TEMPERATURE CONTROLLERS

KIMRAY INC.®

SECTION H

NOTE: We reserve the right to modify or change, without prior notice, any statement or information contained herein. If exact dimensions or specifications are required by the customer
certified prints will be furnished for a minimum charge upon request to KIMRAY, Inc.

TABLE OF CONTENTS

THERMOSTATS

Kimray thermostats are pneumatic pilots designed to signal on a set or varying temperature ranging from 30°F to 750°F. This signal opens or closes a diaphragm operated motor valve. These thermostats can also be used for controlling a set temperature in direct and indirect heaters, emulsion treaters, reboilers, steam generators, heat exchangers, cooler shutter controls and salt bath heaters.

THERMOSTATS

CAPACITY CHARTS

ACCESSORIES

AFLAS ® is a trade mark of Asahi Glass Co

TEMPERATURE:

+30° to +500° F

0° to +260° C

APPLICATION:

Crude Oil & Gas Production (High heat), Steam Flood Production Chemicals (corrosion inhibitors) Amine Sweetener Systems, Gasoline, Diesel, Fuel Oil Systems

FLUID / GAS:

Crude Oil & Gas Production, H2S, Steam, Petroleum fluids, Sea Water

HSN (HNBR)

TEMPERATURE:

-15° to +300° F

-26° to +149° C

APPLICATION:

Crude Oil & Gas Production w/ H2S, Wet C02

FLUID / GAS:

Crude Oil & Gas, H2S, Wet C02, Sea Water

NITRILE

TEMPERATURE:

Buna-N:

-40° to +220° F

-40° to +105° C

Low-Temp:

-85° to +120° F

-65° to +49° C

APPLICATION:

Crude Oil & Gas Production Glycol Dehydrators, Gasoline, Jet Fuel & Diesel Fuel Pumping, Water Disposal, Methanol Injection Pumps, Water pump seals, hydraulic pump seals

FLUID / GAS:

Crude Oil & Gas, Good to Poor in Sour Production (See HSN), Water, Glycols, Hydraulic Oils, Resistance to crude oil in the presence of H2S and amines, Diesel fuel, fuel oils

DO NOT USE WITH:

Aromatic hydrocarbons, chlorinated hydrocarbons, phosphate esters (hydraulic fluids)

TEFLON (T)

TEMPERATURE:

-40° to +400° F

-20° to +204° C

APPLICATION:

Chemically Inert Elastomer Best in static Do not use at low temps

FLUID / GAS:

Almost All Chemicals

VITON ® is a trade mark of Dupont

TEMPERATURE:

-10° to +350° F

-23° to +177° C

APPLICATION:

Crude Oil & Gas Production, Glycol Dehydrators, Gasoline, Jet Fuel & Diesel Fuel Pumping, Water Disposal, Methanol Injection Pumps. (Also Vacuum Service) (Gas permeability is very low)

FLUID / GAS:

Crude Oil & Gas, H2S, Propane, Gasoline, Diesel, Fuel Oil Systems

DO NOT USE WITH:

Hot Water, Not preferred for wet CO2, Methyl Alcohol, Amines, Sodium hydroxide solutions

POLYURETHANE (P)

TEMPERATURE:

-40° to +220° F

-40° to +104° C

APPLICATION:

High abrasion resistance Seats, Diaphragms

FLUID / GAS:

Crude Oil gas and Water, H2S, propane, butane, fuel, mineral oil and grease

ACTION:

Indirect throttle; Pilot Output Pressure (Yellow) decreases with temperature rise.

Direct semi-throttle; Pilot Output Pressure (Yellow) increases with temperature rise.

APPLICATION:

Used to control a set temperature in heaters, emulsion treaters, reboilers, steam generators, heat exchangers, cooler shutter controls, and salt bath heaters.

WORKING PRESSURE (sensing element):

psig	kg/cm^2	
500	35.15	max. without Separable Socket
4000	281.23	max. with Separable Socket
7000	492.15	max. with Special Separable Socket

Separable Socket is an extra price item and must be ordered separately, if desired. To order Separable Sockets refer to Table of Contents

TEMPERATURE RANGE:

T 12, T 18, T 24, T 36 -30°F minimum to 400°F maximum
-34°C minimum to 204°C maximum

SUPPLY PRESSURE:

5 to 30 psig
.35 to 2.11 kg/cm^2

RESPONSE RANGE:

T 12 - 1.75 psig/°F, .22 kg/cm^2/°C
T 18 - 2.50 psig/°F, .31 kg/cm^2/°C

OPERATION:

These Thermostat Base Assemblies consist of a STAINLESS TUBE for monitoring the changing temperature, which is connected by a Low Expansion Alloy Rod to a DIAPHRAGM or BELLOWS ASSEMBLY. The differential pressure across the Diaphragm or Bellows combined with changes in the length of the STAINLESS TUBE throttle a PILOT PLUG seat. The PILOT PLUG consists of two stainless balls rigidly connected together. The seat at BALL 1 is the Supply Pressure inlet (Violet to Yellow). The seat at BALL 2 is the pressure vent (Yellow to Atmosphere).

