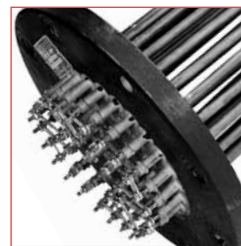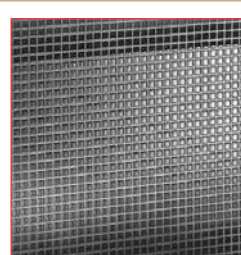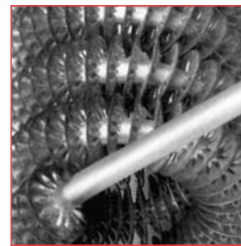# CCI Thermal Technologies INC.

Heating and Filtration Solutions

Caloritech™

Engineered Electric Heat

Controls and Accessories

Section F

Contents

Caloritech™

Edmonton, Alberta

Houston, Texas

Orillia, Ontario

Oakville, Ontario

Denver, Colorado

As a leader in heating and filtration solutions, CCI Thermal Technologies Inc. is committed to ongoing research, product development and above all, excellence in customer service. With facilities across North America, CCI Thermal manufactures seven of the top brands in industrial heating in addition to a comprehensive line of engineered industrial filtration products including:

Cata-Dyne™ *Explosion-Proof Gas Catalytic Heaters*   **Norseman™** *Electric Explosion-Proof Heaters*
Ruffneck™ *Heaters for the Harshest Environments*   **DriQuik™** *Infrared Oven Components*
Caloritech™ *Engineered Electric Heat*   **Fastrax®** *Track and Switch Heaters*
3L Filters™ *Engineered Filtration Systems*

Caloritech™ electric heaters, heating elements and heating accessories are well-known in the industry for their quality, reliability, performance and versatility. In addition to standard "off the shelf" industrial heaters and heating systems components, Caloritech™ also offers engineered heating solutions custom designed, manufactured and tested to satisfy customer specifications. No matter what your application or environment, Caloritech™ has a solution to fit your heating needs.

We invite you to visit www.ccithermal.com to view the broad range of innovative industrial heating products manufactured by CCI Thermal Technologies Inc.
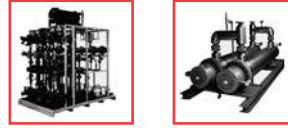
Caloritech™ Catalog: Section A
Elements and Specialty Heaters

Calvane™ heaters, tubular heaters, bolt heaters, tubular band heaters, mitosis heaters, finned tubular heaters, cartridge heaters, strip and finned strip heaters, hot plate/drum heaters, cast-in heaters, transit heaters.

Caloritech™ Catalog: Section D
Engineered Products

circulation heaters, heat transfer systems, custom engineered products, panel heaters, control panels, technical data.

Caloritech™ Catalog: Section B
Immersion Heaters

screwplug heaters, domestic immersion heaters, urn heaters, flange heaters, over-the-side heaters, pipe insert heaters, gate and gain heaters.

Caloritech™ Catalog: Section E
Boilers

hot water boilers, steam boilers, condensate receiver packages, blow off tanks, packaged circulation heaters, calorifiers.
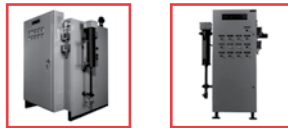
Caloritech™ Catalog: Section C
Air and Space Heaters

infrared radiant heaters, panel heaters, convection heaters, commercial and explosion-proof duct heaters, unit heaters, gate and gain heaters.

Caloritech™ Catalog: Section F
Controls

electronic controls, industrial thermostats, explosion-proof thermostats, thermoswitches, thermocouples and thermowells, *x-Max*® explosion-proof housings.

Cata-Dyne™ Catalog

explosion-proof infrared gas catalytic heaters, high temperature industrial infrared heaters, infrared gas catalytic heating systems, accessories.

Fastrax® Catalog

track and switch heaters, custom designed automated control systems, accessories.

Ruffneck™ Catalog

explosion-proof electric air heaters, heat-exchanger unit heaters, corrosion-resistant washdown unit heaters, convection heaters, thermostats.

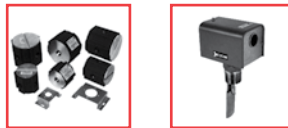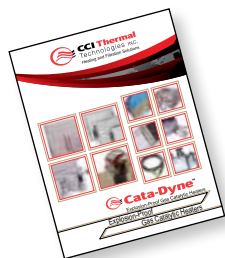## DriQuik™ Catalog

long, medium and short wavelength infrared ovens and emitters, dusters, cooling tunnels, control panels.
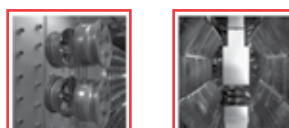
3L Filters™ Catalog

filters, strainers, separators, dehydrators, fuel monitors, clay treaters, head lifts, closures, pressure vessels, engineered products, nuclear, aviation general industrial products.
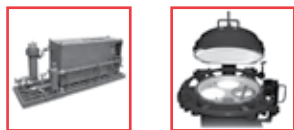
CCI Thermal Technologies Inc.

Putting Safety First

CCI Thermal Technologies Inc. has always been committed to the safety and well being of our customers. We are familiar with the safety regulations of heating products in a wide variety of environments and ensure that our products meet or exceed the requirements for their applications. CCI Thermal Technologies Inc. takes great pride in its lines of certified products.

Visit us at www.ccithermal.com

Our website offers on-line PDF catalogs, product specifications, installation manuals, and technical documentation 24 hours a day. Additionally, you will find easy access to anyone of our factory representatives, regional sales managers or customer service personnel.

Quality

All our business processes are steered by the principles of ISO 9001 and ASME, providing an operational framework that places emphasis on continual improvement and customer satisfaction.

Norseman™ Catalog

natural convection explosion-proof heaters, forced air explosion-proof heaters, thermostats.

Explosion-Proof Housings - XH

Application

Caloritech™ type XH explosion-proof terminal housings (patented) feature the unique *x-Max*® "Track and Trolley" system. Five standard diameters, offered in lengths up to 48" (1220 mm), can cover most of your explosion-proof housing requirements.

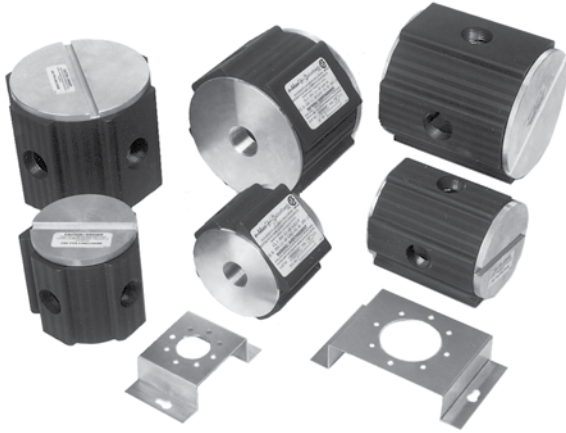No longer is it necessary to remove dozens of bolts to gain access to housing components for installation, adjustment or servicing.

With longer Type XH housings, components are mounted to the trolley. To service, simply unscrew the end cover and slide the trolley out of the housing.

Features

• patented under U.S. Pat. No. 5,798,910 and Canadian patent 2,212,500
• light weight, copper-free aluminum construction throughout
• four conduit openings provided as standard
• suitable for Class I Groups A, B, C, D, Class II Groups E, F, G and Class III hazardous locations, Divisions 1 & 2 Class I, Zone 1 & 2, Groups IIA, IIB & IIC
• equipped with neoprene gaskets for Type 4 moisture resistance
• horizontal or vertical mounting

The Track and Trolley System

Caloritech's **"Track and Trolley"** wiring system allows the user to mount all electrical components to an aluminum **"Trolley"**, make all wiring connections outside of the enclosure, and simply slide the **"Trolley"** along the extruded **"Track"**. Two "Trolley" styles are available as options.

XH

Construction

The *x-Max*® terminal housing features copper-free (less than 0.4 of 1% by weight) aluminum construction throughout. Four conduit openings are provided on standard models, allowing the single Model XH to act not only as a standard X-, T-, C-, or B - style junction box, but as virtually any combination of standard styles.

XH1 Front Side

The standard *x-Max*® housing is available in five cross sectional sizes with approximate inside diameters from 2 3/4" to 5" (70 mm to 127 mm).

The *x-Max*® system is offered in a variety of lengths from 2 1/2" to 48" (64 mm to 1220 mm). Various *x-Max*® products are available that make combining multiple housings an extremely simple process.

XH1 Clear Anodized Finish

Compliances

• NEC/CEC
  • Class I Division 1 & 2 Groups A, B, C, D
  • Class II Division 1 & 2 Groups E, F, G
  • Class III Division 1 & 2
• Class I, Zone 1 & 2, Groups IIA, IIB & IIC
• CSA Standard C22.2 No. 30
• CSA Standard C22.2 No. 25

Caloritech™

Typical Uses

x-Max® As A Terminal Enclosure ...

CX Explosion-Proof Immersion Heater

x-Max® As A Control Station ...

XS Explosion-Proof Control Station

x-Max® As A Junction Box ...
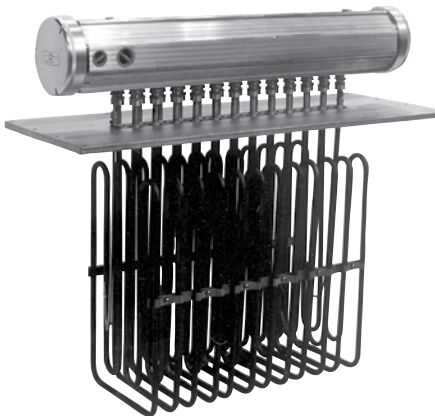
XW Explosion-Proof Duct Heater

x-Max® For Custom Engineered Products ...
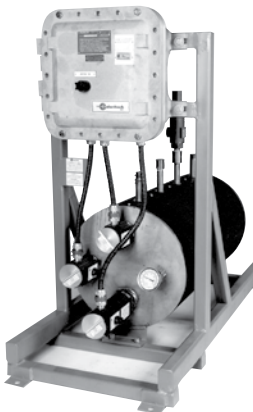
XHWB Explosion-Proof Domestic Water Heater

Installation

A mounting bracket suitable for vertical or horizontal mounting is available. Figure 1 illustrates the universal mounting bracket.
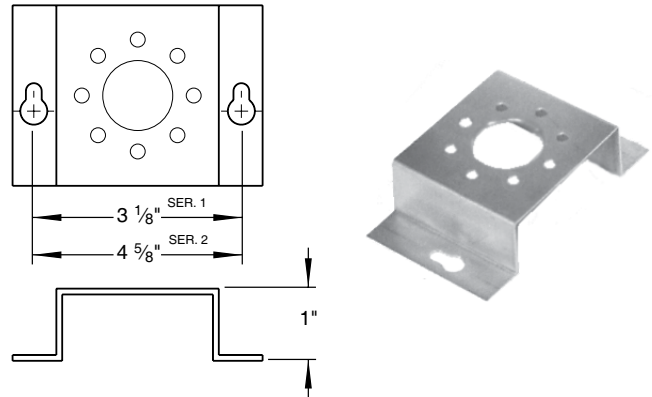
Figure 1 -The *x-Max*® universal mounting bracket

A grounding screw threaded into the inside of the bottom cover is provided.

