GENERAL PLASTICS DATA

PLASTICS PRIMER

In the rapidly expanding technology of plastics, it is important that the characteristics and properties of these materials be fully understood so that they can be utilised to their fullest extent and to avoid at the same time the consequences of misapplication and failure.

WHAT ARE PLASTICS? What are these materials which have found their way into our homes, offices and factories?

A definition is difficult in a few words as there are a wide variety of materials which go to make up plastics.

One definition is that plastics are essentially organic materials and which at some stage of their manufacture are capable of flowing by the application of heat and pressure. Organic materials are those chemicals which contain a high percentage of carbon in their structure.

Almost all chemicals used in the manufacture of plastics are produced synthetically, and the largest proportion are produced in association with the petroleum industry.

The basic chemicals used to form the various plastics are known as "monomers". These monomer units are made to link together into long chains by special processes resulting in materials called "polymers". The process of producing these polymers is known as polymerisation and generally results in the formation of a solid material.

Broadly, all plastics can be subdivided into two main categories, namely –

(1) Thermo-plastic materials.
(2) Thermo-setting materials.

Thermo-plastics are described as plastics which achieve a more plastic or softer condition under the application of heat and as the temperature is reduced, the material cools and returns to its original state. They can be softened (heated) and hardened (cooled) repeatedly with no appreciable change in physical properties – e.g., Celluloid (cellulose nitrate), Cellulose acetate, Perspex (polymethyl methacrylate), Polyethylene, Polypropylene, Polystyrene, Polyvinyl Chloride (PVC) and Nylon.

Thermo-setting plastics are those materials which soften and become plastic upon heating, but which harden or solidify when the heating is continued. After solidifying, no further heating will cause them to soften again. If the heating becomes excessive, however, they undergo chemical decomposition and degradation – e.g. Bakelite (phenal-formaldehyde), Urea-formaldehyde, Melamine formaldehyde, Polyester resins and Epoxy resins.

This points out a basic difference in manufacturing techniques. Thermo-plastics can be fabricated merely by subjecting the material to heat and forming it whilst still in a softened state to a desired shape. Thermo-setting plastics, however, require a mould of some type into or on which the plastic is introduced and a complete part is produced after the plastic has been cured to give a final set.

Plastics were at one time mainly worked in the form of powders by processes of injection or compression moulding, but today they are being widely applied in the form of sheets, rods and tubes, as well as in the form of laminates in which they are reinforced with fibrous materials or combined with sheets of metal, wood, paper or fabric.

Just as the properties of metals are predictable, so are the properties of plastics. They are synthetic but are not substitutes. They stand on their own merit and only take the place of other materials because of specific advantages.

GENERAL PROPERTIES

PVC

Unplasticised, rigid polyvinyl chloride (PVC) is now firmly established as the most satisfactory plastic material for use in constructing exhaust systems to handle the corrosive fumes and gases normal to many industrial plants and processes. Ductwork, piping, hoods and fans are all constructed with PVC.

There are several reasons why this material is used for such purposes PVC is one of the oldest and better known formulations in the plastic field. There is a great deal of experience with its use, generally its corrosion resistance is very good and physically its structural characteristics are adequate for most situations. Temperature resistance is rather limited, but no more so than others in the vinyl group – except for some of the more recent developments, however the cost of PVC compared with other vinyls is generally resolved in favour of PVC.

CORROSION RESISTANCE

Polyvinyl-Chloride is resistant to chemical attack by an extremely wide range of corrosive agents which destroy other construction materials. It is important to keep in mind, however, that no plastic will necessarily provide protection across the entire range of a corrosion problem. Consequently care must be exercised in the selection of a plastic to withstand a certain environment.

In general PVC's resistance to acids is excellent, extending even to strong oxidising acids, in high concentrations. Resistance to attack by alkalis and alkaline salts is very good. Although certain organic compounds such as acetone, aromatic hydrocarbons, chlorinated compounds, ethers, esthers and keytones exhibit a solvent or swelling effect (absorption and subsequent swelling is a characteristic of thermoplastic corrosion), there are many others in regular use for which PVC is completely satisfactory. These include vegetable and animal oils, aliphatic hydro-carbons and most alcohols.

FABRICATION

Rigid polyvinyl chloride can be machined, sawn, cut, drilled, punched and also formed and bent like most metals. Joining to itself is possible by hot air (fusion) welding, solvent welding (cementing), and by use of PVC nuts and bolts.

Rigid PVC which is completely rigid at room temperature changes at about 175°F (80°C) from rigid to a rubbery, highly elastic state. From this point up to about 270°F (130°C) it is possible to form various semi-finished sections and to maintain the obtained form by cooling below the softening point at 175°F (80°C).

The hot air welding process is probably the most important joining method for rigid PVC. It is similar to the oxy-acetylene welding process, except that it is flameless and a hot air stream constitutes the source of heat. The welding process takes place on the surface of the base material and the welding filler rod. The filler rod is fused on to the joint to be welded by the heat from the welding gun and moderate pressure exerted by the operator's hand.

POLYETHYLENE

Polyethylene (also called Polythene) is used in the ventilation industry for such applications as tanks, tank covers, tank linings, ducts, fume hoods, etc. It replaces PVC in some cases for exhaust hoods and ducts, when the temperature is too high for PVC.

Polyethylene is available in two main types –

1. Conventional or low density Polyethylene – also referred to as Branch or Regular Polyethylene. The material is made by high temperatures and high pressures.
2. High density or Linear Polyethylene which is made by a different process, which involves lower temperatures and pressures than Conventional Polyethylene.

Linear Polyethylene is mostly used in the ventilation industry, and is characterised by such properties as – high gloss, rigidity up to 240°F (120°C), higher impact strength than PVC, outstanding resistance to attack and permeation by moisture vapour, gases, chemicals and oils, and toughness over a wide temperature range.

CORROSION RESISTANCE

The material is inert to most gases and chemicals, and is very resistant to strong acids, especially hydrofluoric acid, nitric acid and hydrochloric acid. It is not affected by strong alkalis.

FABRICATION

Polyethylene can be worked with common wood work or machine tools if the usual precautions taken with any thermoplastic are observed.

It may be welded with hot nitrogen gas or hot air. Polyethylene requires a welding temperature of approximately 400°F (204°C) compared with approximately 230°F (110°C) for PVC.

No practical solvent welding technique is possible with Polyethylene

PRECAUTIONS

Polyethylene has been found to be unsuitable for outdoor exposure unless it is pigmented with carbon black as a ultra-violet screener. The unpigmented material degrades as a result of exposure to the combination of weathering conditions, but unpigmented material may be used inside plants where there is no high intensity of ultra-violet light.

Polyethylene's most noticeable defect is a tendency towards stress cracking with age in certain environments.

POLYPROPYLENE

Polypropylene is made in a somewhat similar manner to High Density Polyethylene but using a propylene monomer. In relation to PVC and PE, the different molecular structure of Polypropylene produces an even greater hardness and rigidity together with a much higher working range temperature characteristic. Polypropylene's main advantage in the corrosive fume extraction field, apart from its excellent chemical resistant quality is its ability to withstand higher temperatures than either PVC or PE.

CORROSION RESISTANCE

The material has very high resistance to chemicals such as acids, alkalis, solvents and highly oxidizing materials.

FABRICATION

Polypropylene is exceptionally workable. It can be hot air welded, machined, swaged, bent, flanged and pressed under heat. No practical solvent welding technique is possible with PP.

PRECAUTIONS

It should be noted that Polypropylene is sensitive to copper, manganese, cobalt, chrome and their alloys. These metals reduce the durability properties of PP especially at elevated temperatures. Therefore contact with these metals should be avoided. Although the material is not specifically stabilised in respect of ultra-violet rays, a limited amount of protection is inherent enabling outdoor use when conditions are not extreme.

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WALL THERMOSTATS

PENN T52 SERIES MULTI-STAGE WALL THERMOSTATS

AUTOMATIC CHANGEOVER — LOW VOLTAGE

CAT. NO.	TYPE	Application	SWITCHES	
			SYSTEM	FAN
5011	T52AEA-2	1 stage heating 1 stage cooling	Auto-Heat-Off-Cool	Auto-On
5012	T52BEA-1	1 stage heating 2 stage cooling	Auto-Heat-Off-Cool	Auto-On
5013	T52CEA-2	2 stage heating 1 stage cooling	Auto-Heat-Off-Cool	Auto-On
50128	T52DAA-2	2 stage heating 2 stage cooling	None (1)	None (1)
5014	T52DEA-2	2 stage heating 2 stage cooling	Auto-Heat-Off-Cool	Auto-On

(1) Systems on auto. Fan can be wired for auto operation in cooling mode.

SERIES T52

For air conditioning systems where automatic switch-over of multiple heating and cooling stages is required.

Range: Heating 10°C to 30°C (50°F to 85°F)
Cooling 8°C to 32°C (46°F to 90°F)

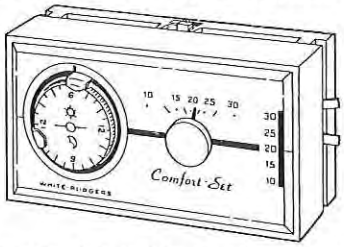
Electrical Rating: 0.8 amp max. at 24V. AC.

Anticipation: Heating 0.3 to 0.8 amps, adjustable.
Cooling fixed.

TO ORDER: Specify Catalogue Number only. For adaptor plate specify Penn No. PLT35A-600.

Underlined Models have Metric Scales.
Refer Tech. Page 144-h for English to Metric Cross Reference Chart

TYPE 1F72 - 10 LOW VOLTAGE AUTOMATIC COMFORT SET THERMOSTAT



FOR HEATING ONLY OR COOLING ONLY SYSTEMS

The 1F72-10 Comfort-Set thermostat combines temperature control and a Solid State Timer to automatically lower or raise room temperature to pre-determined set-points for one or more periods of time every 24 hours. By using the Program Advance Switch, the set-point can be temporarily changed without making permanent changes to the timer program, or adjusting the temperature levels. The thermostat uses sensitive spiral bimetal elements, sealed mercury contacts and is equipped with an adjustable heat anticipator to provide narrow-differential control of room temperature. The Comfort-Set will replace most existing 24 volt, two-wire heating or cooling thermostats without the need for running additional wires or using additional transformers or power-packs.

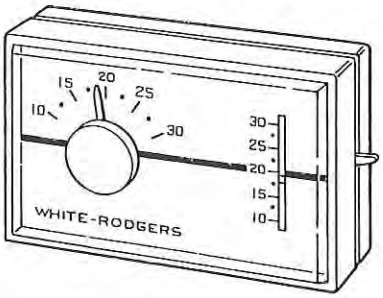
SPECIFICATIONS

Electrical Rating: 24 Volt 50 Hz. 0.15 to 1.0 Amps.
Heat Anticipator: Adjustable for 0.15 to 1.0 Amps.
Cool Anticipator: Fixed for 0 to 1.5 Amps. 30V max.
Temperature Range: 10° to 30°C
Temperature Selectors: Hi - Red Low - Blue
Mounting: Wiring wall plate mounts on wall.
Dimensions: 3¼" High x 6-1/16" Wide x 2-5/16" Deep.
Timer: Automatically raises or lowers room temperature to set-points selected by Hi and Low temperature levels for one or more periods of time every 24 hours.
Minimum set-up or set-back interval is 2 hours.
Program Advance Switch allows temporary program changes without affecting timer settings. Program Advance Switch should NOT be used within one hour before or after a timer reset point.
Powered by a rechargeable battery (maintained at full charge by 24 volt thermostat circuit).
Timer dial turns counter-clockwise during operation.
Dial is divided into AM/PM time sections.
Adjustable plastic pointers (indicators) select reset times.
RED for SET-UP BLUE for SET-BACK
Accessories Available: **Adaptor plate assembly** P/N 61-2021 For mounting on vertical or horizontal outlet box, and to cover wall marks. **Switching Sub-base:** P/N S25-1 To convert heating and cooling operation. **Replacement Battery:** See battery and inside thermostat cover for replacement part numbers.

CAT. NO.

WHITE-RODGERS CONTROLS

TYPE 1F36 - 342 HEAT - COOL THERMOSTAT



This thermostat is designed for use on two-wire heating or cooling systems. It utilises a SPDT sealed-mercury switch and a sensitive spiral bimetal element. Both the heating and cooling circuits are anticipated to provide narrow differential control of room temperature.
When used with Sub-base S21-3, this thermostat can control combination heating and cooling systems and provide System and Fan switch functions.
Included with this thermostat is a terminal wallplate that allows the thermostat to be wired for heating only, or cooling only, and when used with an external System switch, combination heating and cooling applications.

SPECIFICATIONS

Temperature Range: 10° to 30°C
Differentials: Heating −1°C Cooling −1½°C
Electrical Rating: 30 VAC Max.
Anticipation: Heating Adj. 0.15 to 1.0A **Cooling** Fixed 0 to 1.5A
Circuits: **"R" and "4" — Heating** (Open on Rise)
"R" and "Y" — Cooling (Close on Rise)
A jumper between terminals "0" and "4" must be added on wall-plate for cooling operation.
Thermostat Dimensions: 2¾" High x 4½" Wide x 1½" Deep.
Note: For heat-cool combinations with system and fan switches on sub-base, use S21-3 sub-base.
Refer wiring diagrams for heat-cool combinations without using sub-base.

CAT. NO.

FURTHER DETAILS, OPERATION, INSTALLATION, CALIBRATION ETC. OF THESE WHITE-RODGERS THERMOSTATS AVAILABLE ON APPLICATION

WALL THERMOSTATS

PENN LINE VOLTAGE WALL THERMOSTATS

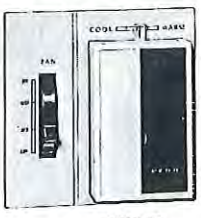
T22
With Selector Switch

T22
With Concealed Adjustment

T25A-1
Two-Stage

T26
Vertical Faceplate

T23A-1



T28DD

HEATING, COOLING OR HEATING AND COOLING

For control of residential, commercial or industrial heating or year 'round air conditioning. Heat or cold anticipators not required. Liquid charged temperature sensing element and highly efficient diaphragm and leverage provides close control of temperature.
T26S-18 and T26T-3, with thermometer are universal replacement models for heating, cooling or heating and cooling and include horizontal mounting faceplate kit. Converts to key adjustment by removing and retaining knob for the key.
Bimetal thermometer supplied as standard.

