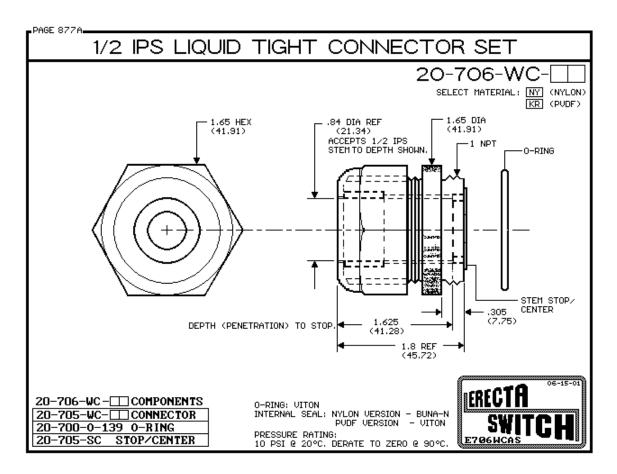












TECH NOTE 101 - Is arcing present? -



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.

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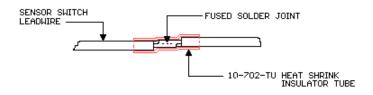
TECH NOTE 102 - Lengthen Sensor Leadwires -



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.

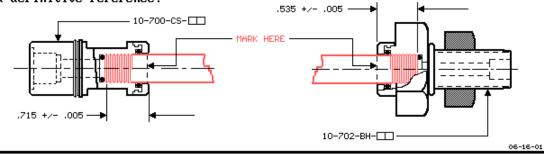


TECH NOTE 103 - Nipple End Seal Integrity -



ERECTA SWITCH accessories, designed to connect to 1/8 pipe nipples, incorporate two 0-ring seals. The larger of the two, seals on its diameters. The smaller 0-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 0-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 0-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.



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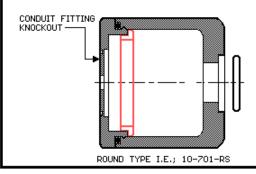
TECH NOTE 104 - Receptacle Cap Attachment/Detachment -

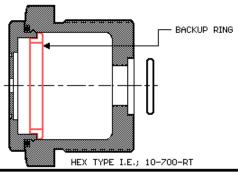


The caps of the ERECTA SWITCH 1-1/4 hex and round receptacles are attached by a snap lock ridge and relief scheme molded into the parts. A separate "backup ring" part is included and is necessary to reliably secure the cap.

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 0-ring sealing surfaces.



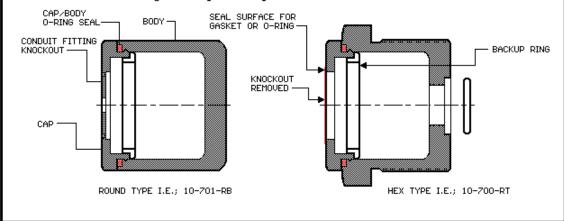


TECH NOTE 105 - Receptacle Body To Cap Seal -



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 0-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 0-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 0-ring with a moist coating of liquid soap.



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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.

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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.

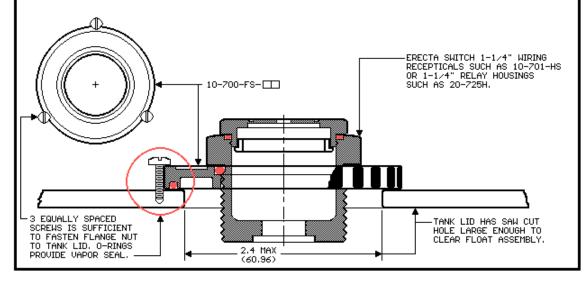
Although the expansion coefficients of the three standard structural materials are similar, the actual molded part sizes are measurably different. Polypropylene parts are larger than Acetal and Acetal parts are larger than PDVF parts. (Molds are designed to produce spec threads with Polypropylene). (Extruded 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.



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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.

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

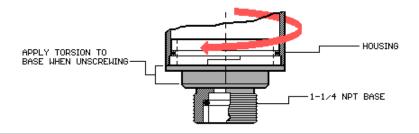


The attachment mechanism of our 20-725, 20-725-HS and 10-701-XX relay and control head housings has some tricky aspects. The base is attached to the relay housing by a rotating cam lock mechanism. The interface between the two parts is sealed by an o-ring. It's a precision, close fitting assembly.