Options

The construction of type XH housings is such that it can be tailored to suit almost any hazardous area or moisture resistant requirement. Consult factory for special orders.

Some Options Include:
- Choice of cover styles:
  - "Inside" (standard, with external threads)
  - "Outside" (with internal threads)
  - "Bolt-On hazardous"
  - "Bolt-On non-hazardous"
  - "Inside" with glass window

All cover styles can be provided with a neoprene O-ring gasket to effect a watertight seal. "Outside" and "Inside" covers are knurled for ease of hand-tightening.

Standard housings (Table 1) have "Inside" covers with a conduit entry provided through the bottom cover. Combinations of different cover styles on a single box are available.

- Choice of finish options:
  - black enamel finish
  - non-anodized natural finish
  - clear anodized finish (standard)
  - black anodized finish

Covers are provided with a non-anodized natural aluminum finish as standard.

Table 1 lists the most popular *x-Max*® housings normally held in stock. CCI Thermal can manufacture box lengths up to 48" (1220 mm).

Optional mounting bracket is shown on page F7. For special orders, consult factory.
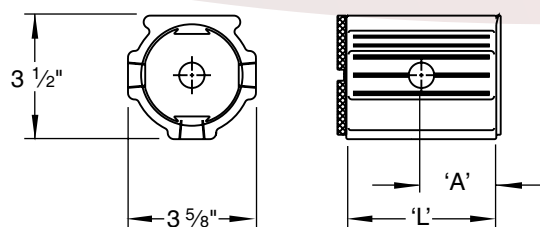
Figure 2 - **XH** Series 1 enclosures
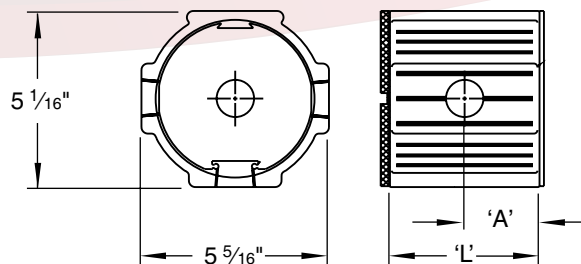
Figure 3 - **XH** Series 2 enclosures

TABLE 1 - Standard Type XH Terminal Enclosures

| Box Length 'L' | | Figure No. | Hole Sizes (NPT) | Hole Location 'A' | | Internal Volume | | Catalog Number | Weight | |
in	mm			in	mm	in³	cm³		lbs	kg
2.50	64	2	1/2"	1.250	32	5.3	87	XH1B1	1.7	0.8
3.25	83	2	3/4"	1.625	41	9.5	155	XH1B2	2.0	0.9
4.00	102	2	3/4"	2.000	51	13.5	222	XH1B3	2.3	1.1
3.50	89	3	1"	1.750	44	27.8	455	XH2B1	3.0	1.4
4.25	108	3	1"	2.125	54	38.4	630	XH2B2	3.5	1.6
5.0	127	3	1"	2.500	64	49.1	805	XH2B3	4.0	1.8

Special Accessories

Special *x-Max*® accessories are available if required for a specific application. These items include:

- mounting bracket (see page F7)
- dry-seal plugs
- lengths of "Trolley" used for installing components
- housing to housing couplings (consult factory)
- sight glasses

Consult Table 2 and Table 3 for catalog numbers.

Small Trolley

Large Trolley

TABLE 2 - *x-Max*® Trolley Sections

| Description | Length | | Catalog Number |
	in	mm	
Small Trolley (for Ser. 1 or Ser. 2)	6	152	XHT1152
	12	305	XHT1305
	18	457	XHT1457
	24	610	XHT1610
	30	762	XHT1762
	36	914	XHT1914
Large Trolley (Ser. 2 only)	6	152	XHT2152
	12	305	XHT2305
	18	457	XHT2457
	24	610	XHT2610
	30	762	XHT2762
	36	914	XHT2914
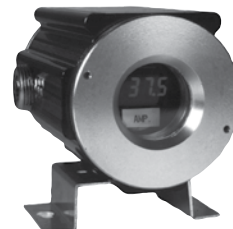
Dry Seal Plugs

Sight Glass

TABLE 3 - *x-Max*® Dry-Seal Plugs

Thread Size	Catalog Number
3/8" NPT	XHP037
1/2" NPT	XHP050
3/4" NPT	XHP075
1" NPT	XHP100
1 1/4" NPT	XHP125
1 1/2" NPT	XHP150

To Order Specify

Quantity, catalog number and special accessories.

XH

Application

Type AR thermostats are used in industrial applications where close control of process temperatures is not a requirement.

Features

All bulb and capillaries of AR thermostats are copper with nickel plating with the exception of the high temperature AR3769 and AR376893. These units have stainless bulb and capillaries. For corrosive applications a protective well or sleeving must be used. DPST controls with 3/8" (9.5 mm) diameter bulbs include a 3/8" NPT compression fitting, non-removable. For other controls without the built-in fitting, the CA1001 is available for field mounting if required (See Figure 2, pg. F10).

Type AR Thermostats

Temp. Range °F	°C	Bulb Size (in)	Superceded Cat. No.	Catalog Number
277VAC 25 Amp D.P.S.T. - Open on Rise				
0 - 100	-18 - 40	3/8 x 5 5/8	TCR220-22	AR0464
50 - 250	10 - 120	3/8 x 3 3/8	TCR220-25	AR1264
50 - 250	10 - 120	3/16 x 10 1/4	—	AR1269
150 - 550	70 - 280	3/8 x 3 3/8	TCR220-28	AR2864
150 - 550	70 - 280	3/16 x 11 1/4	—	AR2869
300 - 700	160 - 370	3/16 x 8 3/4	TCR220-29	AR3769
600VAC 15 Amp T.P.S.T - Open on Rise				
0 - 100	-18 - 40	3/8 x 5 1/4	TCR630-22	AR046843
50 - 250	10 - 120	3/16 x 10 1/4	TCR630-25	AR126893
150 - 550	70 - 280	3/16 x 11 1/4	TCR630-28	AR286893
300 - 700	160 - 370	3/16 x 8 3/4	TCR630-29	AR376893
277VAC 25 Amp D.P.S.T. - Close on Rise				
0 - 100	-18 - 40	3/8 x 6	—	ARR0464
50 - 250	10 - 120	3/8 x 3 1/4	TCR221-25	ARR1264

NOTE:
1. T.P.S.T. switches have two poles that open thermostatically and one pole that is mechanically opened in the off position only.
2. Inverse acting D.P.S.T. switches have only one thermostatic pole but both poles are mechanically opened in the off position.

AR

Neon Pilot Light - Type TCR-PL (Figure 1)

Pilot lights are shipped separately for field mounting and wiring. Standard lights are suitable for 120 to 240 VAC. For pilot lights on higher voltages, check factory.

Stuffing Box Type CA (Figure 2) Type CA1001 is used to make a leak-proof joint where the capillary tubing goes through the wall of the tank or to secure the sensing bulb in a thermostat well.
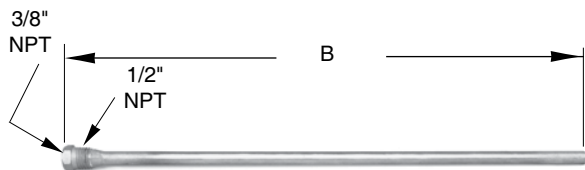
Figure 1 - TCR-PL   Figure 2 - CA1001

Protective Wells

Protective wells are available as standard as a welded incoloy® tube style with stainless bushing. These wells are suitable for normal processes. For corrosive applications, special bar stock wells may be required. Check factory.

3/8" NPT

1/2" NPT

B

Protective Wells

Length 'B' Dim	Inside Thread	Mounting Thread	Catalog Number
12"			CWI12
24"	3/8" NPT	1/2" NPT	CWI24
36"			CWI36

Sleeving

Sleeving can be supplied to cover the bulb and capillary of an AR thermostat as protection against corrosion. All sleevings shown below are 84 inches long.

Sleeving

Bulb Style	Supplied	Mat'l	Max. Temp.	Catalog No.
4 (3/8" Dia.)	Loose	PVC	203°F (95°C)	15902 001
4 (3/8" Dia.)	Installed	PVC	203°F (95°C)	15902 002
9 (3/16" Dia.)	Loose	PVC	203°F (95°C)	15902 003
9 (3/16' Dia.)	Installed	PVC	203°F (95°C)	15902 004
4 (3/8' Dia.)	Loose	Teflon®	392°F (200°C)	15902 005
4 (3/8' Dia.)	Loose	Teflon®	392°F (200°C)	15902 006

Series 30000 Surface Mounting Thermoswitch® Temperature Controllers

Fenwal Series 30000 Surface Mounting Thermoswitch® Controllers operate on the principle of the differential expansion of metals. Because the case is one of the expanding metals and it is in direct contact with the heated surface, a temperature change is sensed almost instantaneously. Contacts open on temperature rise.

Series 30000

Approx. Temp. Range and Factory Setting Tolerance	Current Rating*	Catalog Number
500 to 300°F ± 5°F 3% of setting value	10 Amps 120VAC	11 030000 000
85 to 250°F ± 5°F 3% of setting value	5 Amps 240VAC	11 030000 048
50 to 600°F ± 10°F or 3% of setting value	Resistive	11 030002 000

Note:
* Normally closed contact opens on temperature rise

Modifications

MOD 51 - Adjusting screw lengths
- Available - 1 3/64" (27 mm), 1 1/4"(32 mm), 1 3/4" (44 mm), 1 7/8" (48 mm), 2 3/8" (60 mm), 2 11/16" (68 mm).

MOD 52 - Temperature setting
- Factory setting of temperature. Locking screw included.

MOD 55A - Locking screw and torque spring
- For field calibration.

To Order Specify

Quantity, catalog number and any optional features.

Thermostat Accessories

Explosion-Proof Thermostat - XT

Application

The Model XT explosion-proof thermostat utilizes the unique *x-Max*® system (U.S. Pat. No. 5,798,910, CDN Pat. No. 2,212,500) to provide maximum durability, safety and ease of use. Three basic units are available to suit most hazardous location temperature control applications.

XT thermostats are suitable for air, duct, pipe or tank temperature control.

Features

- approvals for all area classifications
- value engineered
- remote or local temperature sensing
- ratings to 600V, S.P.S.T. and D.P.S.T.
- multiple conduit entries
- externally adjustable with tamper-proof feature
- O-rings for moisture protection

Type XTB

The model XTB unit is normally used for remote sensing. ACSA certified packing gland is provided to allow the 57" capillary to exit the *x-Max*® housing.