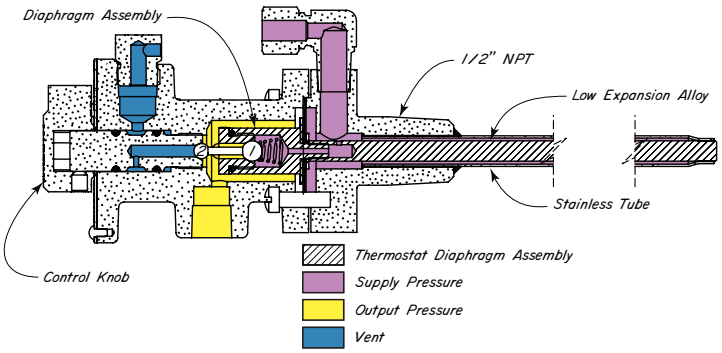
Assume the set temperature of the Thermostat is above that of the system. The vent at BALL 2 is closed and the inlet at BALL 1 is open. Output Pressure (Yellow) is being sent to any Pilot or Motor Valve.

As the temperature rises in the system, the STAINLESS TUBE increases in length to move the Thermostat Diaphragm (or Bellows) Assembly in a direction to first close the seat at BALL 1 (Violet to Yellow) and open the seat at BALL 2 (Yellow to Atmosphere). Output Pressure (Yellow) decreases to cause the desired Pilot or Motor Valve action.

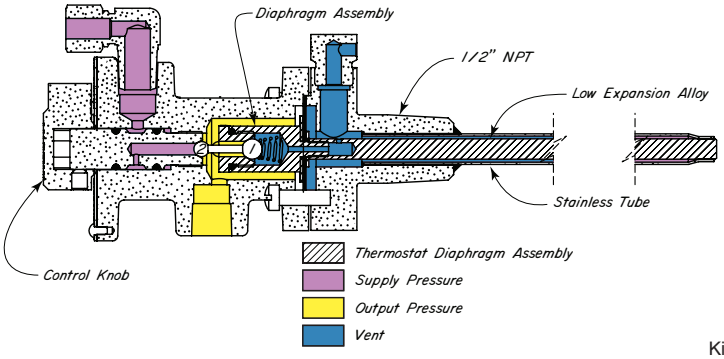
As the temperature decreases, the action is reversed to increase Output Pressure (Yellow).

By reversing the Vent and Supply lines, the Thermostat can be made to act in a direct snap mode, Pilot Output Pressure increases with temperature rise. Pilot output vents with temperature decrease

INDIRECT ACTION

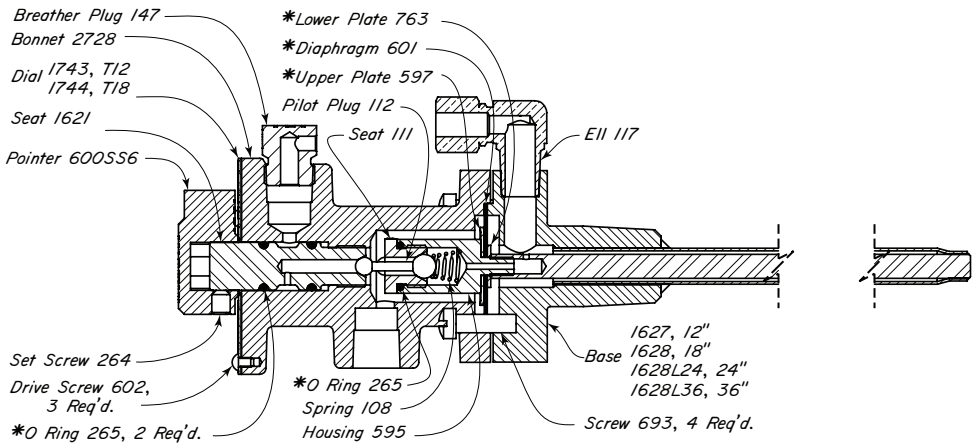


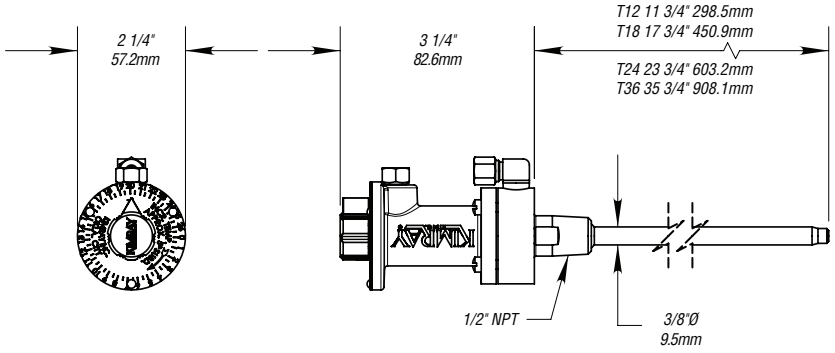
DIRECT ACTION



Kimray is an ISO 9001- certified manufacturer.

LOW TEMPERATURE BASE ASSEMBLIES
DUCTILE IRON





THERMOSTATS AVAILABLE:

CAT. NO.	BASE ASSEMBLY	MAX. TEMP. °F	MAX. TEMP. °C	REPAIR KIT
HAA	T 12	400	204	RLB
HAB	T 18	400	204	RLB
HAC	T 24	400	204	RLB
HAD	T 36	400	204	RLB

NOTES:

*These are recommended spare parts and are stocked as repair kits.

Separable Sockets are available at extra cost, refer to Table of Contents for ordering.

Kimray is an ISO 9001- certified manufacturer.

ACTION:

Indirect throttle; Pilot Output Pressure (Yellow) decreases with temperature rise.

Direct semi-throttle; Pilot Output Pressure (Yellow) increases with temperature rise.