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.

diants.

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 ingre-

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.

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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.

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.

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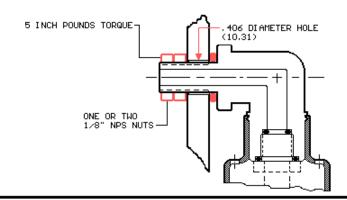
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TECH NOTE 116 - 10-700-N8 Torque Limits -



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.

08-28-97

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



Installing the Cable Assembly into a mating Polypropylene receptacle without the 0-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 0-ring installed, the required assembly force increases. This is particularly noticeable when the 0-ring is not lubricated prior to assembly. A light coat of liquid soap can make a big difference here.

The function of the 0-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.

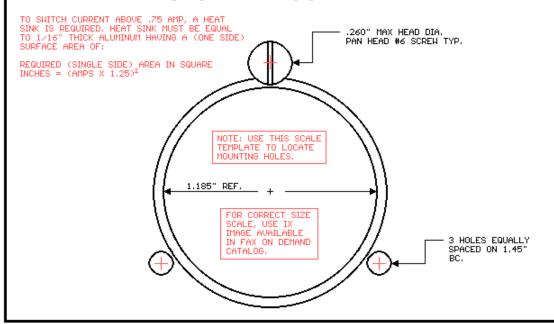
Acetal and PVDF versions are more difficult to deal with. Their molded parts are stiffer and somewhat cramped in the 0-ring area. As a practical matter, lubricating the 0-ring and/or omitting it altogether will be essential. Allowing one side to engage before the other will also reduce the required force. 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 preengaging 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.



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TECH NOTE 120-A Protecting Relay And Switch contacts-



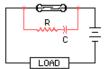
To suppress or eliminate the destructive arc across relay or switch contacts during the switching of inductive loads, various methods are employed. The following methods will suppress or eliminate arcing but at the same time will tend to increase the de-energizing time of the inductive load.

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.

LOAD

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

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

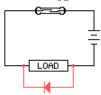


To ensure protection with adequate arc suppression, test the circuit and adjust R and C values as necessary to eliminate arcing at the contacts.

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 diodezener diode in case 5.



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

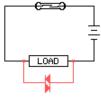


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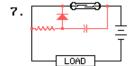
TECH NOTE 120-C Protecting Relay And Switch contacts-

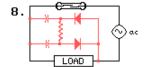


Continued - Case 6. DC or AC circuit. Allowing the varistor to carry approximately 10 percent of the load current will limit the transient voltage level to approximately two times the source voltage.



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.





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.

55-XE1201 ARC SUPPRESSOR AROMAT RELAY COIL

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.

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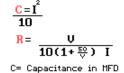
TECH NOTE 120-E Protecting Relay And Switch contacts:



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

DETERMINING RC VALUE

	LOAD CURRENT - AMPERES]	
		0.05	0.1	0.2	0.3	0.5	1.0	2.0	3.0	5.0		
SOURCE VOLTS	120VAC or 120VDC	0.01 + 470	0.01 + 470	0.01 + 220	0.01 + 120	0.022 + 120	0.1 + 47	0.3 + 1 7	0.5 + 47	1.0 + 10	MFD + OHMS	R+C VALUES
	240VAC or 240VDC	0.01 + 1 70	0.01 + 1 70	0.01 + 1 70	0.01 + 1 70	0.022 + 120	0.1 + 120	0.3 + 120	0.5 + 4 7	1.0 + 4 7	MFD + OHMS	



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.

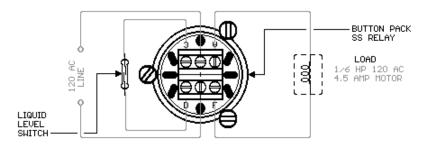
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Cyclic switching of inductive loads is difficult for most control devices. This is particularly true for reed switches. Our 50-BP Button Pack SS relay solves this problem. To give you an idea of its capabilities, consider these test results:

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.

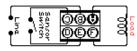
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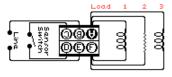
APPLICATION NOTE 101 - Button Pack Relay

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.