Model XTB Externally Adjustable Mode Shown

All XTB models are certified for Class I Groups C & D, Class II Groups E, F & G, and Class III hazardous locations, Divisions 1 and 2.

Type XTW

The model XTW unit is suitable for air or liquid temperature sensing and control in all hazardous locations. For air sensing applications, a finned stainless steel thermostat well assembly is provided to enclose the thermostat bulb. For liquid sensing applications, the model XTWL has an external 1/2" NPT thread on the well assembly to permit easy installation into the tank wall.

All XTW models are certified for Class I Groups A, B,C & D, Class II Groups E, F & G and Class III hazardous locations, Divisions 1 and 2.
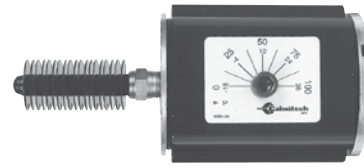
Model XTW Tamper-Proof Adjustable Mode Shown

To set the temperature in tamper-proof adjustable mode, disconnect the power to the unit, remove the socket-head cap screw and use a slot-type screwdriver to adjust.

Type XTK

The type XTK is a thermostat kit suitable for field installation into other Caloritech™ products, such as the CX explosion-proof screwplug heater. This allows these products to be stocked without thermostat and have a kit supplied when required.

The model XTK is available either with a thermostat well assembly or with a packing gland and 60" capillary for remote bulb sensing.

Type XTK
x-Max® Kit

Construction

Housings and covers are made from copper-free extruded aluminum. Consult page F12 for unit dimensions. Standard models XTW and XTB have an attractive black finish. Enclosures are provided with 3/4" NPT conduit entries on two sides. All units are shipped with a universal bracket suitable for horizontal or vertical mounting.
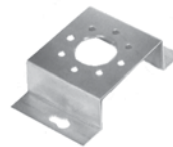
Universal Mounting Bracket (See Page F7 for Dimensions)
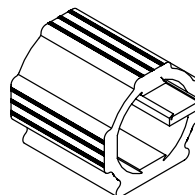
All XT explosion-proof thermostats use the unique **'Track and Trolley'** wiring system for ease of connection. Models XTW and XTB are provided with a #14 GA wire lead for grounding purposes.

XT

Selection

Refer to Table 1 to select the XT model best suited to your application. Note that all XT's are field convertible in minutes from externally adjustable to internally adjustable 'tamper-proof'. Just turn off the power and then simply open the cover, press down on the spring-loaded thermostat and unscrew the knob and shaft assembly. Replace this assembly with the socket-head cap screw provided as standard. When the cap screw is removed, the temperature can be adjusted using a slot-type screwdriver without having to remove the cover.

All thermostats feature a convenient terminal block mounted to a slide-out trolley. This unique feature simplifies wiring.

Type	L
SPST	6 1/2" (165 mm)
DPST	7 1/4" (185 mm)

TABLE 1 - Model XT Explosion Resistant Thermostats

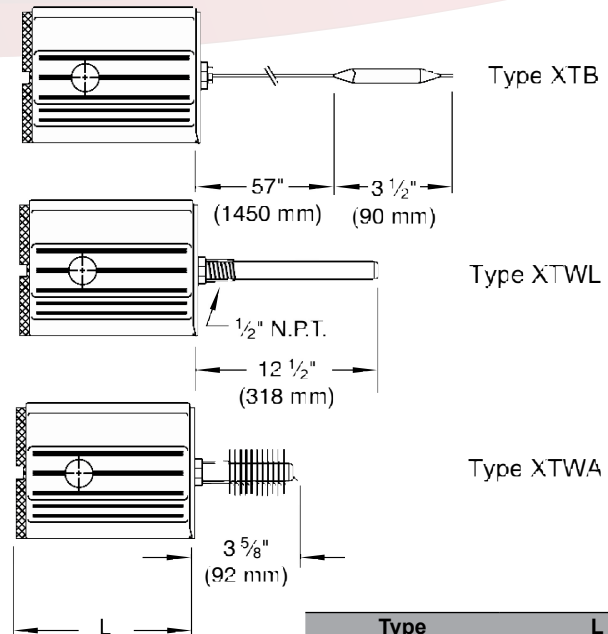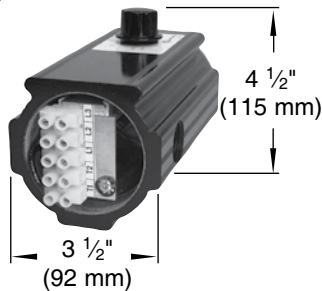| Description	Temperature	Cl. 1 Gp. A,B,C,D Cl.2 Gp. EFG Cl.3	Cl.1 Gp C,D Cl.2 Gp E,F,G Cl.3	SPST - 15A/600V 1Ø 25A/277V	DPST - 15A/600V 3Ø	Approx. Weight kg (lbs)
Remote Sensing Bulb, with 57" (1,448 mm) capillary length	0 to 100°F (-18 to 40°C)	—	✓	XTB04481	XTB04483	1.7 (3.8)
	50 to 250°F (10 to 120°C)	—	✓	XTB12481	XTB12483	1.7 (3.8)
Bulb with Well with 1/2" NPT Fitting for Liquid Sensing	0 to 100°F (-18 to 40°C)	✓	✓	XTWL04481	XTWL04483	1.8 (4.0)
	50 to 250°F (10 to 120°C)	✓	✓	XTWL12481	XTWL12483	1.8 (4.0)
Bulb in Finned Well for Air Sensing	0 to 100°F (-18 to 40°C)	✓	✓	XTWA04481	XTWA04483	1.8 (4.0)
	50 to 250°F (10 to 120°C)	✓	✓	XTWA12481	XTWA12483	1.8 (4.0)
For XB heaters, use as an add-on Kit, Well Assembly provided	0 to 100°F (-18 to 40°C)	✓	✓	XTKW04481	XTKW04483	0.3 (0.7)
	50 to 250°F (10 to 120°C)	✓	✓	XTKW12481	XTKW12483	0.3 (0.7)
For CX and XGB heaters, use as an add-on Kit, with 8" (203 mm) capillary	0 to 100°F (-18 to 40°C)	—	✓	XTKB04481	XTKB04483	0.2 (0.5)
	50 to 250°F (10 to 120°C)	—	✓	XTKB12481	XTKB12483	0.2 (0.5)

Options

- 150°F to 550°F (70°C to 280°C) and 300°F to 700°F (160°C to 370°C) temperature ranges
- other cover styles
- series 2 housing construction (4 3/8" - 111mm - I.D.)
- various housing lengths up to 48" (1220 mm) with contactor and transformer
- multiple thermostats in one housing
- custom conduit entry size and location
- other finish options
- capillary protected with flexible armoured cable
- nickel plated or S.S. bulb and capillary

To Order Specify

Quantity, catalog number, area classification and special features (consult factory).
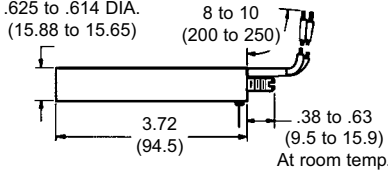
XT
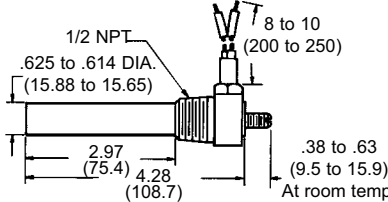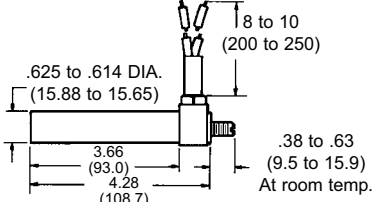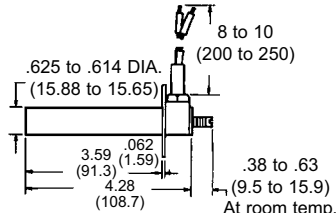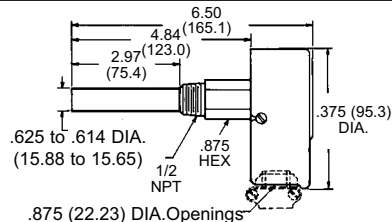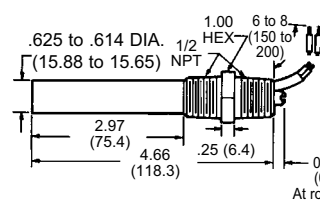
Fenwal Thermoswitch® Temperature Controls

The outer shell is an active sensing member, not merely a housing, resulting in a very fast response time. The shell and strut arrangement has anticipation characteristics substantially reducing overshoot. It is a slow make and break device with a resolution sensitivity of 32°F (0.05°C).

To Order Specify

Quantity, catalog number, and any special features (see pg. F14).

10 AMP 120V & 5 AMP 240V
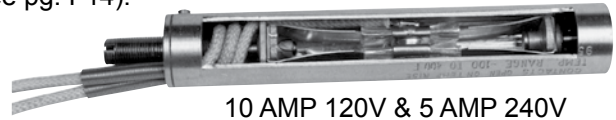
THERMOSWITCH TYPE	DIMENSIONS IN INCHES (MILLIMETRES)	TEMP. RANGE	CONTACT ACTION ON TEMP. RISE	SHELL AND HEAD MAT'L	CATALOG NUMBER
CARTRIDGE (Series 17000)	.625 to .614 DIA. (15.88 to 15.65) 8 to 10 (200 to 250) 3.72 (94.5) .38 to .63 (9.5 to 15.9) At room temp.	-73 to 204°C	OPENS	Brass	01 017000 000
		-100 to 400°F /	CLOSES		01 017021 000
		-73 to 316°C	OPENS	Type 300 Series S.S. Shell	01 017002 000
		-100 to 600°F /	CLOSES		01 017023 000
HEX HEAD (Series 17100)	1/2 NPT .625 to .614 DIA. (15.88 to 15.65) 8 to 10 (200 to 250) 2.97 (75.4) 4.28 (108.7) .38 to .63 (9.5 to 15.9) At room temp.	-73 to 204°C	OPENS	Brass	01 017100 000
		-100 to 400°F /	CLOSES		01 017121 000
		-73 to 316°C	OPENS	Type 300 Series S.S. Shell Brass Head	01 017102 000
		-100 to 600°F /	CLOSES		01 017123 000
BLOCK HEAD (Series 17200)	.625 to .614 DIA. (15.88 to 15.65) 8 to 10 (200 to 250) 3.66 (93.0) 4.28 (108.7) .38 to .63 (9.5 to 15.9) At room temp.	-73 to 204°C	OPENS	Brass	01 017200 000
		-100 to 400°F /	CLOSES		01 017221 000
		-73 to 316°C	OPENS	Type 300 Series S.S. Shell Brass Head	01 017202 000
		-100 to 600°F /	CLOSES		01 017223 000
FLANGE HEAD (Series 17300)	.625 to .614 DIA. (15.88 to 15.65) 8 to 10 (200 to 250) .062 (1.59) 3.59 (91.3) 4.28 (108.7) .38 to .63 (9.5 to 15.9) At room temp.	-73 to 204°C	OPENS	Brass	01 017300 000
		-100 to 400°F /	CLOSES		01 017321 000
		-73 to 316°C	OPENS	Type 300 Series S.S. Shell Brass Head	01 017302 000
		-100 to 600°F /	CLOSES		01 017323 000
JUNCTION BOX IMMERSION (Series 17800)	6.50 (165.1) 4.84 (123.0) 2.97 (75.4) .375 (95.3) DIA. .625 to .614 DIA. (15.88 to 15.65) .875 HEX 1/2 NPT .875 (22.23) DIA. Openings	-73 to 204°C	OPENS	Brass	01 017800 000
		-100 to 400°F /	CLOSES		01 017821 000
		-73 to 316°C	OPENS	Type 300 Series S.S. Shell Brass Head	01 017802 000
		-100 to 600°F /	CLOSES		01 017823 000
COUPLING HEAD (Series 18000)	.625 to .614 DIA. (15.88 to 15.65) 1.00 HEX 6 to 8 (150 to 200) 1/2 NPT 2.97 (75.4) 4.66 (118.3) .25 (6.4) 0 to .25 (0 to 6) At room temp.	-73 to 204°C	OPENS	Brass	01 018000 000
		-100 to 400°F /	CLOSES		01 018021 000
		-73 to 316°C	OPENS	Type 300 Series S.S. Shell Brass Head	01 018002 000
		-100 to 600°F /	CLOSES		01 018023 000

