



ESSEX
TEMPERATURE
CONTROLS

ESSEX®

Temperature Controls



The design engineer faces the difficult task of choosing from a multitude of available components the few which best meet his design and cost criteria . . .

The choice is rarely easy, but it can be simplified. We hope our catalog will assist you in your search for the right control or system component.

IT'S YOUR CHOICE

And no one offers you more in the way of choice controls than Essex. Since the early 1930's, when we first began pioneering new electromechanical control concepts, we've worked hard to expand our product line. Today we design, manufacture and market electrical, electromagnetic, electronic, manual, gas, and temperature controls, control systems and components, including a myriad of appliance and industrial wires, cables and wire assemblies. We supply appliance, air conditioning, heating, refrigeration, business machine, electrical and similar OEM's who require circuitry and control in their products. And we back our OEM's with a nationwide line of aftermarket products.

WE'RE BIG, BUT QUICK ON OUR FEET

The Essex Controls Division has over 5,000 employees, 23 manufacturing plants and 14 warehouses. We're one of the ten divisions within Essex Group, which is a subsidiary of United Technologies Corporation. Despite our size, we're organizationally decentralized. We have five sales offices, each having complete engineering, manufacturing and marketing responsibilities for its line of products. At Logansport, Indiana, we make our electromechanical controls and manual



switches; Fort Wayne, Indiana, our solid-state electronic modules and systems; Auburn, Indiana, our gas controls; and Mansfield, Ohio, our temperature controls. We heap responsibility on our product managers and give them plenty of leeway to prevent the delays inherent in most bureaucracies. At Essex, we're big, but quick on our feet.

ENGINEERING

We're decentralized enough to serve you directly and to keep your needs from ending up on someone's waiting list. Yet our four engineering groups are constantly in touch with each other, pooling their talents whenever necessary. If the problem is really tough we get assistance outside the Controls Division from Essex engineers within other divisions. And for highly sophisticated applications which may require a whole new technology, we work with United Technologies Research Center (UTRC), the R&D arm of our parent company.

THE BOTTOM LINE IS QUALITY

We buy very little from the outside. That way we can set and control our own quality standards. We make our own frames, plastic moldings, die cast parts, aluminum extrusions, precision stampings, armatures, cores, leaf springs, lead wires, cords, harnesses and wire assemblies. We even make our own magnet wire and wind our own coils. At the same time, we've instituted on-line testing procedures, on-floor quality control, and quality assurance laboratories in each of our plants. What you get is performance that's as good tomorrow as it is today. And that's the bottom line.





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Direct Sensing Thermostats

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ESSEX[®]

Direct Sensing Thermostats



ULTIMHEAT[®]
VIRTUAL MUSEUM



TYPE 402 Single Pole Single Throw 3/4 Inch Bimetal Disc Thermostats

APPLICATION DATA

Open or close your electrical circuit positively and instantaneously with the snap action of Essex 402 bimetal disc thermostats. Available as a limit switch to open on rise or a fan switch to close on rise. Applications include: freezers, refrigerators, water heaters, wall and portable heaters, motors, air conditioning, heating and ventilating equipment, washers, dryers, vending machines, unit heaters, table top appliances, and heat pumps.

ENGINEERING DATA

The bimetal disc used in these Essex thermostats are thermally and electrically insulated from the current carrying parts of the device. The disc, therefore, reacts only to the temperature of the controlled equipment or air surrounding the disc. Positive and instantaneous disc action eliminates chattering, false cycling and electrical interference with radio and television reception. Wiping contacts help assure long life. Gold plated pointed contacts are available for use in millivolt and thermocouple circuits requiring low resistance.

The thermostats are mechanically enclosed in tamper

proof plastic cases and may be exposed to the maximum temperatures shown under the Range Tolerances rating table. The bimetal disc is supported in a metal disc retainer or drawn cup as depicted under terminals and flange mountings. A spring clip mounting can be supplied for mounting on a tube or pipe.

ELECTRICAL RATINGS — TYPE 402

120 VAC	240 VAC	277 VAC	480 VAC
25 Amp Res. 10 FLA/60LRA 125 VA	25 Amp Res. 5 FLA/30LRA 125 VA	25 Amp Res. — 125 VA	15 Amp Res. — 125 VA

All rates 100,000 cycles FLA (Full Load Amps)
LRA (Locked Rotor Amps) inductive
402 listed UL File M.H. 6883 and E23581
CSA File LR1261950

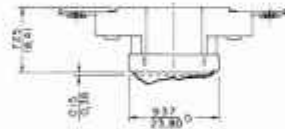
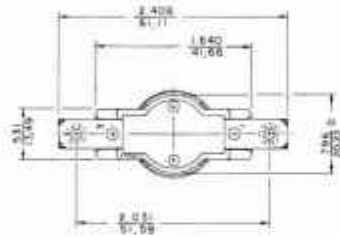
Millivolt applications, consult factory.
VDE, BSI, SEMKO and other international listings available, consult factory.

Manual reset available, refer to Bulletin 432/404.

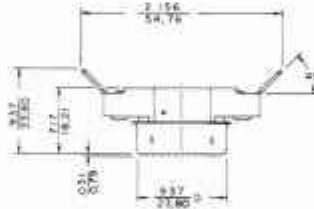
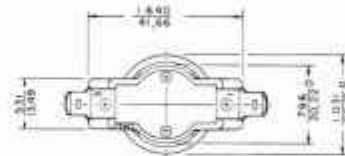
Drawings and illustrations are for general information only. Thermostat type numbers cover mechanical details only. Part number completely identifying the desired unit, will be furnished on request for incorporation into specifications. Before tools or other equipment are ordered, certified and dimensioned prints should be obtained from factory.

TYPE 402 Single Pole Single Throw 3/4 Inch Bimetal Disc Thermostats (cont'd.)

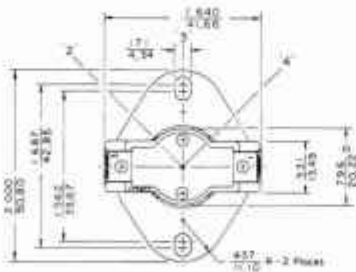
OUTLINE DIMENSIONS BASIC Terminal Arrangements and Mountings



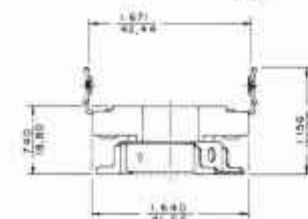
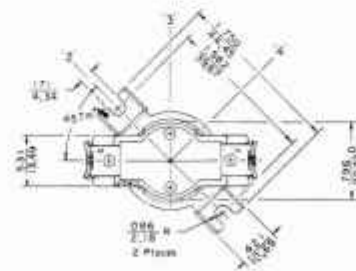
Standard Surface
402-2



Standard Electric Heat
402-5



Standard Cup
402-4



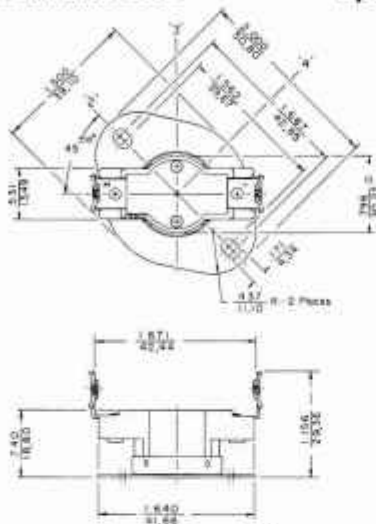
Optional Surface
402-13



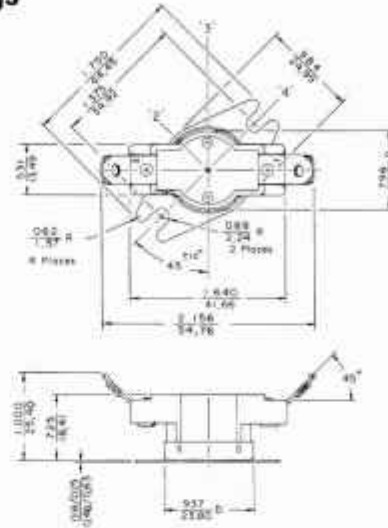
TYPE 402 Single Pole Single Throw 3/4 Inch Bimetal Disc Thermostats (cont'd.)

OUTLINE DIMENSIONS

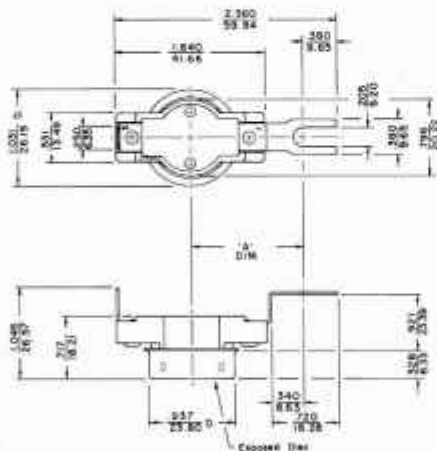
Special Type Mountings



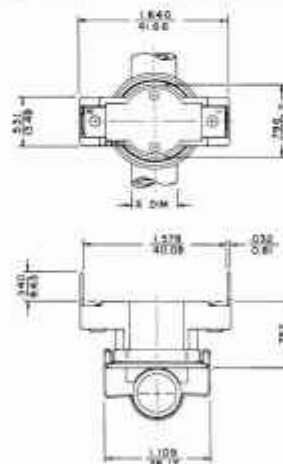
**Special Large Oval
402-3**



**Special Small Flange
402-7**



**Special Electric Heat (new)
402-9**



**Special Contoured Pipe Mounting (new)
402-12**

TUBE MOUNTING SIZES

A DIA.	
250	6.350
375	9.525
500	12.700
625	15.875
750	19.050
875	22.225

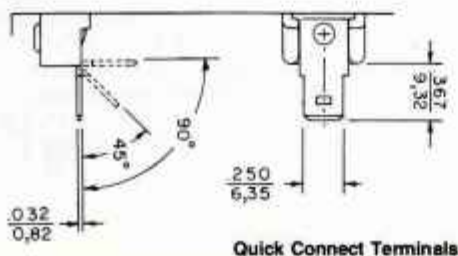
ALSO AVAILABLE IN
FLAT CAP

Series 402-1500 is available with increased electrical clearances. 1/4" thru air, 3/8" over surface.

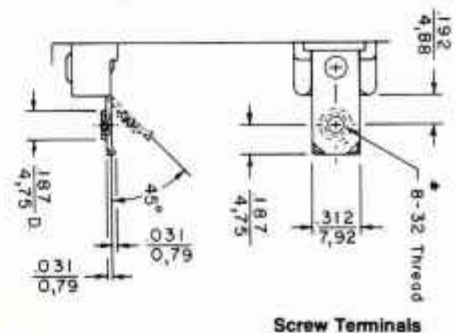
Bimetal disc may be exposed as shown or may be enclosed by the dotted line as indicated.

For Type 404 SPST Manual Reset refer to Bulletin 432/404.

Terminal Construction



Quick Connect Terminals



Screw Terminals



TYPE 402 Single Pole Single Throw 3/4 Inch Bimetal Disc Thermostats (cont'd.)

Ranges and Tolerances

Differentials for the Type 402 Thermostat Range of temperature settings, tolerances and mean differentials, as shown in tabulation, are available. If other temperatures or tolerances are required, send details

of requirements. The larger the tolerances the lower the cost. Tolerance combinations shown below are the smallest available.

Temperature Range	Tolerance**		Mean Differential*
	OPEN	CLOSE	
0°F to 79°F	±6°F	± 6°F	10°F to 29°F
0°F to 79°F	±7°F	± 7°F	30°F to 39°F
0°F to 79°F	±8°F	± 9°F	40°F to 59°F
0°F to 79°F	±9°F	±10°F	60°F to 80°F
80°F to 200°F	±5°F	± 5°F	10°F to 19°F
80°F to 200°F	±5°F	± 7°F	20°F to 29°F
80°F to 200°F	±6°F	± 7°F	30°F to 39°F
80°F to 200°F	±6°F	± 9°F	40°F to 59°F
80°F to 200°F	±8°F	±10°F	60°F to 80°F
201°F to 250°F	±5°F	± 6°F	15°F to 19°F
201°F to 250°F	±5°F	± 7°F	20°F to 29°F
201°F to 250°F	±6°F	± 8°F	30°F to 39°F
201°F to 250°F	±7°F	± 9°F	40°F to 59°F
201°F to 250°F	±8°F	±11°F	60°F to 80°F
251°F to 300°F	±6°F	± 8°F	20°F to 29°F
251°F to 300°F	±7°F	± 9°F	30°F to 39°F
251°F to 300°F	±8°F	±11°F	40°F to 59°F
251°F to 300°F	±9°F	±13°F	60°F to 80°F
301°F to 350°F	±7°F	± 9°F	20°F to 29°F
301°F to 350°F	±8°F	±11°F	30°F to 39°F
301°F to 350°F	9°F	±13°F	40°F to 59°F
301°F to 350°F	±10°F	±15°F	60°F to 80°F

*Differential is the difference between opening and closing temperature of the thermostat.

**To allow for differences between methods and equipment, customers should inspect to limits approximately 1 to 2°F greater than specified above.

GENERAL DATA Samples and Ordering

In the initial application work it is often more satisfactory to order first a dummy assembly, equipped with a thermo couple attached to the bimetal. This is used to learn the best location for the thermostat and arrive at the opening and closing temperature required because the temperature is varied manually. Specify iron constantan or copper constantan for the couple.

A description of the application giving 1. load inductive or resistive, 2. opening and closing temperature with maximum tolerance allowable, 3. terminal types and mounting flange referenced by the description shown in this literature, 4. bimetal enclosed or exposed plus the bimetal enclosure material, 5. probable yearly vol-

ume, 6. ambient temperature, fumes, dust and other environmental conditions should be stated when requesting samples. Use of an Essex Thermostat Application Data sheet will help assure all pertinent information is included.

Drawings and illustrations are for general information only. Thermostat Type numbers cover mechanical details only. Part number, completely identifying the unit, will be furnished on request for your specifications. Before tools or other equipment are ordered, certified and dimensioned prints should be requested from Essex. Manufacturer reserves the right to alter specifications without notice.

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TYPES 414 and 416 $\frac{3}{4}$ " Encapsulated Bimetal Disc Thermostats

APPLICATION DATA:

Essex Type 414 and 416 thermostats are produced in a sealed construction especially designed for refrigeration, air conditioning and industrial applications requiring a moisture and dust-proof enclosure for safe, sensitive and reliable operation. A polypropylene enclosure, filled with epoxy resin, hermetically seals the thermostat mechanism including the leads.

The proven bimetal disc, used in other Essex types, actuates the switch mechanisms of the 414 and 416 with snap-action, positive and instantaneous opening or closing of the switch contacts.

Open or close on rising temperature, single pole, single throw or double throw action available.

ENGINEERING DATA:

The internal mechanism of this encapsulated unit has been designed with a contact wiping action.

Lead wires are normally furnished with either 18 or 16 AWG wire size covered with 1/32" or 1/16" thick 105°C plastic PVC insulation. Standard colors are white, black and red. Standard length is 2 ft. of combined length on single throw thermostats and 3 ft. on double throw, other lengths available.

The lead wires are normally stripped as shown; flag or straight quick-disconnect terminals, or eyelets, are available as an extra.

Due to the complete plastic enclosure, except for the sensor cap, the thermal response is quite accurate, the temperature change in the controlled device is not dissipated in a metal mass.

Pointed contacts for millivolt and thermocouple circuits are available at a small extra charge. Fine silver pointed contacts for pilot duty applications are also available.



TYPES 414 and 416 3/4" Encapsulated Bimetal Disc Thermostats (cont'd.)

Electrical Ratings U.L. and C.S.A. Recognized

The following ratings are approved under UL File E40404, maximum temperature 221°F. (105°C.)

TYPE	LOAD	120 VAC	240 VAC	277 VAC
414 and 416 TERMINALS 1 & 3	Resistive	10	10	7.3*
	Inductive	6 FLA 36 LRA	3.6 FLA 21.6 LRA	3.6 FLA 21.6 LRA
	Pilot Duty (pointed contacts)	14 Res 125 VA	.5 A Res 125 VA	125 VA
416 TERMINALS 1 & 2	Resistive Inductive Pilot Duty (pointed contacts)	5 4 FLA 24 LRA 1 Amp Res 125 VA	5 2.2 FLA 13.2 LRA .5 Amp Res 125 VA	2.2 FLA 13.2 LRA 125 VA

All ratings are 100,000 cycles except 277 VAC inductive which have been developed for special applications requiring 30,000 cycle operation. For special load requirements consult factory. Also available 15 Amp rating at 120 VAC and 240 VAC for limit at 6000 cycles consult factory.