CAT. NO.	TYPE	Type of Adjustment	Application	Selector Switch	RANGE °C (°F)	Differential Approx. °C (°F) Heating	Cooling
HEATING							
5031	T22AAA-1	Knob	SPST	"Off-Auto"	10 to 30 (50 to 86)	1 (1¾)	—
5032	T22ABC-5	Knob	SPST	"Auto-Off-Fan"		1 (1¾)	—
50838	T22ABC-7	Concealed					
50326	T22BBC-1	Knob	SPST, Medium Duty	"Auto-Off-Fan"	5 to 30 (40 to 90)	1.7 (3)	—
50327	T22BBC-3	Concealed					
50328	T22CBC-4	Knob	SPST, Heavy Duty	"Auto-Off-Fan"		1.7 (3)	—
50329	T22CBC-5	Concealed					
COOLING							
5035	T22JAA-2	Knob	SPST	"Off-Auto"	5 to 30 (50 to 86)	—	1.3 (2¼)
5036	T22JCC-2	Knob	SPST	"Auto-Off-Fan"		—	1.3 (2¼)
HEATING AND COOLING							
5038	T22SDA-4	Knob	SPDT, permits shutdown of system at the thermostat.	"Off-Auto"	5 to 30 (40 to 90)	1 (1¾)	1.3 (2¼)
5039	T22SEB-5	Knob	SPDT, used when same device controls heating and cooling.	"Heat-Off-Cool"		1 (1¾)	1.3 (2¼)
50310	T22SFB-5*	Knob	SPDT, used to control separate loads on heating and cooling.	"Heat-Off-Cool"		1 (1¾)	1.3 (2¼)
50313	T22TFB-1*	Knob	SPDT, heavy duty. Used to control separate loads on heating and cooling	"Heat-Off-Cool"		1.7 (3)	1.7 to 2.2 (3 to 4)
50314	T26S-22**	Knob	SPDT	None		1 (1¾)	1.3 (2¼)
50315	T26T-4**	Knob	SPDT, Heavy Duty	None		1.7 (3)	1.7 to 2.2
TWO-STAGE							
50318	T25A-6	Knob	2 SPDT switches 2 stage Heating, Cooling or one stage Heating and one stage Cooling	None	5 to 30 (40 to 90)	1 (1¾)	1.3 (2¼)
50332	T25A-26	Concealed				1.7 (3) Between Stages	
FOUR STAGE							
50345	T36ABB-9250	Concealed	4 SPDT Switches	None	0 — 43 (32-109.4)	1 (1¾) Fixed Each Stage 1 (1¾) Fixed b/n Stages	

* Can also be used where one unit provides both heating and cooling by adding a jumper between terminals 2 and 3.
** Includes faceplate for horizontal mounting. The plate is for "on-the-job" installation over vertical plate.

FAN COIL THERMOSTATS WITH FAN AND SYSTEM SELECTORS

These line voltage thermostats control heating, cooling or combination heating and cooling systems. They operate fan motors, relays or valves on fan-coil units. All thermostats have a 3-speed fan selector switch. The attractive T23 thermostats have a one piece beige gray cover with inlaid two tone panel. Dual Voltage switching is provided (120/240V. A.C.) without need of anticipators to achieve the extremely close control. Field adjustable high and low stops are an integral feature. Mounting is on a standard, double outlet box.

CAT. NO.	TYPE	SWITCHES FAN	SWITCHES SYSTEM	RANGE °C (°F)	DIFFERENTIAL °C (°F) HEATING	DIFFERENTIAL °C (°F) COOLING
50330	T23A-3	"Low-Med-High"	"Heat-Off-Cool"	10 to 32 (50 to 90)	1 (1¾)	1.3 (2¼)
50331	T23B-4	"Low-Med-High"	"Auto-Off"		1 (1¾)	1.3 (2¼)

Heating-Cooling, Sequenced (automatic changeover; separate valves for heating and cooling).

These thermostats control line voltage fan coil or baseboard valves on heating, cooling and heating-cooling systems. Thermostats can control one or two valves directly.
Heating and cooling anticipation are provided. Snap-acting contacts are operated by a bi-metal sensing element. Sequenced models provide a dead-band between heating and cooling cycles.

CAT.NO.	TYPE	FAN SWITCH	RANGE °C(°F)	ELECTRICAL
50322	T28DA-1 (1)	None	12.8 — 35 (55 — 95)	.16A. 240V. A.C. Fan Switch 2.2A.
50325	T28DD-1 (1)	Off-Hi-Med-Lo		

(1) "Off" position of fan switch interlocks to turn off cooling.
Differential: Sequenced models have 3.3°C(6°F) differential from Heat on to Cool on.

Underlined Models have Metric Scales — Refer Tech. Page 144-h for English to Metric Cross Reference Chart.

➔ UNIVERSAL REPLACEMENT — Replaces some Honeywell, White-Rodgers and Robertshaw Controls. Refer Manufacturers literature for full details.

WALL THERMOSTATS

TYPE TWK ROOM THERMOSTATS

Danfoss

TWK is designed for direct control of either a cooling or a heating surface.

Temperature range 0°C to 30°C;32°F to 86°F
Mechanical differential approx.1.5°C=2.7°F
Coupling stability < 0.2°C=0.4°F

Thermal accelerator
220 V parallel

Rating
locked rotor 42 A 250 V~
full load 6 A 250 V~
non-inductive load 10 A 380 V~
Type of switch
single-pole change-over switch (SPDT)

CAT. NO.	TYPE	DESIGN	CODE NO.
50365	TWK	220 V parallel accelerator, SPDT change-over switch	55G0000

SUNNE THERMOSTATS — Low or Line Voltage

CAT. NO.	MODEL	APPLICATION	RANGE	SCALE	DIFFERENTIAL HEATING	DIFFERENTIAL COOLING	ELECTRICAL RATINGS
50382	TC126-007	SPDT	10° to 32°C	Warmer/ Cooler Tamperproof	0.5°C	1°C	240V 50Hz. 4.9 FLA 29.4 LRA 22.0 RES
50383	TC126-005						
50385	TC126-008						
50384	TJ126-004	2 - SPDT Switches with 1°C Deadband	10° to 32°C	Warmer/ Cooler Tamperproof	0.5°C	1°C	
50387	TJ126-003						
50386	TJ126-005						
CAPILLARY THERMOSTATS							Capillary Lgth.
50379	TA103-024	Heating	5° to 40°C				24"
50388	TC103-006	Heat/Cool	10° to 45°C				60"
50380	TE103-003	Heating	5° to 40°C				60"
50389	TH104-008	25A 2 Stage	15° to 35°C				24"

SATCHWELL ROOM THERMOSTATS — Low & Line Voltage

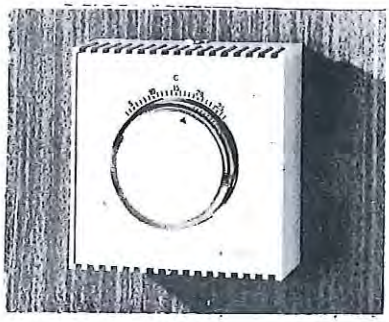
ROOM THERMOSTATS

Types TLX and TLM
Accurately control space temperature by switching suitable mains or low voltage equipment. Types are available for the control of motorised valves, relays, circulating pumps, boiler firing controls, fans and other devices. Suitable for conduit box or surface mounting. Type TLM are heavy duty thermostats suitable for the direct control of heating loads up to 20A.

Approximate size:
90mm high x 86mm wide x 46mm deep.

Accessories:
Ventilated cover for protection against damage, Weather resistant case for exterior use.

For full specification see leaflet DS 1.01.



CAT. NO.	TYPE	SCALE	THERMOSTAT ACTION	RATING	SPECIAL FEATURES
503101	TLX2251	3° to 27°C	On-Off	1A, 24V ac	Adjustable to suit loads of 0.2A to 1.0A
503102	TLX2223	Marked 1 to 5	On-Off	1A, 24V ac	Adjustable to suit loads of 0.2A to 1.0A
503103	TLX2358	3° to 27°C	Changeover	2A, 220-240V ac	Concealed setting & 'Auto/Off' Switch
503106	TLX2356	3° to 27°C	Changeover	2A, 220-240V ac	
503107	TLX2381	3° to 27°C	Changeover	2A, 220-240V ac	With thermometer
503104	TLX2322	Marked 1 to 5	Changeover	2A, 220-240V ac	
503105	TLX2359	3° to 27°C	Changeover	2A, 220-240V ac	With 'deadzone' action
503108	TLX2284	3° to 27°C	On-Off	6A, 220-240V ac	With thermometer
503109	TLX2222	Marked 1 to 5	On-Off	6A, 220-240V ac	
503110	TLX2654	3° to 27°C	On-Off	6A, 220-240V ac	Temperature setback
503111	TLM2253	3° to 27°C	On-Off	20A, 220-240V ac	
503112	TLM2604	3° to 27°C	On-Off	20A, 220-240V ac	Indicated 'On' position
503113	TLM2628	3° to 27°C	On-Off	20A, 220-240V ac	Indicated 'Off' position
503114	TLM2655	3° to 27°C	On-Off	20A, 220-240V ac	Temperature setback
503115	TLM2206	Marked 1 to 5	On-Off	20A, 220-240V ac	
503118	TLM2257	—15° to +10°C	On-Off	20A, 220-240V ac	
503119	TLM2453	3° to 27°C	On-Off	20A, 220-240V ac	Concealed setting
503120	TLM2402	3° to 27°C	On-Off	20A, 220-240V ac	Non-ventilated cover
503121	TLM2802	10° to 40°C	Changeover	Main contact 20A, back contact 5A, 220-240V ac	

HUMIDITY CONTROLS

PENN W42, W43, W45 SERIES HUMIDISTATS

W42AA-1

W43
Vert. Faceplate

W43
Horiz. Faceplate

W45

SPDT contact action provides control of humidifying or dehumidifying equipment with the same control. Flush mounting bracket to fit standard outlet box regularly supplied.

The W42AA-1 mounts on a flat surface or on a standard 2" x 4" outlet box. Dial lock feature. Packed in reshippable carton. The W42 features a human hair sensing element.

Types W43A and W45AA have field adjustable high and low limit stops. Stops can be set for locked setting.

W43A-14 is a universal replacement model which includes a horizontal faceplate kit. Converts to key adjustment by removing and retaining knob for the key. The W43 features a human hair sensing element.

Type W45AA-2 is designed for agricultural and industrial applications where high humidity control is required. A typical application is fruit and vegetable storage areas. The W45 features a Cellulose Acetate Butyrate sensing element.

Max. Operating Ambient: 100° F.

TO ORDER: Specify Catalog Number only.

Type W43A, W45AA

Motor Ratings	120 V.	208 V.	240 V.
A.C. Full Load Amps.	6.0	3.5	3.0
A.C. Locked Rotor Amps.	36.0	21.0	18.0
Pilot Duty — 125 VA. 24 to 277 V. A.C.			

Type W42AA: Pilot Duty only — 125 VA. at 120/240 V. A.C.

CAT. NO.	TYPE	SWITCH ACTION	RANGE	DIFF.% R.H. APPROX.	VOLTAGE
5061	W42AA-1	SPDT	10 to 90% R.H.	4	Low or Line
5062	W43A-14*	SPDT	0 to 70% R.H.	4	Low or Line
5065	W45AA-2**	SPDT	50 to 90% R.H.	4	Low or Line

* Includes faceplate for horizontal mounting. The plate is for "on-the-job" installation over vertical plate. Can field convert to concealed adjustment, specify plate kit PLT213-6 (vertical) or PLT213-5 (horizontal).

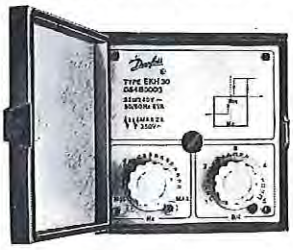
** Can field convert for horizontal mounting by ordering faceplate kit PLT222-4.

Danfoss Hygrostats Types EKH 20 and 30

Type EKH is an electronic hygrostat used for controlling the relative humidity of the air (% RH), for example, in air-conditioning, refrigeration, and processing plants.

Type EHK 20 is a two-stage hygrostat with adjustable differential. EKH 20 can be used either to humidify or dehumidify the air.

Type EHK 30 is a three-stage hygrostat with adjustable dead zone and a differential which is half the value of the dead zone setting. EKH 30 can be used to control both humidification and dehumidifcation. Furthermore EKH 30 can be used for controlling two-stage humidification or two-stage dehumidification.



Control unit

Room sensor holder ESRH

Duct sensor holder ESDH

Sensor socket ESMH

Sensor element ESEH

Technical data

Control unit

Type	EHK 20	EHK 30
Regulation	2-stage	3-stage
Range	45 - 95 % RH	
Differential (DIFF)	1 - 8 % RH adjustable	½ × Nz-value
Dead zone (Nz)		2 - 8 % RH adjustable
Dial graduation	approx. 1 % per dividing line	
Ambient temperature	−15 - +60°C (+5 - +140°F)	
Mains voltage	220/240 V~ $^{+10}_{-15}$ % 50/60 Hz	
Rating	max. 4 A at 250 V	
Power consamption	6 VA	
Output relays	One SPDT req.	Two SPDT req.
Electrical life	VDE Class II	
Screwed cable entries	Pg 13.5	
Enclosure	IP 54 to IEC 144 and DIN 40050	
Shock and vibration proofness	2 g in the range from 0 - 1000 Hz	

Sensors

Ranges at 25°C (77°F) sensor temperature	45 - 65 % RH (red marking) 60 - 80 % RH (yellow marking) 75 - 95 % RH (blue marking)
Sensor temperature range	0 - +40°C (+32 - +104°F)
Ambient temperature range	−15 - +60°C (+5 - +140°F)

CAT. NO.	DESCRIPTION		CODE NO.
50626	Control unit	Type EKH 20	84B0002
50627	Control unit	Type EKH 30	84B0003
50631	Room sensor holder	Type ESRH	84B0021
50633	Duct sensor holder	Type ESDH	84B0023
50632	Sensor socket For use when sensing element is mounted on control unit	Type ESMH	84B0022
50628	Sensing element, red marking 45-65% RH		84B0103
50629	Sensing element, yellow marking 60-80% RH		84B0104
50630	Sensing element, blue marking 75-95% RH		84B0105

GENERAL PURPOSE INDUSTRIAL THERMOSTATS

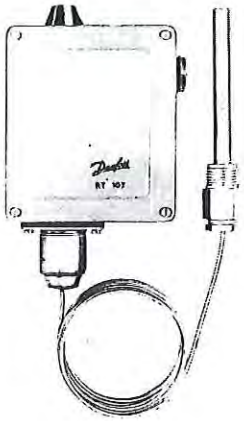
Danfoss

Thermostats Type RT

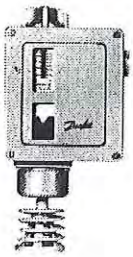
Danfoss Type RT Thermostats are temperature-controlled electric switches for use in refrigeration and air-conditioning systems and in many industrial applications.