Temperature Controls

Thermoswitch® Modifications

Most modifications can be made to stock units on a short delivery basis. Modifications may be required to match replacement OEM equipment or to provide extra functionality for a new application. For complete information, check factory or request Fenwal brochure 1.10.

MOD 1
Special Marking

MOD 2
Extended Lead Wires

MOD 3
Factory Temperature Setting

MOD 4
Temperature Locking Device

MOD 5
Tamper-Proof Cap Over Adjusting Sleeve
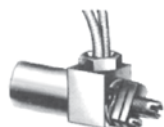
MOD 6A
Large Dial & Knob (Specify Mid-Point Temperature)
MOD 6B
Small Dial & Knob (Specify Mid-Point Temperature)

MOD 8A
Moisture Resistant Seal On Adjusting Sleeve
MOD 8B
4 Hole Moisture Resistant Seal On Adjusting Sleeve used with Mod 6

MOD 10
Moisture Resistant Tamper-Proof Cap

MOD 11
Armoured Cable Over Lead Wires

MOD 13
Packing Gland On Lead Wires

MOD 14
Extended Adjusting Sleeve

Note:
For volume OEM applications, special features including longer length shells and plating of brass parts are available. Check factory.

Thermostat Wells

In certain applications, draining the system to replace a thermoswitch is impractical. A permanently mounted well overcomes this obstacle. Wells may also be required in high pressure or corrosive applications. Although the Fenwal wells are accurately machined to reduce thermal lag, best control is still achieved by direct insertion.

To Order Specify

Quantity, catalog number, and any special features.

Figure 1

3/4" NPT

1.125" HEX

.662" to .654" (16.8 to 16.6)

4.88" (123.8)

Figure 2

3/4" NPT

1.125" HEX

.662" to .654" (16.8 to 16.6)

5.44" (138.2)

Figure 3

3.94" (100.1)

1.13" (28.7)

1.63" (41.1)

3.0" (76.2)
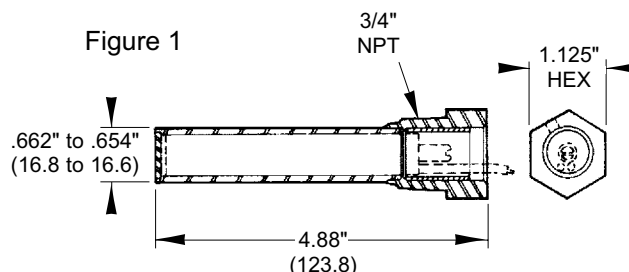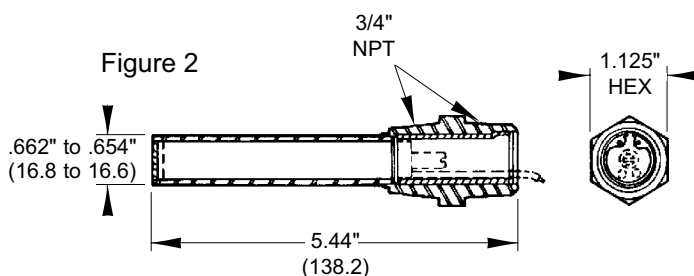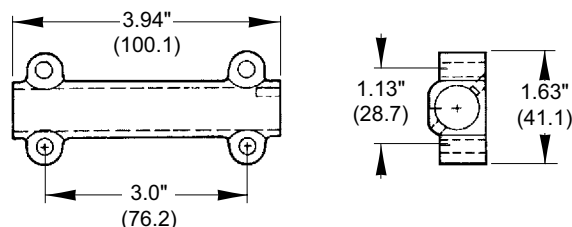
Thermostat Wells

Description	Material	Catalog No.
Figure 1 Hex Head Well	321 S.S. Well & Head 100 PSI @ 250°F (121°C) 60 PSI @ 600°F (316°C)	34 011201 000
Figure 2 Coupling Head Well	321 S.S. Well & Head 100 PSI @ 250°F (121°C) 60 PSI @ 600°F (316°C)	34 011204 000
Figure 3 Surface Mounting Well	Aluminum	34 011100 002

Modifications & Thermostat Wells

Series 20000 - Snap Acting Thermoswitch

Control action is provided by an expandable liquid acting in a bellows assembly. Bellows motion created by volume changes of the liquid activates a snap acting switch through a push rod. Snap switches have both normally open and normally closed contacts with a 15 AMP resistive 120 / 240VAC rating. Control differential is approximately 3.5% of span.

Figure 1 - Model 23-0201XX-000

Figure 2 - Model 23-0203XX-000

Figure 3 - Model 23-0208XX-000

Figure 4 - Model 23-0210XX-000*

Figure 5 - Model 23-0211XX-000*

Note:
*Shown with optional dial and knob (MOD30)

To Order Specify

Quantity, catalog number and any special features.

Snap Acting Thermoswitch

Temp. Range	Fig.	Rating	Catalog No.
100°F to 300°F (38°C to 65°C)	1	15 Amp, 120-250VAC	23 020100 000
	2		23 020300 000
	3		23 020800 000
25°F to 225°F (-4°C to 107°C)	1	15 Amp, 120-250VAC	23 020110 000
	2		23 020310 000
	3		23 020810 000
50°F to 300°F (10°C to 149°C)	4	15 Amp, 120-250VAC	23 021000 000
	5		23 021100 000
0°F to 250°F (-18°C to 121°C)	4	15 Amp, 120-250VAC	23 021010 000
	5		23 021110 000

Precision Snap-Disc Thermostats

High quality snap-disc thermostats are custom made in quantities of 200 pieces and up, primarily for original equipment manufacturers. Typically, snap-discs are used as high limits. Contact factory for design assistance.

08-0X   08-8X
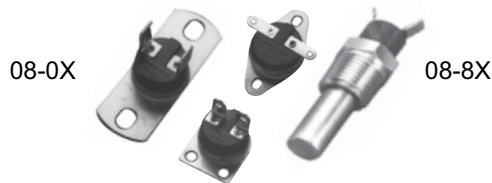
Snap-Disc Thermostats

Dimensions in (mm)		Rating	Set-Point - °F (°C)	Catalog Number
Dia.	Height			
08-0X Surface Mount Snap Disc				
0.640" (16.3 mm)	0.250" (6.4 mm)	7A 240VAC	10°F to 350°F (-12°C to 177°C)	08-01
0.640" (16.3 mm)	0.350" (8.9 mm)	12A 240V		08-02
0.667" (16.9 mm)	0.350" (8.9 mm)	5A 240V	10°F to 550°F (-12°C to 288°C)	08-03
08-8X Probe Style Snap Disc				
0.545" (13.8 mm)	9/16" (14.3 mm) or 1" (25.4 mm) Probe Length Standard	3A 240V	10°F - 550°F (-12°C to 288°C)	08-80
0.545" (13.8 mm)	9/16" (14.3 mm) or 1" (25.4 mm) Probe Length Standard	5A 240V	10°F to 350°F- (12°C to 177°C)	08-81

Note:
08-8X also available in coupling head styles

Control Panel Thermostat

40mm

40mm   40mm

Figure 1   Figure 2
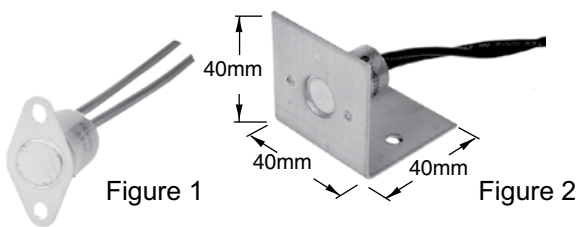
These Fenwal snap-discs have been designed to control low wattage SS or SD type Caloritech™ strip heaters which are commonly used to heat control panels to prevent buildup of damaging internal moisture in low temperatures.

Panel Thermostat

Description	Fig.	Contact Rating	Operating Temp.	Catalog No.
Less Bracket	1	12 AMP	Open 55°F (13°C)	15897 001
c/w Bracket	2	120/240VAC	Close 36°F (2°C) (fixed)	15897 002

Detect-a-Fire® Units

These highly reliable detection and release devices have been a standard of the industry for over 45 years; controlling the release of fire suppression agents such as CO_2, water, or dry chemicals. In some systems the device is used as an alarm to sense overheat or fire and alert personnel. In other systems, it is used to sense fire and actuate fire attack systems. Detect-a-Fire® units are designed with rate compensation. Only the Detect-a-Fire® unit accurately senses the surrounding air temperature as well as fire growth rate. At precisely the predetermined danger point, the system is activated.

Figure 3   Figure 4

Figure 5   Figure 6

Fenwal Detect-a-Fire®

Contact Action on Rise	Fig. No.	Description	Catalog Number
Open	4	Horizontal Flush	12 027020 000
Open	3	Horizontal Surface	12 027020 001
Close	4	Horizontal Flush	12 027021 000
Close	3	Horizontal Surface	12 027021 001
Open	5	Vertical Hex	12 027120 000
Close	5	Vertical Hex	12 027121 000
Open	6	Vertical Coupling	12 028020 003
Close	6	Vertical Coupling	12 028021 000

Note:
5.0 Amps, 125VAC
0.5 Amps, 125VDC

Horizontal detectors (Figures 3 & 4) are designed for locations where appearance is a factor. Horizontal detectors are suitable for non-hazardous locations. Flush mounted units (Figure 3) are designed to mount onto standard 4" (102 mm) octagonal electrical boxes. Vertical detectors (Figures 5 & 6) can be operated in hazardous locations provided they are terminated in an approved fitting. Models are available for all hazardous locations.

To Order Specify

Quantity, catalog number and temperature setting.