APPLICATION:

Used to control a set temperature in heaters, emulsion treaters, reboilers, steam generators, heat exchangers, cooler shutter controls, and salt bath heaters.

WORKING PRESSURE (sensing element):

psig	kg/cm^2	
500	35.15	max. without Separable Socket
4000	281.23	max. with Separable Socket
7000	492.15	max. with Special Separable Socket

Separable Socket is an extra price item and must be ordered separately, if desired. To order Separable Sockets refer to Table of Contents

TEMPERATURE RANGE:

HT 12, HT 18 -30°F minimum to 750°F maximum
-34°C minimum to 399°C maximum

SUPPLY PRESSURE:

5 to 30 psig
.35 to 2.11 kg/cm^2

RESPONSE RANGE:

HT 12 - 2.50 psig/°F, .31 kg/cm^2/°C
HT 18 - 3.75 psig/°F, .47 kg/cm^2/°C

OPERATION:

These Thermostat Base Assemblies consist of a STAINLESS TUBE for monitoring the changing temperature, which is connected by a Low Expansion Alloy Rod to a DIAPHRAGM or BELLOWS ASSEMBLY. The differential pressure across the Diaphragm or Bellows combined with changes in the length of the STAINLESS TUBE throttle a PILOT PLUG seat. The PILOT PLUG consists of two stainless balls rigidly connected together. The seat at BALL 1 is the Supply Pressure inlet (Violet to Yellow). The seat at BALL 2 is the pressure vent (Yellow to Atmosphere).

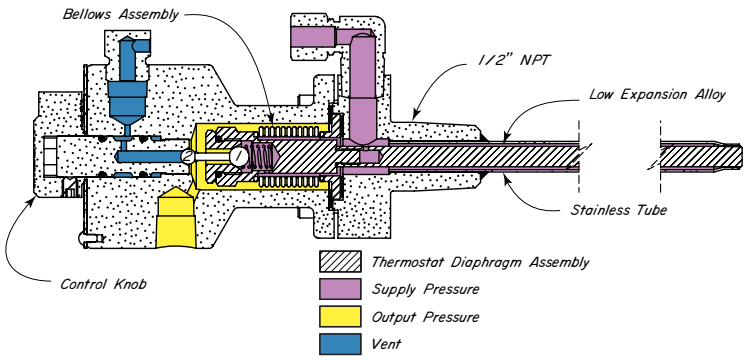
Assume the set temperature of the Thermostat is above that of the system. The vent at BALL 2 is closed and the inlet at BALL 1 is open. Output Pressure (Yellow) is being sent to any Pilot or Motor Valve.

As the temperature rises in the system, the STAINLESS TUBE increases in length to move the Thermostat Diaphragm (or Bellows) Assembly in a direction to first close the seat at BALL 1 (Violet to Yellow) and open the seat at BALL 2 (Yellow to Atmosphere). Output Pressure (Yellow) decreases to cause the desired Pilot or Motor Valve action.

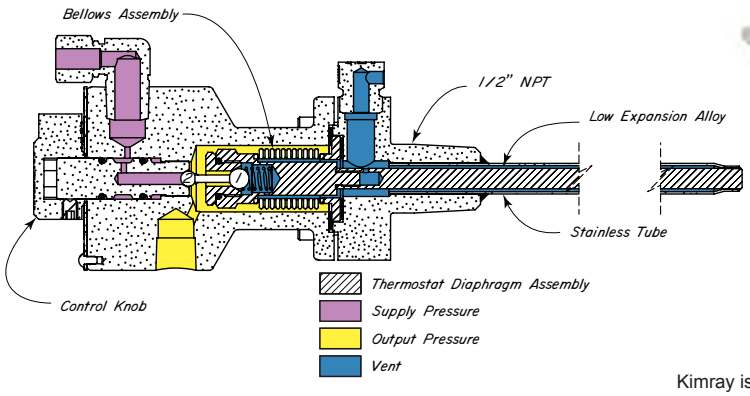
As the temperature decreases, the action is reversed to increase Output Pressure (Yellow).

By reversing the Vent and Supply lines, the Thermostat can be made to act in a direct snap mode, Pilot Output Pressure increases with temperature rise. Pilot output vents with temperature decrease