RT 140

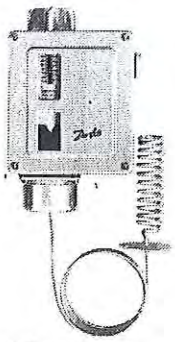
RT 102



RT 107



RT 16L



RT 140L

RT 270
differential thermostat

CAT. NO.	TYPE	CODE (1) No.	CAP. LENGTH m	RANGE °C	RANGE °F	ADJ. MECHANICAL DIFFERENTIAL AT MIN. TEMP. SETT. °C	ADJ. MECHANICAL DIFFERENTIAL AT MAX. TEMP. SETT. °C	(2) MAX. BULB TEMP. °C	BULB TYPE & REMARKS
1427	RT4	17-5036	—	–5/+30	+23/+86	1 - 7	0.6 - 4	70	Rigid Coil Sensor
14223	RT14	17-5099	2	"	"	1.5 - 8	1.5 - 8	150	Cyl. Remote Bulb
14224	RT14	17-5100	3	"	"	"	"	"	"
14225	RT14	17-5101	5	"	"	"	"	"	"
14226	RT14	17-5102	8	"	"	"	"	"	"
50833	RT14	17-5103	10	"	"	"	"	"	"
14235	RT101	17-5003	2	+25/+90	+77/+194	2 - 11	3 - 24	300	Remote B & Pocket
14250	RT101	17-5006	3	"	"	"	"	"	"
14237	RT101	17-5024	8	"	"	"	"	"	"
50811	RT101	17-5025	10	"	"	"	"	"	"
14238	RT102	17-5147	2	"	"	2 - 10	"	"	Cap. Tube Bulb
5082	RT103	17-5155	—	+10/+45	+50/+113	1.5 - 12	1.5 - 12	70	Rigid Coil Sensor
14242	RT107	17-5135	2	+70/+150	+158/+302	5 - 30	1.5 - 10	215	Remote B & Pocket
14243	RT107	17-5140	5	"	"	"	"	"	"
50842	RT120	17-5205	2	+120/+215	+248/+419	"	"	260	Cyl. Remote Bulb
50843	RT120	17-5206	5	"	"	"	"	"	"
50844	RT120	17-5207	8	"	"	"	"	"	"
50822	RT123	17-5220	2	+150/+250	+302/+482	"	"	300	"
50823	RT124	17-5227	2	+200/+300	+392/+572	"	"	350	"
5083	RT140	17-5236	2	+15/+45	+59/+113	1.5 - 9	1.5 - 11	240	Coiled/Mtg. Flange
14246	RT270	17D-0031	2 x 5	0/+15	Fixed 2	LT Work. Range –30/+40		65	2 Remote Bulbs
WITH ADJUSTABLE DEAD ZONE					Mech. Diff.	Max. Dead Zone			
14254	RT16L (3)	17L-0024		0/+38	1.0	5	2	100	Rigid Coil Cap Sens.
14255	RT140L (3)	17L-0031	2	+15/+45	1.2	6.8	6.8	240	Coiled/Mtg. Flange

(1) With SPDT Switch Code No. 17-4030 **CAT. NO. 14127**

(2) Ambient temperature for housing: —40 to +70°C.

(3) With Dead Zone Switch Code No. 17-4032 **CAT. NO. 14128**

Accessories available on application.

7

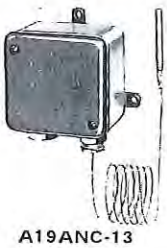
GENERAL PURPOSE INDUSTRIAL THERMOSTATS
PENN TEMPERATURE CONTROLS

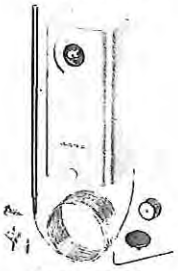

A19AAC-44


A19AAC-13


A19ADN-5


A19AAE-16


A19ANC-13


A19AAB-42


A19EBA, A19EBB, A19EBC

CAT. NO.	TYPE	SWITCH ACTION APPLICATION	RANGE °C	RANGE °F	DIFFERENTIAL °C	DIFFERENTIAL °F	BULB & CAPILLARY	RANGE ADJUST.
HIGH RANGE TEMPERATURE								
† 50851	A19AAB-32	SPST, Open High Remote Bulb Thermostat	0 to 43	32 to 110	1.9	3½	3/8" x 4¾" copper 6' Cap. **	Screwdriver Slot External Scale
† 50853	A19AAB-37	SPST, Open High Oven Thermostat	40 to 150	104 to 302	3.9	7	3/16" x 10-1/8" copper 6' Cap.	Knob External Scale
† 50854	A19AAB-42	SPST, Open High Oven Thermostat	100 to 290	212 to 554	5.6	10	3/16" x 5-5/8" copper 6' Cap.	Convertible
†* 50855	A19AAC-44	SPDT Dual Fuel Changeover	—35 to +10 plus bulb shield	—31 to +50	2.8	5	3/8" x 4" copper 6' Cap. **	Screwdriver Slot Internal Scale
† 50856	A19AAC-13	SPDT	40 to 120	104 to 248	2.8	5	3/8" x 3-7/8" copper 6' Cap. **	Screwdriver Slot External Scale
50861	A19ADN-5	SPST Open High	40 to 120	104 to 248	Manual Reset		3/8" x 3" 6' Cap.	Concealed Screwdriver Slot
50862	A19ADP-3	SPDT	40 to 120	104 to 248	Manual Reset Locks Out High		3/8" x 3" 6' Cap.	Concealed Screwdriver Slot

* Locking cover and bulb shield assembly are standard on Type A19AAC-44.
** With 3" bulb support.
Maximum bulb temperature: A19AAB-32 and A19AAC-44, 60°C (140°F); A19AAB-44, 177°C (350°F); A19AAB-42, 327°C (620°F); A19AAC-13, A19ADN-5 and A19ADP-3, 143°C (290°F).

DIRECT MOUNTED — MEDIUM TEMPERATURE

50858	A19AAF-27	SPDT	10 to 55	50 to 130	1.1 Min. Adjust.	2 Min. Adjust.	.29" x 2-11/16" Well. Direct Immers'n½"NPT	Knob
Maximum bulb temperature 77°C (170°F).								

WIDE RANGE — ADJUSTABLE DIFFERENTIAL

50857†	A19ABC-60	SPDT	10 to 55	50 to 130	1.9 to 8	3½ to 14	3/8" x 5" 8' Cap.	Knob
Maximum bulb temperature 77°C (170°F).								

THERMOSTATS FOR CROP DRYING

50859†	A19AAE-16	SPST Open High	25 to 80	77 to 176	0.8 Fixed	1½ Fixed	1-1/8" x 1¼" Copper-coiled 10' Cap.	Knob Ext. Scale
Maximum bulb temperature 93°C (200°F).								

INDUSTRIAL THERMOSTAT RAINPROOF ENCLOSURE

50860†	A19ANC-13	SPDT	—15 to 65	5 to 149	3 Fixed	6 Fixed	.29" x 2½" 10' Cap.	Screwdriver Slot
Maximum bulb temperature 88°C (190°F).								

FAN OR LIMIT LIQUID EXPANSION

CAT. NO.	TYPE	APPLICATION	SWITCH ACTION	RANGE °C	RANGE °F	DIFFERENT. MIN.	DIFFERENT. MAX.	ADJ. STOP MIN.	ADJ. STOP MAX.	BULB LGTH.	MAX. BULB TEMP.
50864	A19EBA-7	Furnace Fan Control	Close High	10 to 120	50 to 248	5°C (9°F)	20°C (36°F)	63°C (145°F)	121°C (250°F)	152 mm (6")	143°C (290°F)
50863	A19EBB-1	Warm Air Limit	Open High	38 to 177	100 to 350	5°C (9°F)	20°C (36°F)	116°C (240°F)	177°C (350°F)		190°C (375°F)
50865	A19EBC-1	Counter-Flow Warm Air Furnace	SPDT	38 to 177	100 to 350	5°C (9°F)	20°C (36°F)	116°C (240°F)	177°C (350°F)		190°C (375°F)
50866	A19EDB-3	Warm Air Limit Which Locks Out	Open High	40 to 180	104 to 356	Manual Reset		116°C (240°F)	177°C (350°F)		190°C (375°F)

ELECTRICAL RATINGS: Refer Tech Page 144-g.
For A19ADN-5 and A19ADP-3 Refer Table No. 2 Tech. Page 144-g.

Underlined Models have Metric Scales. Refer Tech. Page 144-h for English to Metric Cross Reference Chart.

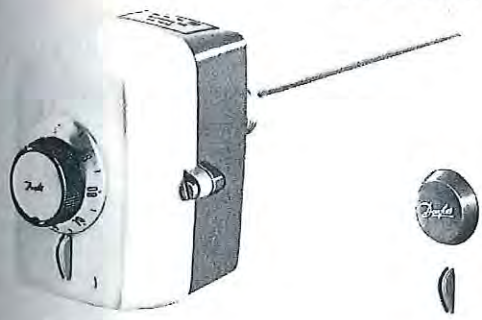
➡ UNIVERSAL REPLACEMENT with removable knob and tension clip for conversion to knob, screwdriver or concealed adjustment. Remote bulb models complete with 5/8" mounting clip.

Note: Cat. Nos. marked with (†) are ALSO detailed in the Refrig./Air Conditioning Section 1 of this Catalogue — Refer Table below.

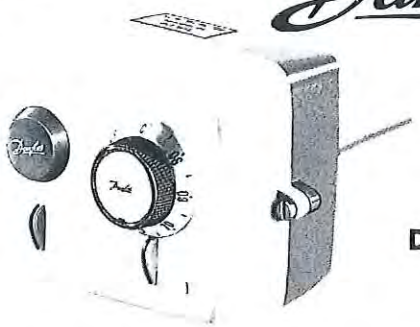
TYPE	INDUST. SECT. CAT. NO.	REFRIG. AIR COND. CAT. NO.
A19AAB-32	50851	14443
A19AAB-37	50853	14445
A19AAB-42	50854	14446
A19AAC-44	50855	14444
A19AAC-13	50856	14441
A19ABC-60	50857	1444
A19AAE-16	50859	14447
A19ANC-13	50860	14436

BOILER THERMOSTATS

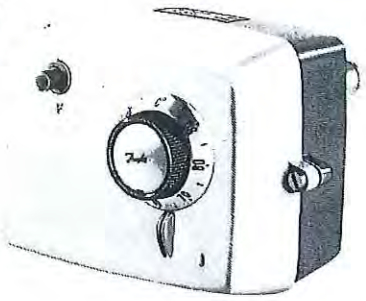
Danfoss



KT



DTS



DTO

TYPE	CAT. NO.	CODE NO.	TEMPERATURE		BULB POCKET			Contact System SPST TPST (Cut-out on a rise in temp.)	Contact Load
			Range as marked on the control	Differential	Thread BSP-F	LENGTH in.	LENGTH mm.		
KT Boiler T'Stat	5115	59B0125	25-95°C	6°C	1/2"	4.3/8	110	SPST	6A, 380V, AC 0.5A, 250V, DC
	5116	59B0126				6	150		
DTO High Temp. Cut-out + Boiler T'Stat	51114	59F0185	93°C 25-95°C	15°C 6°C	3/4"	3.1/2	90	TPST SPST	6A, 380V, AC 0.5A, 250V, DC (High Temp. Cut-out 6A, 250V, DC)
	51116	59F0192	100°C 63-87°C	10°C 6°C	3/4"	4.3/8	110	SPST	
	51117	59F0193	105°C 25-95°C	10°C 6°C	3/4"	6	150	SPST	
DTM High Limit T'Stat + Boiler T'Stat	51118	59F0150	50-110°C 25-95°C	11°C 6°C	1/2"	4.3/8	110	SPST	6A, 380V, AC 0.5A, 250V, DC
DTS High Temp. Cut-out + Boiler Thermostat	51124	59F0182	25-95°C	6°C	1/2"	4.3/8	110	SPST Safety T'Stat Cut-out 110°C	6A, 380V, AC 0.5A, 250V, DC
	51125	59F0183	25-95°C	6°C	1/2"	4.3/8	110	SPST Safety T'Stat Cut-out 100°C	

PENN

A19ABC-26

A19ABC-27

Universal replacement control for open high, open low or SPDT applications. Liquid filled element provides rapid response to temperature change. Control furnished with well assembly for ½" tappings. Adjustable differential. A truly universal replacement. All controls supplied with well assembly. Not available less well assembly.

Maximum Bulb Temperature: 290° F.

TO ORDER: Specify Catalog Number only.

ELECTRICAL RATINGS

Motor Ratings	120 V.	240 V.
A.C. Full Load Amps.	10.0	6.0
A.C. Locked Rotor Amps.	60.0	36.0
Pilot Duty — 125 VA. 24 to 600 V. A.C.		

CAT. NO.	Type	Switch Action Application	Range °C	Range °F	Differential °C	Differential °F	Well Conn.	Range Adjuster
→ 51151*	A19ABC-26	Open High Open Low (Operating and Circulator) SPDT	40 to 120	104 to 248	3 to 13	6 to 24	1/2"	Convertible
→ 51152*	A19ABC-27	Remote Mtg. (Operating and Circulator) SPDT	40 to 120	104 to 248	3 to 13	6 to 24	1/2" 6' Cap.	Convertible
51153*	A19ADB-27	Open High with Lockout - Reset Open on Rise	40 to 120	104 to 248	Manual Reset (Locks out High)		1/2"	Knob
Maximum Bulb Temperature: 143°C (290°F).								

* Also detailed in Refrig./Air Cond. Section 1.

Underlined Models have Metric Scales — Refer Tech. Page 144-h for English to Metric Cross Reference Chart.

→ UNIVERSAL REPLACEMENT with removable knob and tension clip for conversion to knob, screwdriver or concealed adjustment.

7

OUR BIG SELECTION ANSWERS YOUR EVERY NEED AND PRICED RIGHT TOO

591

HYDRONIC AND WARM AIR CONTROLS

Danfoss SURFACE THERMOSTAT TYPE AT

Type AT is a simple and sturdy Surface Thermostat which is easily and quickly installed. It is designed to control the temperature of any hot water pipe or heated surface to which the metal base of the thermostat is attached.

A Surface Thermostat is particularly useful as the method of mounting obviates the necessity of draining the system of water.

As will be seen from the temperature range of the instrument, 30-90°C (80-200°F), a primary application of the AT is to control and regulate Boiler Temperature when the instrument is located on the flow pipe of the boiler. The lagging of the pipe should simply be stripped off at the intended point of fitting and the thermostat can then be secured to the pipe by means of the two spiral bands supplied with the thermostat.

CONSTRUCTION

The bimetal temperature element is contained in a cast silumin metal base and actuates the switch through deflections caused by temperature variations.

The totally enclosed switch is the well proven Danfoss "Mini Contact" which has a Single Pole Changeover (S.P.D.T.) contact system with positive snap action.

The tight fitting cover is made of moulded plastic for best insulation and is secured by two screws.

A particular advantage and design feature is the changeover switch action, Breaking Circuit on Rise of Temperature, and, on the other pole, Making Circuit on Rise of Temperature.

The AT Thermostat may therefore be used to control a Two-Position (On-Off) Damper Motor or Motorised Valve. (3-wire connection), or, more usually, in conjunction with another primary controller, when the AT unit serves as a secondary low or high limit control to the primary controller.