Snap-Disc Thermostats & Detect-a-Fire® Units

Series XTF - Thermoswitch® Controllers For Hazardous Locations

The XTF Thermoswitch® is an assembly consisting of a Thermoswitch Unit, well assembly, and explosion-proof junction box designed to meet the UL & CSA requirements of Class I, Groups A, B, C & D, and Class II, Group E, F &G, Division 1 & 2 locations. The sensing element, which is a cartridge-type Thermoswitch Unit, is seated in the well assembly and held in place by a snap ring. The well assembly, in turn, is threaded in to the explosion-proof junction box, giving protection to the controller.
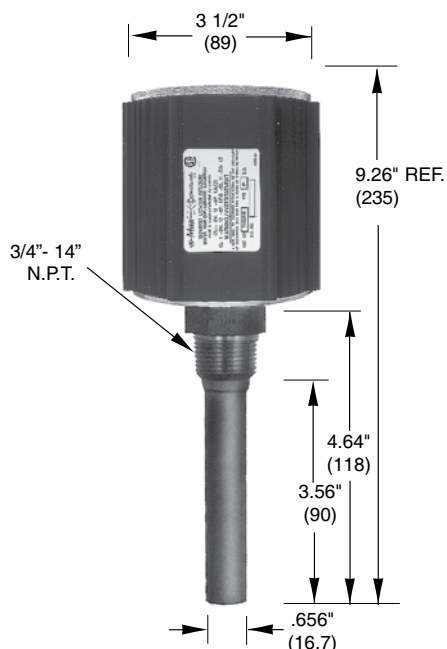
Fenwal Series 17000

Electrical Rating: 10 Amps @ 120VAC
5 Amps @ 240VAC Resistive
Pressure Rating: 100 PSIG @ 250°F (121°C)
60 PSIG @ 500°F (260°C)

Series XTF

Temp. Range	Contact Action on Temperature Rise	Catalog Number
-100°F to 400°F (-73°C to 204°C)	Opens	XTF17000
-100°F to 400°F (-73°C to 204°C)	Closes	XTF17021

Note:
Above units can be factory preset and/or locked to any temperature within the range. Check factory for details.

Percentage Timers

Application
Type OKT percentage timers (input controllers) are used mainly for pulsing power to metal tubular element radiant heaters. Where load voltage and current ratings exceed the timer contact rating, the timer can be used to switch contactors. Percentage timers cannot be effectively used on quartz lamp radiant heaters.

Figure 1 - Percentage Timer
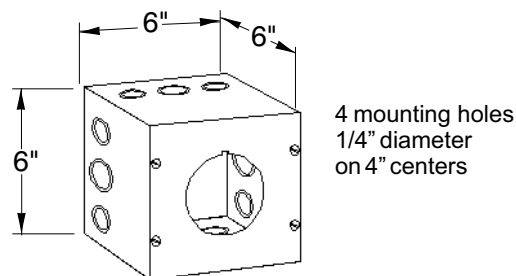
Figure 2 - Surface Mounting Enclosure

Operation
The OKT features a synchronous motor driven cam which closes a snap action switch for a percentage of 30 second "on" time. The adjustment knob sets the pointer to an "on" time of 0 to 100%. A timer set to 50% (mid scale) would allow full voltage to the heater(s) for 15 seconds and no voltage for 15 seconds thus reducing the average heat output. Standard features include a plug-in style mounting, an electrically isolated pilot light and a cycle progress pointer.

To Order Specify
Quantity, catalog number and temperature setting.

Percentage Timer

Fig.	Description	Catalog Number
1	30 second cycle percentage timer 10 Amps 120/240VAC S.P.S.T	OKT3010M
2	Type 1 surface mounting enclosure 6" x 6" x 6"	OKE666

Specific Purpose Thermostats

Some of the more popular thermostats available from CCI Thermal are shown below.

Room thermostats are normally wall mounted to sense room ambient temperature. Various models are available: some can switch line voltage resistive loads up 600VAC, some are designed for 24VAC low voltage systems and others have 0-135 Ω proportional outputs for step controls and SCR's.

Remote bulb controls normally mount on ducts, tanks, boilers, ovens, etc. and are also available in models for line voltage or pilot duty switching and with proportional outputs.

To Order Specify

Quantity, catalog number and any special features.

| Figure 1 | Figure 2 | Figure 3 | Figure 4 | Figure 5 | Figure 6 |

Room Thermostats

Fig. No.	Temp. Range °F (°C)	Contact Rating	Features	Catalog No.
1	40 to 80 (5 to 25)	21A 240VAC S.P.S.T.	- Standard leads - Snap action switch - Heat anticipator	T498A1786
1	40 to 80 (5 to 25)	21A 240VAC D.P.S.T	- Standard leads - Snap action switch - Heat anticipator	T498B1652
2	55 to 85 (13 to 30)	21A 240VAC S.P.S.T.	-Locking screw -Thermometer - Heavy duty	176-6
3	55 to 90 (13 to 32)	25A 277VAC 15A 600VAC D.P.S.T.	- Breaks 1 pole thermostatically - Breaks 1 pole mechanically - Heavy duty	TC620
3	55 to 90 (13 to 32)	15A 600VAC T.P.S.T.	- Breaks 2 poles thermostatically - Breaks 1 pole mechanically - Heavy duty	TC630
4	50 to 86 (10 to 30)	0 - 135 Ohms	- Proportional for step control or SCR	T921A1522

Electronic Remote Bulb Thermostat

Fig. No.	Temp. Range °F (°C)	Contact Rating	Features	Catalog No.
5	-20 to 240 (-29 to 116)	10A 120V 5A 240V	- Electronic 4 stage c/w sensor	T775A1035

Two Stage Thermostat

Fig. No.	Temp. Range °F (°C)	Contact Rating	Capillary Length in (mm)	Catalog No.
6	5 to 95 (-15 to 35)	200VA 240VAC Pilot Duty	236 (6000)	T678A1163
6	59 to 167 (15 to 75)		236 (6000)	T678A1403
6	167 to 257 (75 to 125)		59 (1500)	T678A1239

Proportional Thermostat

Fig. No.	Set Point °F (°C)	Throttling Range °F (°C)	Capillary Length in (mm)	Catalog No.
Copper Capillary And Bulb [1/2" Dia. x 4 13/16" (13 mm x 21 mm)]				
6	0 to 100 (-18 to 38)	3 to 30 (1.7 to 16.7)	236 (6000)	T991A1012
6	-29 to 70 (-34 to 21)	3 to 30 (1.7 to 16.7)	59 (1500)	T991A2044
6	55 to 174 (13 to 79)	3.5 to 36 (1.9 to 20)	236 (6000)	T991A1194
6	160 to 261 (71 to 127)	3 to 30 (1.9 to 20)	59 (1500)	T991A1061
6	160 to 261 (71 to 127)	3 to 30 (1.7 to 16.7)	236 (6000)	T991A10479
6	55 to 174 (13 to 79)	3 to 30 (1.9 to 20)	59 (1500)	T991A1186

Specific Purpose Thermostats

Electronic Indicating Controls

Series UT Yokogawa electronic controls are available in 1/4 and 1/8 DIN sizes. Red LED displays show both process and set point.

The UT can accept inputs from all thermocouples, RTDs, mV and mA. Outputs can be relay, pulse DC for solid state relays and 4 - 20 mA for step controls and SCRs. Most controls are field configurable to any input and output.

UT320 Series
Electronic
Indicating
control

3.78"

1.89"   3.94"
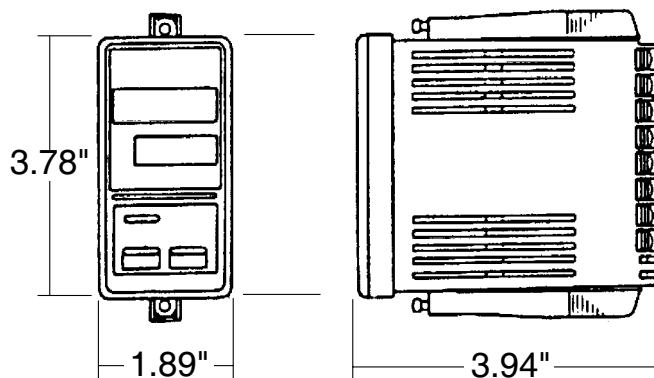
UT320 Specification Table

PV/SP Data Display	4 digits / 4 digits
PV Input	1 universal input (TCs, RTDs, mV, V)
Indication Accuracy	0.1%± digit
Auxilary Analog Input	Not Available
Control Scan Period	250ms
Control Loops	1
Control Modes	MAN/AUTO
Number of Setpoint (SP)	4
Control Algorithm	ON/OFF, PID (continuous, time-proportional), heating & cooling
SUPER, Auto Tuning	SUPER, SUPER2, AT
Control Outputs (MV)	Select from Relay, Voltage Pulse or 4-20 mA
Auxilary Analog Output(*) (4-20mA)	1 point except for Heating/Cooling control (cannot use LPS15V)
Loop Power Supply (LPS)	2 points, 15V and 24V(optional)
Digital Inputs	2
Digital Outputs	3
RS485 Communication Protocols	Four-wire, MODBUS, PC-link, Ladder or Coordinated Operation
Approvals	UL, CE, CSA. Front Protection IP55
Other Specifications	1.9"(W) x 3.8"(H) x 3.9"(D) [48 mm(W) x 95 mm(H) x 100 mm(D)]
	90 to 264VAC power supply
	max. 20VA power consumption
Ambient T, Limits RH	32°F to 122°F (0°C to 50°C), 20-90%RH

UT320 Model and Suffix Codes

Model	Suffix Code		Description
UT320			Digital indicating controller
Type	-0		Standard type
	-2		Heating/cooling type
	-3		Standard type with 24V DC loop power supply
Options		0	None
		1	Communications functions, heater burnout alarm (2 points)*
		2	Heater burnout alarm (2 points)

Note:
*Sensor for heater burnout alarm sold separately.