INDIRECT ACTION

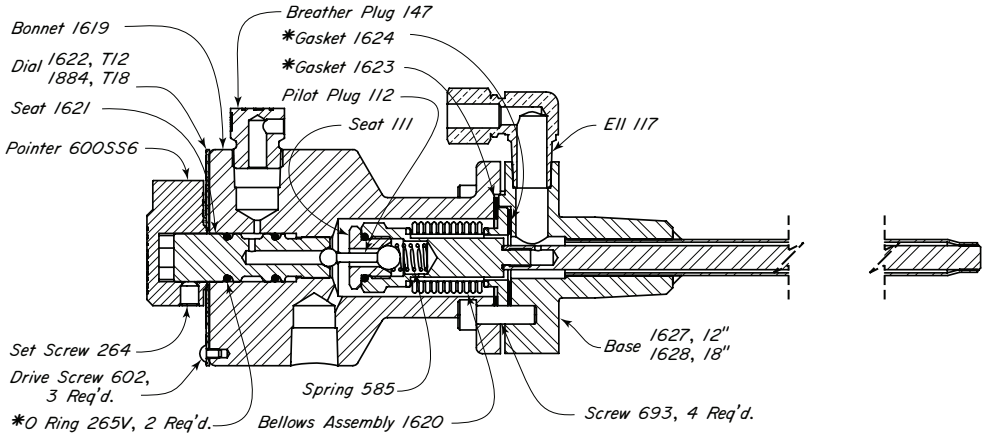


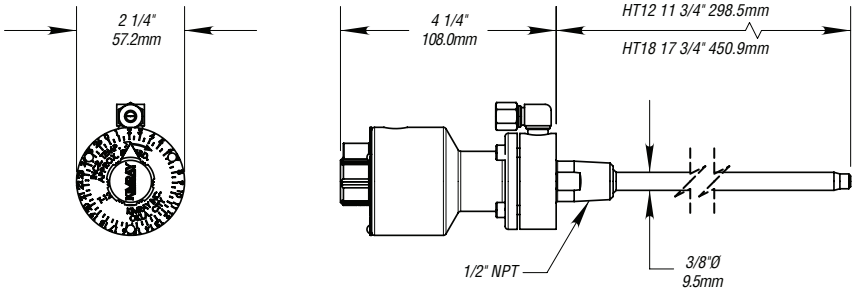
DIRECT ACTION



Kimray is an ISO 9001- certified manufacturer.

HIGH TEMPERATURE BASE ASSEMBLIES STEEL





THERMOSTATS AVAILABLE:

CAT. NO.	BASE ASSEMBLY	MAX. TEMP. °F	MAX. TEMP. °C	REPAIR KIT
HBA	HT 12	750	399	RLQ
HBB	HT 18	750	399	RLQ

NOTES:

*These are recommended spare parts and are stocked as repair kits.

Separable Sockets are available at extra cost, refer to Table of Contents for ordering.

Kimray is an ISO 9001- certified manufacturer.

ACTION:

Direct snap; Pilot Output Pressure "snaps on" with temperature rise.

APPLICATION:

Used to control temperature in indirect and direct heaters, emulsion treaters, reboilers, steam generators, heat exchangers, cooler shutter controls, and salt bath heaters.

WORKING PRESSURE (sensing element):

psig	kg/cm²	
500	35.15	max. without Separable Socket
4000	281.23	max. with Separable Socket
7000	492.15	max. with Special Separable Socket

Separable Socket is an extra price item and must be ordered separately, if desired. To order Separable Sockets refer to Table of Contents.

TEMPERATURE RANGE:

T 12S, T 18S	-30°F minimum to 400°F maximum
	-34°C minimum to 204°C maximum
HT 12S, HT 18S	-30°F minimum to 750°F maximum
	-34°C minimum to 399°C maximum

OPERATION:

These Thermostats each consist of an Indirect Acting Throttle Base Assembly which is connected to a 3 PS Pilot providing a Direct Snap Output Signal. The 3 PS Pilot also acts as an amplifier increasing the sensitivity of the Base Assembly.

Assume the set temperature of the Thermostat is above the temperature of the system being controlled. As the system temperature rises, the STAINLESS TUBE increases in length to move the Thermostat Diaphragm (or Bellows) Assembly in a direction to first close the seat at BALL 1 (Violet to Red) and open the seat at BALL 2 (Red to Atmosphere). As Variable Pressure (Red) decreases, the 3 PS Pilot Diaphragm Assembly moves upward to close the seat at BALL 4 (Yellow to Atmosphere) and open the seat at BALL 3 (Violet to Yellow). Increasing Pilot Output Pressure (Yellow) helps move the 3 PS Pilot Diaphragm Assembly upward and thereby produces a "snap on" pilot action. Output Pressure (Yellow) is sent to cause the desired Pilot or Motor Valve action.

As the system temperature decreases, Variable Pressure (Red) increases, the Pilot Diaphragm Assembly is forced downward to close the seat at Ball 3 (Violet to Yellow) and open the seat at BALL 4 (Yellow to Atmosphere). Venting of Pilot Output Pressure (Yellow) permits the Pilot Diaphragm Assembly to move downward more rapidly, producing a "snap off" pilot action. Output Pressure (Yellow) is vented causing the desired Pilot or Motor Valve action.

