

# ThermoBloc™ Boiler protection recirculation and distribution unit series 281



## Function

The ThermoBloc™ boiler protection recirculation and distribution unit is used in hydronic heating systems with non-condensing boilers, including solid fuel, biomass, gas, LP or oil-fired. It can be installed with steel, cast iron and copper tube style boilers, automatically controlling the return water temperature, protecting against corrosion from condensation occurring when a minimum flue gas temperature is not otherwise maintained.

The ThermoBloc unit is compact for easy installation, reducing required space and fittings. It combines the functionality of a boiler protection valve with a circulation pump and a unique flapper check valve allowing for thermosyphon flow between the boiler and distribution system during a power outage. The ThermoBloc includes three temperature gages and is encased in an insulation shell.

## Product range

Code 281xxxA Boiler protection unit, with 140° F cartridge, threaded and sweat connections ..... sizes 1", 1-1/4"

## Technical specifications

### Materials

Body:	brass
Shutter:	PSU
Spring:	stainless steel
Flapper check valve	PPS
Seal:	EPDM
Thermostatic sensor:	wax

### Performance

Suitable fluids:	water, up to 50% glycol solutions
Max working pressure:	150 psi (10 bar)
Working temperature range:	40-210°F (5-100°C)
Temperature gage scale:	30-250°F (0-120°C)
Thermostatic sensor cartridge:	140°F (60°C) standard
	115°F (45°C), 130°F (55°C), 160°F (70°C) optional cartridges
Sensor cartridge accuracy:	±3.6°F (±2°C)
Bypass from boiler complete closing temperature:	Tset +18°F (10°C)

Connections:	- NPT male union	1" and 1-1/4"
	- sweat union	1" and 1-1/4"

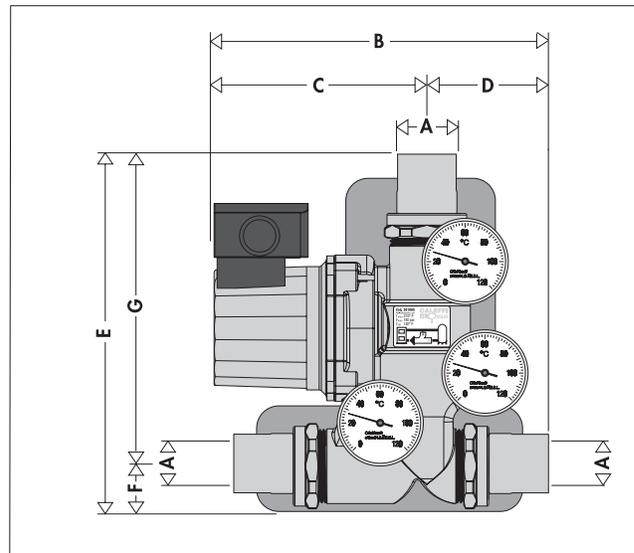
### Pump

Three speed pump:	Wilco Star S-16 U15
Body:	cast iron
Power supply:	115 V - 60 Hz
Max. pressure:	150 psi (10 bar)
Max. temperature:	230°F (110°C)
Agency approval:	cULus

### Insulation

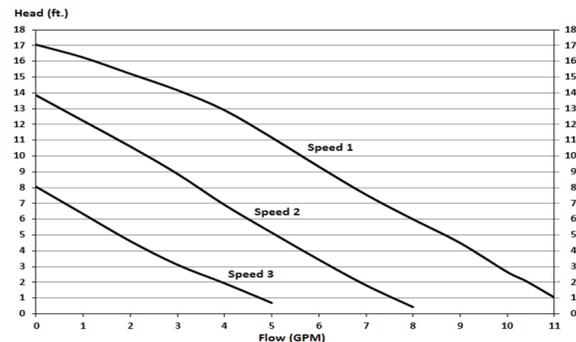
Material:	EPP
Mean thickness:	30 mm
Density:	45 kg/m <sup>3</sup>
Working temperature range:	40-210°F (5-100°C)
Thermal conductivity:	0.037 W/(m·K) at 10°C
Reaction to fire (UL94):	class HBF