UT350/UT450 Series Electronic Indicating Control
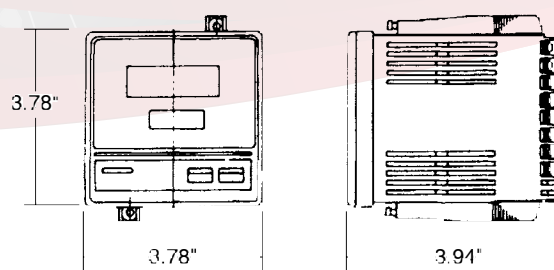
UT350/UT450 Specification Table

	UT350	UT450
PV/SP Data Display	4 digits / digits	5 digits / 5 digits
PV Input	1 universal input (TCs, RTDs, mV, V)	
Indication Accuracy	0.1%+1 digit	
Auxilary Analog Input	Not Available	1 for remote SP
Control Scan Period	250ms	200ms
Control Loops	1	1
Control Modes	MAN/AUTO	MAN/AUTO/CAS,, RUN/STOP
Number of Setpoint(SP)	4	8
Control Algorithm	ON/OFF, time-proportional PID, continuous PID, heating & cooling	ON/OFF, 3 position, time-proportional PID, continuous PID, heating & cooling
SUPER, Auto Tuning	SUPER, SUPER2, AT	
Control Outputs(MV)	Select from Relay, Voltage Pulse or 4-20 mA	
Auxilary Analog Output(*)(4-20mA)	1 point except for Heating/Cooling control (cannot use with LPS15V)	1 point (cannot use with LPS15V) 2 points when MV is relay output
Loop Power Supply (LPS)	2 points, 15V and 24V (optional)	
Digital Inputs	2	2,3,6 or 7
Digital Outputs	3	3 or 4
RS485 Communication Protocols	Four-wire, MODBUS, PC-link, Ladder or Coordinated Operation	
Approvals	UL, CE, CSA. Front Protection IP55	
Other Specifications	96(W) x 96(H) x 100(D) mm, 90 to 264VAC power supply max. 20VA power consumption	
Ambient T, Limits RH	32°F to 122°F (0°C to 50°C), 20-90%RH	

UT350 Model and Suffix Codes

Model	Suffix Code		Description
UT350			Digital indicating controller
Type	-0		Standard type
	-2		Heating/cooling type
	-3		Std type with 24V DC loop
Options		0	None
		1	Communication functions heater burnout alarm (2 pts)*
		2	heater burnout alarm (2 pts)

Note:
*Sensor for heater burnout alarm sold separately.

To Order Specify

Quantity and catalog number.

UT450 Model and Suffix Codes

Model	Suffix Code		Description
UT450			Digital indicating controller
Type	-0		Standard type
	-1		Position-proportional type
	-2		Heating/cooling type
	-3		Std type with 24V DC loop
	-4		Position-proportional type with 24V DC loop power supply
Options		0	None
		1	Comm. Functions, remote input, 5 add. DIs, 1 add. Alarm
		2	Comm. Functions, remote input, 1 add. DI
		3	4 add. DIs, 1 add. Alarm
		4	Remote input, 1 add. DI

UT

Caloritech™

Electronic Indicating Controls

Series 100 Electronic Indicating Controls

The 100 series of 1/16 DIN sized controls are available in a number of models having a variety of features to suit the particular application.

| Figure 1 | Figure 2 | Figure 3 | Figure 4 |

The S100 is the lowest cost single digital display model.

The C100 is a general purpose control with dual digital displays for both process and set point.

The D100 offers high end process features for applications where a 1/8 or 1/4 DIN control is not appropriate.

The CB100L is an indicating, manual reset, high limit, FM approved control used in conjunction with another process control. Table 1 shows the features for each model.

100 Series

Model	Description	Catalog No.
S100 (Figure 1)	T/C Input/Relay Output	S100FXA8-M*NN
	T/C Input/SSR Output	S100FXA8-V*NN
	RTD Input/Relay Output	S100FDB6-M*NN
	RTD Input/SSR Output	S100FDB6-V*NN
C100 (Figure 2)	T/C Input/Relay Output	C100FXA3-M*NN
	T/C Input/4-20 mA Output	C100FXA3-8*NN
	RTD Input/Relay Output	C100FDA1-M*NN
	RTD Input/4-20 mA Output	C100FDA1-8*NN
D100 (Figure 3)	All Inputs/Relay Ouput	D100F-MN*NN-NN-NN
	All Inputs/SSR Output	D100F-VN*NN-NN-NN
	All Inputs/4-20 mA Output	D100F-8N*NN-NN-NN
CB100L (Figure 4)	T/C Input/Relay Output	CB100LXA3-M*NN-N-NN/A

Note:
For thermocouple input controllers, replace '**X**' with the thermocouple type (i.e. J or K). Other models available,check factory.

Standard Features

	S100	C100	D100	CB100L
Accuracy				
+/- 0.5% of span	✓	✓	—	—
+/- 0.3% of span	—	—	✓	—
Auto Tune	✓	✓	✓	—
Fuzzy Logic	—	—	✓	—
Configurable Control Modes	✓	✓	✓	—
Display				
Dual	—	✓	✓	✓
Single	✓	—	—	—
Inputs				
T/C, RTD, Current Voltage	—	✓	✓	✓
T/C, RTD (only)	✓	—	—	—
Outputs				
Relay	✓	✓	✓	✓
SSR Pulse	✓	✓	✓	—
4-20 mA	—	✓	✓	—
triac Driver	—	✓	—	—
Loop Break Alarm	✓	OPT.	✓	—
Ramp To Set Point	—	—	✓	—
Optional Features				
2 Alarms (Temperature)	✓	✓	✓	✓
Heater Break Alarm	✓	✓	✓	—
Loop Break Alarm	STD.	✓	STD.	—
Communications	—	—	✓	✓
Retransmitted Ouptut	—	—	✓	✓
Remote Test	—	—	—	✓
Auxiliary Set Point	—	—	✓	—

To Order Specify

Quantity and catalog number.

Standard Thermocouples

Thermocouples are sensing devices used with electronic controls (such as Fenwal models 921, 550, & 543). Some normally stocked types are shown below. Many other configurations can be made to order. See Section D of the Caloritech™ catalog for general information.
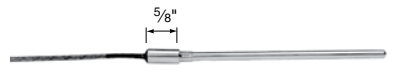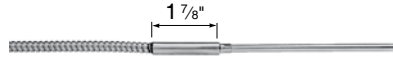

Figure 1
Figure 2
Figure 3
Figure 4
Figure 5
Figure 6

Standard Thermocouples

ANSI Type	Probe Length in	Probe Length mm	Lead Length in	Lead Length mm	Lead Type	Figure No.	Catalog No.
J	3	76	72	1829	Fiberglass	1	J316G31603721ASP
	6	152					J316G31606721ASP
	12	305					J316G316012721ASP
	18	457					J316G316018721ASP
	24	610					J316G316024721ASP
J	3	76			PVC/Armour	2	J316G31603728A
J	6	152			PVC/Armour	2	J316G31606728A
K	12	305	72	1829	Fiberglass	1	K316G316012721ASP
K	18	457			Fiberglass	1	K316G316018721ASP
K	24	610			Fiberglass	1	K316G316024721ASP
J	3	76	72	1829	PVC	3	J316G316FX1/403724A
	3	76	72	1829	Armour	4	J316G316FX1/403728A
J	ADJ		72	1829	Armour	5	TC11468-01
	—		48	1219	—	6	J15406A48
	1 1/8	29	—				TC11467-01
J	1 5/8	41	—		Term. Encl.	7	TC11467-02
	2 7/8	78	—				TC11467-03

½" NPT
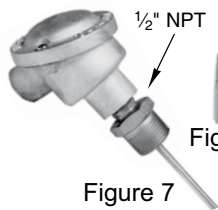
Figure 8
Figure 9
Figure 10
Figure 7

Control Sensor Accessories

| Description	Fig. No.	Catalog No.
1/8" NPT Bayonet Adaptor	8	BA4011-1
1/4" NPT Compression Fitting	9	A10687-36
Pipe Clamp Adaptor	—	10949-2A
J Plug (Black)	10	CO 45101
J Jack (Black)	10	CO 45201
K Plug (Yellow)	10	CO 45102
K Jack (Yellow)	10	CO 45202

To Order Specify

Quantity and catalog number.

Thermocouple Wells

Thermocouple Well Assemblies

These assemblies are used mostly in tank applications to provide a strong one piece device to sense liquid temperatures. The terminal enclosure can be used outdoors or in dusty, oily or damp environments. Optional enclosures are available for hazardous applications. Wells are constructed of steel or stainless for most applications. For highly corrosive liquids, check with the factory for custom bar stock well assemblies.
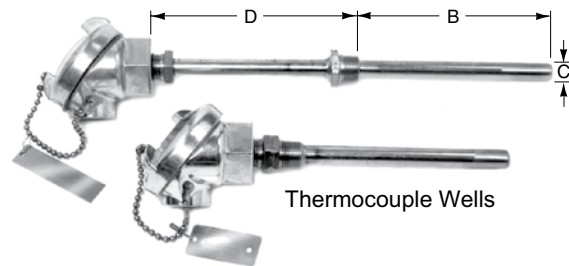
Thermocouple Wells

Thermocouple Wells

ANSI Type	Process Fitting	Well Mat'l	Dimensions - in (mm) B	C	D	Catalog No.
J	3/4" NPT	Steel	18 (457)	.840 (21.3)	5 3/4 (146)	B10013-01
J	3/4" NPT	304 SS	18 (457)	.840 (21.3)	5 3/4 (146)	B10013-02
J	1/2" NPT	304 SS	6 (152)	.540 (13.7)	6 1/4 (158)	B10013-03
J	3/4" NPT	304 SS	4 1/2 (114)	.540 (13.7)	2 1/2 (64)	B10013-06
J	1/2" NPT	316 SS	6 (152)	.540 (13.7)	1 1/2 (38)	B10013-09

Figure 11
Figure 12
Figure 13

Thermocouple Wire

Thermcouple/Instrumentation Extension Wire

| Gauge	ANSI Type	Fig. No.	Insulation Temperature	Catalog Number
Untwisted, No Shield				
16	JX	11	PVC 221°F (105°C)	P/P 16 JX
20	JX	11	PVC 221°F (105°C)	P/P 20 JX
16	KX	11	PVC 221°F (105°C)	P/P 16 KX
20	KX	11	PVC 221°F (105°C)	P/P 20 KX
16	KX	12	G-Glass, 2750°F (510°C)	G/G 16 KX
20	KX	12	Fiberglass	G/G 20 KX
Twisted, Shielded with Drain Wire				
20	JK	13	PVC 221°F (105°C)	UP/ALPTW20JX
20	KX	13	PVC 221°F (105°C)	UP/ALPTW20KX
RTD 3Wire Copped, Shielded				
16	Copper	13	PVC 221°F (105°C)	UP/ALPTW16FTRIAD
Instrument 2 Wire Copper, Shielded				
	Copper	13	PVC 221°F (105°C)	UP/ALPTW16FBX

To Order Specify

Quantity and catalog number.

Electronic Step Controls

A step control will bring on stages a few seconds apart. As the process reaches set point, stages will drop out until the heat required balances the losses. Under steady state operation some stages remain on and one or two stages may cycle to maintain straight line control.