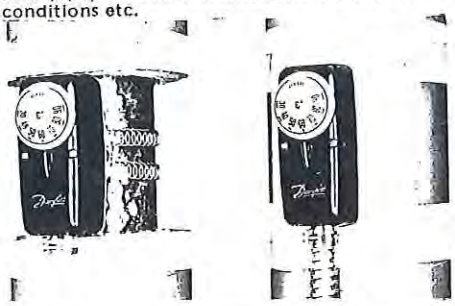
INSTALLATION

The location selected must be properly representative of the temperature to be controlled. Remove any insulation material (lagging) from the pipe, as shown in the sketch. Before fitting the thermostat on the pipe, the pipe surface should be thoroughly cleaned. A capsule of metallic paste is provided with each thermostat. The paste has a high thermal conductivity and should be liberally applied between the contact surfaces of the thermostat base and cleaned pipe surface. The thermostat should be secured to the pipe by means of the two spiral bands supplied with the thermostat.

The pipe should then be re-insulated, so that the lagging reaches up to and covers the base of the thermostat. The two spiral bands provided are suitable for pipes of ½" — 3". It does not matter whether the thermostat is mounted on a vertical or horizontal pipe, above or below the pipe, provided that proper thermal contact is made between the pipe surface and the thermostat base.

DIFFERENTIAL

The test differential of the thermostat is about 3°C (5.5°F). In practice an operating differential of 6° to 10°C (10° to 18°F) must be anticipated (under adverse conditions possibly more), due to the nature of the surface of the riser pipe, the wall thickness of the pipe, the flow conditions etc.



Switch S.P.D.T., 6A 440V a.c. 0, 1A 250 V d.c.

Temperature range : 30—90°C (80—200°F).

Operating differential : 6—10°C (10—18°F).

Max. ambient temperature is 100°C (212°F).

Max. temperature of contact base is 125°C (255°F).

Code No.41E0000 (Celsius scale).

CAT. NO.	5131.

PENN HOT WATER STRAP-ON

A19DAC-9

SPDT strap-on surface type hot water control for direct or reverse action. May be used as either an open high control or as an open low control. The terminals of the contact unit are color coded to simplify installation. May be mounted on either horizontal or vertical riser pipe.

ELECTRICAL RATINGS

Motor Ratings	120 V.	240 V.
A.C. Full Load Amps.	10.0	6.0
A.C. Locked Rotor Amps.	60.0	36.0
Pilot Duty — 125 VA., 120 to 240 V. A.C.		

CAT. NO.	TYPE	SWITCH ACTION	RANGE °C(°F)	Differential °C (°F) FIXED	MOUNTING
51351	A19DAC-9	SPDT	38 to 116 (100 to 240)	5.6 (10)	Clamp-on Strap Supplied

Max. Case Ambient Temp. 60°C (140°F), Max. Sensing Element Temp. 143°C (290°F)

A25 SERIES WARM AIR LIMIT CONTROL — MANUAL RESET

A25AN-9, A25CN-4

Normally located in a return air duct system and wired to shut down air conditioning or ventilating fans when the temperature of the air becomes excessive, as from a fire.

The reset is a "trip-free" type device and will not permit restart until the reset lever is released. Rod and tube type sensing element assures positive control action. Duct mounting flange is included.

ELECTRICAL RATINGS

Motor Ratings	120 V.	208 V.	240 V.	277 V.
A.C. Full Load Amps.	16.0	9.2	8.0	—
A.C. Locked Rotor Amps.	96.0	55.2	48.0	—
Non-Inductive	16.0 Amps. at 120/277 V. A.C.			
Pilot Duty — 125 VA. 24 to 600 V. A.C.				

CAT. NO.	TYPE	SWITCH ACTION	RANGE °C (°F)	RANGE ADJUSTER	DIAL STOP
51355*	A25AN-9	SPST Open High	—4 to 102 (25 to 215)	Knob	High Limit Set at 52°C (125°F)
51356*	A25CN-4	SPDT	—4 to 102 (25 to 215)	Knob	High Limit Set at 52°C (125°F)

Maximum Element Temperature 149°G (300°F)

HOT WATER SINGLE FUNCTION TWO POLE — HEAVY DUTY

A72CA-1

CAT. NO.	TYPE	SWITCH ACTION	RANGE °C (°F)	Differential °C (°F) MIN.	Differential °C (°F) MAX.	WELL CONN. SIZE	ELECTRICAL RATING
51368	A72CA-25	Open on Rise	60 to 104 (140 to 220)	3.0 (6)	25 (45)	1/2" NPT	Refer Table 13 Tech. Page 144-g

Maximum bulb temperature: 121°C (250°F).

* Cat. Nos 51355 (A25AN-9) & 51356 (A25CN-4) ALSO in Refrig./Air Cond. Section 1 as Cat. Nos. 14448 & 14449.

Underlined Models have Metric Scales — Refer Tech. Page 144-h for English to Metric Cross Reference Chart.

UNIVERSAL REPLACEMENT with removable knob and tension clip for conversion to knob, screwdriver or concealed adjustment.

HYDRONIC AND WARM AIR CONTROLS

Satchwell

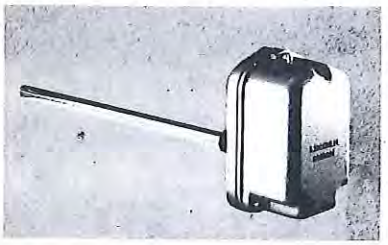
STEM TYPE THERMOSTATS

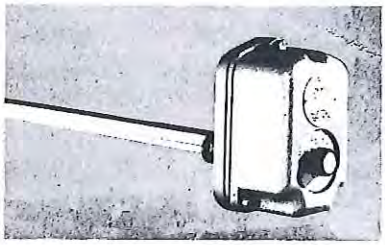
STEM TYPE THERMOSTATS

W Series — Immersion and Air Types
The W Range provides on-off control of electric heaters, solenoid valves, motorised valves or damper actuators. Types WRR and WTN have manual reset for high limit applications.

Construction:
WR, WRR:
Die-cast metal base with moulded plastic switch cover.
WT, WTN, WPS, WTO, WPO:
Die-cast metal base and cover.
WT, WTN, WTO:
Waterproofed to CEE 2-drop requirements.
Stem:
Aluminium brass and nickel-iron.
Pocket:
(Immersion Types) Corrosion — resisting bronze screwed ½" BSP (Mild Steel and Stainless Steel available).
S.P.C.O. Switch Rating:
Main contact: 15A,250-440V ac
Back contact: 5A,250-440V ac

Approximate head size:
WR and WRR
87mm high x 68mm wide x 82mm deep.
WT, WTN & WPS
132mm high x 87mm wide x 95mm deep.





CAT. NO.	Immersion Types WR, WRR, WT, WTN and WPS			
	THERMOSTAT TYPE	SCALE °C	STEM LENGTH	SETTING KNOB
5135	WR2201	5 to 105	300mm	Exposed
5136	WR2254	50 to 150	300mm	Exposed
5137	WRR2203	50 to 150	300mm	Exposed
5138	WT2251	5 to 105	300mm	Concealed
5139	WT2254	50 to 150	300mm	Concealed
51310	WT2206	80 to 200	300mm	Concealed
51311	WT2256	50 to 300	300mm	Concealed
51312	WT2451	0 to 65	450mm	Concealed
51313	WTN2203	25 to 130	300mm	Concealed
51314	WPS2352	5 to 110	300mm	Exposed
	Air Types WTO and WPO			
	THERMOSTAT	SCALE °C	STEM LENGTH	SETTING KNOB
51315	WTO2252	−15 to +110	300mm	Concealed
51316	WTO2256	50 to 300	300mm	Concealed
51317	WTO2452	0 to 80	450mm	Concealed
51318	WTO2651	0 to 50	600mm	Concealed
51319	WPO2301	−20 to +100	300mm	Exposed

Approximate size:
132mm high x 87mm wide x 95mm deep.

For full specification see leaflet DS 1.05.

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THIS CATALOGUE INCLUDES ONLY A SMALL SELECTION OF AVAILABLE SATCHWELL EQUIPMENT
We will be pleased to supply additional information on the comprehensive range available, together with Technical literature

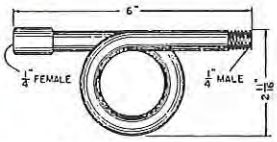
WE BELIEVE IN GOOD QUALITY PARTS AND EQUIPMENT, RELIABLE SERVICE, BACKED BY LARGE STOCK HOLDINGS SUPPLIED BY REPUTABLE AND TRUSTWORTHY COMPANIES

PRESSURE AND VACUUM SWITCHES

PENN

Controls available with SPST, DPST or 4-wire, two circuit contact units. Contacts for line or low voltage. Pressure connector : ¼" male NPT (0 - 103 kPa only) [0 - 15 psig] ; ¼" female NPT (all other ranges).
Part No. TBG16A-600 Siphon is supplied with all controls except models with 0 to 103 kPa (0 to 15 psig) range.

SERIES P47



PART NO. TBG16A-600
Regularly supplied with steam pressure controls for service over 15 lbs. gauge pressure.

CAT. NO.	TYPE	NUMBER OF POLES	RANGE		DIFFERENTIAL MIN.		DIFFERENTIAL MAX.		MAX. ALLOW. PRESSURE	
			kPa	PSIG	kPa	PSI	kPa	PSI	kPa	PSIG
CONTACTS OPEN ON RISE — AUTOMATIC RESET										
5161	P47AA-21	1	0 to 103	0 to 15	7	1	55	8	345	50
5164	P47AA-22	1	345 to 1655	50 to 240	138	20	690	100	2069	300
5162	P47AA-23	1	—68 to 345	20" to 50	34	5	241	35	1241	180
5163†	P47AA-15	1	0 to 1034	0 to 150	83	12	276	40	2241	325
5165	P47CA-3	2	—68 to 345	20" to 50	34	5	241	35	1241	180
5166	P47CA-7	2	0 to 1034	0 to 150	83	12	276	40	2241	325
CONTACTS OPEN ON RISE — MANUAL RESET										
5167	P47AB-1	1	0 to 103	0 to 15	Manual Reset				345	50
5168	P47AB-2	1	—68 to 345	20" to 50	Manual Reset				1241	180
5169	P47AB-3	1	345 to 1655	50 to 240	Manual Reset				2069	300
51610	P47AB-4	1	0 to 1034	0 to 150	Manual Reset				2241	325
51612	P47CB-1	2	—68 to 345	20" to 50	Manual Reset				1241	180
51613	P47CB-2	2	345 to 1655	50 to 240	Manual Reset				2069	300
51611	P47HB-1	2	0 to 103	0 to 15	Manual Reset				345	50
CONTACTS CLOSE ON RISE — AUTOMATIC RESET										
51614	P47BA-1	1	0 to 103	0 to 15	7	1	55	8	345	50
51615†	P47BA-10	1	—68 to 345	20" to 50	34	5	241	35	1241	180
51616†	P47BA-9	1	0 to 1034	0 to 150	83	12	276	40	2241	325
SPDT — 4 WIRE TWO CIRCUIT* — AUTOMATIC RESET										
51619	P47GA-25	Two	0 to 1034	0 to 150	83	12	276	40	2241	325
51617	P47GA-26	Single	0 to 103	0 to 15	7	1	55	8	345	50
51618	P47GA-11	Pole	—68 to 345	20" to 50	34	5	241	35	1241	180
51620	P47GA-12	Contacts	345 to 1655	50 to 240	138	20	690	100	2069	300

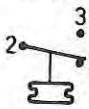
* Main contacts (Line M2) open on rise, simultaneously auxiliary contacts (Line M1) close.
Note: † Metric version "Range" is in units of kg/cm² — approx. equivalents in kPa and PSIG are shown in Table above.
Electrical Ratings: Refer Manufacturers literature.
Underlined Models have Metric Scales — Refer Tech. Page 144-h for English to Metric Cross Reference Chart.

Danfoss

RT 113

SPDT CONTACT SYSTEMS

Changing over from one circuit to another



10(4)A 380V.AC 12W 220V.DC. Code No. 17-4030

CAT. NO.	TYPE	CODE (1) NO.	RANGE kPa (PSIG)	DIFFERENT. kPa (PSI)	MAX.(2) TEST PRESS. kPa (PSIG)	PERMISS. AMBIENT TEMP. °C (°F)	PRESS. CONNECTION
51638 (14276)*	RT 1	17-5245	—81 to 490 (24" to 71)	49 to 159 (7.1 to 23)	2455 (356)	—40/+70 (—40/+158)	1/4" Flare
51631 (14278)*	RT5(3)	17-5250	193 to 1669 (28 to 242)	98 to 393 (14.2 to 57)	2455 (356)	—40/+70 (—40/+158)	1/4" Flare
51628	RT112	17-5191				—40/+70 (—40/+158)	
51627	RT113	17-5196				—40/+70 (—40/+158)	
51630 (14282)*	RT116	17-5203	98 to 979 (14 to 142)	19 to 127 (2.8 to 18.5)	2455 (356)	—40/+70 (—40/+158)	3/8" BSP External
51639 (14284)*	RT117	17-5295	979 to 2944 (142 to 427)	59 to 293 (8.5 to 57)	3448 (500)	—40/+70 (—40/+158)	3/8" BSP External
51626	RT121	17-5215				—40/+70 (—40/+158)	3/8" BSP External
51629 (14280)*	RT200	17-5237	19 to 586 (2.8 to 85)	19 to 117 (2.8 to 17)	2455 (356)	—40/+70 (—40/+158)	3/8" BSP External

CAT. NO. 14127

DESCRIPTION	CAT. NO.	TYPE	CODE(1) NO.	LP WORKING RANGE	DIFF. RANGE	MECH. DIFF.	MAX(2) TEST PRESS.	PERMISSIBLE AMBIENT TEMP.	PRESSURE CONNECTION
Diff. Press. Controls	51632 (14290)*	RT260A	17D-0021	—100 to 1175kPa (29.5"Hg to 170 psig)	49 to 392 (7 to 57)	fixed 30 (fixed 4.3)	2455 (356)	70°C	3/8" BSP ext. +ϕ6/ϕ 10mm
	51633 (14291)*	RT262A	17D-0025	—100 to 588 (29.5"Hg to 85 psig)	10 to 147 (1.4 to 21)	fixed 10 (fixed 1.4)	1175 (170)	70°C	weld nipple

(1) With SPDT switch, code No. 17-4030. (2) All pressure controls can withstand a full vacuum. (3) With a seal cap, code No.17-0895, instead of a knob.
* CAT. NO. in (brackets) are those used in Refrig/Air Cond. Section 1.

PENN AIR COMPRESSOR SWITCHES

P16 SERIES HEAVY DUTY AIR COMPRESSOR SWITCHES

PRESSURE RANGES TO 1380 kPa (200 PSIG)

Pressure switch for air compressors and other pressure equipment.

ELECTRICAL RATINGS

Volts	Single Phase A.C.	Polyphase A.C.	D.C.
120	2 H.P.	3 H.P.	1 H.P.
240	3 H.P.	5 H.P.	1 H.P.
440-550	3 H.P.	5 H.P.	—
32	—	—	½ H.P.