*Type 414 only.

Ranges, Tolerances, Differentials

The ranges of top temperature settings with tolerances and mean differentials shown in the tabulation below are considered standard. (Selection of the larger differential and wider tolerances will give the lower price.)

Top Temperature Range	Manufacturing Tolerance**		Mean Differential*
	OPEN	CLOSED	
0°F to 80°F	±5°F	±6°F	10°F to 29°F
0°F to 80°F	±5°F	±7°F	30°F to 80°F
81°F to 200°F	±5°F	±6°F	10°F to 19°F
81°F to 200°F	±5°F	±7°F	10°F to 29°F
81°F to 200°F	±6°F	±8°F	10°F to 39°F
81°F to 200°F	±7°F	±9°F	10°F to 80°F
201°F to 221°F	±5°F	±7°F	15°F to 29°F
201°F to 221°F	±6°F	±8°F	30°F to 39°F
201°F to 221°F	±7°F	±9°F	40°F to 80°F

*Differential is the difference between opening and closing temperature of the thermostat.

**To allow for differences between methods and equipment, customers should inspect to limits approximately 1°F. to 2°F. greater than specified above.

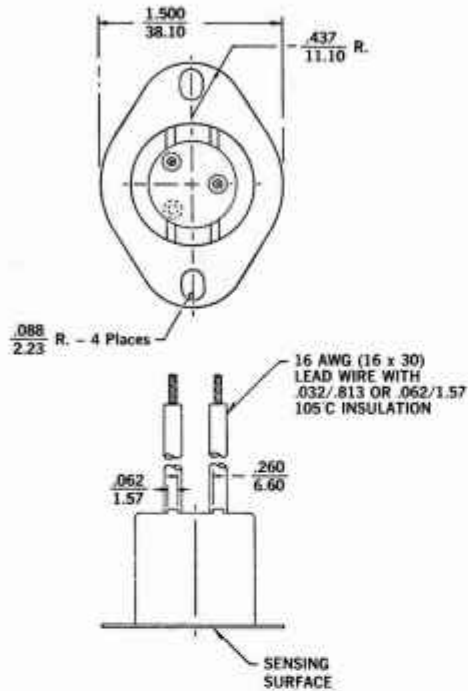
Special Tolerances

If other settings tolerances or differentials are required, refer to factory for consideration, indicating complete details of application, as load, temperatures and frequency of operation. At an extra charge, opening and closing tolerances of ±4°F. or ±3°F. may be obtained depending on application. With these tight tolerances, customers must inspect at somewhat wider limits.

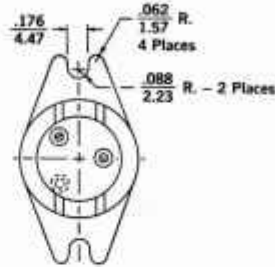


TYPES 414 and 416 3/4" Encapsulated Bimetal Disc Thermostats (cont'd.)

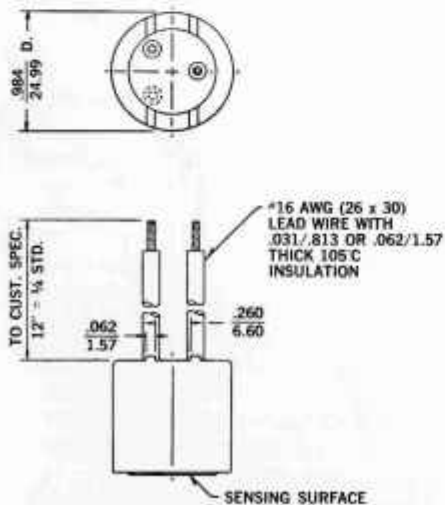
MOUNTINGS AND OUTLINE DIMENSIONS



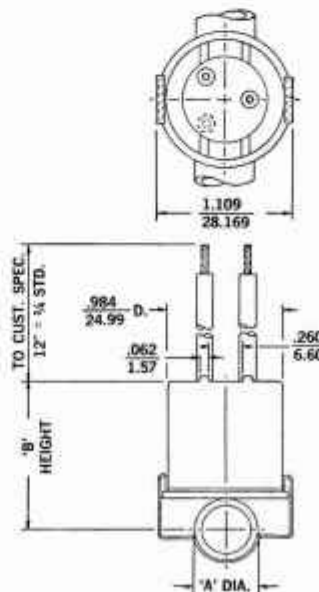
414-3 416-3



414-7 416-7



414-6 416-6



414-12 416-12

TUBE MOUNTING SIZES

'A' DIA.	'B' HEIGHT
.250 / 6.350	1.125 / 28.575
.375 / 9.525	1.187 / 30.150
.500 / 12.700	1.250 / 31.750
.625 / 15.875	1.312 / 33.325
.750 / 19.050	1.375 / 34.925
.875 / 22.225	1.437 / 36.500

#16 AWG (26 x 30) LEAD WIRE, WITH .032/.813 OR .062/1.575 THICK 105 C INSULATION

THERMOSTAT MAY BE ROTATED TO ANY POSITION WITH RESPECT TO THE PIPE IT IS MOUNTED UPON.

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TYPES 414 and 416 3/4" Encapsulated Bimetal Disc Thermostats (cont'd.)

GENERAL DATA

Samples and Ordering Information

Essex Controls welcomes the opportunity to work with you to develop thermostatic controls designed specifically for your product.

In the initial application work it is frequently more satisfactory to first order a thermocouple assembly of the type required equipped with a thermocouple attached to the bimetal. This can be used to explore the best location for the thermostat, and arrive at the opening and closing temperature required as the temperature is varied manually. Specify whether couple should be iron constantan or copper constantan.

A description of the appliance giving (1) load inductive or resistive, (2) opening and closing temperature with maximum tolerance that can be allowed, (3) lead details and terminations, (4) mountings referenced to type numbers shown on bulletin, (5) probable yearly volume,

(6) environmental conditions such as ambient temperature, fumes, dust, etc., should accompany request for samples.

Use of our application data sheet makes sure complete information is included.

Drawings and illustrations are for general information only. Thermostat type numbers cover mechanical details only. Part numbers, completely identifying the desired unit, will be furnished on request for incorporation into specifications. Before tools or other equipment are ordered, certified and dimensioned prints should be obtained from factory.

Manufacturer reserves right to alter specifications without notice.

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Direct
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Thermostats



424-601



424-602



424-605

TYPE 424 Hermetically Sealed Bimetal Disc Thermostats

APPLICATION DATA

Essex Type 424 hermetically sealed thermostats are extremely compact and have rapid response characteristics that make them ideally suited for electronic and avionic applications where quick make and break of the circuit is required. Typical uses include: communications and airborne electronic equipment such as radar, TV relay, transmitters, gyros, all types of heater controls and over-temperature protection subject to shock and vibration.

Features: Electronic and avionic applications hermetically sealed construction.

ENGINEERING DATA

Essex Type 424 thermostats are of the bimetal disc design. They are made to make or break the circuit upon a temperature change, either increase or decrease.

Ambient Range -50°F to 300°F
Operating Range ± 0°F to 300°F

All Essex Certified thermostats are processed, temperature checked, and inspected to rigid standards on a low AQL. Certificates of Conformance or Military Source Inspection are available as well as qualification tests made in the Essex Environmental Laboratory.

Electrical Ratings

Average for normal operating conditions, the following

ratings are subject to *increase* or *decrease* as determined by type of controlled device and circuit characteristics.

Dielectric — 1250 volts, RMS, 60 cycles terminal to ground

Operating Voltage	Amperes	No. Operating Cycles
125 VAC	4 resistive	100,000
125 VAC	6½ resistive	30,000
125 VAC	13.3 resistive	6,000
125 VAC	¼ horsepower	100,000
28 VDC	4 resistive	100,000

Condensers and/or resistors are sometimes required due to circuit or load conditions, particularly on slow make and break constructions. Normally is not recommended on a snap-action construction such as Type 424. If used, should be thoroughly tested in actual circuit so as not to get a condenser discharge that will weld the contacts together.

Operation

Operation of a thermostat that *opens* on temperature rise is as follows: In the *closed* position, current flows from terminal (1) to terminal (2) through contact disc (3) which is held closed by contact spring (4). Heat from controlled device is transmitted to the bimetal thermal element (6) by conduction through metal enclosure (5) which is in direct contact with device. When the preset



TYPE 424 Hermetically Sealed Bimetal Disc Thermostats (cont'd.)

ENGINEERING DATA Operation cont'd.

temperature is reached, the bimetal disc (6) instantaneously snaps, reversing its curvature. This reverse in curvature lifts the operating button (9) which separates contacts (7) and contact disc (3) to *open* or *break* the circuit. As the temperature then drops to a lower predetermined point, bimetal again reverses curvature instantaneously, releasing the button and allowing contact spring (4) to reclose the circuit.

Since bimetal is completely insulated from contact disc, the thermal element is electrically independent. This electrical independence means Type 424 thermostats respond only to heat from controlled device or air surrounding thermostat, thereby preventing false cycling or life-shortening "jitters".

Ranges, Tolerances, Differentials

The ranges of top temperature settings with tolerances and mean differentials shown in tabulation are considered standard. (Selection of the wider tolerance and differential will bring the lower unit price.) If other settings, tolerances or differentials are required refer to factory for consideration.

Range	Tolerances**		Min. Mean Differentials*
	OPEN	CLOSE	
0°F to 31°F	± 7°F	± 10°F	30°F
32°F to 199°F	± 5°F	± 7°F	20°F
32°F to 199°F	± 5°F	± 7°F	15°F
200°F to 300°F	± 7°F	± 10°F	30°F
200°F to 300°F	± 5°F	± 7°F	30°F

* Differential is the difference between opening and closing temperatures of the thermostat.

** To allow for differences between methods and equipment, customers should inspect to limits approximately 1° to 2°F greater than specified above.

Qualification to MIL-E-5272C Amendment-1

The construction and processing of Essex Type 424 hermetically sealed thermostats are such that exposure to ambients of -100°F or +300°F for 48 hours do not appreciably change operating characteristics or insulation values thus exceeding the requirements of MIL-E-5272C low temperature and high temperature tests. This makes this component particularly adapted

to military applications.

Vibration tests to Procedure XIV MIL-E-5272C at room ambient and 302°F; 20 to 60 cps at .05" displacement; to 2000 cps at 20g show no contact bounce nor appreciable insulation or temperature change. The unit thus exceeds requirements of Procedure XII.

Shock tests consisting of 18 impacts in three axes of 100g acceleration in 11 milliseconds show no contact bounce or appreciable change in insulation or temperature values. This characteristic promotes reliability in missile and aircraft applications, exceeding requirements of MIL-E 5272C Procedure V.

The Essex Type 424 hermetically sealed thermostat further meets the following procedures from MIL-E-5272C Amendment-1.

Humidity	Procedure III
Salt Spray	Procedure I
Immersion	Procedure I
Acceleration	Procedure III

Calibration

All Type 424 thermostats are carefully precalibrated at the factory; no adjustment is possible after assembly. Thorough testing procedures of Type 424 thermostats assure good quality control and dependable, specified performance. Customer's checking tolerances must be wider than the manufacturing tolerances to allow for differences in test equipment and instruments. Essex will be glad to assist in setting up your inspection equipment and procedures.

GENERAL DATA

Ordering Information

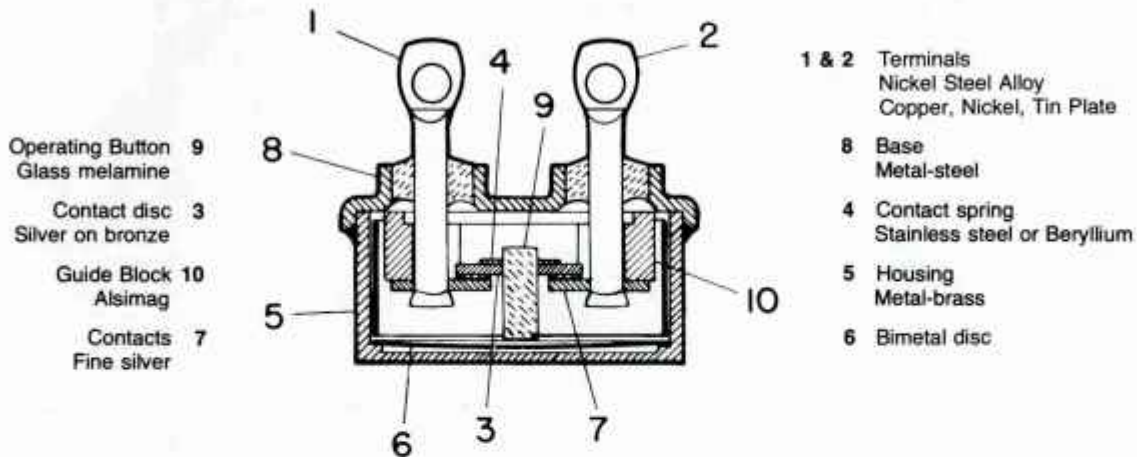
Essex Controls welcomes the opportunity to work with you to develop thermostatic controls designed specifically for your product. For best results we suggest you specify by "424" number the type and mounting required, operating temperatures, tolerances, current rating, probable quantity, and any military specifications involved.

A non-operating thermocouple-equipped sample is more practical than a number of operating samples to arrive at best location and require operating temperatures during development. Specify either iron-constantan or copper-constantan thermocouples.



TYPE 424 Hermetically Sealed Bimetal Disc Thermostats (cont'd.)

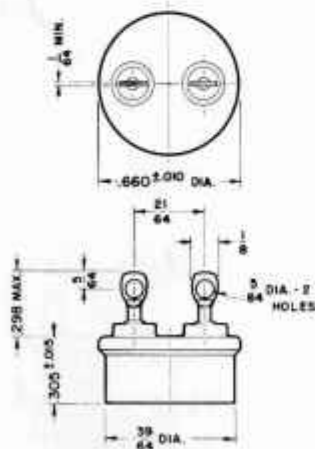
OUTLINE DIMENSIONS



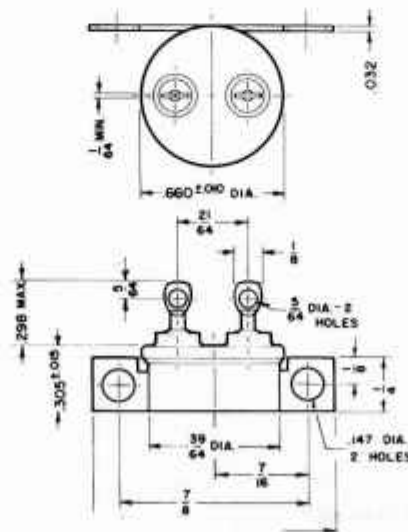
Finish — Electro tin plate — may be certified to MIL-T-10727, Type 1 if required.

For use in millivolt and thermocouple circuits, contact disc (3) is produced with a gold overlay, also contacts (7) are gold plated, supplied at an increase in price. Specify if required.

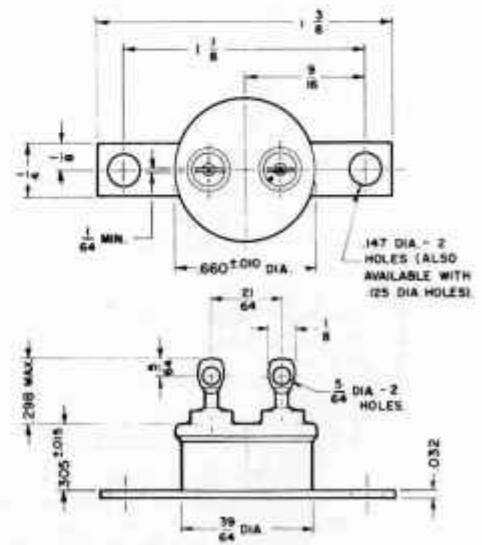
Drawings and illustrations are for general information only. Thermostat style numbers cover external dimensions, terminals and mounting details only. Part numbers, completely identifying the desired units, will be furnished on request for incorporation into specifications.