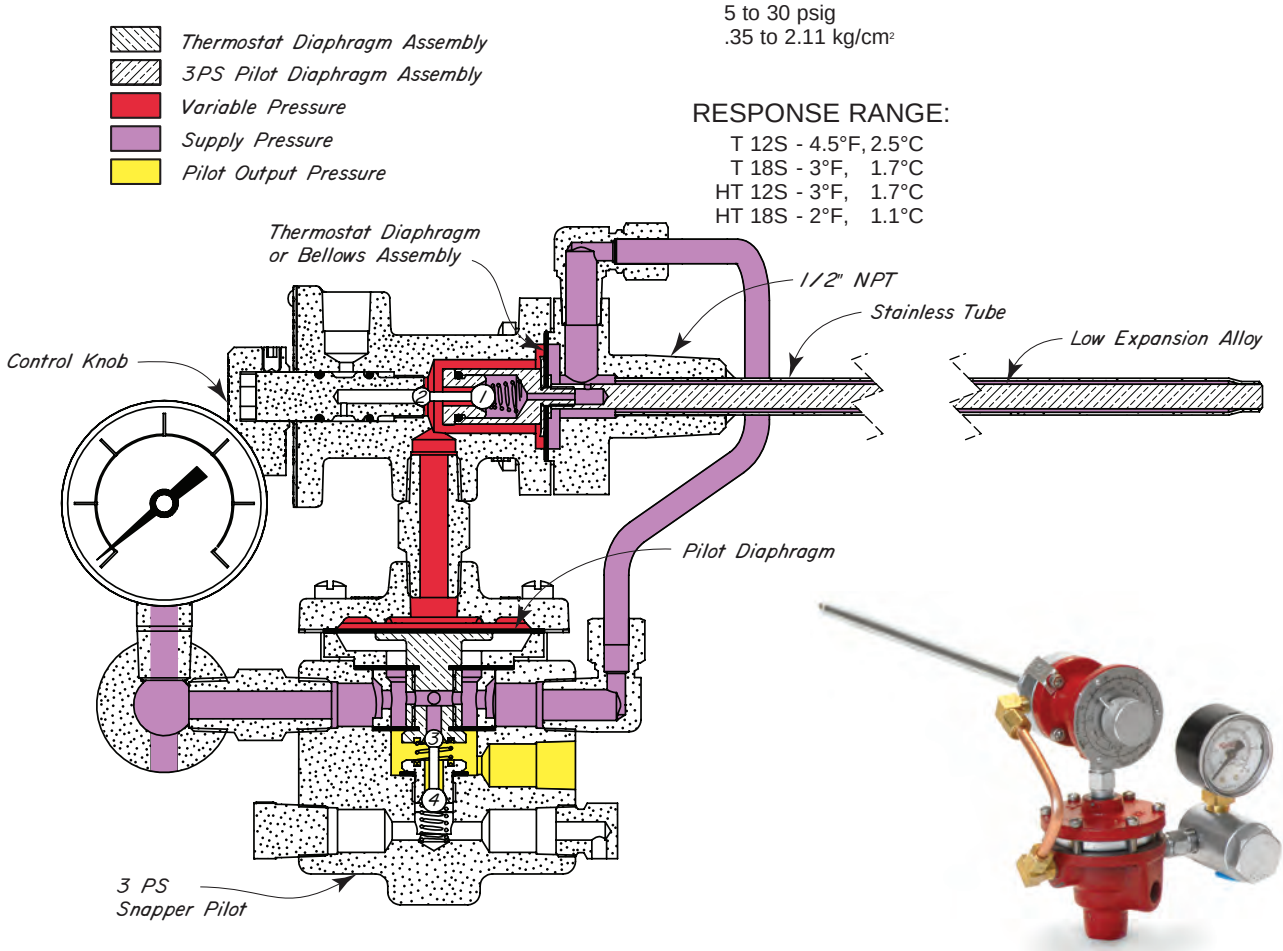
The 112 SMT is the recommended Motor Valve for this thermostat configuration. Refer to "Burner Valves" in the Table of Contents for more information.

SUPPLY PRESSURE:

5 to 30 psig
.35 to 2.11 kg/cm²

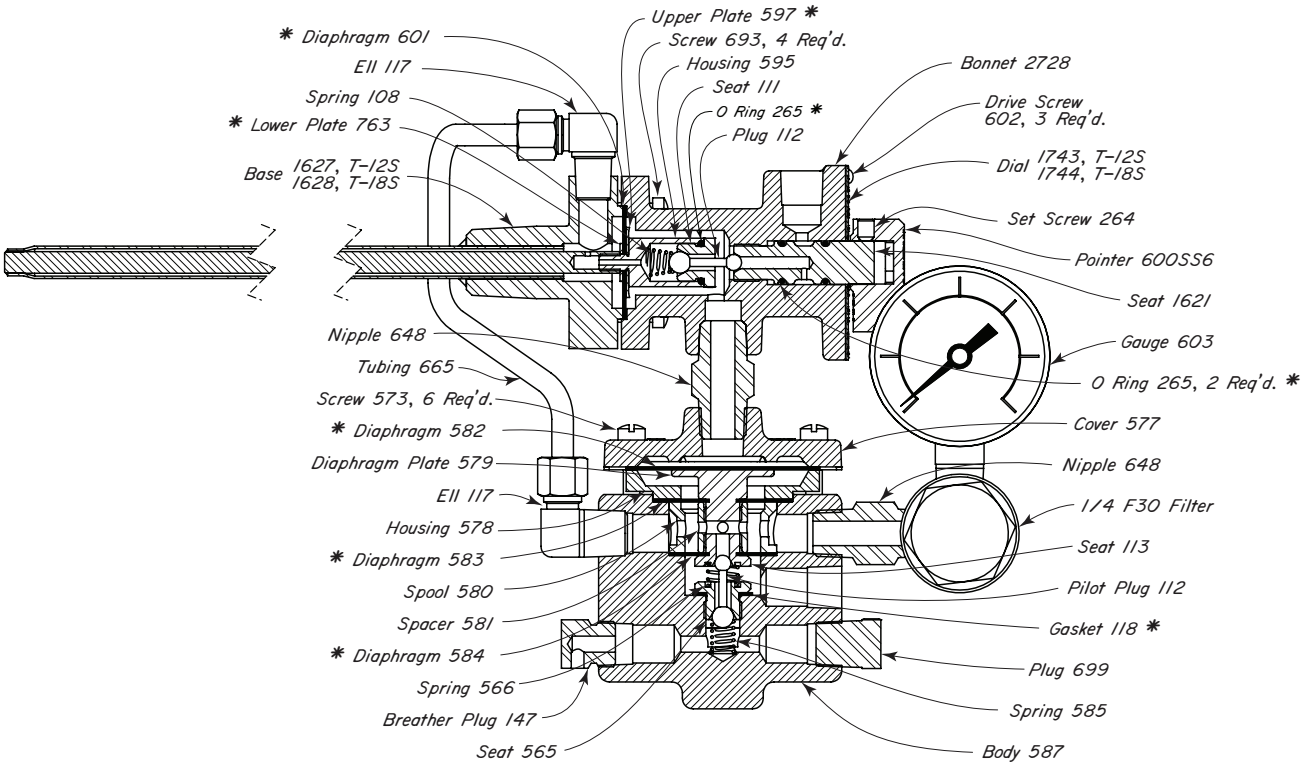
RESPONSE RANGE:

T 12S - 4.5°F, 2.5°C
T 18S - 3°F, 1.7°C
HT 12S - 3°F, 1.7°C
HT 18S - 2°F, 1.1°C

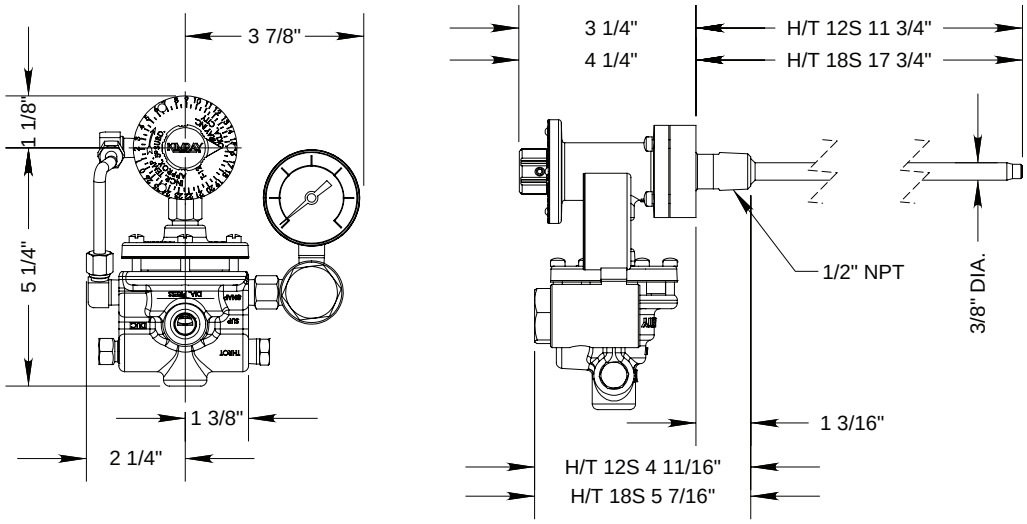


Kimray is an ISO 9001- certified manufacturer.

DIRECT SNAP THERMOSTAT
DUCTILE IRON or STEEL



DIMENSIONS



ALL TAPPED OPENINGS ARE 1/4" NPT EXCEPT AS NOTED.

THERMOSTATS AVAILABLE:

CAT. NO.	BASE ASSEMBLY	MAX. TEMP. °F	MAX. TEMP. °C	REPAIR KIT
HAG	T 12DAS	400	204	RLA
HAH	T 18DAS	400	204	RLA
HBG	HT 12DAS	750	399	RLR
HBH	HT 18DAS	750	399	RLR

NOTES:

*These are recommended spare parts and are stocked as repair kits.

Separable Sockets are available at extra cost, refer to Table of Contents for ordering.

For parts reference of the High Temperature Base Assemblies for HT 12S and HT 18S, refer to "Base Assemblies " in Table of Contents.

Kimray is an ISO 9001- certified manufacturer.

ACTION:

Indirect snap; Pilot Output Pressure "snaps off" with temperature rise.

APPLICATION:

Used to control temperature in indirect and direct heaters, emulsion treaters, reboilers, steam generators, heat exchangers, cooler shutter controls, and salt bath heaters.

WORKING PRESSURE (sensing element):

psig	kg/cm²	
500	35.15	max. without Separable Socket
4000	281.23	max. with Separable Socket
7000	492.15	max. with Special Separable Socket

Separable Socket is an extra price item and must be ordered separately, if desired. To order Separable Sockets refer to Table of Contents.

TEMPERATURE RANGE:

-30°F minimum to 400°F maximum
-34°C minimum to 204°C maximum

OPERATION:

This Thermostat consists of a Direct Acting Semi-throttle Base Assembly which is connected to a 3 PS Pilot producing an Indirect Snap Output Signal. The 3 PS Pilot also acts as an amplifier increasing the sensitivity of the Base Assembly.