P16AA-1

P16BA-1

CAT. NO.	TYPE	Range Min.Cut-in to Max. Cutout kPa(psig)	Diff. Adj. kPa(psi) Min.	Diff. Adj. kPa(psi) Max.	Factory Set. Open kPa (PSI)	Factory Set. Close kPa (PSI)	No. of Poles	Pressure Connector FNPTF
NO VALVE								
5201	P16AA-10	138 to 1379 (20 to 200)	165 (24)	455 (66)	1034 (150)	827 (120)	2	1/4"
2–WAY VALVE								
5202	P16BA- 1	138 to 1379 20 to 200)	165 (24)	455 (66)	1034 (150)	827 (120)	2	1/4"

Contacts OPEN on rise on the above listed switches.

STANDARD DUTY AIR COMPRESSOR SWITCHES

5208	P61NA- 3	620 to 1034 (90 to 150)	172 (25)	276 (40)	862 (125)	655 (95)	2	1/4"

STANDARD SWITCHES LOW PROFILE ENCLOSURE

P61BA-3

"Low profile" case makes switch easy to wire. Two pole, single throw contacts open on rise. Pressure switch for domestic water systems, air compressors (not requiring mechanical release valves and where pressure does not exceed 70 psig). Also for miscellaneous applications which are not harmful to the Buna-N diaphragm or the plated steel diaphragm housing.

P61BA-3 is supplied with separate "snap-in" pulsation orifice for universal replacement on all pumps.

ELECTRICAL RATINGS

Volts	Single Phase A.C.	Polyphase A.C.	D.C.
120	1 H.P.	1 H.P.	—
240	1 H.P.	1 H.P.	—
32	—	—	¼ H.P.

52012	P61BA- 3	103 to 483 (15 to 70)	103 (15)	172 (25)	276 (40)	138 (20)		1/4"
52015	P61BC- 1*	103 to 483 (15 to 70)	103 (15)	172 (25)	276 (40)	138 (20)		1/4"

* With manual "OFF" lever.

$I_e = 9A\ (AC_3)$ at
$U_e = 500V\sim$

Danfoss TRIPLE-POLE PRESSURE SWITCHES TYPES PS and PSU

The pressure switches, Types PS and PSU, are designed for automatic control of compressors and pressurised water plants. Type PSU, fitted with an unloader valve is designed for pressure relief on starting.

CAT. NO.	TYPE	CODE NO.	CUT-OUT PRESS. RANGE kPa	CUT-OUT PRESS. RANGE PSIG	MINIMUM DIFFERENTIAL kPa	MINIMUM DIFFERENTIAL PSI	MAXIMUM DIFFERENT. kPa	MAXIMUM DIFFERENT. PSI
52027	PS 4B	31E0171	96 - 393	14 - 57	59 - 69	8.5 - 10	393	57
52031	PS 9B	31E0175	245 to 931	35.5 to 135	117 - 179	17 - 26	931	135
52032	PSU 9B	31E0176						
52035	PS 15B	31E0179	690 to 1469	100 to 213	165 - 227	24 - 33	979	142
52036	PSU15B	31E0180						

7

TELEX FOR FAST SERVICE

TO GIVE OUR CUSTOMERS EVEN FASTER SERVICE WE HAVE INSTALLED TELEX IN MOST OF OUR BRANCHES. IF YOU ARE A TELEX SUBSCRIBER YOU CAN SEND YOUR ORDER DIRECT BY TELEX. TELEX NUMBERS ARE LISTED AT THE FRONT OF THIS CATALOGUE.

PENN PUMP PRESSURE SWITCHES

1 H.P. STANDARD

240 V. 10 A
Cover and Earth Screw

Compact, NEMA 1 case. Two pole, single throw contacts open on pressure rise. Pressure switch for domestic water systems, air compressors (not requiring mechanical release valves and where pressure does not exceed 483 kPa [70 psig]). Also for miscellaneous applications which are not harmful to the Buna-N diaphragm or the plated steel diaphragm housing. P61AA-6 supplied with separate "snap-in" pulsation orifice for universal replacement. If pulsation isn't needed it can be discarded.

P61AA

CAT. NO.	TYPE	RANGE MIN. CUT-IN TO MAX. CUT-OUT		DIFFERENTIAL ADJUSTMENT				PULSATION ORIFICE
				MINIMUM		MAXIMUM		
		kPa	PSIG	kPa	PSI	kPa	PSI	
5223	P61AA - 6	103 to 483	15 to 70	103	15	172	25	Yes (Snap-in)

→ UNIVERSAL REPLACEMENT — Replaces: Square D FSG-2, Furnas 69BA8, 69WA44.

P61 SERIES PRESSURE SWITCH WITH INDICATOR

P61DA-6

For pumps and air compressors (not requiring release valves). Two pole pressure switch opens contacts on pressure rise. Long life pressure indicating gauge indicates pressure at switch, regardless of switch setting.

Pressure Connector: ¼" FNPTF.

Pulsation Orifice: No.

240 V. 10A. Cover and Earth Screw

ELECTRICAL RATINGS

Volts	Single Phase A.C.	Polyphase A.C.	D.C.
120	1 H.P.	1 H.P.	¼ H.P.
240	1 H.P.	1 H.P.	—
32	—	—	—

CAT. NO.	TYPE	RANGE MIN. CUT-IN TO MAX. CUTOUT kPa (PSIG)	DIFFERENTIAL kPa (PSI)
5224	P61DA - 6	103 to 483 (15 to 70)	103 to 207 (15 to 30)

LOSS OF PRIME PROTECTION WITH MANUAL LEVER

P61BH-1

This two-pole pressure switch opens an electrical circuit should the pressure fall below the switch set point. A typical application is for use on unattended pumping units where protection against loss of water is desired. A built-in lever permits the switch contacts to be manually closed to start the equipment. Switch contacts remain closed during safe operating pressures.

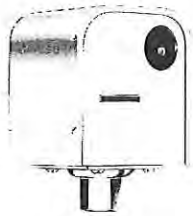
240 V. 10 A.

ELECTRICAL RATINGS

Volts	Single Phase A.C.	Polyphase A.C.	D.C.
120	1 H.P.	1 H.P.	—
240	1 H.P.	1 H.P.	—
32	—	—	¼ H.P.

CAT. NO.	TYPE	RANGE kPa (psig)	FACTORY SETTING		PRESSURE CONNECTOR FNPTF
			CLOSES	OPENS kPa (psig)	
5225	P61BH - 1	62 to 172 (9 to 25)	Manual	62 (9)	1/4"

REVERSE ACTION



P61AG-1

Pressure switch for automatically grounding primary side of magneto ignition circuit on gas engine operated pump or air compressor. Contacts open automatically at predetermined low setting to permit engine to be restarted manually. Also used to open circuit on falling pressure on electrically operated equipment.

240 V. 10 A.

ELECTRICAL RATINGS

Volts	Single Phase A.C.	Polyphase A.C.	D.C.
120	1 H.P.	1 H.P.	—
240	1 H.P.	1 H.P.	—
32	—	—	¼ H.P.

CAT. NO.	TYPE	Switch Action	Range Min.Cutout to Max.Cut-in kPa (psig)	Differential Adj.		Factory Setting		No. of Poles	Pressure Connect. FNPTF
				Min. kPs (PSI)	Max. kPa (PSI)	Open kPa (PSI)	Close kPa (PSI)		
5226	P61AG-1	Close High	69 to 517 (10 to 75)	69 (10)	241 (35)	138 (20)	241 (35)	2	1/4"

COMBINATION OPERATING AND LOSS OF PRIME PROTECTION

TWO POLE CONTACT UNIT

P61BB-2

Model P61BB-1 replaces the standard pump operating switch to maintain supply pressure and also provides shut-down in event pressure falls approximately 10 psi below the switch cut-in setting.

Manual start lever provides "manually closed contact" for starting, permitting pressure build-up to maintain the run position.

240 V. 10 A.

ELECTRICAL RATINGS

Volts	Single Phase A.C.	Polyphase A.C.	D.C.
120	1 H.P.	1 H.P.	—
240	1 H.P.	1 H.P.	—
32	—	—	¼ H.P.

CAT. NO.	TYPE	RANGE kPa (PSIG)	FACTORY SETTINGS kPa (PSIG)			PRESSURE CONNECTOR FNPTF
			OPERATING		LOSS OF PRIME	
			CUTOUT	CUT-IN		
5227	P61BB - 2	124 to 469 (18 to 68)	276 (40)	138 (20)	69 (10)*	1/4"

*Loss of prime cutout will remain approx. 10 psi below the cut-in setting when switch settings are increased.

PENN PUMP PRESSURE SWITCHES

Continued next page (522-a).

PENN PUMP PRESSURE SWITCHES

WEATHER-RESISTANT PRESSURE SWITCH

P61
Weather Tight Case

Two-pole pressure switches for mounting in locations subject to outdoor weather. The P61CA opens an electrical circuit on a rise in pressure. A typical application is for operation of irrigation pumps. The P61CG closes a circuit on a pressure rise. A typical application is a magneto grounding switch on stationary engines.

ELECTRICAL RATINGS

Volts	Single Phase A.C.	Polyphase A.C.	D.C.
120	2 H.P.	2 H.P.	—
240	2 H.P.	3 H.P.	—
32	—	—	¼ H.P.

CAT. NO.	TYPE	SWITCH ACTION	RANGE kPa (psig)	Differential Adj. (psi)		Factory Setting		NO. OF POLES	Pressure Connector FNPTF
				Min.	Max.	Open	Close		
5228	P61CA - 1	Open on Rise	103 to 483 (15 to 70)	103 (15)	207 (30)	276 (40)	138 (20)	2	1/4"

Series P10

ACTION ON INCREASE OF PRESSURE

P10 SERIES LOW PRESSURE CONTROL SINGLE STAGE

P10BC-28
With Bracket No. BKT16A-600

These SPDT pressure controls open or close an electrical circuit from a change in operating pressure.

Typical applications include: Pneumatic systems, control of pumps or small air compressors and pressure-electric interlock of fluid flow systems.

R to Y terminals make (cut-in) on pressure rise.

Maximum Allowable Pressure: 150 psig.

Controls have a visible calibrated scale and adjustable range. A universal mounting bracket No. BKT16A-600 is supplied as standard. Model

ELECTRICAL RATINGS — (For each Pennswitch) P10BC, P10FC

Motor Rating	120 V.	208 V.	240 V.	277 V.
A.C. Full Load Amps.	16.0	9.2	8.0	7.0
A.C. Locked Rotor Amps.	96.0	55.2	48.0	42.0
Non-Inductive Amps.	16.0	9.2	8.0	7.2
Pilot Duty — 125 VA. at 24 to 277 V. A.C.				

NOTE: On 2-stage models, the maximum connected load shall not exceed 2000 VA.

P10FC-16

CAT. NO.	TYPE	NUMBER OF STAGES	CONTACT ACTION	RANGE kPa (PSIG)	FACTORY SETTING				PRESSURE CONN. FNPTF
					kPa (PSIG)		SWITCH DIFFERENT. kPa (PSI)		
52214	P10BC-28	1	SPDT	20 to 140 (3 to 20)	83 (12) R to Y Cut-In		2 14		1/8"
	P10BC-29	DETAILS ON APPLICATION							
	P10BG-3	DETAILS ON APPLICATION							
	P10FC-16	2	SPDT	20 to 140 (3 to 20)	55 (8) R - Y Cut-Out Low Stage	82 (12) R - Y Cut-In High Stage	14 (2) Low Stage	14 (2) High Stage	1/8"

Underlined Models have Metric Scales.

7

SUPPLEMENTARY LITERATURE

OUR CATALOGUE IS QUITE COMPREHENSIVE — EVEN SO WE CANNOT PRINT ALL THE INFORMATION IN THE VARIOUS MANUFACTURERS' LITERATURE — THESE ARE AVAILABLE ON REQUEST

PENN AIR VOLUME CONTROLS

FOR SHALLOW WELLS

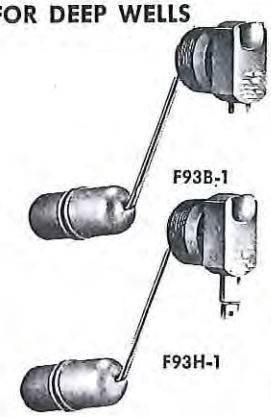
F92B-2

Shallow Well Air Volume Control to prevent waterlogged or air bound tanks by maintaining proper air volume at all times. Float operation regulates opening and closing of the air valve on change in water level. The air valve opens on water level rise. It is connected to the snifter valve by means of copper tubing (tubing with flat flare fittings furnished on request — see Specification Table). All internal operating parts are constructed of brass to minimize corrosion.

CAT. NO.	TUBE KIT NO.
5244	190 – 820 – 30" tube
5245	190 – 821 – 36" tube
5246	190 – 822 – 48" tube
5247	190 – 823 – 60" tube

CAT. NO.	TYPE	GAUGE TAPPING	COPPER TUBING AND CONNECTORS		TANK CONN.	SUPPLY TANK
5242	F92B-2	¼" Tap for Gauge	Flat flare fitting for 3/16" tubing all Air Volume Controls	Available with 3/16" O.D.Copper Tube with two flat flare fittings in optional tube lengths, as shown below: Kit No. 190-820 — 30" tube. Kit No. 190-821 — 36" tube. Kit No. 190-822 — 48" tube. Kit No. 190-823 — 60" tube.	1¼" Male National Pipe Thread	552kPa (80lbs.)Max. Pressure. Min.Diameter 9 Inches
5243	F92B-1	¼" Tap for Gauge .016 brass orifice				

FOR DEEP WELLS



F93B-1

F93H-1

Deep Well Air Volume Control to prevent air bound tanks by maintaining proper air volume at all times. Float operation opens the air valve on water level drop (increase in tank air), permitting air to bleed from tank to atmosphere.

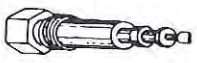
F93H-1 provided with minimum pressure release regulator (releases air to atmosphere only when tank pressure is 172 kPa (25 lbs.) or higher). Recommended for installations where water must be drawn rapidly. Prevents the discharge of air when the tank pressure drops to the minimum required at the water taps.

All internal parts are constructed of brass to minimise corrosion.

CAT. NO.	TYPE	GAUGE TAPPING	MIN.PRESSURE RELEASE	TANK CONN.	SUPPLY TANK
5249	F93B-1	¼" Tap for Gauge	Supplied on F93H-1 Only (Set at 172 kPa [25 lbs.]) Non- Adjustable	1¼" Male National Pipe Thread	552 kPa (80lbs.)Max. Pressure Minimum Diam. 9 inches.
52410	F93H-1	¼" Tap for Gauge			

AIR RELEASE VALVES FOR F90/F91 AIR VOLUME CONTROLS

F91 SERIES DEEP WELL CONTROLS



PART NO. KIT23A-601

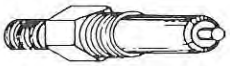
CAT. NO.