424-601



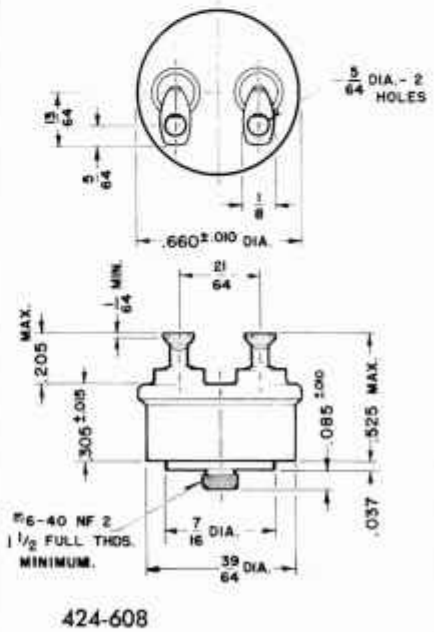
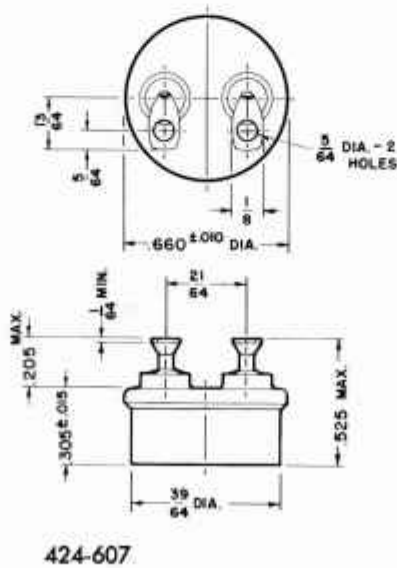
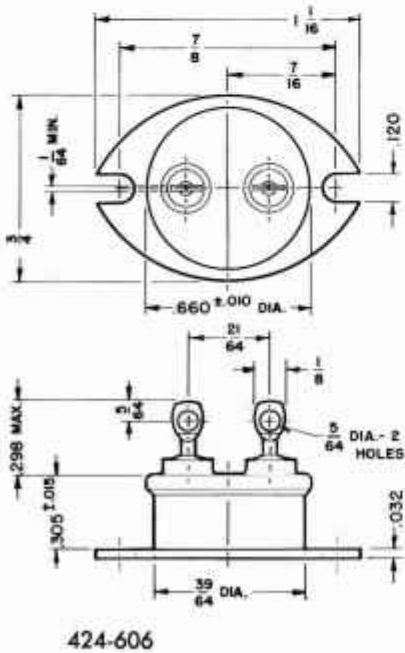
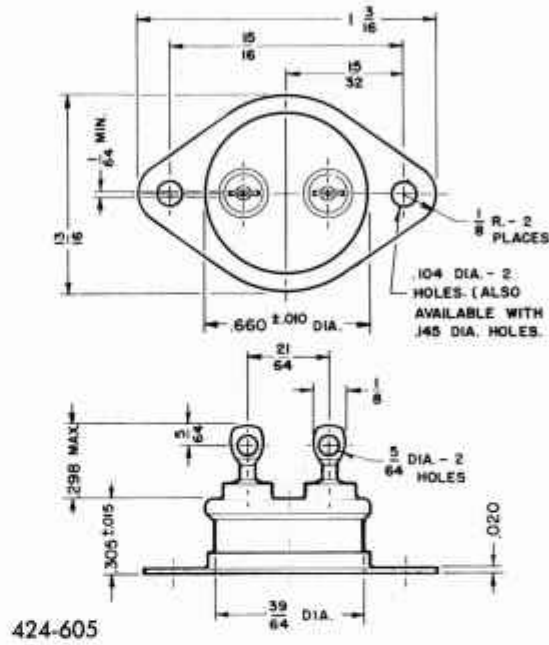
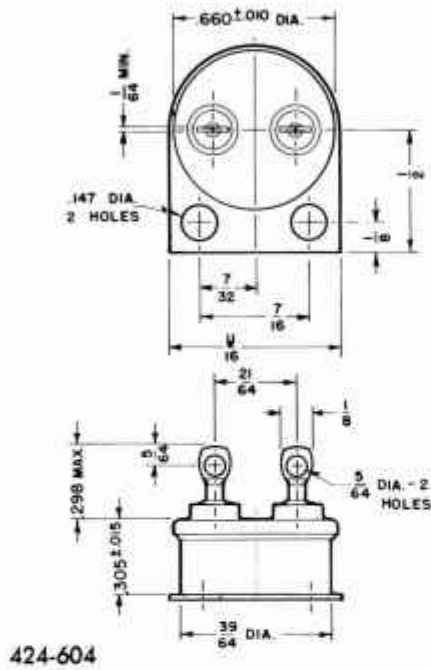
424-602



424-603



TYPE 424 Hermetically Sealed Bimetal Disc Thermostats (cont'd.)



NET WEIGHTS APPROXIMATELY 6 GRAMS.

ESSEX[®]

Direct Sensing Thermostats



TYPE 430 1/2" Bimetal Disc Thermostats

APPLICATION:

Essex Type 430 thermostats use a bimetal disc for snap action, positive and instantaneous opening or closing of electric circuits. A partial listing of products which are controlled or protected by Essex Type 430 thermostats includes freezers, refrigerators, water heaters, wall and portable heaters, motors, air conditioning, heating and ventilating equipment, washers, dryers, vending machines, unit heaters, table top appliances. Available as limit switch to open on rise or a fan switch to close on rise and single pole double throw.

The standard unit is available with exposed or enclosed disc. Optional terminals, mounting brackets and flanges are illustrated in this bulletin. Manual reset available, refer to Bulletin 432/404.

ELECTRICAL RATINGS

LOAD	120VAC	240VAC	277VAC
RESISTIVE	15 AMPS	10 AMPS	8.7 AMPS
RESISTIVE	1 AMP	1 AMP	1 AMP
INDUCTIVE	5.6FL-34.8LR	2.9FL-17.4FLR	—
PILOT DUTY	125VA	125VA	125VA
MILLIVOLT	1 AMP 1 VOLT AC/DC		

All 100,000 cycle ratings. 430 listed U.L. file. MH 6883 and E23581 C.S.A. 12619, and 20339. Consult factory for special load requirements.

FEATURES:

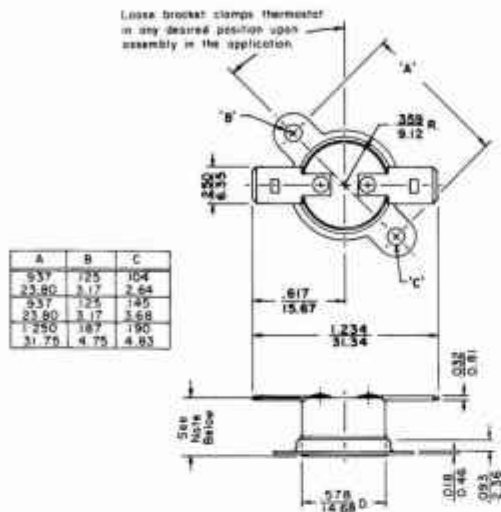
Since the bimetal disc used in the Essex 430 thermostat is thermally and electrically insulated from the current carrying parts of the thermostat, disc reacts ONLY to the temperature of the controlled device or medium surrounding disc. This feature, plus positive and instantaneous action of disc, eliminates chattering, false cycling and electrical interference with radio and television reception. Long life is assured with wiping contacts.

For use in millivolt and thermocouple circuits, requiring low resistance, gold plated pointed contacts are available. Also available are fine silver pointed contacts for pilot duty applications. The thermostat is mechanically enclosed in a tamper proof plastic case and may be exposed to the maximum temperatures shown on rating table.

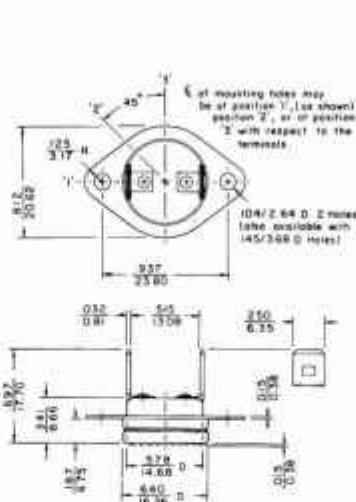
NEW Special 430-3100 series with 15 AMP inductive rating now available to meet U.L. Subject 923 for Microwave Ovens.

Drawings and illustrations are for general information only. Thermostat type numbers cover mechanical details only. Part number completely identifying the desired unit, will be furnished on request for incorporation into specifications. Before tools or other equipment are ordered, certified and dimensioned prints should be obtained from factory.

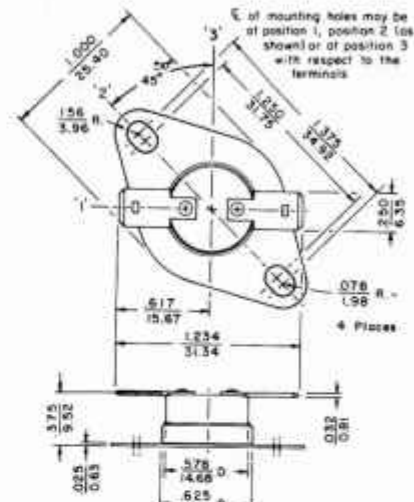
MOUNTINGS



430-310
Loose Hold Down

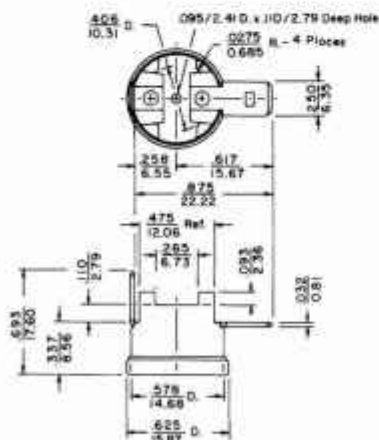


430-311
Extended Cup

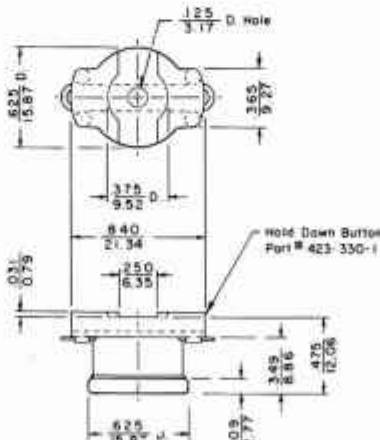


430-319
Large Surface

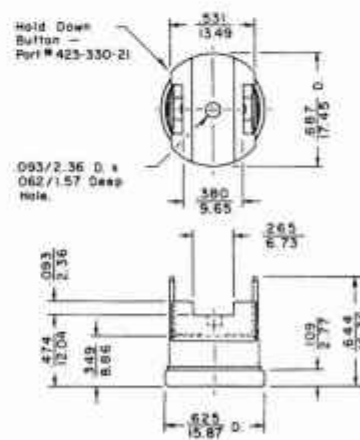
SPECIAL MOUNTINGS and CAPS



430-316
4 Post Special Mounting



Insulated Mounting Buttons



In order to hold total assembly costs to minimum Essex offers the 430-316 construction. With this unit the customer normally supplies a mounting device. This device fits between the four posts on the back of the thermostat and thus eliminates the need for an extra mounting bracket. When requesting samples please specify the type of terminals as well as part number 430-316.

Bimetal disc may be exposed as shown in most of the outline drawings or closed as indicated by dotted line ---/. The enclosed aluminum retainer may be reinforced with embossed ribs as shown.

For enclosed bimetal, surface mounted and clamped in position a flat cap of aluminum or plated brass can be applied to any Type 430 construction except 430-311.



TYPE 430 (cont'd.)

RANGES, TOLERANCES, DIFFERENTIALS FOR THE 430 STEMCO THERMOSTAT

The ranges of top temperature settings, with tolerances and mean differentials shown in the tabulation below are considered standard. (Selection of the wider differential and larger tolerance will bring the lowest unit price.) If other settings, tolerances or differentials are required refer to factory for consideration.

FAHRENHEIT				CENTIGRADE			
Temperature Range	Manufacturing Tolerance		Mean Differential	Temperature Range	Manufacturing Tolerance		Mean Differential
	OPEN	CLOSE			OPEN	CLOSE	
35 - 79	±5	±6	15 - 24	1 - 26	±3	±4	8 - 14
	±5	±7	25 - 29		±3	±4	14 - 16
	±5	±8	30 - 39		±3	±5	17 - 22
	±6	±8	40 - 49		±4	±5	22 - 27
	±7	±9	50 - 60		±4	±5	28 - 34
80 - 180	±5	±6	15 - 19	27 - 82	±3	±4	8 - 11
	±5	±7	20 - 29		±3	±4	11 - 16
	±5	±8	30 - 49		±3	±5	17 - 27
	±6	±10	50 - 60		±4	±6	28 - 34
	±9	±13	61 - 100		±5	±7	34 - 56
181 - 230	±5	±7	15 - 24	82 - 110	±3	±4	8 - 14
	±5	±8	25 - 39		±3	±5	14 - 22
	±6	±9	40 - 49		±4	±5	22 - 27
	±7	±11	50 - 60		±4	±6	28 - 34
	±10	±15	61 - 100		±6	±8	34 - 56
231 - 300	±6	±9	25 - 29	110 - 150	±4	±5	14 - 16
	±6	±10	30 - 39		±4	±6	17 - 22
	±7	±11	40 - 49		±4	±6	22 - 27
	±8	±11	50 - 60		±5	±6	28 - 34
	±11	±17	61 - 100		±6	±10	34 - 56
301 - 350	±10	±20	60 - 80	150 - 177	±6	±11	34 - 45

* Differential is the difference between opening and closing temperature of the thermostat.
 ** To allow for differences between methods and equipment customers should inspect to limits 1" to 2" greater than specified.

ESSEX®

Direct Sensing Thermostats



TYPE 430 1/2 inch Standard Construction Disc Thermostat

APPLICATION DATA

Essex 430 general purpose temperature control is an Essex standard construction thermostat. The control incorporates a bimetal disc for snap action, positive and instantaneous opening or closing electric circuits.

Typical applications are as a temperature limiter in electronic equipment, freezers, water heaters, motors, washers, vending machines and table top appliances to mention a few.

The standard unit is small in size, and available with enclosed disc. Terminals and mounting brackets are available as illustrated in the following under the Outline Dimension Section.

ENGINEERING DATA

Only the disc reacts to the temperature of the controlled device or medium surrounding the disc because the thermostat is thermally and electrically insulated from the current carrying parts of the device.

This feature plus the positive and instantaneous disc action eliminates chattering, false cycling and electrical interference with radio and TV reception. Wiping contacts helps assure long life. The thermostat is mechanically enclosed in a tamper-proof plastic case.

Electrical Rating

Resistive 15 Amps to 120 VAC, 10 Amps at 240 VAC
Pilot Duty 120 VA
All 100,000 cycle ratings Essex 430 listed U.L. File MH 6883.

Temperature Ranges and Tolerances

RANGE	TOLERANCE OPEN**	TOLERANCE CLOSE**	DIFFERENTIAL*
80-180°F	± 5°F	± 7°F	15-29°F
181-230°F	± 5°F	± 8°F	30-39°F
231-300°F	± 7°F	± 11°F	40-60°F
301-350°F	± 10°F	± 20°F	61-80°F

* Differential is the difference between opening and closing temperature of the thermostat.

** To allow for differences between methods and equipment, customers should inspect to limits approximately 1 to 2°F greater than specified above.

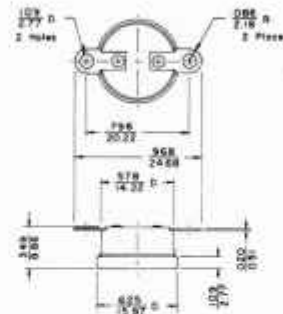
TYPE 430 1/2 inch Standard Construction Disc Thermostat (cont'd.)