Series R851B Step Control

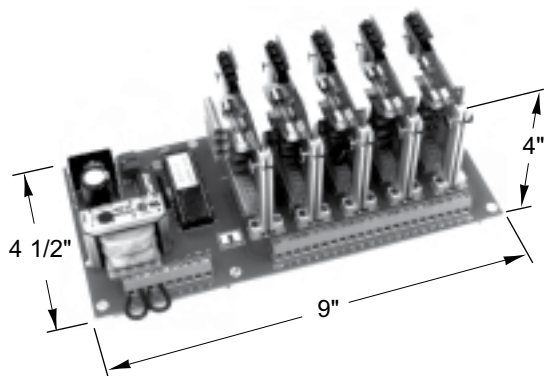The R851B is frequently used in boiler and duct heater systems.
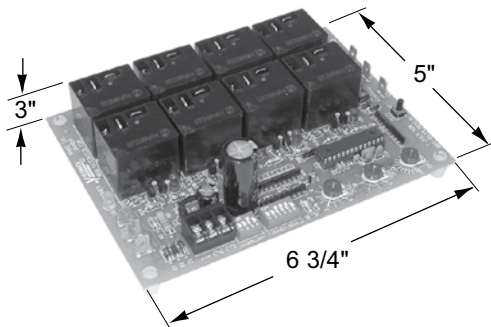
R851B Series Step Control

No. of Stages	Input Signal	Relay Rating	Power	Catalog Number
4	0-135 Ω	10 Amp		R815B-4
8	2-10VDC 4-20 mA	240VAC MAX	24VAC	R851B-8

Sequence

Selectable: First stage in, last stage out; or first stage in, first stage out.

Base Load Step Controls

A base load step control is used with a number of contactors and an SCR. Contactors step on approximately 80% of the load while the last 20% is controlled by an SCR for very fine trimming.

A temperature control feeds a signal to the SCR. A signal from the SCR indicating the SCR is at 100% output will cause the step control to bring on stages. If the SCR is at zero output, stages will drop out. As long as the SCR is modulating, base loads are neither added nor dropped out.

566 Series Step Control

The 566 base load step control is made up of a motherboard and 1 to 5 output boards, each with 4 outputs, for a maximum of 20 stages (as shown above).

Time delay between stages is independently adjustable for up and down sequencing from 1 to 200 seconds per stage. This step control can operate in base load control mode by receiving a signal from an SCR. It can also operate in standard step control mode receiving process signals directly from a control.

566 Series Step Control Mother Board with Relay Boards (4 Per Card)

No. of Stages	Input Signal	Relay Rating	Power	Catalog Number
4				566-4
8	0 - 135 Ω	24 - 120 Amp		566-8
12	4 - 20 mA	2 Amp Max	120VAC	566-12
16	0 - 10V (SCR)	Per Stage		566-16
20				566-20

To Order Specify

Quantity, part number, input and number of stages.

Thyristor Power Controls (SCR's)

SCR's are solid state switches which can open and close silently and as frequently as the control device dictates (even many times per second). This fast switching does not affect the life of the device as there are no moving parts. Also see discussion in Section D of the Caloritech™ catalog.

Besides improving process control, the fast switching will extend heater life. Heaters will normally stabilize at actual requirements rather than continuously cycling between off and maximum output.

For most process applications, zero voltage switched SCR's are preferred. This type produces minimal voltage spikes that may cause radio frequency interference (RFI). Phase angle fired units are available as an option for low mass heating sources that can change temperature rapidly- such as infrared lamps.

Dimensions

Series	Amps	Dimensions - in (mm)		
		W	H	D
ZF2	15 - 40	9.6 (244)	6 (152)	3.1 (79)
ZF2	70	17.25 (438)	10 (254)	5 (127)
ZF3	15 - 40	14 (356)	6 (152)	3.1 (79)
ZF3	70	26 (660)	10 (254)	5 (127)

SCR's are manufactured in all standard voltages, single or three phase. Units are available with current ratings from 15 to in excess of 1000 amps. All control inputs can be accommodated including the most common process signals: 0-5k ohm and 4-20 mA.

Single phase units are single leg break. Three phase units are available in 2 or 3 leg break with the most common and cost effective version the 2 leg break.

SCR's are available as separate components or for more reliable performance, can be ordered as part of a factory designed and built control panel. See pages Section D for control panel information.

Open Style SCR's

This small, cost effective series is available in sizes from 15 through 70 amps and in single or three phase. Note that, for control inputs other than 4-20 mA, a separate 24VAC control circuit transformer is required.
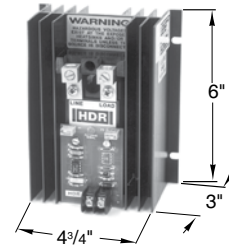

Figure 1 - SCR 1 Phase

SSR Type 15-70 AMP 1200V PIV

Amps 104°F (40°C)	Voltage XXX	Phase	Control Signal	Catalog Number
15	120, 240, 480, 600	1 ph	4-20 mA	ZF1-XXX-15-C
25				ZF1-XXX-25-C
40				ZF1-XXX-40-C
70				ZF1-XXX-70-C
0-10 VDC, 0-135 Ω, Manual Pot				
15	120, 240, 480, 600	1 ph	0-10VDC	ZF1-XXX-15-V-02‡
25				ZF1-XXX-25-V-02‡
40				ZF1-XXX-40-V-02‡
70				ZF1-XXX-70-V-02‡

Note:
‡These models require a separate 24VAC control circuit transformer. Replace XXX with applied line voltage. Units also available with 5kΩ potentiometer. Change suffix 02 to 05.
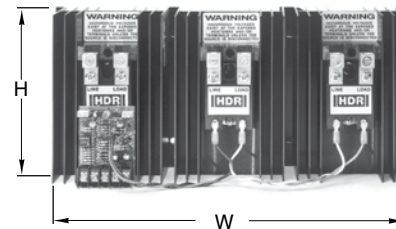
Figure 2 - SCR 3 Phase

SSR Type 15-70 AMP 1200V PIV

Amps 104°F (40°C)	Voltage XXX	Phase	Control Signal	Catalog Number
15	120, 240, 480, 600	3 ph 2 leg break	4-20 mA	ZF2-XXX-15-C
25				ZF2-XXX-25-C
40				ZF2-XXX-40-C
70				ZF2-XXX-70-C
4-20 mA, 0-10 VDC, 0-135 Ω, Manual Pot				
15	120, 240, 480, 600	3 ph 3 leg break	0-10VDC	ZF3-XXX-15-V-02‡
25				ZF3-XXX-25-V-02‡
40				ZF3-XXX-40-V-02‡
70				ZF3-XXX-70-V-02‡

Note:
‡These models require a separate 24VAC control circuit transformer. Replace XXX with applied line voltage. Units also available with 5kΩ potentiometer. Change suffix 02 to 05.

To Order Specify

Quantity, catalog number, voltage, phase, & control signal.

SCR's

SCR Controls 60-1200 Amps

Listed SCR's are zero crossover fired. Units from 60 to 225 amps are semi-enclosed with electrically isolated heat sinks. Units over 225 AMP are open, with live heats inks that require mounting in a control panel enclosure with suitable venting. All units over 60 AMP are fan cooled. All units include a heat sink over temperature thermostat. The SCR's are protected with fast blow (I^2t) semi-conductor fusing.
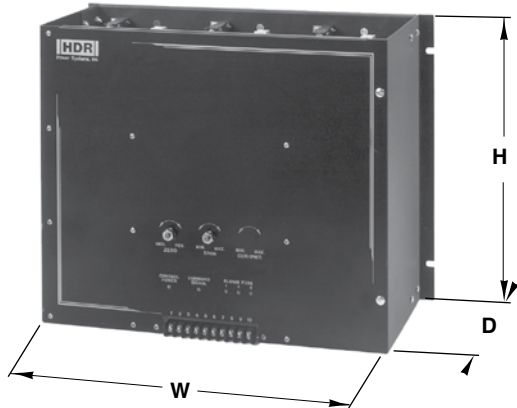

Figure 1 - ZF3 Series Shown 60-225 Amps

Dimensions Figure 1 Controls

Series	Dimensions - in (mm)		
	W	H	D
ZF1	9.5 (241)	16.25 (413)	9.25 (235)
ZF2	12.5 (318)	16.25 (413)	9.25 (235)
ZF3	17.5 (452)	16.25 (413)	9.25 (235)

SCR's 60-225 Amps 1400V PIV (Figure 1)

Amps 104°F (40°C)	Voltage XXX	Phase	Control Signal	Catalog Number
60				ZF1-XXX-60-01‡
90				ZF1-XXX-90-01
120	240, 480, 600	1 ph	4-20 mA	ZF1-XXX-120-01
180				ZF1-XXX-180-01
225				ZF1-XXX-225-01
60				ZF2-XXX-60-01‡
90		3 ph		ZF2-XXX-90-01
120	240, 480, 600	2 leg	4-20 mA	ZF2-XXX-120-01
180		break		ZF2-XXX-180-01
225				ZF2-XXX-225-01
60				ZF3-XXX-60-01‡
90		3 ph		ZF3-XXX-90-01
120	240, 480, 600	3 leg	4-20 mA	ZF3-XXX-120-01
180		break		ZF3-XXX-180-01
225				ZF3-XXX-225-01

Note:
- ‡60 AMP models do not have fans or over temp. thermostats.
- All others are fan cooled with a N.O. over temp. thermostat.
- Replace XXX with applied line voltage.
- Catalog number shown is for 4-20 mA control signal. Change suffix.
- 01 to 02 for 0-10VDC; 05 for 5kΩ potentiometer.
- All models include high speed semi-conductor fusing.
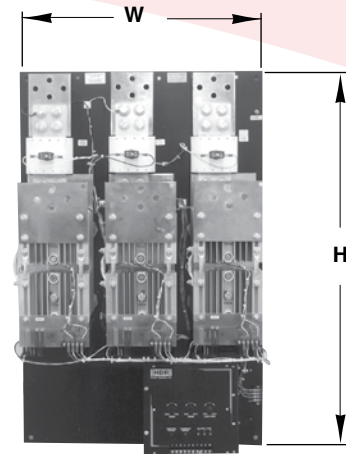
To Order Specify

Quantity and catalog number.

Figure 2 ZF3 Series Shown 800-1200 amps

Dimensions Figure 2 Controls

Series	amps	Dimensions - in (mm)		
		W	H	D
ZF1	350 - 500	14 3/4 (375)	20 1/8 (511)	8 1/2 (216)
ZF1	650	16 3/4 (425)	23 (584)	11 1/2 (292)
ZF1	800 - 1200	16 3/4 (425)	29 (737)	12 (305)
ZF2	350 - 500	19 (483)	20 1/8 (511)	8 1/2 (216)
ZF2	650	24 (588)	23 (584)	11 1/2 (292)
ZF2	800 - 1200	27 (686)	29 (737)	11 3/4 (298)

SCR's 350-800 A 1400V PIV (Figure 2)

Amps 104°F (40°C)	Voltage XXX	Phase	Control Signal	Catalog Number
350				ZF1-XXX-350-01
500				ZF1-XXX-500-01
650	480, 600	1 ph	4-20 mA	ZF1-XXX-650-01
800				ZF1-XXX-800-01
350		3 ph		ZF2-XXX-350-01
500				ZF2-XXX-500-01
650	480, 600	2 leg	4-20 mA	ZF2-XXX-650-01
800		break		ZF2-XXX-800-01

Note:
- Replace XXX with applied line voltage.
- Catalog number shown is for 4-20 mA control signal. Change suffix 01 to 02 for 0-10VDC; 05 for 5kΩ potentiometer.
- For larger units check factory.
- All models include fans, $I2t^2$ fusing and N.O. over temp. thermostat.
- All models have live heatsinks and require enclosures.
- 3 leg break available - check factory.