F91 SERIES DEEP WELL CONTROLS FOR ATTACHING CAPILLARY TUBING FOR GASEOUS WELLS

PART NO. 191-811R

CAT. NO.

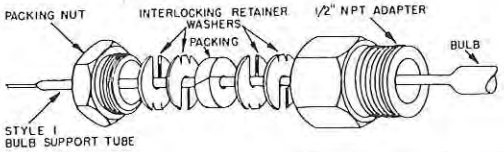
F90 SERIES SHALLOW WELL CONTROLS



PART NO. 192-802R

CAT. NO.

CLOSED TANK FITTING



Part No. FTG13A-600R packing nut assembly. For application where the temperature does not fall below –35° F (–37° C) or exceed 250° F (121° C). Maximum liquid pressure limit is 150 psig (1034 kPa). Use with Style 1, ⅜" dia. bulb for direct immersion application. A19's require models with support tube; A70, A72's do not need support tube.

CAT. NO.

AIR RELEASE VALVE FOR F91H ONLY

Part Number 191-812R

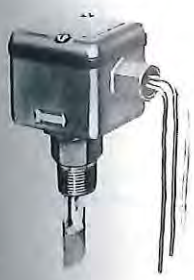
CAT. NO.

PENN FLOW AND FLOAT SWITCHES

F61 SERIES FLOW SWITCH

STANDARD FLOW RATE — SPDT

F61KB-11



F61MB-1

The F61 flow switch is designed for use on liquid lines using water, ethylene glycol solutions, or other liquids not injurious to the brass and phosphor bronze parts that come in contact with the liquid. The SPDT contacts make or break an electrical circuit when flow starts or stops.

F61KB-11 : NEMA 1 type enclosure.

F61MB-1 : This flow switch meets NEMA type 4 requirements and is U.L. listed as raintight. Use on indoor or outdoor applications in high humidity atmospheres, on liquid lines handling fluids below dewpoint temperatures or below 0°C (32°F).

Use on lines carrying well water, swimming pool water, sea water, brine or ethylene glycol. Not for use with hazardous fluids or in hazardous atmospheres.

CAT. NO.	TYPE
5261	F61KB-11 Std. Enclosure
52623	F61MB- 1 Vapour Proof Encl.

The paddle is of three segments for use in pipes from 1" to 3" in diameter. Paddle segments may be removed or trimmed as needed. Type No. F61KB-11 and F61MB-1 include a 6" paddle for pipes 4" to 6".

ELECTRICAL RATINGS

Motor Ratings	120 V.	208 V.	240 V.	277 V.
Horsepower	1	1	1	—
A.C. Full Load Amps.	16.0	8.8	8.0	—
A.C. Locked Rotor Amps.	96.0	52.8	48.0	—
Non-Inductive or Resistance Load Amps.	16	16	16	16
Pilot Duty — 125 VA. 24/277 V. A.C.				

Dimensions :
F61KB-11 : 8-3/8"H(3" paddle), 4"W,2-13/16"D.
F61MB-1 : 8-11/16"H(3" paddle), 4-51/64"W, 2-13/16"D.
Pipe Connection : 1" MNPT.
Max. Liquid Pressure : 1034kPa (150psig).
Max. Liquid Temperature : 121°C (250°F).
Min. Liquid Temperature, F61KB-11 : 0°C(32°F); **F61MB-1** : −29°C (−20°F).
Ambient Temperatures : 0 to 82°C (32 to 180°F).

TYPICAL FLOW RATES — IMPERIAL GALLS/MIN. & LITRES/SEC.

TYPE	LINE PIPE SIZE		Imp.G.P.M. litre/sec.	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"*	5"*	6"*	8"*
F61KB-11 or F61MB- 1	Min. Adj.	Flow Increase R to Y Closes	Imp. GPM	3.5	4.8	6.3	11.4	15.0	22.9	54.2 30.8 †	104 47.5 †	158 61.7 †	313 171 †
			l/s	.26	.37	.47	.86	1.14	1.74	4.10 2.33†	7.89 3.60†	12.00 4.67†	23.66 12.93†
		Flow Decrease R to B Closes	Imp. GPM	2.1	3.1	4.2	7.9	10.4	15.8	41.7 22.5 †	84.2 34.2 †	132 45 †	267 142 †
			l/s	.16	.23	.32	.60	.79	1.20	3.15 1.70†	6.37 2.59†	10.00 3.41†	20.19 10.73†
	Max. Adj.	Flow Increase R to Y Closes	Imp. GPM	7.3	11.1	16.0	24.2	28.8	44.2	107 67.5 †	204 98.3 †	313 120 †	633 346 †
			l/s	.56	.84	1.21	1.83	2.18	3.34	8.08 5.11†	15.45 7.44†	23.66 9.09†	47.95 26.18†
		Flow Decrease R to B Closes	Imp. GPM	7.1	10.4	15.0	22.5	26.7	41.7	102 63.3 †	196 92.5 †	300 113 †	608 333 †
			l/s	.54	.79	1.14	1.70	2.02	3.15	7.70 4.80†	14.83 7.00†	22.71 8.52†	46.06 25.24†

* Flow rates for these sizes are calculated.
† These gpm figures are for switch with 6" paddle. For 4" and 5" line pipe the paddle is trimmed.

LOW FLOW RATE — SPDT

TYPE F61KD

For use on liquid lines using water, ethylene glycol solutions, or other liquids not injurious to the brass and phosphor bronze parts. SPDT contact switch is activated by a low flow rate; however, it has a large flow capacity with minimum pressure drop. Typical applications include:

- Water purification and treatment systems.
- Booster pumps.
- Fast shut down on high input boilers to guard against circulation failure.
- Cooling systems for electronic tubes, bearings and compressors.

F61KD : NEMA 1 type enclosure.

Min. Liquid Temperature, F61KD : 0°C (32°F)
Ambient Temperature : 0 to 82°C(32 to 180°F).
Dimensions : 5-1/32"H, 4"W, 2-13/16"D.

Motor Ratings	120 V.	208 V.	240 V.	277 V.
Horsepower	1	1	1	—
A.C. Full Load Amps.	16.0	8.8	8.0	—
A.C. Locked Rotor Amps.	96.0	52.8	48.0	—
Non-Inductive or Resistance Load Amps.	16	16	16	16
Pilot Duty — 125 VA. 24/277 V. A.C.				

CAT. NO.	TYPE	Inlet and Outlet Size Female NPT	Enclosure NEMA Type	Adjustment Range Imp.GPM —l/s R to Y Closes Flow Increase	Adjustment Range Imp.GPM —l/s R to Y Opens Flow Decrease	Maximum Liquid Temp.	Maximum Liquid Pressure
5262	F61KD-3	½" x ½"	1	Imp. GPM Min. 0.50 Max. 0.92	Imp. GPM Min. 0.25 Max. 0.75	121°C (250°F)	1034 kPa (150psig)
5263	F61KD-4	¾" x ¾..	1	l/s Min. 0.038 Max. 0.069	l/s Min. 0.019 Max. 0.057		

7

FLOW AND FLOAT SWITCHES

F60 SERIES FLOW INTERLOCK SWITCHES

PENN

F60

Food waste disposal units, commercial dishwasher and similar applications.

Designed to control an electrical circuit on applications requiring a predetermined amount of liquid. Control contacts will close when the required amount of liquid is flowing through the unit. Control contacts open when flow decreases to a preselected rate of flow.

ELECTRICAL RATINGS

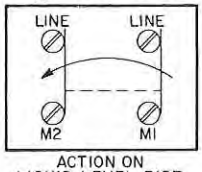
Motor Ratings	120 V. A.C.	208 V. A.C.	240 V. A.C.
Horsepower	1.0	1.0	1.0
Non-Ind. Amps.	15.0	9.2	8.0
Pilot Duty — 125 VA.		120 to 240 V. A.C.	

CAT. NO.	TYPE	SWITCH ACTION	FLOW RANGE	INLET AND OUTLET
5264	F60B-1	SPST — Close on Increase of Flow	Min. closing point 1.46 Imp. GPM — 0.11 l/s. Max. closing point 2.08 " " — 0.16 " Opening point 0.42 " " — 0.03 " below cut-in point, non-adjustable	½" Female NPT
5265	F60M-1	SPDT		½" Female NPT
5266	F60L-1	SPDT (Low Flow)	Min. closing point 0.42 Imp. GPM — 0.03 l/s. Max. closing point 0.63 " " — 0.05 " Opening point 0.08 " " — 0.006 " below closing point, non-adjustable	½" Female NPT

F59 SERIES SUMP PUMP SWITCH

WEIGHT OPERATED

Type F59A, F59H



ACTION ON LIQUID LEVEL RISE

F59A-2
Universal Replacement

F59D-5

Switch to start electric motor on liquid level rise, stop motor on liquid level drop. Cuts in when upper weight is submerged approximately halfway. Cuts out when lower weight is approximately half-exposed. Each switch includes 1 m (36") of cable and 2 weights.

F59D5 is equipped with a switch power cord and a 3 prong male/female power plug. The male prongs plug into the wall outlet and the sump pump cord plugs into the female end of the plug.

ELECTRICAL RATINGS

Volts	A.C.	D.C.
F59A, F59H		
120	1 H.P.	1/4 H.P.
240	1 H.P.	1/4 H.P.
F59D		
120	1/2 H.P.	1/4 H.P.

CAT. No.	TYPE	Contact Action	Mounting	Wiring
52612	F59A-1	DPST	External mounting bracket	Drop cord wiring
52613	F59A-2	DPST	External mounting — Includes universal mounting bracket & 24" strap for quick easy mounting on the motor, on the pedestal or on the discharge pipe.	Drop cord wiring
	F59D-5	SPST	External mounting — Includes clamp for mounting on pedestal or on the discharge pipe.	8' power cord with 3 prong dual plug
52614	F59H-1	DPST	External mounting bracket	Conduit Wiring — 7/8" conduit openings in case
52615	Part Number WGT11A-601R for weight and cable kit only.			

➡ UNIVERSAL REPLACEMENT

KENRAHN BALL FLOAT SWITCH

2½" DIA. PVC BALL FLOAT ANGULAR CHANGE PRODUCES SNAP ACTION OF MERCURY SWITCH.

TYPE CR — Contacts close on Rise of liquid. Used for emptying or high level Alarm circuits.

TYPE CF — Contacts close on Fall of liquid Used for filling or low level Alarm circuits.

ELECTRICAL RATING
1 AMP 240 VOLT AC.
1 AMP 6-24 VOLT DC.

STANDARD LENGTHS OF DOUBLE INSULATED CABLE 20' AND 40'.

CAT. NO.	TYPE	SWITCH ACTION	VOLTS	CABLE LENGTH
52616	R32 - 20	Close on Rise	32*	6.1 m (20 ft.)
52618	R230-20	Close on Rise	230	
52619	CF230-20	Close on Fall	230	
52620	R230-40	Close on Rise	230	12.2 m (40 ft.)
52621	F230-40	Close on Fall	230	

* 32 Volt Control Transformer supplied.

AVAILABLE ON APPLICATION: 32V units with 12.2 m (40 ft.) & 18.3 m (60 ft.) Cables
230V units with 18.3 m (60 ft.) Cables

PENN AIR FLOW SWITCHES

F62 SERIES AIR FLOW SWITCH

SPDT CONTACT UNIT

F62AA-8

This control detects air flow or the absence of air flow in ducts, responding only to velocity of air movement. One piece stainless steel paddle may be trimmed, if needed. Control supplied with mounting plate gasket.

Paddle Width	Switch Actuation on Flow	* Minimum Air Velocity in FPM (m/sec.) Required to Actuate Control			
		Horizontal Flow		Vertical Flow (Upward)	
		50 in² (323 cm²) or Larger Duct Area	Less Than 50 in² (323 cm²) Duct Area	50 in² (323 cm²) or Larger Duct Area	Less Than 50 in² (323 cm²) Duct Area
2⅛"	Increase (R to Y Closes)	625 (3.2)	575 (2.9)	950 (4.8)	750 (3.8)
	Decrease (R to B Closes)	325 (1.7)	220 (1.1)	850 (4.3)	575 (2.9)
3⅛"	Increase (R to Y Closes)	500 (2.5)	350 (1.8)	750 (3.8)	500 (2.5)
	Decrease (R to B Closes)	250 (1.3)	100 (.5)	650 (3.3)	350 (1.8)

* These are approximations only. Actual trip points are affected by air turbulence, humidity, air density, air temperature, etc.

Range adjusting screw permits field adjustment of flow rate setting.

Dimensions: 10⅜" H (including paddle), 4" W, 2 13/16" D.

ELECTRICAL RATING

Motor Ratings in Amps.	120 V.	208 V.	240 V.	277 V.
Nominal Horsepower	1	1	1	—
A.C. Full Load	16.0	8.8	8.0	—
A.C. Locked Rotor	96.0	52.8	48.0	—
Non-Inductive or Resistance Load	22.0*	22.0*	22.0*	22.0*
Pilot Duty — 125 VA. 120/277 V. A.C.				

* SPST normally closed or normally open rating. SPDT rating is 16.0 Amps.

CAT. NO.	TYPE	PADDLE SIZE	MAX. AMBIENT TEMP.
5268	F62AA-8	2-1/8" x 6-7/8"	82°C (180°F)
5269	F62AA-9	3-1/8" x 6-7/8"	82°C (180°F)

PENN REPLACEMENT PADDLES FOR F61KB, F61MB & F62 FLOW SWITCHES

CAT. NO.	REPLACEMENT KIT NUMBER	DESCRIPTION
52647	KIT21A-600	3 in 1 paddle kit for Series F61
52648	KIT21A-601	6" paddle kit for Series F61
52649	KIT44A-600	2-1/8" wide paddle kit for Series F62
52650	KIT44A-601	3-1/8" wide paddle kit for Series F62
52652	PLT52A-600	3 in 1 Stainless Steel paddle kit for Series F61

NOTES

7

McDONNELL LIQUID FLOW SWITCHES

GENERAL PURPOSE MODELS

These flow switches are used primarily as automatic controls or safety devices in air conditioning, heating and water systems and also in processing work. They include the Model FS4-3 standard, and the Model FS8V in vapour-proof construction.

FEATURES

Easy Wiring—Cover completely removable. No cramped quarters, no danger of kinked wires interfering with operation.

Two Knockouts—Connect conduit at either side of housing.

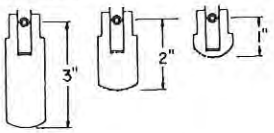
Switch—Single-pole double-throw. Compact in size. Powerful snap action assures dependable operation.

Knife-Edged Bearings—Of hardened stainless steel to minimize friction.

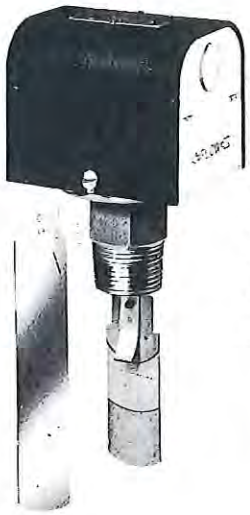
Adjusting Screw—Provides simple way to adjust sensitivity to flow.