OUTLINE DIMENSIONS

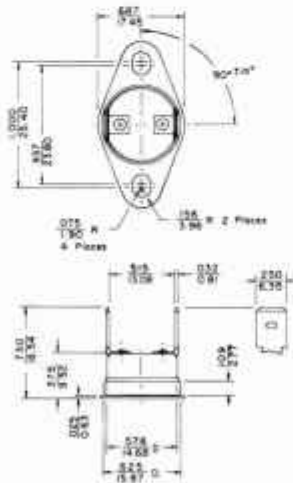
430-1



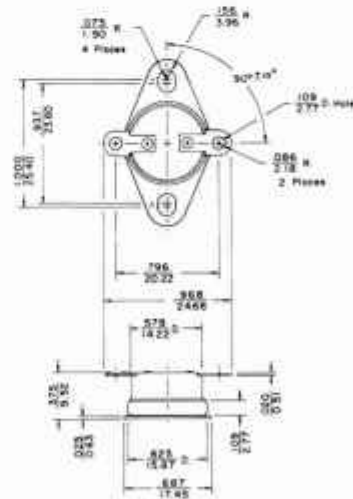
430-3



430-2



430-4



ESSEX[®]

Direct Sensing Thermostat



TYPE 430-2900 Fire Detection Thermostat

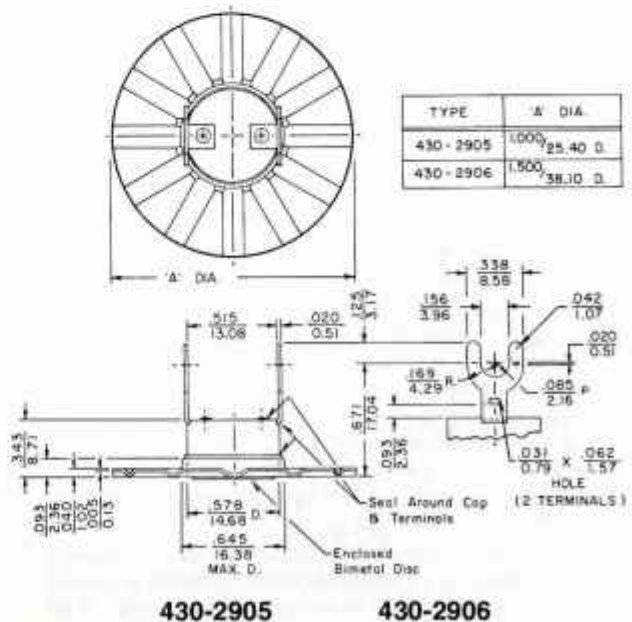
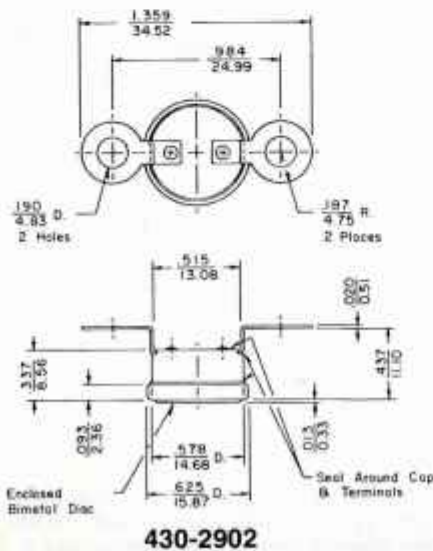
APPLICATION DATA

Essex fire alarm thermostats feature a bimetallic disc for snap-action, positive and instantaneous opening and closing of electrical contacts. These thermostats incorporate structural design necessary in fire alarm systems. Electrical contacts are gold-pointed for very low internal resistance path between terminals. Each unit has epoxy-sealed terminals and a retainer providing a sealed construction which retards ambient contaminants.

Two heat collectors are available which help increase the response of the unit. Heat collectors are either 1 inch, or 1½ inch diameter styles.

Two standard calibrations are available for fire alarm temperature requirements. One: Close on temperature rise at $133^{\circ} \pm 5^{\circ}\text{F}$, and open at $97^{\circ} \pm 7^{\circ}\text{F}$. Two: Close at $190^{\circ} \pm 5^{\circ}\text{F}$, and open at $150^{\circ} \pm 7^{\circ}\text{F}$. High temperature unit (two) is popular for boiler room and above furnace installations where higher than normal temperatures are prevalent.

Electrical ratings are 1 amp at 115 volts AC and .5 amps at 24 volts DC. U.L. listing file is S1747 and the unit has tested in accordance with U.L. standard 521 fire detection thermostat.





TYPE 431 1/2 inch Encapsulated Bimetal Disc Thermostat

APPLICATION DATA

Essex Type 431 thermostat is used whenever a moisture and dust-proof enclosure is required for safe, sensitive and reliable operation. A polypropylene boot enclosure, filled with epoxy resin, covers the thermostat. The bimetal disc control element is in close proximity to the sensor cap to provide rapid response to temperature changes. Instantaneous, positive action of the disc prolongs thermostat life by minimizing arcing and eliminating chattering and false cycling.

A Mounting Bracket is available as shown in drawing. Specify 431-301 if mounting bracket is desired. Type 431-306 may be mounted with a clip supplied by customer. Refer to factory for mounting on a tube or pipe. Lead wires are normally furnished with #18 gauge wire size, covered with 1/32" or 1/16" thick, 105°C plastic insulation. Standard length is 2 ft. of combined length. Other lengths available to specifications. Lead wire ends normally stripped as shown. Terminals can be furnished to customer specifications at extra cost.

Features: Since the bimetal disc used in the Essex 431 thermostat is thermally and electrically insulated from the current carrying parts of the thermostat, disc reacts ONLY to the temperature of the controlled device or medium surrounding disc. This feature, plus positive and instantaneous action of disc, eliminates chattering, false cycling and electrical interference with radio and television reception. Long life is assured with wiping contacts.

For use in millivolt and thermocouple circuits, requiring low resistance, gold plated pointed contacts are available. Also available are fine silver pointed contacts for pilot duty applications.

ENGINEERING DATA

Electrical Ratings

LOAD	120VAC	240VAC	277VAC
RESISTIVE	10 AMPS	7.5 AMPS	—
RESISTIVE	1 AMP	1 AMP	1 AMP
INDUCTIVE	5.8FL-34.8LR	2.9FL-17.4LR	—
PILOT DUTY	125VA	125VA	125VA
MILLIVOLT	1 AMP 1 VOLT AC/DC		

All 100,000 cycle ratings. 431 listed U.L. file. SA1761. Consult factory for CSA file and ratings — max. temp. 176°F.

Ranges, Tolerances, Differentials

The range of temperature settings, tolerances and mean differentials as shown in tabulation are available. If other temperatures or tolerances are needed send details for consideration.

Temperature Range	Tolerances**		Mean Differentials*
	Open	Close	
0 to 79°F	±5°F	± 8°F	15-29°F
0 to 79°F	±7°F	±10°F	30-80°F
80 to 176°F	±5°F	± 8°F	15-29°F
80 to 176°F	±7°F	±10°F	30-80°F

* Differential is the difference between opening and closing temperature of the thermostat.

** To allow for difference between methods and equipment, customers should inspect to limits approximately 1°F. to 2°F. greater than specified above. Essex will be glad to assist in setting up your inspection equipment and procedure.

TYPE 431 1/2 inch Encapsulated Bimetal Disc Thermostat (cont'd.)

GENERAL DATA

Samples and Ordering

Essex Controls welcomes the opportunity to work with you to develop thermostatic controls designed specifically for your product.

In the initial application work it is frequently more satisfactory to order first a thermocouple assembly of the type required, equipped with a thermocouple attached to the bimetal. This can be used to explore the best location for the thermostat and arrive at the opening and closing temperature required as the temperature is varied manually. Specify whether the thermocouple should be iron constantan or copper constantan.

A description of the appliance giving (1) load inductive or resistive, (2) opening and closing temperature with maximum tolerance that can be allowed, (3) terminal types and mounting flanges referenced to the type

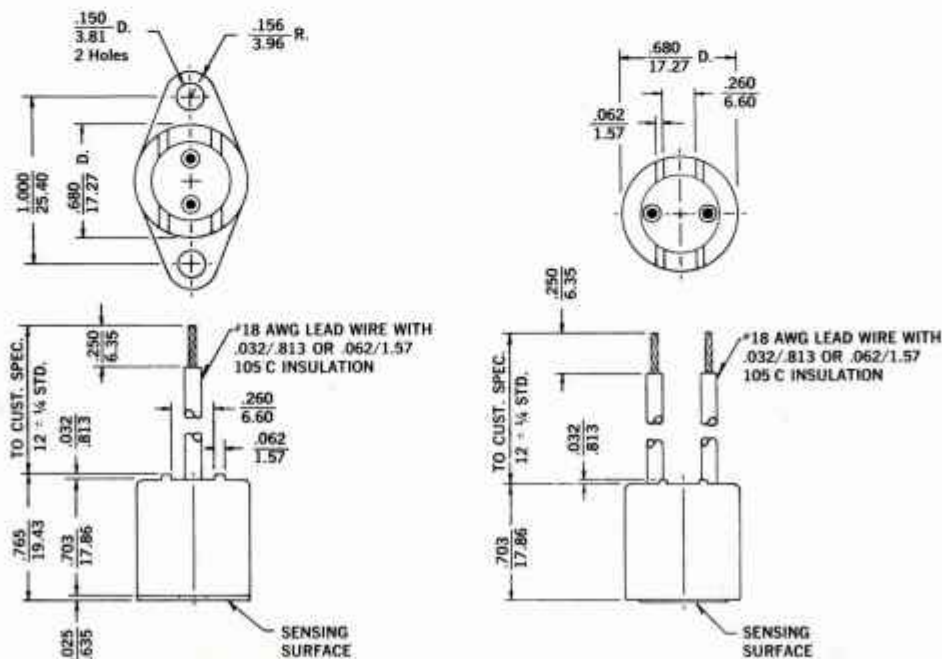
numbers shown in the bulletin, (4) probable yearly volume, (5) environmental conditions such as ambient temperature, fumes, dust, etc., should accompany requests for samples.

Use of our application data sheet makes sure complete information is included.

Drawings and illustrations are for general information only. Thermostat type numbers cover mechanical details only. Part number completely identifying the desired unit, will be furnished on request for incorporation into specifications. Before tools or other equipment are ordered, certified and dimensioned prints should be obtained from factory.

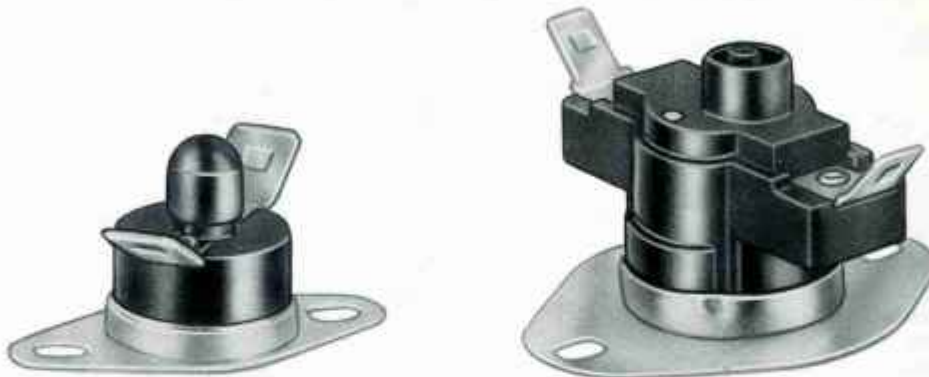
Manufacturer reserves right to alter specifications without notice.

OUTLINE DIMENSIONS



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TYPES 432 and 404 Manual Reset 1/2 inch and 3/4 inch Bimetal Disc Thermostats

APPLICATION DATA:

Essex manual reset controls are ideally suited for temperature control in applications where the manufacturers want to call special attention to a specific heat malfunction that may require a service call.

Features: Both the 432 and the 404 thermostats use a bimetal disc for snap action, positive and instantaneous opening of the electric circuit. In addition, the 404 features trip-free operation, where physical depression of the reset button holds the contact open and renders the device inoperative.

ENGINEERING DATA:

At operating temperatures of 100°F. (37°C.) both units may be manually reset approximately 25°F. to 30°F. (14°C. to 16°C.) below the actual opening temperature. This differential will increase at the opening temperature is increased. The minimum resettable temperature is 75°F. (24°C.) for both controls. Temperature ranges of 100°F.-350°F. (37°C.-176°C.) are available. Consult factory for applications below 100°F. (37°C.).

Various terminal and mounting brackets are available in addition to our standard ones shown. For additional information on the 432 refer to Bulletin 430 and for the 404 refer to Bulletin 402.

Electrical Ratings U.L. and C.S.A. Recognized

TYPE	LOAD	120V AC	240V AC	277V AC	CYCLES	MAX. TEMP.	U.L. FILE	C.S.A.
432	RES.	15 AMP	10 AMP	8.7 AMP	6000	350°F 176°C	E23581	12619 & 20339
	FLA/LRA	5.8/34.8	2.9/17.4	—	6000	350°F 176°C	E23581	
	PILOT	125VA	125VA	125VA	6000	350°F 176°C	E23581	
404	RES.	25 AMP	25 AMP	25 AMP	6000	350°F 176°C	MH6883	12619
	FLA/LRA	10/60A	5/30A	—	6000	350°F 176°C	MH6883	
	PILOT	125VA	125VA	—	6000	350°F 176°C	MH6883	

TYPES 432 and 404 Manual Reset 1/2 inch and 3/4 inch Bimetal Disc Thermostats (cont'd.)

Operating Temperature Ranges & Tolerances

TYPE	RANGE	TOLERANCES
432	100°F.-200°F.	± 8°F.
	201°F.-250°F.	± 10°F.
	251°F.-350°F.	± 12°F.
404	100°F.-200°F.	± 8°F.
	201°F.-250°F.	± 9°F.
	251°F.-350°F.	± 10°F.

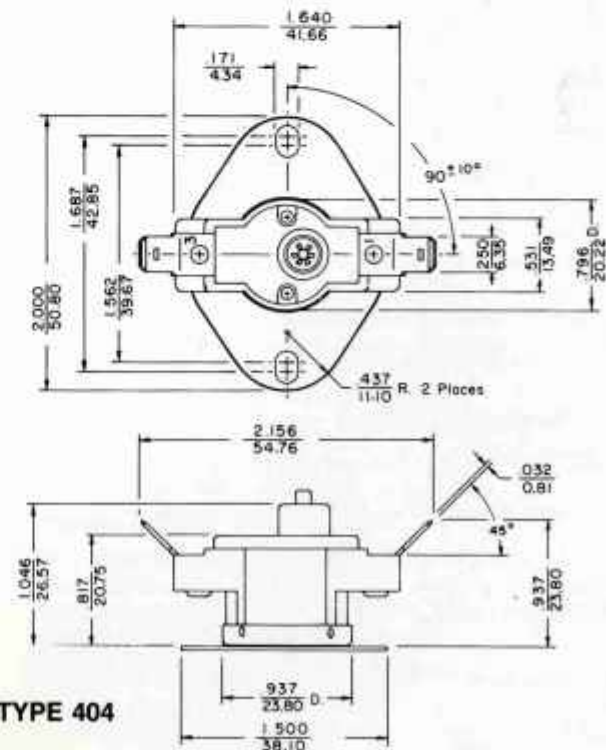
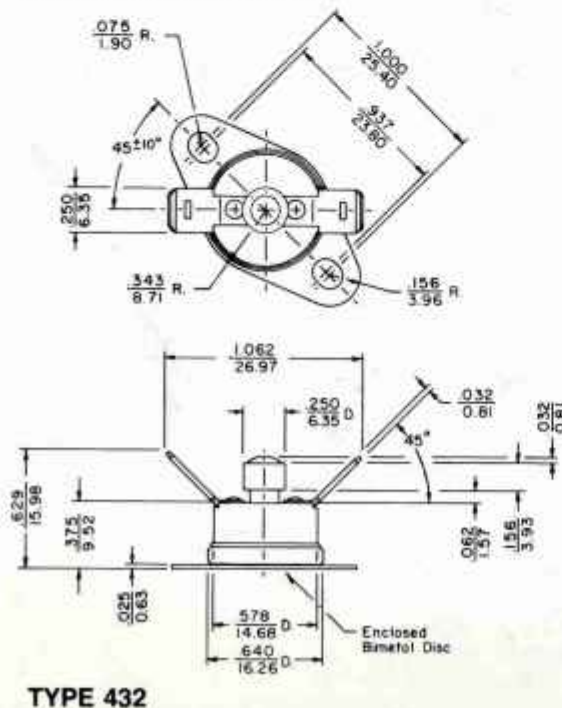
Consult Factory For Special Tolerance Requirements.