SCR Controls (Phase angle)

Phase angle fired SCR's are also available.
(Check Factory).

To Order Specify

Quantity, catalog number, voltage, phase, & control signal.

High Temperature Wire

For specific information on allowable current capacity and temperatures for wire refer to your regional Electrical Code. Wire ampacity decreases as the ambient temperature increases.

Other Gauges

Heavier gauges are available. Consult factory.

High Temperature Wire
600V Max. - 3 Wires Max. In Raceway

Gauge	Maximum Allowable Wire Temp.		Recommended Max. Amps at Ambient of		Catalog Number
	°F	°C	86°F (30°C)	284°F (140°C)	
8	392	200	55	32	SEW-8
10	392	200	45	26	SEW-10
12	392	200	30	17	SEW-12
10	482	250	40	23	TCGT-10
12	482	250	25	14	TCGT-12

To Order Specify

Quantity and catalog number.

Flow Switches

Flow Switches are typically used as proving switches to energize heaters only when sufficient flow is present. They are inserted into pipelines carrying non-corrosive and non-hazardous liquids. Flow rates from 3 to 700 G.P.M. can be accommodated in 1" to 8" (25 mm to 203 mm) pipe sizes.

Flow Switches

| Process Connection	Switch Rating		Exposure	Catalog Number
	Resistive	Inductive		
1" NPT	16A 277VAC Max	125VA 24-277VAC	150PSIG (1034kPa)	F61KB-11

To Order Specify

Quantity and catalog number.

Air Flow Switches.

Pressure Differential Switch

This device is used as an interlock to ensure sufficient air movement before a duct heater can be energized.

The pressure differential switch must be installed to a vertical surface.
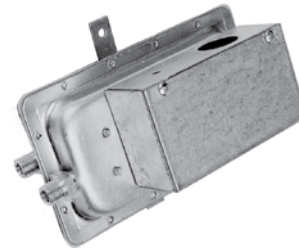
Pressure Differential Switches

Pressure Range	Electrical Rating	Catalog Number
.05" to 12.0" WC (Field Adjustable)	15 amp Resistive 120 / 277VAC 300VA Inductive	AFS-222

Sail Switch

Sail switches are used to activate electrical equipment in response to airflow in a duct. Both normally open and normally closed contacts (SPDT) are provided with a 2.5 AMP 240VAC maximum resistive rating. The normally open contact makes at 250 fpm (1.3 m/s) and breaks below 75 fpm (0.4 m/s). The sail switch can be adapted to horizontal or vertical air flow.

Sail Switch

| Electrical Rating	Air Flow		Maximum Air Temp.		Catalog Number
	Min.	Max.	°F	°C	
2.5A 240VAC	75 fpm	250 fpm	170	77	S688A1007

To Order Specify

Quantity and catalog number.

High Temperature Wires, Flow & Air Flow Switches

Level Control (For Conductive Liquids)

The SV series electronic liquid level control senses the resistance between remote mounted level probe electrodes (see type EH below). By altering the lengths of the electrodes, various combinations of high and low limit, heater ON-OFF and pump ON-OFF can occur as liquid levels change in the vessel.

When liquid is present, the SV220 de-energizes and the SV210 energizes. Otherwise both controls are the same.
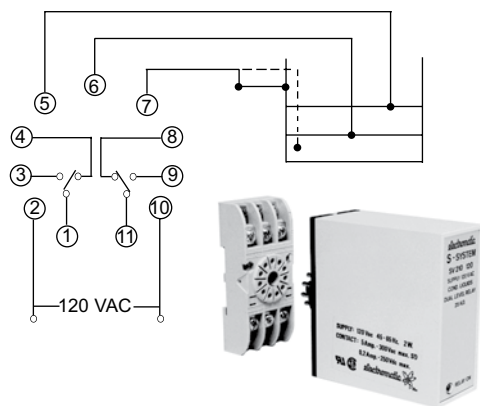

NOTE:
If the container is non conductive a third (lowest position) electrode must be installed as shown.

Level Control

Sensor Current	<25 kΩs Relay	Relay Rating	Catalog Number
2.5 mA	De-energizes	8 Amp 120VAC DPDT	SV220-115
2.5 mA	Energizes		SV210-115

Level Probe

The EH probe assembly can be used with the SV series electronic level controls. The assembly consists of a 2" NPT brass screw plug, weather resistant terminal enclosure and 1, 2 or 3 brass rods mechanically held and electrically isolated in porcelain holders. The rods can be field cut from the 24" (610 mm) supplied lengths to corresponding liquid levels required for control.

3 ROD MODEL SHOWN
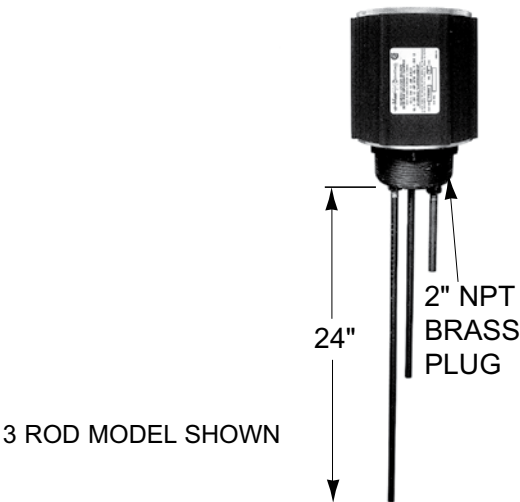
Level Control

Number of Sensing Rods	Rod Length(s)	Mounting	Catalog Number
1	24" - 610 mm (Field cut to desired length)	2" NPT Brass Screwplug	EH10863-13
2			EH10863-14
3			EH10863-15

To Order Specify

Quantity, catalog number.

Notes:

Caloritech™

Notes:

Notes:

F30 Caloritech™

PLEASE ADHERE TO INSTRUCTIONS PUBLISHED IN THIS MANUAL.
Failure to do so may be dangerous and may void certain provisions of your warranty.
For further assistance, please call:

Oakville: 1-800-410-3131
(U.S.A. and Canada)

Please have model and serial numbers available before calling.

WARRANTY: Under normal use the Company warrants to the purchaser that defects in material or workmanship will be repaired or replaced without charge for a period of 18 months from date of shipment, or 12 months from the start date of operation, whichever expires first. Any claim for warranty must be reported to the sales office where the product was purchased for authorized repair or replacement within the terms of this warranty.

Subject to State or Provincial law to the contrary, the Company will not be responsible for any expense for installation, removal from service, transportation, or damages of any type whatsoever, including damages arising from lack of use, business interruptions, or incidental or consequential damages.

The Company cannot anticipate or control the conditions of product usage and therefore accepts no responsibility for the safe application and suitability of its products when used alone or in combination with other products. Tests for the safe application and suitability of the products are the sole responsibility of the user.

This warranty will be void if, in the judgment of the Company, the damage, failure or defect is the result of:
• vibration, radiation, erosion, corrosion, process contamination, abnormal process conditions, temperature and pressures, unusual surges or pulsation, fouling, ordinary wear and tear, lack of maintenance, incorrectly applied utilities such as voltage, air, gas, water, and others or any combination of the aforementioned causes not specifically allowed for in the design conditions or
• any act or omission by the Purchaser, its agents, servants or independent contractors which for greater certainty, but not so as to limit the generality of the foregoing, includes physical, chemical or mechanical abuse, accident, improper installation of the product, improper storage and handling of the product, improper application or the misalignment of parts.

No warranty applies to paint finishes except for manufacturing defects apparent within 30 days from the date of installation.

The Company neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with the product(s).

The Purchaser agrees that all warranty work required after the initial commissioning of the product will be provided only if the Company has been paid by the Purchaser in full accordance with the terms and conditions of the contract.

The Purchaser agrees that the Company makes no warranty or guarantee, express, implied or statutory, **(INCLUDING ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE)** written or oral, of the Article or incidental labour, except as is expressed or contained in the agreement herein.

LIABILITY: Technical data contained in the catalog or on the website is subject to change without notice. The Company reserves the right to make dimensional and other design changes as required. The Purchaser acknowledges the Company shall not be obligated to modify those articles manufactured before the formulation of the changes in design or improvements of the products by the Company.

The Company shall not be liable to compensate or indemnify the Purchaser, end user or any other party against any actions, claims, liabilities, injury, loss, loss of use, loss of business, damages, indirect or consequential damages, demands, penalties, fines, expenses (including legal expenses), costs, obligations and causes of action of any kind arising wholly or partly from negligence or omission of the user or the misuse, incorrect application, unsafe application, incorrect storage and handling, incorrect installation, lack of maintenance, improper maintenance or improper operation of products furnished by the Company.

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Technologies INC.
Heating and Filtration Solutions

As a leader in advanced heating and filtration solutions with facilities across North America, CCI Thermal Technologies Inc. manufactures six of the top brands in industrial heating in addition to a comprehensive line of engineered industrial filtration products including:

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Cata-Dyne™ is the industry standard in infrared gas catalytic heaters, enclosures, pipeline systems and accessories. Customers across a wide range of industries rely on Cata-Dyne™ to supply them with safe, reliable, efficient and versatile infrared catalytic heating equipment for a variety of applications in both hazardous and non-hazardous environments.

Ruffneck™ is renowned for its rugged, reliable and versatile heavy-duty explosion-proof heaters, heating systems and heating accessories. Ruffneck™ has a long and proud history of supplying quality heating products for the harshest industrial environments to a worldwide customer base for over 30 years. Ruffneck™ is well-known in the industry for its "ship the heat in a week" policy, where 95% of all standard orders are shipped within one week of order placement.

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Heaters for the Harshest Environments

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3L Filters™ has satisfied the most demanding industrial filtration requirements for over 40 years. A broad range of standard and custom products includes liquid filters, strainers, separators, pressure vessels, and engineered products and systems. 3L Filters™ has special expertise for nuclear, petrochemical, water treatment and environmental applications.

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Electric Explosion-Proof Heaters

Norseman™ is the most technologically advanced line of explosion-proof electric air heaters and heating accessories, including both forced air heaters and natural convection heaters, as well as unit heaters, panel heaters and thermostats. Norseman™ offers innovative, low maintenance solutions for a wide range of applications in a variety of industrial and commercial environments. Custom engineered heaters or heating systems are available for specialized applications.

Fastrax® has manufactured railroad track and switch heating since 1995. Fastrax® engineers complete heating packages for the rail industry. Fastrax® track and switch heaters are designed to provide the most efficient heat transfer on rail equipment and components for the coldest environments. In addition to heaters, Fastrax® manufactures fully automatic energy saving controls to complete the rail heating system.

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Track and Switch Heaters

DriQuik™ . . . .
Infrared Oven Components

DriQuik™ provides components for infrared drying ovens. DriQuik™ utilizes a pioneered radiant oven technology established in the 1930s providing the industry standard in infrared radiant heating components.

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