Packless—Heavy duty Monel sylphon seals switch assembly from line.

3-in-1 Paddle—Segmented Monel paddle quickly adaptable for 1" to 3" pipe. Extended Monel paddle also included for larger pipe sizes.



McDONNELL No. FS4-3



The Model FS4-3 is a compact flow switch for service on water lines principally. It has a single-pole double-throw switch, can be wired to make one circuit, break a second circuit when flow starts or stops. All parts in contact with liquid in pipe are of brass or Monel. The FS4-3 is installed in tee or welded fitting in horizontal pipe.

Max. Pressure : 1034 kPa (150 psi)

Max. Temperature : 149°C (300°F)

CAT. NO. 52634

McDONNELL No. FS8V

The Model FS8V provides vapour-proof construction in a compact size flow switch. It is particularly suited for use in areas of high humidity and for out-of-doors installation. It has a single-pole double-throw switch, adjustment for sensitivity to flow, packless construction, wetted parts of brass and Monel. Like the FS4-3 it has segmented paddle as well as extended paddle, and it installs in tee or welded fitting in horizontal pipe.

Max. Pressure : 1034 kPa (150 psi)

Max. Temperature : 107°C (225°F)

CAT. NO. 52636

HEAVY DUTY MODELS

These flow switches are designed for heavier duty service or for use with process liquids. They include the FS7 standard Model and the FS7-4 Model for lower flow rates.

FEATURES

Switch—Dependable snap-action type, compact in size.

Foolproof Wiring—Wiring completely shielded from switch action.

Magnetic Switching—Eliminates all mechanical connection between paddle arm and switching assembly.

Packless—Sealed tube of non-magnetic stainless steel isolates switch compartment from liquid and pressure in the pipe.

Easily Adjusted—for sensitivity to flow.

Convertible Paddles—Extended paddle, for pipe sizes over 1¼", quickly job-trimmed to precise size for optimum performance.

McDONNELL No. FS7

The Model FS7 Flow Switch can be used for a wide variety of applications in air-conditioning, heating and water systems, and in processing work. They have a single-pole double-throw switch, can be wired to make one circuit and break a second circuit when flow stops or starts. The standard Model is supplied with all wetted parts of brass.

Max. Pressure : 2069 kPa (300 psi)

Max. Temperature : 149°C (300°F)

CAT. NO. 52635

McDONNELL No. FS7-4

The Model FS7-4 Flow Switch incorporates the basic features and design of the Model FS7. They are modified by moving the fulcrum of the paddle lever arm so they will respond to lower flow rates. They have single-pole double-throw switches, and include an extended paddle for larger pipe sizes. All wetted parts are of brass.

Max. Pressure : 2069 kPa (300 psi)

Max. Temperature : 149°C (300°F)

CAT. NO. 52637

REFER NEXT PAGE FOR :
FLOW RATE RABLES
ELECTRICAL RATINGS
INSTALLATION DATA

McDONNELL LIQUID FLOW SWITCHES
CAPACITY — ELECTRICAL — INSTALLATION DATA

FLOW RATES REQUIRED TO ACTUATE FLOW SWITCHES

Flow rates in Imperial gallons per minute and litres per second.

MODEL	PIPE SIZE IN WHICH FLOW SWITCH INSTAL'D.			1"	1.1/4"	1.1/2"	2"	2.1/2"	3"	4" *	5" *	6" *
FS4-3	Factory or Minimum Adjustment	Flow	Imp.GPM	5.0	8.2	10.6	15.7	20.3	25.0	33.1	48.9	66.0
			l/s	.38	.62	.80	1.19	1.54	1.89	2.51	3.70	5.0
		No Flow	Imp.GPM	3.0	4.7	5.8	7.8	9.7	10.0	16.5	24.4	33.0
			l/s	.23	.36	.44	.59	.73	.76	1.25	1.85	2.5
	Maximum Adjustment	Flow	Imp.GPM	8.5	14.0	19.2	27.3	35.3	43.4	61.3	95.8	138.3
			l/s	.64	1.06	1.45	2.07	2.67	3.29	4.64	7.25	10.5
		No Flow	Imp.GPM	7.7	12.5	16.3	20.0	31.3	38.4	53.5	76.7	102.5
			l/s	.58	.95	1.23	1.51	2.37	2.91	4.05	5.81	7.8
FS8V	Factory or Minimum Adjustment	Flow	Imp.GPM	4.1	6.3	7.8	11.4	14.9	20.2	29.4	40.5	50.3
			l/s	.31	.48	.59	.86	1.13	1.53	2.23	3.07	3.81
		No Flow	Imp.GPM	2.8	4.4	5.6	7.8	10.1	13.7	22.5	31.2	39.0
			l/s	.21	.33	.42	.59	.77	1.04	1.70	2.36	2.95
	Maximum Adjustment	Flow	Imp.GPM	14.7	24.2	31.5	47.0	59.4	74.2	98.3	148.3	204.2
			l/s	1.11	1.83	2.39	3.56	4.50	5.62	7.44	11.23	15.46
		No Flow	Imp.GPM	12.5	20.5	26.8	39.5	49.3	60.4	87.5	133.3	187.5
			l/s	.95	1.55	2.03	2.99	3.73	4.57	6.63	10.09	14.20
FS7-4	Factory or Minimum Adjustment	Flow	Imp.GPM		4.0	5.3	8.3	12.8	20.3	27.8	37.0	46.9
			l/s		.30	.40	.63	.97	1.54	2.11	2.80	3.55
		No Flow	Imp.GPM		2.5	3.0	4.9	7.9	12.8	17.6	25.8	40.6
			l/s		.19	.23	.37	.60	.97	1.33	1.95	3.07
	Maximum Adjustment	Flow	Imp.GPM		6.4	8.3	13.2	19.8	29.6	51.2	70.0	95.7
			l/s		.49	.63	1.00	1.50	2.24	3.88	5.30	7.25
		No Flow	Imp.GPM		4.9	5.8	9.2	14.2	24.3	31.4	42.5	59.6
			l/s		.37	.44	.70	1.08	1.84	2.38	3.22	4.51

FLOW RATES FOR FS7

PIPE SIZE IN WHICH FLOW SWITCH INSTAL'D.			1.1/4"	1.1/2"	2"	2.1/2"	3"	4"	5"	6"	8" **	10" **	12" **	14" **	16" **
Fact. or Min. Adjust.	Flow	Imp.GPM	7.0	9.0	14.8	22.3	38.4	44.7	59.8	78.8	169.2	328.3	587.5	716.7	950.0
		l/s	.53	.68	1.21	1.69	2.91	3.38	4.53	6.00	12.8	24.9	44.5	54.3	71.9
	No Flow	Imp.GPM	3.3	4.2	6.8	10.3	17.8	18.5	26.5	37.5	104.2	225.8	441.7	537.5	716.7
		l/s	.25	.32	.52	.78	1.35	1.40	2.01	2.84	7.9	17.1	33.4	40.7	54.3
Max. Adjust.	Flow	Imp.GPM	11.3	14.8	24.5	38.5	63.3	82.5	117.5	165.0	325.0	575.0	933.3	1150.0	1516.7
		l/s	.86	1.12	1.86	2.92	4.79	6.25	8.90	12.49	24.6	43.5	70.7	87.1	114.8
	No Flow	Imp.GPM	10.4	12.7	21.0	31.1	55.7	59.2	83.3	116.7	233.3	430.0	733.3	891.7	1183.3
		l/s	.79	.96	1.59	2.36	4.22	4.48	6.31	8.84	17.7	32.6	55.5	67.5	89.6

Flow rates are averages which may vary ±10% from tabulated values.

* Equipped with extended paddle trimmed to pipe size - Models FS4-3 and FS8V

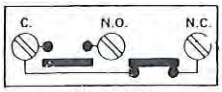
** Model FS7 equipped with 6" paddle.

ELECTRICAL RATINGS Ampere Ratings	
Motor Duty	230 V.A.C.
Full Load	3.7 Amps.
Locked Rotor	22.2 Amps.
	230 V.D.C.
	0.15 Amps.
Pilot Duty: A.C. 125 V.A., 115-230 V.	

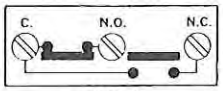
SWITCH OPERATION SCHEMATICS

In the Flow Rates given in the tables above for liquid flow switches the word "Flow" means that the switch will close one circuit, and open the other, when the flow rate is increased to the rate shown. (See schematic "Flow")

The words "No-Flow" mean the switch will reverse position - will open the first circuit and close the second - when the flow rate is decreased to the rate shown. (See schematic "No-Flow).

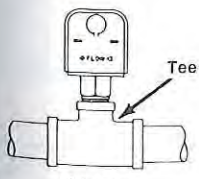


NO FLOW

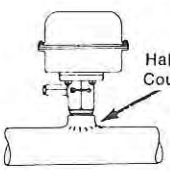


FLOW

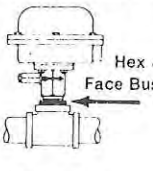
TYPICAL INSTALLATIONS



with Tee



with Welded Half-Coupling



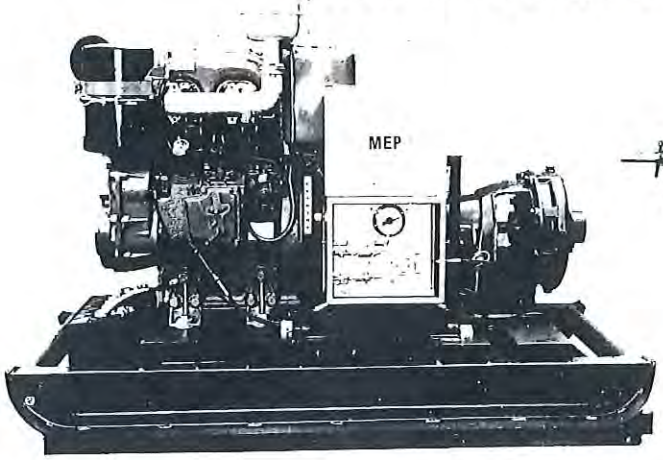
with Face or Hex Bushing

Installation

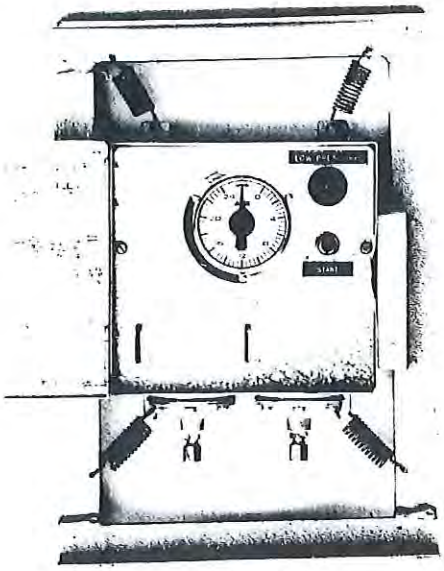
It is recommended that all models be installed upright in a horizontal run of pipe and that any valves, elbows, orifices or other restrictions be removed at least five pipe diameters from either side of the flow switch. Specific installation instructions are provided with each control.

ENGINE PROTECTION EQUIPMENT

"KENRAHN" ELECTRIC AND NON ELECTRIC TYPES



A4 12/24



EPS/TWO 12/24

Engine Protection Control Units are designed to provide protection for petrol or diesel engines and pumping plants against damage caused by :–

Low lubricating oil pressure **High coolant temperatures**
Loss of prime or low pump pressures **Fan belt breakage or generator failure**

Control Units are also available complete with a time switch to provide the convenience of shut down after the expiry of a preset time.

ELECTRICAL ENGINE PROTECTION UNITS EEP & EPS

Electrically Operated Protection Units 12/24 Volt DC

EEP/TWO – Suits Air Cooled Engine Driving a Pump.
EEP/TO or TW – Suits Air Cooled Engines.
XP/NO – Temp. Sensor for EEP Units (Water Cooled Engines).

Knock Offs for above Units to Operate Diesel Rack

A2 12/24V – 8 lb. Thrust 1" Stroke.
A4 12/24V – 36 lb. Max. Load with external spring, 2" Stroke.
A2 Bowden Cable and bracket.

Fail Safe Electrically Operated Protection Unit

EPS/TWO – Suits Air Cooled Engine Driving a Pump.
EPS/TO or TW – Suits Air Cooled Engines.
XP/NC – Temp. Sensor for EPS Units (Water Cooled Engines).
A2S 12 or 24V – 8 lb. Thrust 1" Stroke. State Voltage.
A4 12 or 24V – 36 lb. Max. Load with external spring, 2" stroke.
A2S Bowden Cable and Bracket.

Any of above supplied without Time Clock deduct.

SYMBOLS:

T – 24 hr. Timer stops engine at end of Pre-set time.
W – Loss of Pump Discharge Pressure.
O – Loss of Engine Oil Pressure.
XP – Engine Water Temperature Protection.

MECHANICAL ENGINE PROTECTION EQUIPMENT – MEP

Standard Stocked Units:

To Suit Air Cooled Engine Driving a Pump – MEP/TWO
To suit Water Cooled Engine Driving a Pump – MEP/TWOX
Time Control Only – No Protection – MEP/T

SYMBOLS:

T – 24 hr. Timer Stops Engine at end of Pre-set Time MEP/TOX or TWX
W – Loss of Pump Discharge Pressure – MEP/OWX
O – Loss of Engine Oil Pressure – MEP/OX or WX
X – Engine Water Temperature Protection – MEP/TO or TW

Variations to any of above Models.

Standard:

12 – 12 hr. Timer to replace 24 hr. Timer
S – Micro switch to prevent battery drain and protect alternator
B – Black spring on pressure unit 30-100 psi shut down.
A – Air Cooled Engine Temperature Flat Bulb.

Special:

E – Excess water pressure. Stops on press. rise up to 100 psi.
V – Vacuum Sensor for Pump Suction Line.
F – Flood Irrigation Sensor stops on Low Pump Press. 1-6 psi

Brackets to suit most engines are available on request.