GENERAL DATA Samples and Ordering

Essex welcomes the opportunity to work with you to develop controls designed specifically for your products. Our laboratory facilities are available to you for application or checking this control in your product. A description of the appliance giving: (1) load inductive or resistive; (2) opening and min. reset temperature with maximum tolerance that can be allowed; (3) terminal types and mounting flanges; (4) enclosed or exposed bimetal; (5) probable yearly volume; (6) environmental conditions such as ambient temperature, fumes, dust, etc.; should accompany requests for samples. Use of our application data sheet makes sure complete information is included.

Illustrations are for general information only. Thermostat type numbers cover mechanical details only. Part numbers completely identifying the desired unit, will be furnished on request. Before tools or other equipment are ordered, certified and dimensioned, prints should be obtained.

OUTLINE DIMENSIONS



ESSEX®

Direct Sensing Thermostats



436-5 Thermostat



436-2 Thermostat
(1 terminal grounded)



436-1 Thermostat
(1 terminal grounded)



436-10 Thermostat
(both terminals insulated)



436-9 Thermostat
(both terminals insulated)

TYPE 436 Miniature Bimetal Disc

APPLICATION DATA

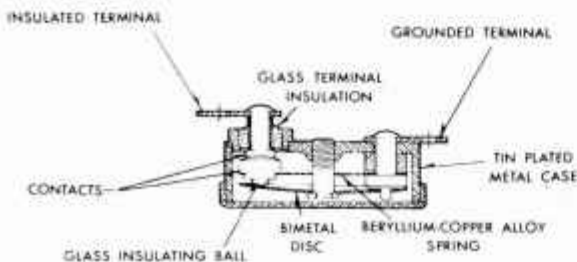
Principal use for Essex 436 thermostats is in electronic and avionic work where a compact, reliable thermostat that is both snap-acting and has a narrow differential for close temperature control is required.

Essex 436 thermostats are *miniature snap-acting* units designed to *open on a temperature rise*. Models which *close on a temperature rise* are not available.

These thermostats can be supplied in a wide variety of standard production designs, both hermetically sealed and semi-enclosed. Some of the available models, with leading dimensions, are illustrated, however, space considerations preclude showing the entire line. Terminals may be rotated within the outside diameter of the case or formed at 90° to the plane of the thermostat.

ENGINEERING DATA

Construction



Features

Normal operating temperatures are from 10° to 295°F. Closest heat control is obtained with units in round metal housings.

Silver cadmium oxide contacts are standard, though fine silver, silver palladium or platinum iridium contacts are available. Consult factory for availability.

Units will stand a dielectric test of 500 volts AC for one minute. In types where one terminal is grounded, test is made with contacts open at 50° F above specified opening temperature. Qualified to MIL-E-5272C, consult factory for details.

Electrical Ratings

Average Electrical Ratings		
Cycles of Operation	Voltage	Amperage (Non-inductive)
25,000	30 VAC/DC	3
	115 VAC	3
100,000	30 VAC/DC	1.5
	115 VAC	1.5
250,000	30 VAC/DC	1
	115 VAC	1

These ratings, while conservative, may be increased or decreased, depending on the type of service, rate of heating and cooling, characteristics of the circuit, including source of power. Normally, capacitors are not recommended. If used, the size must be *carefully* selected, depending on circuit characteristics. Resistors are recommended to reduce condenser discharge from welding the contacts.



TYPE 444, 445, 446, and 457 Adjustable and Non-Adjustable Bimetal Strip Styles

APPLICATION DATA

The Type 444 thermostat, available with either adjustable or fixed calibration, is used in flat irons, broilers, skillets, hot plates, waffle irons, fans, room heaters, coffee makers, sealing machines plus many other appliances or industrial applications. Standard operating ranges are from 80° to 550°F., as measured on the bimetal.

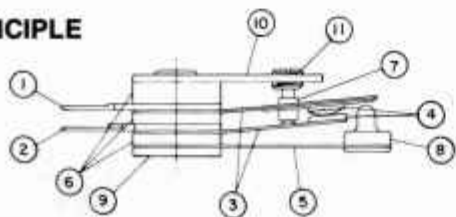
Special ranges are from 32° to 550°F., subject to review of the application. Applications can be made to combine a heater with the thermostats to give a "percent of time on and off" control.

ENGINEERING DATA

Essex Type 444 thermostats are available in different dimensions and with various combinations of features, according to customer specifications. The outline drawings on the inside pages of this bulletin are representative of standard models. Adjustable units can be supplied with angular rotation of 90, 180, 240, 270 and 300 degrees. Terminals may be spaced to best suit the mounting conditions, specify position by number on page 2.

A modification of the standard thermostat has a positive off plate underneath the top contact blade (Item BB). This permits setting the turn on point in the low position and at the same time a calibration of the temperature in the high position. It also prevents closing of the contacts due to extremely low ambients, such as in some air heater applications. It is patented construction available at extra cost. Note a thermostat with such a range that it does not close in the low position when cooled to -31°F is accepted by UL in place of a positive off on space heaters, hot plates and similar applications.

PRINCIPLE



Current flows from terminal (1) to terminal (2) through the contact springs (3) and contacts (4). The bimetal (5) carries no current. It is in direct contact with the mounting bushing (6) used in the surface mounting applications and responds rapidly to changes in surface temperature. As a result of this electrical independence, it responds mainly to temperatures of the device or to temperatures of the air surrounding the bimetal, eliminating false cycling or life-shortening "jitters". In the case of a thermostat opening on temperature rise, the bimetal strip moves upward. There is a friction movement of the insulated pin (7) against the blade and this, combined with the fact that it has to overcome contact blade pressure, gives the thermostat a positive action with a clean make and break. Contacts close again when the temperature drops to a point where the downward force of the contact spring overcomes the bimetal pressure and friction. When the thermostat closes on temperature rise, the bimetal moves downward, thus clearance must be provided below bimetal (5) and insulator (7).

With standard threads, the adjusting stem is rotated clockwise for higher temperature in open on rise construction.

GENERAL DATA

Mounting

The easiest way to mount the thermostat is by means of a No. 8-32 screw through the hole in the thermostat into the surface on which the thermostat is mounted. It is recommended with this mounting that the torque applied to the #8 screw does not exceed 15 inch pounds. On special orders, this hole can be furnished with inside threads (Item C), at slight additional cost. For air heaters, and fan applications in particular, the nozzle mounting (Items T, W, X, Item T furnished at extra cost) is desirable, with threaded bushings in either No. 3/8-24 or 15/32-32 threads.

Mounting brackets or heat collectors supplied by customer or developed by Essex may be built into thermostat stack at additional cost.



TYPE 444, 445, 446, and 457 Adjustable and Non-Adjustable Bimetal Strip Styles (cont'd.)

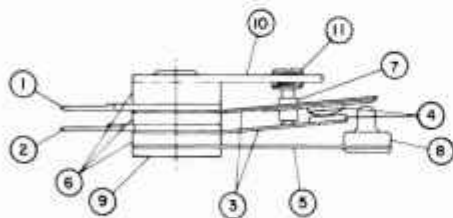
GENERAL DATA (cont'd.)

Calibration

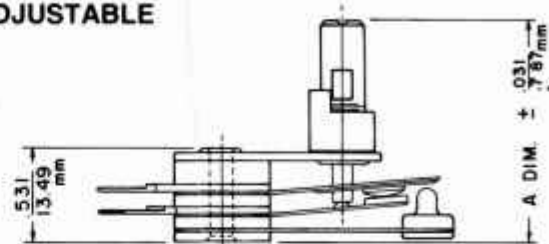
Essex Type 444 thermostats are precalibrated to open the contacts or to close the contacts (as specified), when the bimetal is at a predetermined temperature. With a range of from 80° to 200°F., limits of $\pm 10^\circ\text{F.}$ are used. With a range of from 201° to 400°F., limits are $\pm 15^\circ\text{F.}$ 401° to 450°F $\pm 20^\circ\text{F.}$, 451° to 550 $\pm 25^\circ\text{F.}$ There is an extra charge for a calibration below 80°F. Customers checking calibrating tolerances should use limits of approximately $\pm 2^\circ\text{F.}$ greater than specified above, to allow for difference between methods in calibration as well as instrumentation.

Construction

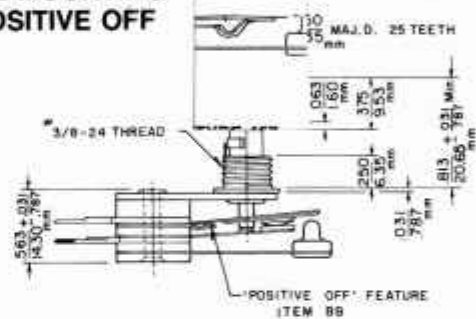
PART		MATERIAL
Terminals	1 & 2	Plated Steel
Contact Leaf	3	Stainless Steel, Phosfor Bronze Or Beryllium Copper
Contacts	4	Silver Alloy Or Fine Silver
Thermal Element	5	Bimetal
Insul. Washer	6	Ceramic
Insul. Pin	7	Ceramic
Actuator	8	Ceramic
Bushing	9	Plated Steel
Base Plate	10	Plated Steel
Adj. Stem	11	Brass Or Plated Steel



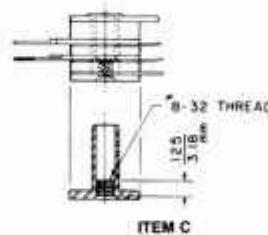
ADJUSTABLE



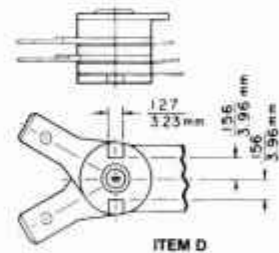
NOZZLE MOUNTING AND POSITIVE OFF



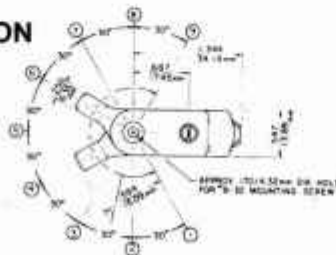
THREADED FOR MTG. SCREW



NOTCHED FOR ANTI-ROTATION



OUTLINE DIMENSIONS STANDARD CONSTRUCTION

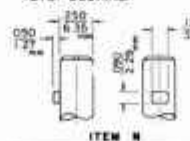


NON-ADJUSTABLE 444 OR 445

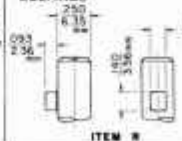


STOP LUGS AND SPRING LUGS

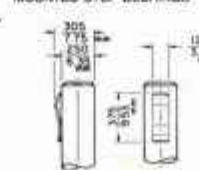
STANDARD LUG FOR USE WITH NOZZLE MOUNTED STOP BUSHING



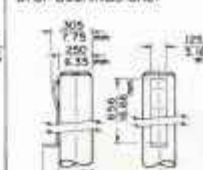
STANDARD LUG FOR USE WITH HEXAGON STOP BUSHINGS



SPRING LUG FITS STANDARD KNOB USE WITH NOZZLE MOUNTED STOP BUSHINGS



SPRING LUG FITS STANDARD KNOB USE WITH HEXAGON STOP BUSHINGS ONLY



SPRING LUG



ITEM Q

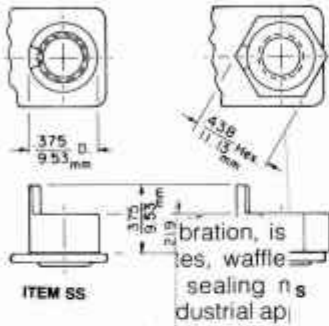
ITEM RR

ITEM QQ

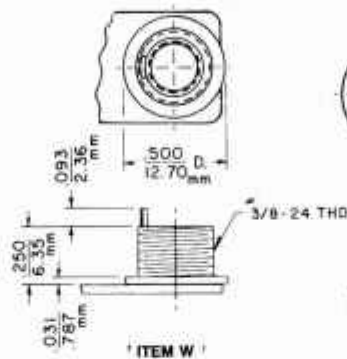


TYPE 444, 445, 446, and 457 Adjustable and Non-Adjustable Bimetal Strip Styles (cont'd.)

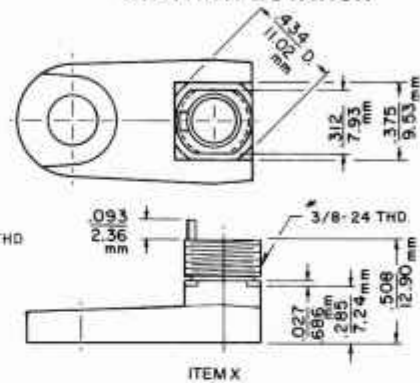
STANDARD



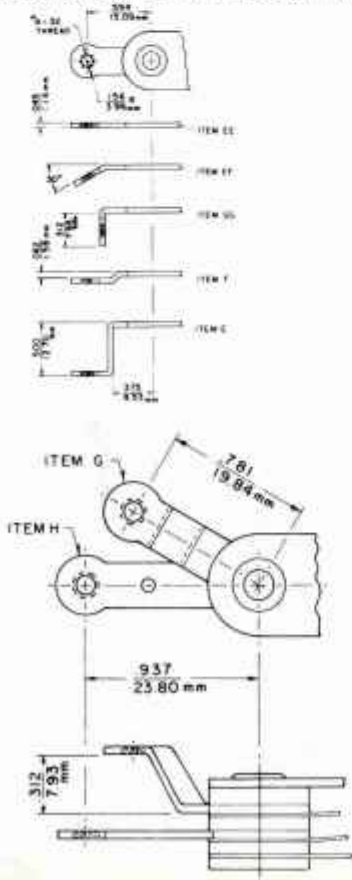
NOZZLE MOUNTING



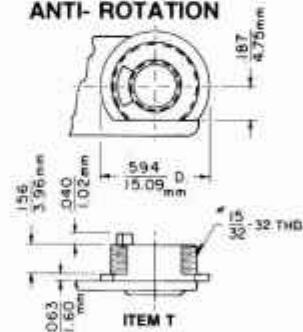
**NOZZLE MOUNTING
BASE PLATE
WITH ANTI-ROTATION**



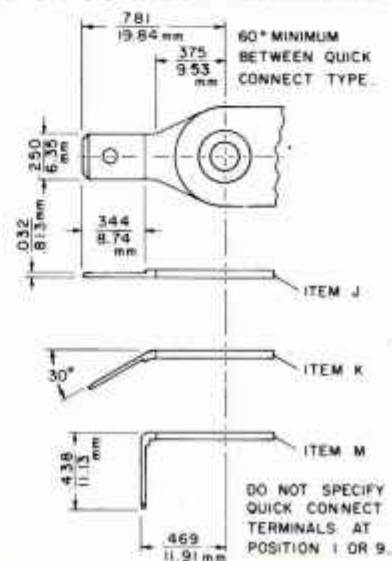
SCREW TYPE TERMINALS (FORMED SCREW TERMINALS EXTRA CHG.)



**NOZZLE MOUNTING
WITH FLAT FOR
ANTI-ROTATION**



QUICK CONNECT TERMINALS



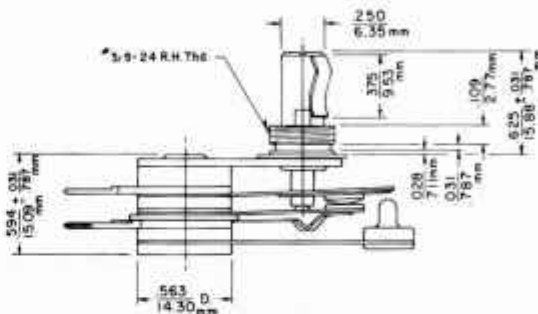
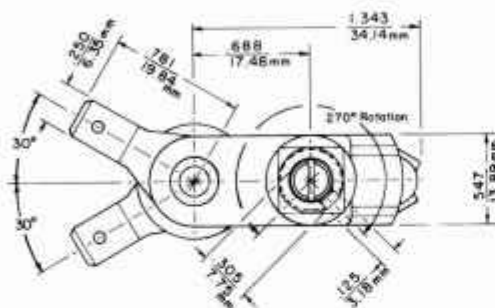


TYPE 444, 445, 446, and 457 Adjustable and Non-Adjustable Bimetal Strip Styles (cont'd.)