## Dimensions

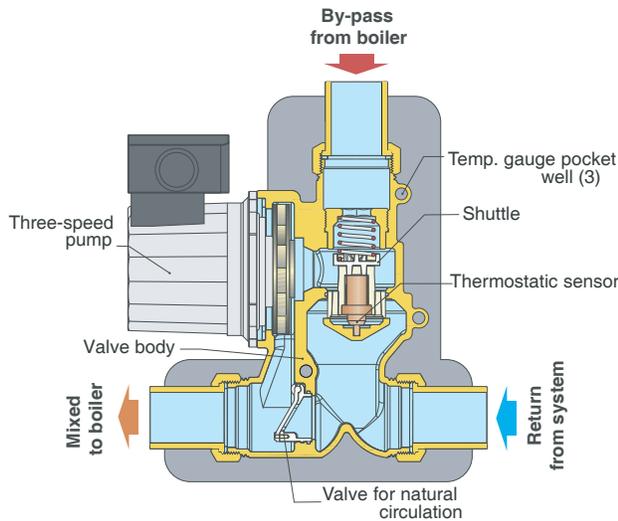


Code	A	B	C	D	E	F	G
281166A	1" NPT	8 3/4"	5 5/8"	3"	9 7/8"	1 7/8"	8"
281966A	1" SWT	8 3/4"	5 5/8"	3"	9 7/8"	1 7/8"	8"
281176A	1 1/4" NPT	8 3/4"	5 5/8"	3"	9 7/8"	1 7/8"	8"
281976A	1 1/4" SWT	8 3/4"	5 5/8"	3"	9 7/8"	1 7/8"	8"

## 281 Pump characteristics



**Characteristic components**



**Operating principle**

The thermostatic sensor, completely immersed in the medium, controls the movement of a shutter that regulates the bypass flow from the boiler and toward the system. At boiler startup, the boiler protection recirculation and distribution unit recirculates the bypass flow from the boiler to bring the boiler up to temperature as quickly as possible (fig. 1). When the bypass flow from the boiler  $T_f$  exceeds the setting of the fixed thermostatic sensor  $T_{set}$ , the unit's return from the system port starts opening to produce the water mixing  $T_{mix}$ : in this phase the system loading begins (fig. 2).

When the mixed flow to the boiler temperature  $T_{mix}$  is greater than the set point of the boiler protection recirculation and distribution unit by approximately  $18^\circ\text{F}$  ( $10^\circ\text{C}$ ), the bypass flow from the boiler port closes and water returns to the boiler at the same temperature as the return flow from the system (fig. 3).

When power is out and the circulation pump stops running, the flapper check valve, which is closed during normal operation, opens with a slight pressure differential resulting from the effects of heated water in the boiler and cooler water in the distribution system, a natural thermosyphon flow. This prevents an excessive heat buildup which eventually would cause the pressure relief valve to open (fig. 4).

The compact brass body casting houses the pump and all functioning components, offering easy installation, either on the right or left side of the boiler. The temperature gages can be easily removed and re-inserted on the back side of the unit.

The brass body prevents the formation of ferrous residues in the system, prolonging boiler operating life.

The unit features a thermostatic sensor to control the temperature of water returning to the boiler to prevent condensation. The sensor can be easily replaced for maintenance or set point change.

The flapper check valve allows the natural thermosyphon circulation of the system heat transfer fluid when the pump stops running due to power failure. When the pump is running under normal conditions the thrust of the flowing medium keeps the flapper closed, forcing flow past the thermostatic sensor. When the pump stops running and the fluid in the boiler is at high temperature, natural circulation begins, bypassing the thermostatic sensor, preventing overheating in the boiler.