SINGLE & COMBINATIONS AVAILABLE			
CAT. NO.	TYPE	CAT. NO.	TYPE
52827	EEP/TOX	52878	A2 12/24V (8 lb/1")
52828	EEP/TWOX	52888	A4 12/24V (36 lb/2")
52843	EEP/TWO	52879	A2 Bowden Cable
	EEP/TO		EPS/TWO
	EEP/TW		EPS/TO
52881	XP/NO		EPS/TW
52842	MPB 240V	52882	XP/NC
52844	EPS/OXP	52887	A2S 12/24V (8 lb/1")
52845	EPS/TWOXP		A2S Bowden Cable

SINGLE & COMBINATIONS AVAILABLE			
CAT. NO.	TYPE	CAT. NO.	TYPE
52851	MEP/OX	52868	MEP-T/ITC
52852	MEP/TOX	52869	MEP/O
52853	MEP/TWOX	52870	MEP/W
52854	MEP/TWO	52871	MEP/X
52855	MEP/TW	52874	MEP/WX
52856	MEP/TO	52875	MEP/OWX
52857	MEP/TWX		MEP/T

SPARES AVAILABLE ON APPLICATION

ORDERING INFORMATION : QUOTE CAT. NO. REQUIRED – PLUS

Standard Models – Specify: Type Number / Engine Type / Pump Pressure Range / Shutdown Device Required / Voltage

Non-Standard Models – Specify Features Required

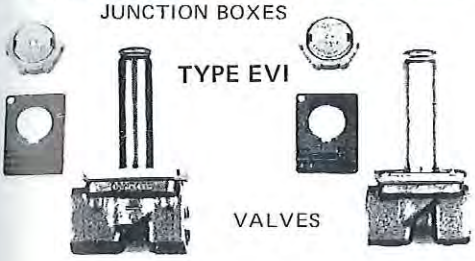
THERE'S JUST NOT ENOUGH SPACE TO LIST ALL OF THE EQUIPMENT AND SERVICES WE CAN OFFER YOU LET US KNOW ABOUT YOUR REQUIREMENTS

SOLENOID VALVES

FOR WATER, OIL, AIR AND GAS

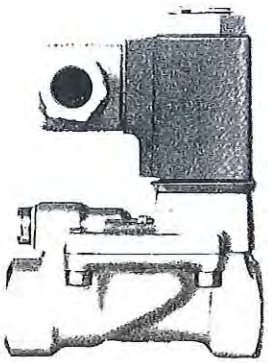
Danfoss

JUNCTION BOXES



TYPE EVI

VALVES



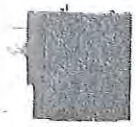
TYPE EVSI

CAT. NO.	TYPE	CODE No.	APPLIC.	* CONN.	DIFFERENTIAL PRESSURE kPa MIN	DIFFERENTIAL PRESSURE kPa MAX	TEMP. MEDIUM °C	TEST PRESS. kPa	Kv m^3/h @ PD 100kPa
DIRECT CONTROLLED									
531110	EVI-1.5	32U1407	OLW	1/8" F.BSP	0	3000	−10 to +90	5000	0.05
531111		32U1417	OLW	1/4" F.BSP	0	3000		5000	0.05
531112	EVI-2	32U1437	OLW	1/4" F.BSP	0	2000		5000	0.15
531113	EVI-3	32U1467	OLW	1/4" F.BSP	0	1000		5000	0.3
SERVO – CONTROLLED									
	EVSI-6	32U1454	OL	3/8" F.BSP	10	3000†	Air −10/+60	5000	0.6
	EVSI-10	32U1514	OL	1/2" F.BSP	10	3000†	Oil −10/+90	5000	1.5
53141	EVSI-15	32U4507	WBD	1/2" F.BSP	30	1000	−30 to +100	2000	4.0
53142	EVSI-20	32U4527	WBD	3/4" F.BSP					8.0
53143	EVSI-25	32U4547	WBD	1" F.BSP					11.0
53144	EVSI-32	32U4567	WBD	1¼" F.BSP					16.0
53145	EVSI-40	32U4587	WBD	1½" F.BSP					22.0
53146	EVSI-50	32U4607	WBD	2" F.BSP					40.0
	EVSI-65	16D4105	WBD	2½" F.BSP	25	1000	−25 to +90	2000	50.0
	EVSI-80	16D4106	WBD	3" F.BSP					75.0
	EVSI-100	16D4107	WBD	4" F.BSP					130.0
53149	EVJHS-15	32U3033	Steam	1/2" F.BSP	10	1000	160 Max.	3000	4.8
53150	EVJHS-20	32U3053	Steam	1/2" F.BSP					6.0

* 0 = Oil L = Air W = Water WBD = Water and brine for refrigeration plant.

† EVSI-6 & 10 for Oil: Diff. Pressure 2000 kPa.

All valves supplied standard with Junction Box.



9 Watt Coil with AMP Plug

AMP Terminal Box

ELECTRICAL COIL DATA

(Coils Without Junction Box)

CAT. NO.	VOLTS/ FREQUENCY	WATTS	CODE No.	SUITS VALVE
122289	240 / 50	9	42N7502	EVI / EVSI
122290	415 / 50	9	42N7505	EVI / EVSI
122291	12V. DC	9	42N7550	EVI / EVSI
122292	24V. DC	9	42N7551	EVI / EVSI
	240 / 50	8	32K7772	EVJHS
122296	Junction Box		42N0156	EVI / EVSI

7

TYPE EVSI SOLENOID VALVES AND CAPACITIES FOR WATER AND BRINE ARE ALSO LISTED IN REFRIG./AIR COND. SECTION 1. PAGE 122-b

For complete details refer Manufacturers Literature Available On Request

SOLENOID VALVES

Valve Type 56 — AIR & GAS SERVICE

Basic Valve Number	Pipe connection BSP internal parallel in	Orifice diameter mm	Orifice diameter in	Operating pressure differential Maximum in H_2O	Operating pressure differential Minimum	Gas capacity SG 0·5 7·5 mm H_2O pressure drop. m^3/hr	Gas capacity SG 0·5 0·3 in H_2O pressure drop. ft^3/hr
5675	¼	7·9	0·312	16	0	1·6	55
5676	⅜	12·7	0·5	16	0	3·2	115
5677	½	12·7	0·5	16	0	3·7	130
5602	¾	25·4	1·0	12	0	8·4	295
5603	1	25·4	1·0	12	0	11·3	400

The body is a high grade aluminium die casting and has pipe connections screwed ¼ in—1 in BSP internal parallel (BS 21). The valve plunger is of heat treated nickel iron with a floating seat disc of synthetic rubber to ensure tight shut-off throughout the valve life. The plunger housing is of high quality brass, with adequate clearance to give high plunger acceleration.

Satchwell BLACK AUTOMATIC CONTROLS LTD

Valve Type 66

An electro-hydraulic actuator assembly self-contained in a rugged light alloy housing mounted directly to a cast spheroidal (nodular) graphite iron valve body via a mild steel adaptor collar.

The valve seat is of specially selected NITRILE rubber powerfully loaded in the closed position by two stainless steel springs.

When an electrical supply is established to the PowerSeat actuator, a relief valve closes and an electrically driven pump provides pressure to the underside of a piston lifting the main valve against the return springs. When the valve is fully open, the pump is switched off by a limit switch, the relief valve remaining closed.

When 'CLOSE' is signalled, or electrical power fails, the relief valve opens relieving the pressure under the piston, permitting the return springs to close the main valve.

Basic Valve Number	Pipe connection BSP in	Orifice diameter mm	Orifice diameter in	Max. operating pressure differential kg/cm^2	Max. operating pressure differential lbf/in^2	Flow capacity 7.5mm H_2O press. drop m^3/hr	Flow capacity 0·3in H_2O press. drop ft^3/hr	Opening time seconds	Closing time seconds
6601	1	25	1	0·84	12	10·5	375	2 to 5	Less than 1
6602	1¼	32	1·25	0·84	12	15·5	550		
6603	1½	38	1·5	0·84	12	24	850		
6604	2	50	2	0·49	7	45	1600		
6605	2½	64	2·5	0·35	5	68	2400		
6606	3	76	3	0·35	5	83	2950		
6607	4	102	4	0·21	3	144	5100		

Media: Air or gas. **Media temperature:** 65°C (150°F) maximum. **Ambient temperature:** 55°C (130°F) maximum.
Maximum body pressure: 10·5 kg/cm^2 (150 lbf/in^2). **Back pressure** (maximum reverse pressure): 0·15 kg/cm^2 (2 lbf/in^2)
Pipe connections: screwed BSP internal parallel or flanged, drilled as required to Table D or Din 10—see options.
Mounting attitude: actuator vertical or horizontal as shown on valve nameplate.
Voltage: 240v 50Hz (suitable generally for 220v 50Hz).

OIL BURNER NOZZLES

STEINEN

SPECIFICATIONS

Steinen nozzles are available in five different types, each of which produces a different spray pattern. These nozzles are designed and engineered for top performance in the various types of furnace and boiler designs.

Nozzles are stamped with the capacity in G.P.H. (gallons per hour), the spray angle and letters identifying the type of spray pattern.

DESIGN FEATURES

Steinen nozzles with the stainless steel highly finished, self-seating metering insert creates a perfect swirl chamber that produces a uniform spray pattern — no one-sided fires.

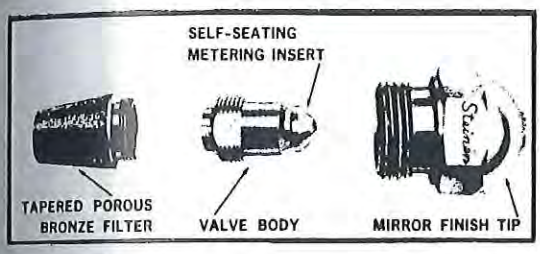
The exclusive polished "Mirror Finish" tip, made from high quality heat and wear resistant stainless steel allows maximum heat reflection minimizing internal gumming and coking. Stainless steel, being less of a heat conductor than most other materials, also maintains lower internal nozzle temperatures, thereby keeping the accumulation of varnish and residue at a minimum.

The unique Steinen porous bronze filter with its exclusive tapered design provides greater filtering area, an added advantage for longer and more efficient nozzle life. Porous bronze filters are standard on all nozzles .40 G.P.H. through 1.00 G.P.H. Above 1.00 G.P.H., 100 mesh monel strainers are furnished.

Every Steinen nozzle is individually tested and calibrated to high quality standards. Each nozzle is packed in an individual transparent, dustproof plastic container with a plastic cap clearly stamped showing capacity, spray angle and type of nozzle.

CAPACITIES AND SPRAY ANGLES

Steinen nozzles are available from .40 thru 50.00 G.P.H. in 30°, 45°, 60°, 70°, 80°, 90° spray angles. All nozzles are individually tested for capacity, spray angle, spray pattern and atomization against a calibrated Master nozzle. The Master nozzles are calibrated with oil @ 35 SSU viscosity @ 100°F and 100 PSI. The tolerance of the spray angles are held to plus or minus 5° and capacity tolerance to plus 5% minus nothing. However, it is important to note that in conducting laboratory or field tests, different ratings may be obtained as capacity varies with viscosity. The capacity changes by approximately 1% for each SSU change in viscosity. When operating at higher pressures, the capacity increases and the spray angle may decrease. It is recommended that when operating at approximately 200 PSI, wider spray angles may be necessary. When using heavier oils, it may also be necessary to use wider spray angles depending upon the air handling equipment.



Porous Bronze Filters are standard on all nozzles .40 G.P.H. thru 1.00 G.P.H. Above 1.00 G.P.H. 100 mesh monel strainers are furnished.

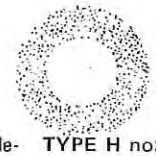
INSTRUCTIONS

for Ordering Nozzles . . . Please Specify

1. Quantity wanted
2. Capacity rating
3. Angle of spray
4. Type of spray

All nozzles are packaged in dust-proof containers, with size and capacity clearly printed on top.

TYPE Q is a specially designed nozzle in the popular sizes .50 - 3.00 G. P. H. These nozzles have a distinctive spray pattern and are highly successful in solving critical combustion problems as it minimizes noisy fires and pulsation.



TYPE H nozzles produce a very fine atomized hollow cone spray pattern.

.40 TO 2.25 G.P.H.

TYPE S solid cone nozzles produce a fine atomized uniform spray throughout the entire pattern.

.40 TO 4.00 G.P.H.

TYPE PH nozzles are similar to the Type H except that they are relatively more hollow. Made in larger capacities for light and heavy oil applications where fine atomization is required.

2.50 TO 50.00 G.P.H.

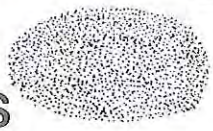
TYPE SS is a general purpose nozzle in the larger sizes and delivers a semi-solid cone spray pattern.

4.50 TO 50.00 G.P.H.

Danfoss Oil Nozzle Type OD

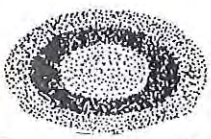
SPRAY PATTERNS

S



H

B



ORDERING
Specify

- Quantity Reqd.
- Capacity Rating
- Spray Pattern

Danfoss oil nozzles are a precision-made quality product, with a perfect spray pattern determined by the cone and the orifice tip as the important parts. The cone and the orifice tip are made with an instrument-mechanical precision, of a wear resistant and corrosion proof chrome-nickel steel. These features in combination with careful positioning of these parts in the nozzle housing result in an oil nozzle with a perfect spray pattern.

Danfoss oil nozzles in the capacity range of from (1.6 to 4.5 kg/h) (0.5 to 1.35 US gal/h) (1.89 to 5.11 l/h) are equipped with a nylon strainer designed especially for small oil nozzles with a low velocity of flow. Danfoss oil nozzles with a low capacity have a bore as fine as a hair in the orifice tip. It is, therefore, important that the strainer should be a tight fit on the nozzle housing so that small particles of foreign matter do not evade the strainer and reach the bore.

Danfoss oil nozzles have a treble capacity marking. On the flat sides of the oil nozzle its capacity is indicated in kg/h, USgal/h, and l/h respectively.

The kg/h rating can be used — with a good approximation — for a comparison between the oil nozzle capacity and the capacity stamped on the boiler, since 1 kg of oil per hour corresponds to approx. 10,000 kcal/h.

The USgal/h rating makes it easy to find a Danfoss oil nozzle to replace an oil nozzle marked in USgal/h only, since oil nozzles of American make and Danfoss oil nozzles are directly comparable.

The l/h rating can also be used with a good approximation for comparison between the oil nozzle capacity and the kW firing rate, since 1 litre of oil per hour corresponds to approx. 10 kW.

Danfoss oil nozzles have a marking which indicates the capacity, spray angle, and spray pattern of the oil nozzle. This marking is repeated on the cover of the oil nozzle container.

To make a further distinction between the different spray patterns of the oil nozzles, they are supplied in containers each with a different coloured cover.

Spray Pattern B — White, S — Red, H — Blue.

CAPACITY RANGE

SPRAY PATTERN	30° SPRAY ANGLE			45° SPRAY ANGLE			60° & 80° SPRAY ANGLE		
	kg/h	USgal/h	l/h	kg/h	USgal/h	l/h	kg/h	USgal/h	l/h
S	2.25 to 10.0	0.65 to 3.0	2.46 to 11.4	1.6 to 10.0	0.5 to 3.0	1.89 to 11.4	1.6 to 10.0	0.5 to 3.0	1.89 to 11.4
H	2.25 to 10.0	0.65 to 3.0	2.46 to 11.4	1.6 to 10.0	0.5 to 3.0	1.89 to 11.4	1.6 to 10.0	0.5 to 3.0	1.89 to 11.4
B	2.25 to 12.0	0.65 to 3.75	2.46 to 14.0	2.25 to 40.0	0.65 to 12.0	2.46 to 45.0	2.0 to 100	0.6 to 31.5	2.27 to 119