Type 457 Operation

In operation the Type 457 modification of the Type 444 is designed to give a linear relationship between the percentage of the time on and the angular position of the adjusting stem. Clockwise rotation of the adjusting

stem will vary the percent of time on from zero to 100%. Loads of 200 to 1100 watts 120 VAC can be handled. The unit is not UL listed, requires approval in the application.



TYPE 457

ELECTRICAL RATINGS

UL File E 23581

TYPE	MAX. TEMP.	CYCLES	120 VAC	240 VAC
444 OR 446	550°F	100,000	15.0 Amp. Res. 5.0 FLA* 30.0 LRA*	8.3 Amp. Res. 2.5 FLA* 15LRA*
445	450°F	100,000	16.7 Amp. Res. 5.0 FLA* 30.0 LRA*	8.4 Amp. Res. 2.5 FLA* 15.0 LRA*

CSA File 12619 or 20339

TYPE	MAX. TEMP.	CYCLES	120 VAC	240 VAC
440 OR	550°F	6,000	6.9 Amp. Res.
446 OR		100,000	16.7 Amp. Res.
445			5.0 FLA* 30.0 LRA*

*FLA: Full load amps.

*LRA: Locked rotor amps. Inductive

Spacings on Types 444, and 445 are to ground through air and over surface 1/16", Type 446 has 1/8" through air and 1/4" over surface.

No 277 VAC listing is shown in the rating table as we do not recommend application of the Type 444 construction on this voltage.

SAMPLES and ORDERING INFORMATION

Essex Controls welcomes the opportunity to work with you to develop thermostatic controls designed specifically for your product. The facilities of our laboratory are available to you for application or checking to U.L. standards, if you will send or bring your appliance to us.

In the initial application work it is frequently more satisfactory to order first a dummy assembly of the type required equipped with a thermocouple attached to the bimetal which can be used to explore the best location for the thermostat and arrive at the operating temperature required as the temperature is varied manually. Specify whether couple should be iron constantan or copper constantan.

A description of the appliance giving (1) load inductive or resistive, (2) operating temperature with maximum

The Type 445 shown in the rating table is mechanically the same as the Type 444 nonadjustable, but is UL accepted as a limit on baseboard heaters. For portable heater applications a combined control and tip switch is also available, see Bulletin 462-1000.

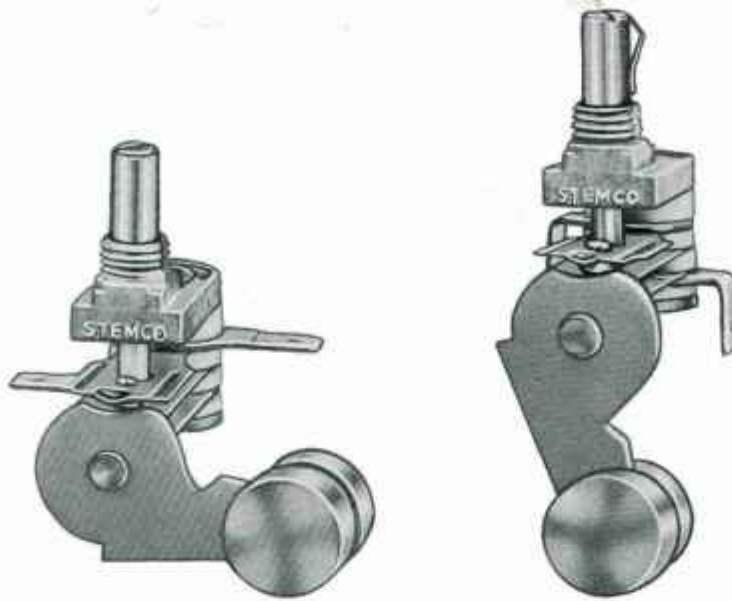
tolerance that can be allowed, (3) terminal types and location (4) angular and thermal range (5) adjusting stem height, (6) method of mounting (7) probable volume, (8) any detrimental environmental conditions should accompany requests for samples. Use of our application data sheet makes sure complete information is included.

Drawings and illustrations are for general information only. Part numbers, completely identifying the desired unit will be furnished on request for incorporation into specifications. Before tools or other equipment are ordered, certified and dimensioned prints should be obtained from the factory.

Manufacturer reserves right to alter specifications without notice.

ESSEX[®]

Direct
Sensing
Thermostats



TYPE 462-1000 Strip Type Thermostat with Safety Tip-Over Switch

APPLICATION DATA

The Essex Series 462-1000 combination tip switch thermostat meets the industry's requirement for a unit with a thermal "off" position (-32°F) and a redundant separate set of tip-switch contacts. A special die cast base provides easy nozzle mounting of the control.

It features a die cast base, 270° angular rotation and standard size.

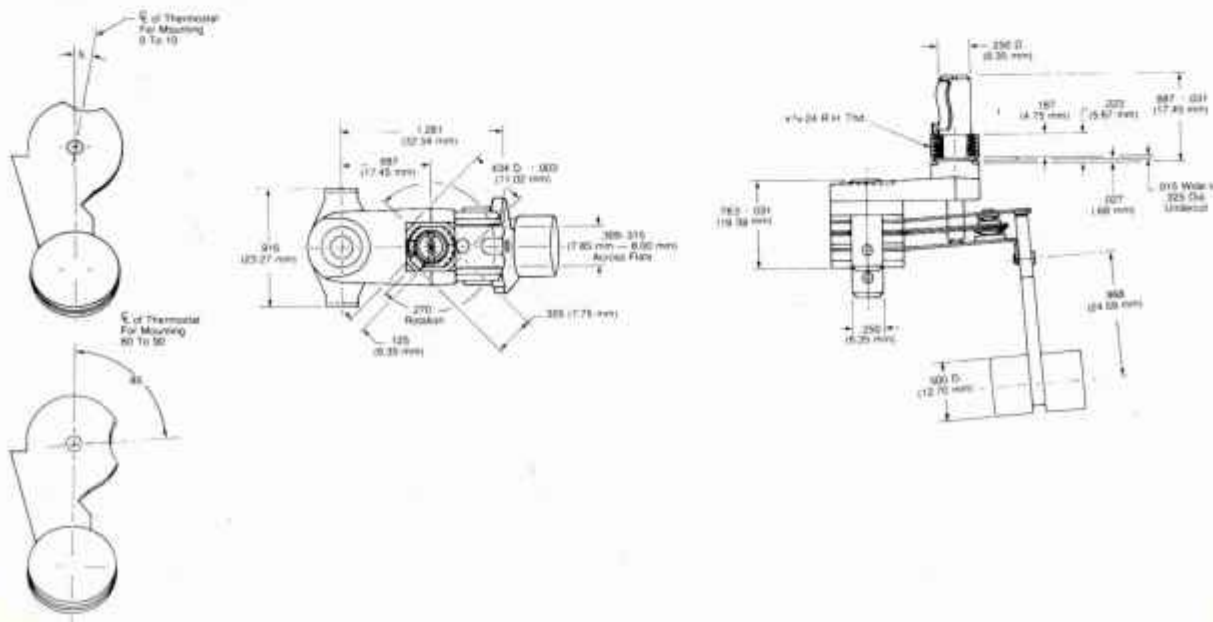
GENERAL DATA

Essex Type 462-1000 is U.L. listed under File #E23581, C.S.A. Listed under File #LR20339-50. User should specify:

ENGINEERING DATA

Essex Combination Tip Switch Temperature Controls will be custom engineered to your specific OEM application. It has been designed to meet current agency standards. It is rated for portable electric space heater manufacturers at 12.5 amps @ 120 VAC resistive; 5 full load amps; 30 locked rotor amps @ 120 VAC inductive.

- Load-inductive or resistive
- Operating temperature with tolerances
- Terminal types and location
- Angular and thermal range
- Adjusting stem height
- Method of mounting



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Thermostats



TYPE 465 Miniature Bimetal Strip Thermostats Adjustable and Non-Adjustable Styles

APPLICATION DATA

The Type 465 thermostat is available with either adjustable or fixed calibration. Current applications are hamburger makers, mini french fryers, doughnut makers, steamers, sealing machines, fans, limits, and many other appliances or industrial applications. The standard operating ranges are from 80°F to 550°F as measured on the bimetal.

ENGINEERING DATA

Two Type 465 Miniature Series available:

1. Essex Standard Series

465-1 through 499 Electrical rating 13.75 amps using a 1/4" O.D. Contacts "Fine Silver" High Rating Applications.

2. Cost Savings 465-500 Series

Electrical rating 8.0 amps using a 3/16" O.D. composite rivet Contacts "Fine Silver" Low Rating Applications.

For additional ratings see U.L. CSA Rating Chart.

Type 465 thermostats are available in different dimensions and with various combinations of features, according to customer specifications. The outline drawings shown in this bulletin are representative of standard models. Adjustable units can be supplied with angular rotation of 90, 180 and 270 degrees. Terminals may be spaced to best suit the mounting conditions, specify by position number as indicated under Outline Dimensions on the inside of this bulletin.

The Type 465 thermostat is available with only a thermal off. There is no mechanical off feature available with this control because of its size. A thermal off is a low temperature, i.e. low enough so that the contacts do not close in the low position when cooled to -31°F. This is acceptable to U.L. in place of a positive off on space heaters, hot-plates and similar applications. This feature does not add to the cost of the control and can be built into almost any control except those having an angular rotation of 90°. For units requiring a mechanical

off, we suggest the Type 444 thermostat as shown on Bulletin 444.

Principle

Current flows from terminal (1) to terminal (2) through the contact springs (3) and contacts (4). The bimetal (5) carries no current. It is in direct contact with the mounting bushing (6) used in the surface mounting applications and responds rapidly to changes in surface temperature. As a result of this electrical independence, it responds mainly to temperatures of the device or to temperatures of the air surrounding the bimetal, eliminating false cycling of life-shortening "jitters". In the case of a thermostat opening on temperature rise, the bimetal strip moves upward. There is a friction movement of the insulated pin (7) against the blade and this, combined with the fact that it has to overcome contact blade pressure, gives the thermostat a positive action with a clean make and break. Contacts close again when the temperature drops to a point where the downward force of the contact spring overcomes the bimetal pressure and friction. When the thermostat closes on temperature rise, the bimetal moves downward, thus clearance must be provided below bimetal (5) and insulator (7).

With standard threads, the adjusting stem is rotated clockwise for higher temperature in open on rise construction.

GENERAL DATA

Mounting

The easiest way to mount the thermostat is by means of a No. 6-32 screw through the hole in the thermostat into the surface on which the thermostat is mounted. It is recommended with this mounting that the torque applied to the #6 screw does not exceed 12 inch pounds. On special orders, this hole can be furnished with inside threads (Item C), at slight additional cost. For air heaters, and fan applications in particular, the nozzle mounting (Item X) is desirable, with bushings having a 3/8"-24 thread.



TYPE 465 Miniature Bimetal Strip Thermostats Adjustable and Non-Adjustable Styles (cont'd.)

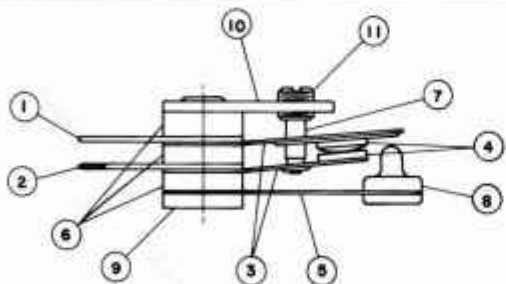
GENERAL DATA (con't.)

Calibration

Type 465 thermostats are precalibrated to open the contacts or to close the contacts (as specified), when the bimetal is at a predetermined temperature. With a range of from 80° to 200°F., limits of $\pm 10^\circ\text{F}.$ are used. With a range of from 201° to 400°F., limits are $\pm 15^\circ\text{F}.$; 401° to 450°F., $\pm 20^\circ\text{F}.$; 451° to 550°F., $\pm 25^\circ\text{F}.$ There is an extra charge for a calibration below 80°F. Customers checking calibrating tolerances should use limits of approximately $\pm 4^\circ$ greater than specified above, to allow for difference between methods in calibration as well as instrumentation.

Construction

PART	MATERIAL
Terminals	1 & 2 Plated Steel
Contact Leaf	3 Stainless Steel
Contacts	4 Silver Alloy Or Fine Silver
Thermal Element	5 Bimetal
Insul. Washers	6 Ceramic
Insul. Pin	7 Ceramic
Actuator	8 Ceramic
Bushing	Plated Steel
Base Plate	10 Plated Steel
Adj. Stem	11 Plated Steel



Electrical Ratings

Temperature —

Types 465-1 through -499 — Maximum calibrated temperature of 550 F (288 C)

Types 465-500 through -699 — Maximum calibrated temperature of 450 F (232 C).

Electrical — U.L. Rating File No. E-23581

Types 465-1 through -499
 120 v ac, noninductive, 13.75 amp
 120 v ac, 4.5 FLA, 20 LRA
 120 v ac, pilot duty, 125 va

Types 465-500 through -699
 120 v ac, 8 amp, noninductive

TYPE NO.	SUFFIX DESIGNATION	C.S.A FILE NO.	MAX. TEMP. IN °F	NO. OF CYCLES X 1,000	
465	1 thru 499	12619	550	100	
ELECTRICAL RATINGS					
NON-INDUCTIVE		INDUCTIVE		PILOT DUTY	
AMPS	VOLTS	FLA	LRA	VOLTS	VA
10	120	4.5	20	120	125
6	240				

Stop Lugs and Stop Bushings

Most of the constructions shown on Bulletin 444, Type 444, can be used on the Type 465 if standards are not practical. Contact factory before requesting non-standard.

SAMPLES AND ORDERING INFORMATION

Essex Controls welcomes the opportunity to work with you to develop thermostatic controls designed specifically for your product. The facilities of our laboratory are available to you for application or checking to U.L. standards, if you will send or bring your appliance to us.

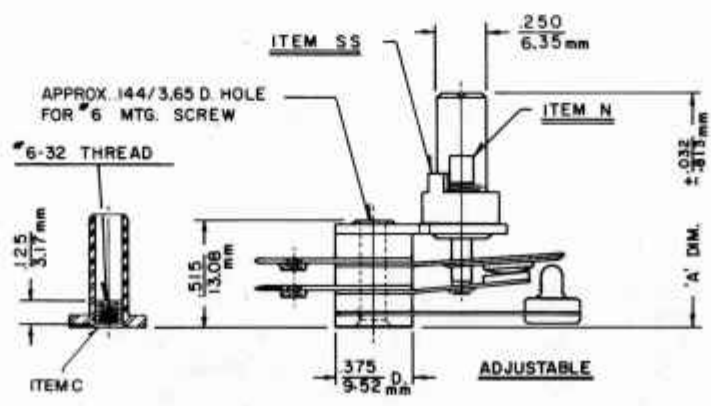
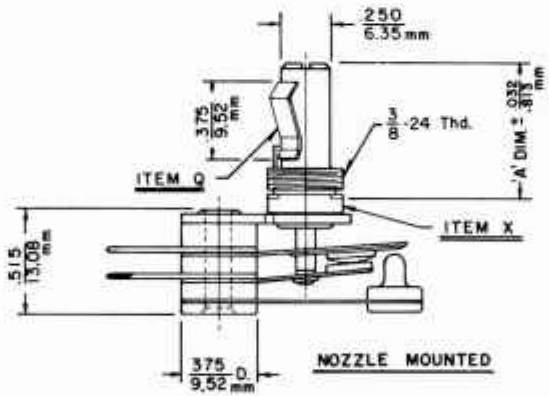
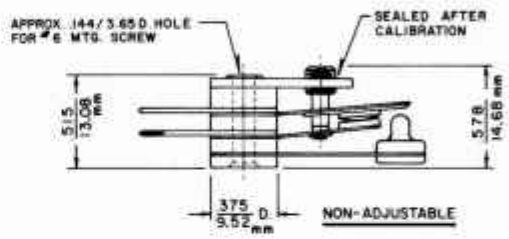
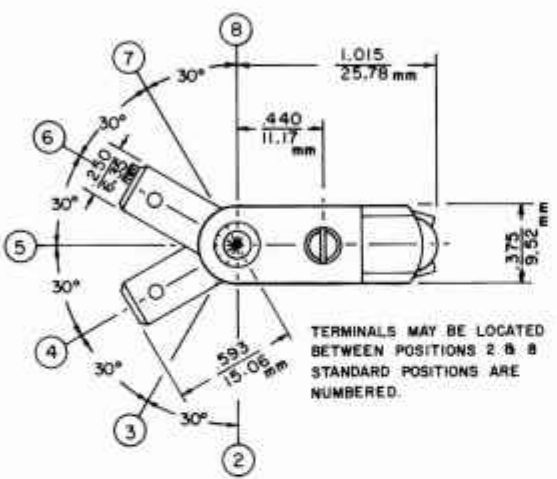
In the initial application work it is frequently more satisfactory to order first a dummy assembly of the type required equipped with a thermocouple attached to the bimetal which can be used to explore the best location for the thermostat and arrive at the operating temperature required as the temperature is varied manually. Specify whether couple should be iron constantan or copper constantan.

A description of the Appliance giving (1) load inductive or resistive, (2) operating temperature with maximum tolerance that can be allowed, (3) terminal types and location (4) angular and thermal range (5) adjusting stem height, (6) method of mounting (7) probable volume, (8) any detrimental environmental conditions should accompany requests for samples. Use of our application data sheet makes sure complete information is included.

Drawings and illustrations are for general information only. Part numbers, completely identifying the desired unit will be furnished on request for incorporation into specifications. Before tools or other equipment are ordered, certified and dimensioned prints should be obtained from the factory.

TYPE 465 Miniature Bimetal Strip Thermostats Adjustable and Non-Adjustable Styles (cont'd.)

OUTLINE DIMENSIONS



ESSEX[®]

Direct Sensing Thermostats



Type 471 Temperature Probe

APPLICATION DATA

The Type 471 Temperature Probe is designed for opening or closing an electrical circuit on a rise in temperature. It can be used as a limit control or to prove pilot or main burner ignition in gas heating equipment. Typical applications include crop dryers, heaters and vent dampers. Withstanding high ambient temperatures yet able to provide thermostatic control at low temperatures are characteristic of this control.

Standard operating temperatures are from 170°F to 700°F — consult factory for temperatures outside these limits. A SPST design is available for opening or for closing a circuit on temperature rise. Note: An anti vibration spring is necessary where the control will be subjected to vibration.

ENGINEERING DATA

Standard probe lengths ("A" Dimension) are 1³¹/₃₂", 2³/₄" and 3¹¹/₁₆" with a ³/₁₆" diameter tube. For other tube lengths, refer to the factory. FOR BEST PERFORMANCE, FLAME SHOULD IMPINGE ON THE PROBE AT LEAST ³/₄" FROM THE TIP. A ceramic terminal cap providing complete insulation of the terminals is available if required for your application.

NOTE: When ceramic terminal cap is specified, ³/₁₆" quick connect terminals must be used.

Electrical Ratings

Because ratings may be increased or decreased depending upon the type of circuit incorporated for the temperature probe, ratings should be reviewed with the factory. UL and AGA listed for 100,000 cycles:

AGA Report 20-1B1
1 amp @ 12, 24 and 120 VAC
U.L. File MH 7972
1 amp @ 120 VAC noninductive

Range and Tolerance

Although the Essex Type 471 Temperature Probe can withstand temperatures of 1400°F and the body 750°F, the maximum calibration temperature is 700°F. The adjusting screw is locked tight after calibration. The Probe is calibrated at the factory to these tolerances:

760°C

Temperature Range	Minimum Tolerance
170°F - 600°F	± 25°F
601°F - 700°F	± 50°F

Type 471 Temperature Probe (cont'd.)

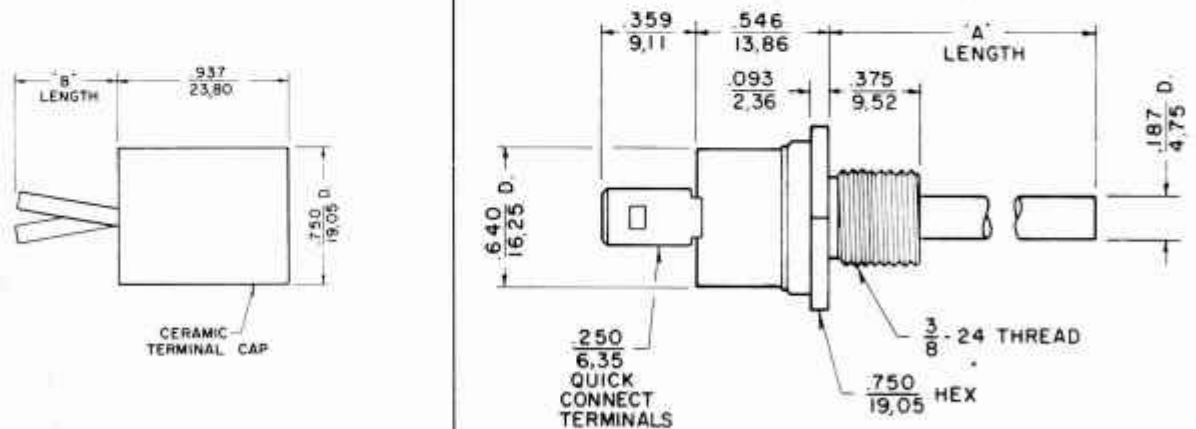
GENERAL DATA

Samples and Ordering Information

Submit the following information when requesting samples and quotations: current, voltage, type, cycle life, ambient temperatures of the probe and body; the "A"

and/or "B" length dimensions; quantity; probable yearly volume.

OUTLINE DIMENSIONS



ESSEX®

Direct Sensing Thermostats



TYPE 495 1/2 inch "International" Standard Construction Disc Thermostats

APPLICATION DATA

Essex Type 495 general purpose temperature controls are an Essex Standard Construction Thermostat which meet "international" requirements. The control incorporates a bimetal disc for snap action, positive and instantaneous opening or closing electric circuits.

Typical applications are as a temperature limiter in electronic equipment, water heaters, motors, tumble dryers, microwave ovens, copy machines, coffee makers and other table top appliances.

The standard unit is small in size, and available with enclosed disc. Terminals and mounting brackets are available as illustrated in the Outline Dimensions section below.

ENGINEERING DATA

Only the disc reacts to the temperature of the controlled device or medium surrounding the disc because the thermostat is thermally and electrically insulated from the current carrying parts of the device.

This feature plus the positive and instantaneous disc action eliminates chattering, false cycling and electrical interference with radio and TV reception. Wiping contacts help assure long life. The thermostat is mechanically enclosed in a tamper-proof plastic case.

Another construction feature is the terminal rivet sleeve which maintains positive spacing between each terminal and contact as specified by European regulatory agencies.

ELECTRICAL RATING

Resistive 10 Amps, Inductive 2.9 Amps at 240 VAC
Product-recognized by these regulatory agencies: U.L. MH6883; BSI (England) 4272 DHD/4537 DHD; SEMKO (Sweden) 43-58981/1; VDE (Germany) 6431-451-1.

Temperature Ranges & Tolerances

RANGE	TOLERANCE OPEN*	TOLERANCE CLOSE*	DIFFERENTIAL*
80-180°F	± 5°F	± 7°F	15-29°F
181-230°F	± 5°F	± 8°F	30-39°F
231-300°F	± 7°F	± 11°F	40-60°F
301-350°F	± 10°F	± 20°F	61-80°F

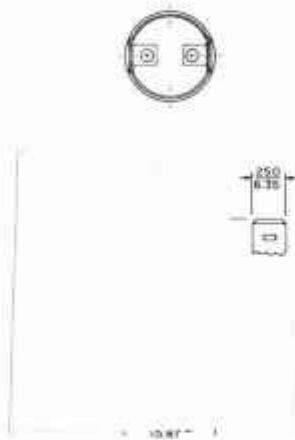
*Differential is the difference between opening and closing temperature of the thermostat.

**To allow for differences between methods and equipment, customers should inspect to limits approximately 1 to 2°F greater than specified above.

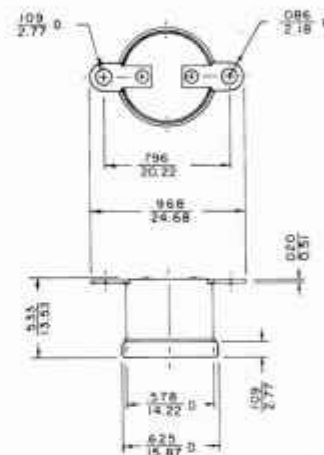
TYPE 495 1/2 inch "International" Standard Construction Disc Thermostats (cont'd.)

OUTLINE DIMENSIONS

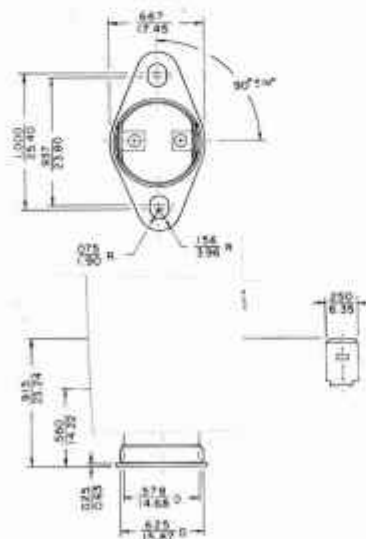
495-1



495-3

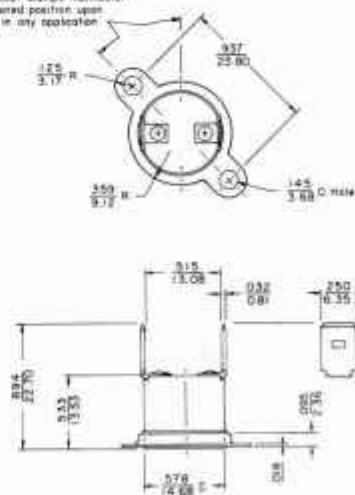


495-2



495-4

Linear bracket clamps thermostat in any desired position upon assembly in any application.



Note: Optional terminal and mounting brackets, shown in Type 430 product literature, is available for the Type 495.

ESSEX®

Remote
Sensing
Thermostats



Model 603
Fixed Setting

TYPE 351 Fixed-setting Thermostats

APPLICATION DATA

Low cost ESSEX Direct Acting Fixed Setting Controls have served in the field successfully for several years in flame sensing and limit applications. Typical applications are: Bake limits in ovens, limits for high power burners on glass top ranges, pilot flame switches, commercial cooking equipment, plus numerous other applications.

ENGINEERING DATA

The Model 603 is a fixed setting thermostat that incorporates a precision switch with a direct acting Essex Hydrastat™ Direct Acting means fewer parts and therefore lower cost than a Lever Action Model 103 fixed setting thermostat. Direct Acting also means wider differentials and calibration tolerances to the design engineer.

AGENCY APPROVAL DATA — TYPES 351 AND 352

I Underwriters laboratories components listings.

A. File 23581, Guide XAPX2 — Temperature Indicating and Regulating Equipment:

1. Appliance temperature limiting controls:
Models 101, 102, 103, 111, 112, 113, 1101, 1102, 1111, 1112 with suffix letters.
Models 201, 202, 203, 1201, 1202 with 2 suffix letters.
Model 603 with suffix letter.
2. Water heater control, temperature regulating:
Models 161, 162, 163, 1161, 1162 with suffix letters.
Models 261, 262, 263, 1261, 1262 with 2 suffix letters.

3. Water heater control, temperature limiting:

Models 16
Models 26

- B. File MH6883, Class 4823 — Controls, Limit:
Model 106
Model 206
Model 603 with 1 suffix letter

II Canadian Standards Association

A. File 20981, Guide 400-E-O, Class 4823 — Temperature indicating and regulating equipment:

1. Appliance Controls:
Model 101, 102, 103, 106 with 1 suffix letter

Note: Suffix letters indicate switch types.



Model 102
Screwdriver
Adjustment



Model 101
Knob Adjustment



Model 103
Fixed Setting

TYPE 351 Adjustable and Fixed Setting Thermostats

APPLICATION DATA

An Essex Hydrastat™ operates a precision single pole double throw switch via a lever for close tolerance narrow differential switching capability. Both adjustable or fixed setting models are available. Features: The Model 102 screwdriver adjustment and front connect terminals is perfect for speed fryers, vending machines, coffee makers or sandwich toasters. The knob adjustment on the Model 101 offers a low cost method to maintain desired temperatures within a narrow band for applications such as convection ovens, charbroilers, grills, electric toasters and ovens. Model 103 fixed setting type is ideal where narrow differential close tolerance control is necessary.

The ESSEX Energy Regulator is a device that regulates the energy output of the unit being controlled by limiting the amount of time that power is applied to the unit. A resistor sized according to the input voltage (up to 480V) provides the heat to the Hydrastat™ which operates a snap action switch. The switch then cycles the device according to the adjustment setting which regulates from "off" to one hundred percent time "on". Essex offers the only device of its kind that can be used on any rating up to 30 amps. Because the life of an Energy Regulator increases proportionally according to its setting a life expectancy of up to 3 times longer than devices with lesser ratings has been experienced.

ENGINEERING DATA

A variety of switch and Hydrastat combinations are available offering you great versatility. For outdoor or extreme ambient situations, control boxes are available. Ambient compensated parts can also be specified. Optional rear connected terminals provide the same versatility and dependability as the conventional front mount.

ORDERING DATA

Order Essex Hydrastat remote sensing thermostats by specifying:

- Application
- Current and Voltage
 - Inductive or resistive
 - AC or DC
- Maximum temperature ambient
- Control switch
- Capillary
- Bulb
- Temperature to be controlled
 - Rising
 - Falling
 - Rate of temperature change
 - Off required
- Termination
 - screw
 - quick connect
- Dimensional parameters

OFF 50-110	OFF 200-400
OFF 75-250	*200-550
*100-210	OFF 1-10 Colder

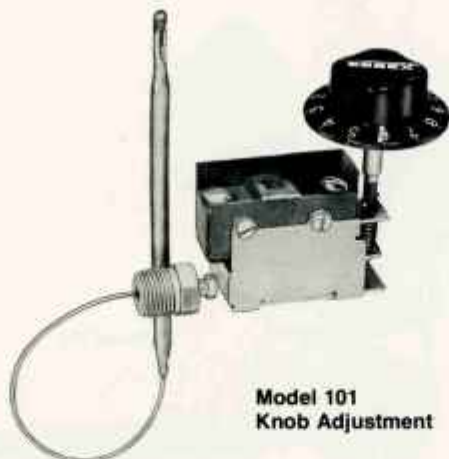
*Available with or without "OFF"



ULTIMHEAT[®]
VIRTUAL MUSEUM



Model 102
Screwdriver
Adjustment



Model 101
Knob Adjustment



Model 103
Fixed Setting

TYPE 351 Adjustable and Fixed Setting Thermostats

APPLICATION DATA

An Essex Hydrastat™ operates a precision single pole double throw switch via a lever for close tolerance narrow differential switching capability. Both adjustable or fixed setting models are available. Features: The Model 102 screwdriver adjustment and front connect terminals is perfect for speed fryers, vending machines, coffee makers or sandwich toasters. The knob adjustment on the Model 101 offers a low cost method to maintain desired temperatures within a narrow band for applications such as convection ovens, charbroilers, grills, electric toasters and ovens. Model 103 fixed setting type is ideal where narrow differential close tolerance control is necessary.

ENGINEERING DATA

A variety of switch and Hydrastat combinations are available offering you great versatility. For outdoor or extreme ambient situations, control boxes are available. Ambient compensated parts can also be specified. Optional rear connected terminals provide the same versatility and dependability as the conventional front mount.

ORDERING DATA

Order Essex Hydrastat remote sensing thermostats by specifying:

- Application
- Current and Voltage
- Inductive or resistive
- AC or DC

Maximum temperature ambient

Control switch

Capillary

Bulb

Temperature to be controlled

Rising

Falling

Rate of temperature change

Off required

Termination

screw

quick connect

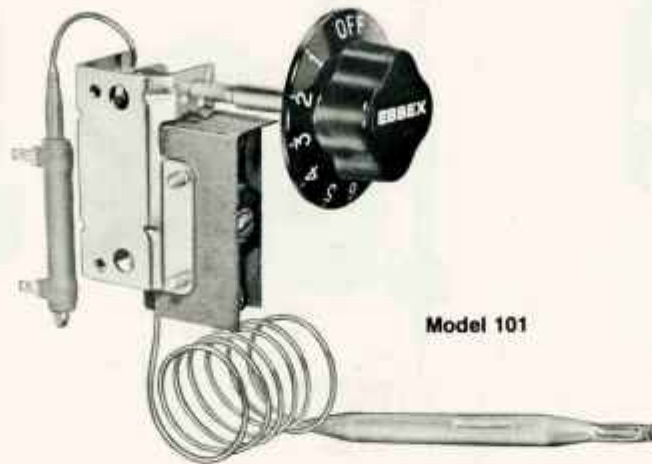
Dimensional parameters

OFF 50-110	OFF 200-400
OFF 75-250	*200-550
*100-210	OFF 1-10 Colder

*Available with or without "OFF"

ESSEX[®]

Remote
Sensing
Thermostats



Model 101

TYPE 351 with Differential Reducer-Special Control

APPLICATION DATA

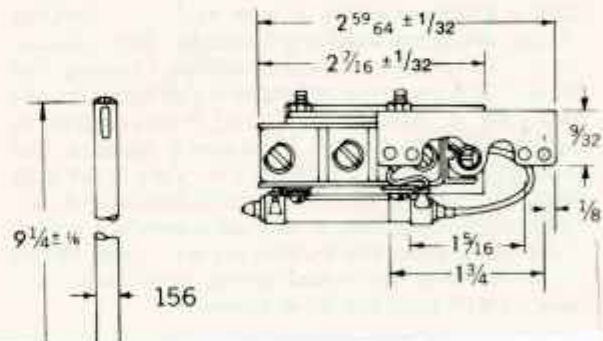
The differential Reducer (or Anticipator) is recommended for precision applications where constant, closely regulated temperatures are desired. These include lab ovens, oil baths and commercial cooking appliances — like ovens and griddles where constant temperature is vital for achieving consistent quality of food.

Features: This optional device provides a low-cost method for maintaining desired temperatures within a narrow range. When used with ESSEX thermostats, it will maintain the set temperature with the accuracy of very expensive controls.

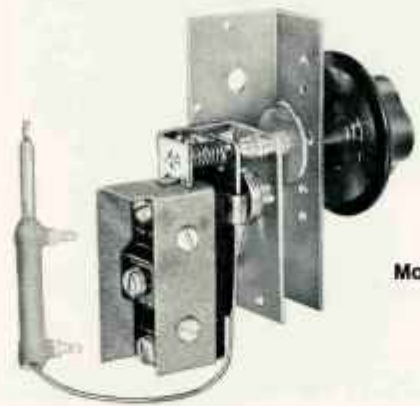
ENGINEERING DATA

The ESSEX Differential Reducer (Anticipator) is suitable for high temperatures up to 1050°F. The unit consists of a small auxiliary bulb in the hydraulic element system surrounded by a low-wattage resistor. The resistor is connected in parallel with the main heating load and acts to shut off the thermostat before the main bulb. When the thermostat is shut off, the small bulb cools faster than the main bulb. This action assists in turning on the thermostat sooner. The thermostat therefore cycles more often which results in a more narrow controlled temperature swing. Anticipator resistors should be specified for the heater operating voltage and are available for 120, 230 or 480 volt applications.

OUTLINE DIMENSIONS



$\frac{1}{32}$



Model 1101

TYPE 351 Energy Regulator/Infinite Control-Special Control

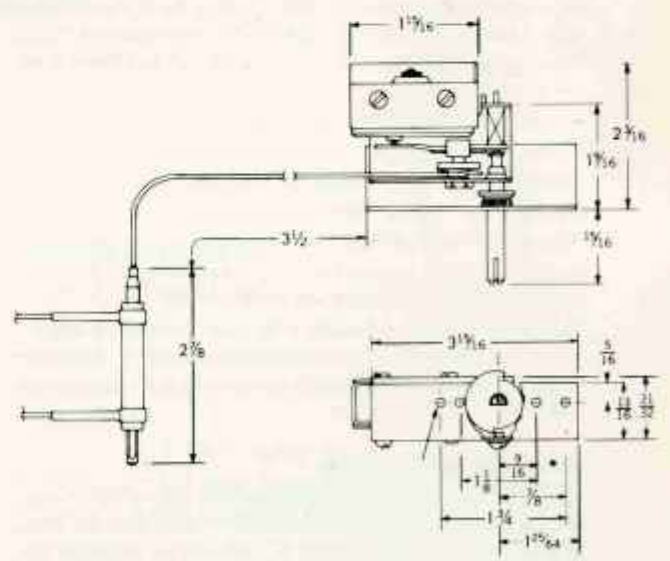
APPLICATION DATA

The ESSEX Energy Regulator is designed for convenient use on all wattages. One control can be stocked for different voltage applications. Changes in operating voltage can be made by simply changing the resistor. Typical applications include commercial appliances, heavy-duty electric-heat controls, electric charcoal broilers, ovens and ranges and corn poppers.

ENGINEERING DATA

The ESSEX Energy Regulator is a device that regulates the energy output of the unit being controlled by limiting the amount of time that power is applied to the unit. A resistor sized according to the input voltage (up to 480V) provides the heat to the Hydrastat™ which operates a snap action switch. The switch then cycles the device according to the adjustment setting which regulates from "off" to one hundred percent time "on". Essex offers the only device of its kind that can be used on any rating up to 30 amps. Because the life of an Energy Regulator increases proportionally according to its setting a life expectancy of up to 3 times longer than devices with lesser ratings has been experienced.

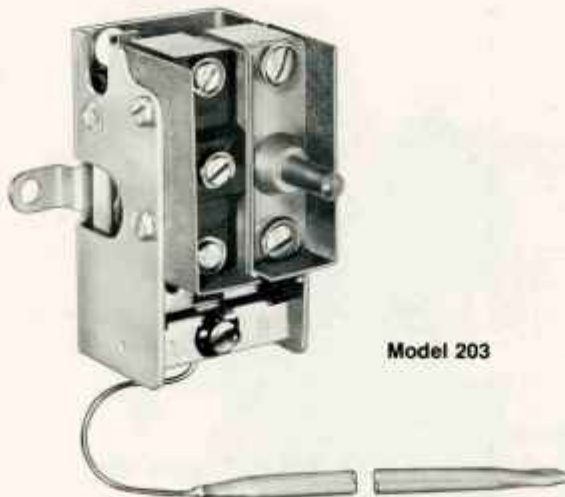
OUTLINE DIMENSIONS



ESSEX®

Remote Sensing Thermostats

BULLETIN 352

ULTIMHEAT®
VIRTUAL MUSEUM

Model 203

TYPE 352 Dual Electric Thermostats

APPLICATION DATA

Two-step heating or cooling control. Upon starting, both switches are on. When the setting is approached, one switch shuts off. The other switch remains on until the setting is reached, then it cycles alone to maintain the setting. This is desirable for fast recovery and reduced overshoot.

Combination heating and cooling. Both heater and cooler can be controlled from one thermostat without the need of selector switches.

Combination thermostat. With cycling switch and hand reset switch, the manual reset can be adjusted to trip at a temperature above the cycling switch to prevent exceeding the setting.

Combination fan and limit control.

Three-phase control.

Double-line break. Break both sides of a line where required by local codes.

Adjustable wide differential operation.

Under certain conditions of splitting the load, capacities are available up to 50 amps.

Features: Three types are available: with knob adjustment, screwdriver adjustment or fixed setting. Two precision snap action switches controlled by a single adjustment.

ENGINEERING DATA

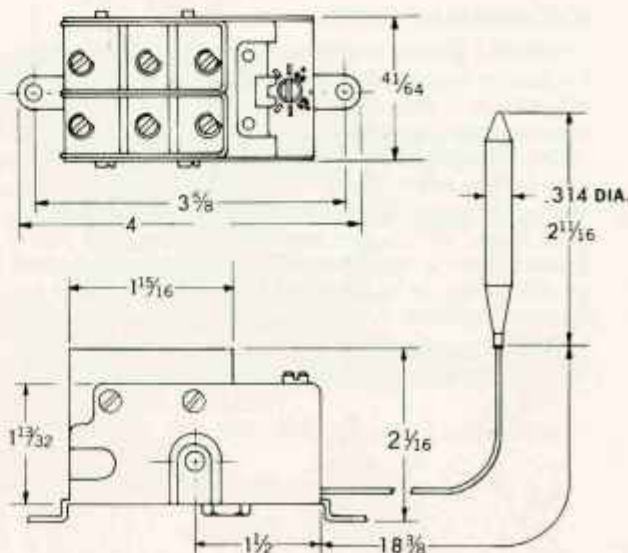
Essex Series 200 is built upon the time proven accuracy and dependability of the Hydrastat™. Two precision snap action switches (controlled in one unit by a single adjustment) can be arranged to trip at approximately the same time or separately at a predetermined differential within the units' temperature range.

For either commercial or domestic applications, this model is available in a choice of ratings, temperature ranges, methods of adjustment — including a manual reset control — and diaphragm styles.

Essex Dual Electric Thermostats feature these design advantages:

- 2 SPDT snap action switches.
- Switches can be calibrated to snap at approximately the same time or at different temperatures.
- Any combination of switches can be used. High temperature switches which withstand 250°F ambients are available as are sealed 15 amp and 22 amp switch versions.
- Rear connected terminals are available as an option (series 1200 Electric Thermostat) providing the same versatility and dependability as the conventional front mount model.

OUTLINE DIMENSIONS



ESSEX®

Remote Sensing Pressure Switch



TYPE 353 HP and LP PRESSURE SWITCH

APPLICATION DATA

Essex Pressure Switch, the low-cost pressure switch for fixed settings 15-500 psi, is a fixed setting switch with normally closed contacts. The contacts open when the cutout pressure of the medium being controlled is met or exceeded in a pressure falling mode for low pressure (LP) models or a pressure rising mode for high pressure (HP) models.

Available in fixed settings for any pressure, 15 to 500 psi., it is ideal for air conditioning and commercial refrigeration compressors and systems, as well as gas, liquid and numerous other pressure control applications that require dependability at competitive prices.

Features: Available in Three basic types:

(1) LP Series — 15 PSI Min. (2) HP Series — 500 PSI Max. (3) Dual Series — Combined LP and HP on Universal Mounting Bracket

ENGINEERING DATA

- Electrical ratings from pilot duty 125VAC to 25A 480V; 1 hp 120V, 2 hp 240V
- Choice of cycling switch or manual re-set
- Standard .093" copper tubing in lengths to your specifications
- 1/4" O.D. flare fitting available
- 100% stainless steel pressure power element available for use with ammonia and other corrosive gases or liquids
- Approved at 2500 psi without rupturing

ESSEX®

Remote
Sensing
Thermostats



ULTIMHEAT®
VIRTUAL MUSEUM



TYPE 353 HP and LP PRESSURE SWITCH (con't.)

GENERAL DATA

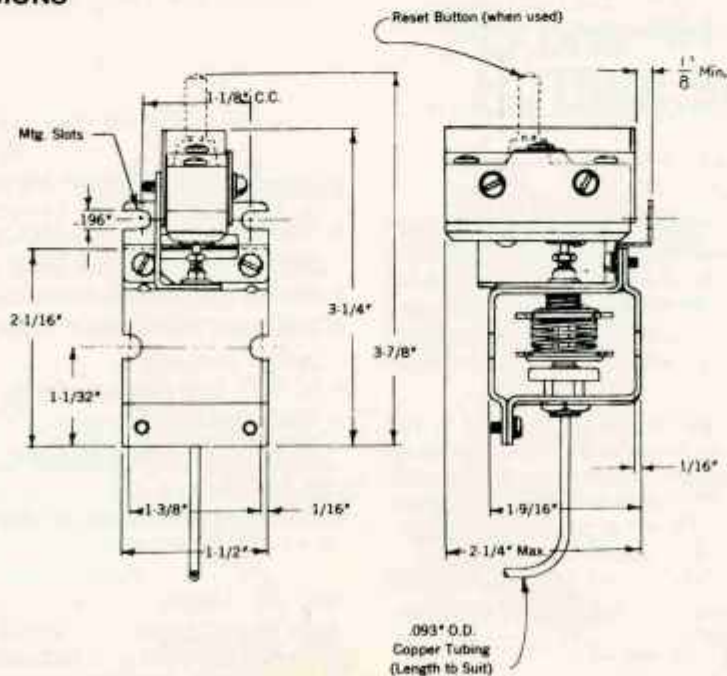
ORDERING INSTRUCTIONS

When ordering please specify the following:

1. Application
2. Current and Voltage
Inductive or Resistive
AC or DC
3. Maximum Temperature Ambient
Control Switch
4. Manual or Automatic Reset
Snap Action Switch
5. Pressure to be Controlled
A. Rising
B. Falling
6. Termination— screw or quick connect
7. Dimensional Parameters

U.L. Component Listing
Refrigeration Controllers
E40404
Guide #SDFY2

OUTLINE DIMENSIONS



ESSEX[®]

Remote Sensing Thermostats



The Essex Hydrastat is a device that converts temperature change into hydraulic motion.

TYPE 368 Hydrastat™

APPLICATION DATA

When you consider the versatile Essex Hydrastat power control for your application, design freedom is maximized by the variety of available options. Specify the Essex Hydrastat where movement in response to temperature change is required.

Features: Temperature sensing range from 20°F to 1500°F; temperature sensing in extreme environments; When applied to Essex Type 351 or 352 Remote Sensing Thermostats offer switching capability up to 2 pole double throw; fixed setting and knob control or screwdriver adjustments; narrow differential and energy regulating controls available; front or rear mounting; UL, AGA, C.S.A. listed up to 30 Amps 240 volts — 25 Amps at 480 volts.

ENGINEERING DATA

By considering the relationship between the required bulb dimensions and the desired temperature range the appropriate Essex Hydrastat can be specified. Only the length or the diameter of the bulb can be a fixed specification. One of these dimensions must remain open because it will vary according to the movement necessary at the operating temperature.

Probe units consisting of a bulb attached to the diaphragm assembly are also available for more direct sensing applications. Capillary length can be specified for remote temperature sensing.

GENERAL DATA

Test the Hydrastat's versatility. Send the specifications outlined below as they relate to your application:

Normal operating range

Maximum temperature

Minimum temperature

Capillary material: Copper or Stainless Steel

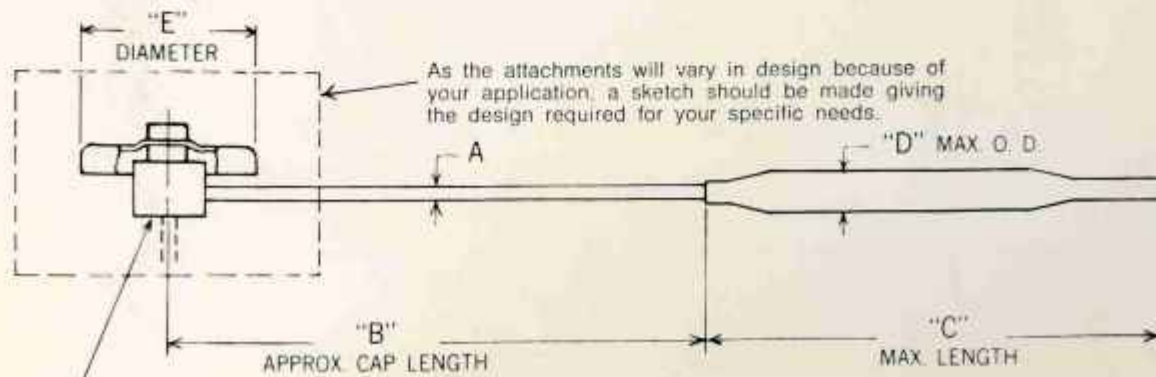
Bulb material: Copper or Stainless Steel

Capillary length — dimension "A" below. Standard sizes available are .059" .078" .093"

Cup diameter — dimension "E" below. The maximum travel and maximum external load are specified.

Cup Diameter	Maximum Travel	Maximum External Load
5/8"	.020"	6#
3/4"	.045"	20#
1"	.050"	15#

OUTLINE DIMENSIONS



Capillary can come out of stud from side as shown or from the bottom as dashed.



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ESSEX GROUP



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