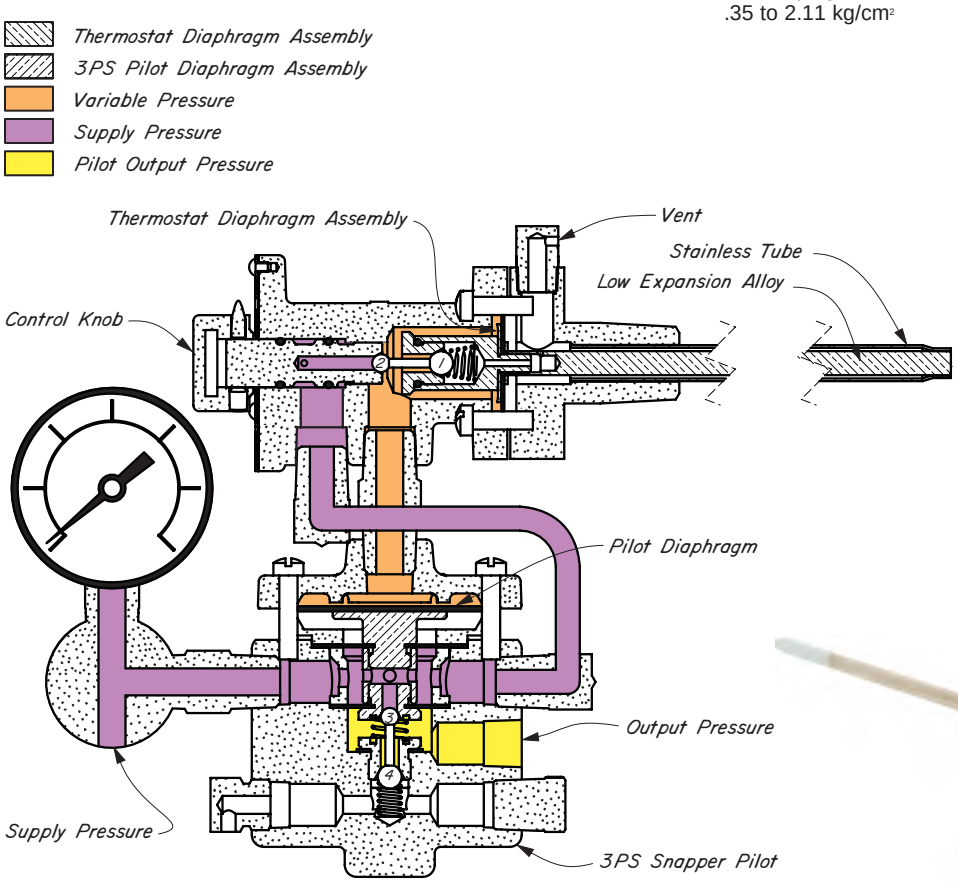
Assume the set temperature of the Thermostat is above that of the system being controlled and Pilot Output Pressure (Yellow) is being sent to any Pilot or Motor Valve. As the system temperature rises, the STAINLESS TUBE increases in length to move the Thermostat Diaphragm Assembly in a direction to first close the seat at BALL 1 (Orange to Atmosphere) and open the seat at BALL 2 (Violet to Orange). As Variable Pressure (Orange) increases, the 3 PS Pilot Diaphragm Assembly moves downward to close the seat at BALL 3 (Violet to Yellow) and open the seat at BALL 4 (Yellow to Atmosphere).

Venting of Pilot Output Pressure (Yellow) helps move the 3 PS Pilot Diaphragm Assembly downward and thereby produces a "snap off" action of the pilot to cause the desired Pilot or Motor Valve action.

As Variable Pressure (Orange) decreases due to decreasing system temperature, the Pilot Diaphragm Assembly is forced upward to close the seat at BALL 4 (Yellow to Atmosphere) and open the seat at BALL 3 (Violet to Yellow). Increasing Pilot Output Pressure (Yellow) permits the Pilot Diaphragm Assembly to move upward more rapidly, producing a "snap on" pilot action. This action allows a Motor Valve to open fully.

SUPPLY PRESSURE:

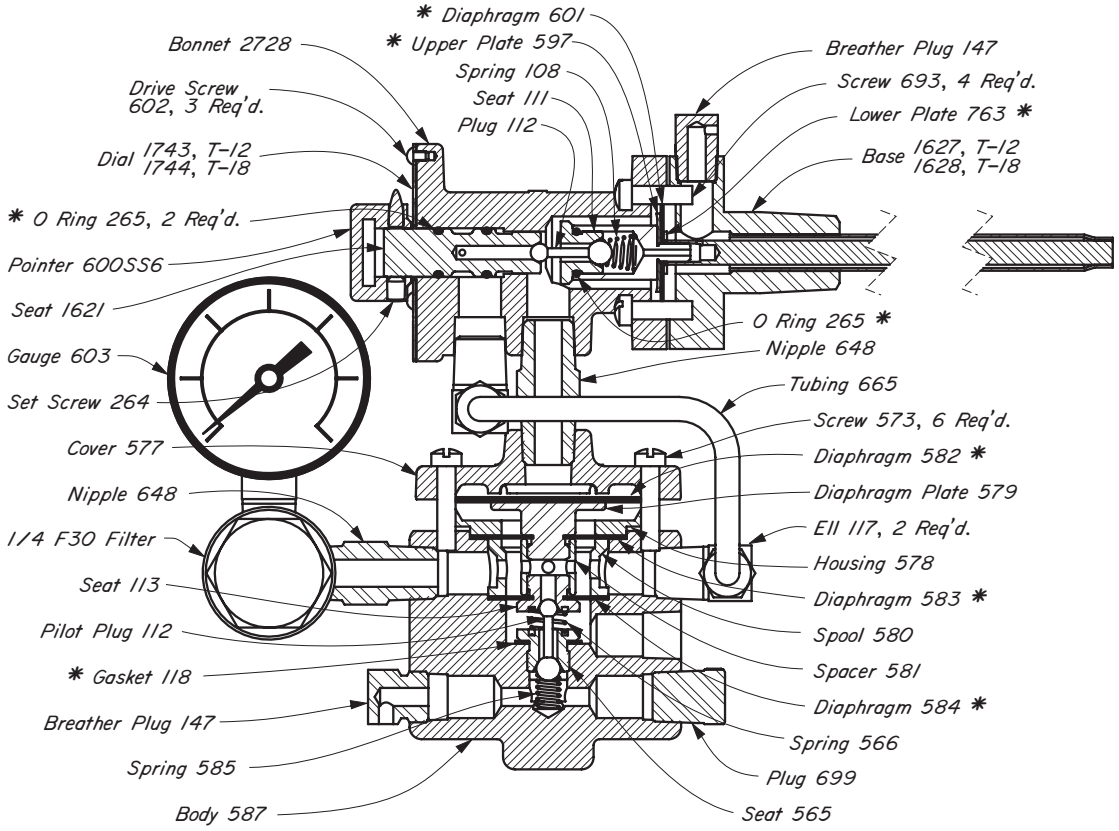
5 to 30 psig
.35 to 2.11 kg/cm²



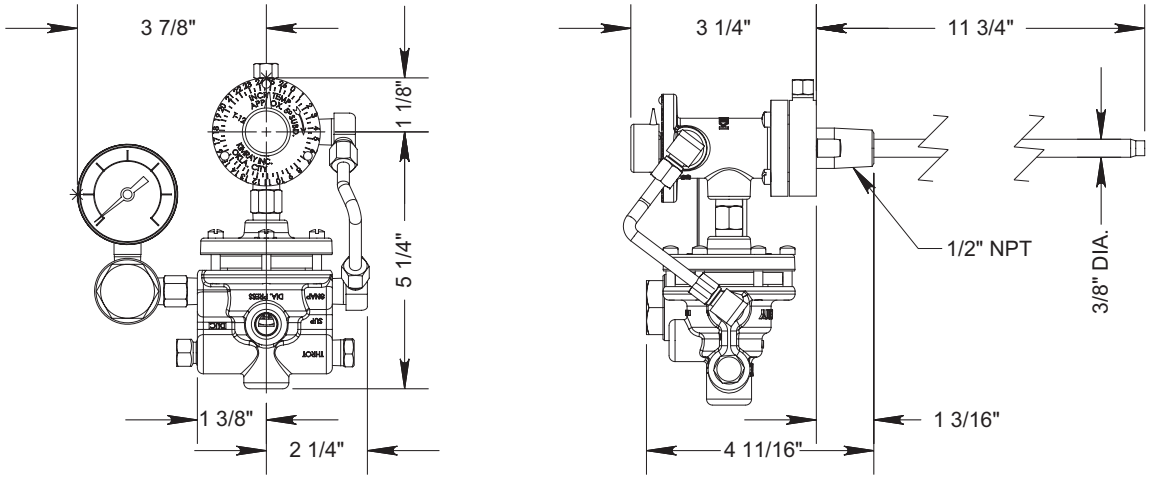
Kimray is an ISO 9001- certified manufacturer.

KIMRAY INC.®

INDIRECT SNAP THERMOSTAT
DUCTILE IRON



DIMENSIONS



ALL TAPPED OPENINGS ARE 1/4" NPT EXCEPT AS NOTED.

THERMOSTATS AVAILABLE:

CAT. NO.	BASE ASSEMBLY	MAX. TEMP. °F	MAX. TEMP. °C	REPAIR KIT
HAU	T 12 IAS	400	204	RLN
HAX	T 18 IAS	400	204	RLN
HAY	HT 12 IAS	750	399	RAV

NOTES:

*These are recommended spare parts and are stocked as repair kits.

Separable Sockets are available at extra cost, refer to Table of Contents for ordering.

Kimray is an ISO 9001- certified manufacturer.

INDIRECT THROTTLE THERMOSTAT

ACTION:

Indirect throttle; Pilot Output Pressure (Yellow) decreases with temperature rise.

APPLICATION:

For temperature control of indirect heaters, emulsion treaters, reboilers, steam generators, heat exchangers cooler shutter controllers, and salt bath heaters.

WORKING PRESSURE (sensing element):

psig	kg/cm²	
500	35.15	max. without Separable Socket
4000	281.23	max. with Separable Socket
7000	492.15	max. with Special Separable Socket

Separable Socket is an extra price item and must be ordered separately, if desired. To order Separable Sockets refer to Table of Contents.

TEMPERATURE RANGE:

T 12T, T 18T	-30°F minimum to 400°F maximum
	-34°C minimum to 204°C maximum
HT 12T, HT 18T	-30°F minimum to 750°F maximum
	-34°C minimum to 399°C maximum
HT 12T-S, HT 18T-S	-30°F minimum to 750°F maximum
	-34°C minimum to 399°C maximum

OPERATION:

These Thermostats each consist of a Base Assembly sending an indirect throttle signal to operate a 3 PG Pilot. The 3 PG Pilot is connected as a throttle pilot and amplifies this signal increasing the sensitivity of the Base Assembly.

Assume the set temperature of the Thermostat is above the temperature of the system being controlled and Output Pressure (Yellow) is being sent to a Pilot or Motor Valve.

As the system temperature rises, the STAINLESS TUBE increases in length to move the Thermostat Diaphragm (or Bellows) Assembly in a direction to first close the seat at BALL 1 (Violet to Orange) and open the seat at BALL 2 (Orange to Atmosphere). As Variable Pressure (Orange) decreases the 3 PG Pilot Diaphragm Assembly moves upward to close the seat at BALL 4 (Violet to Yellow) and open the seat at BALL 3 (Yellow to Atmosphere). Pilot Output Pressure (Yellow) is vented for the desired Pilot or Motor Valve action.

As the system temperature decreases, the action is reversed to increase Pilot Output Pressure (Yellow).

Due to the low modulating characteristic of a Motor Valve, the action of this controller will not be a true throttle action but will have a tendency to over ride the control point. The 112 SMT-T is the recommended Motor Valve for this thermostat configuration. Refer to “Burner Valves” in the Table of Contents for mor information.

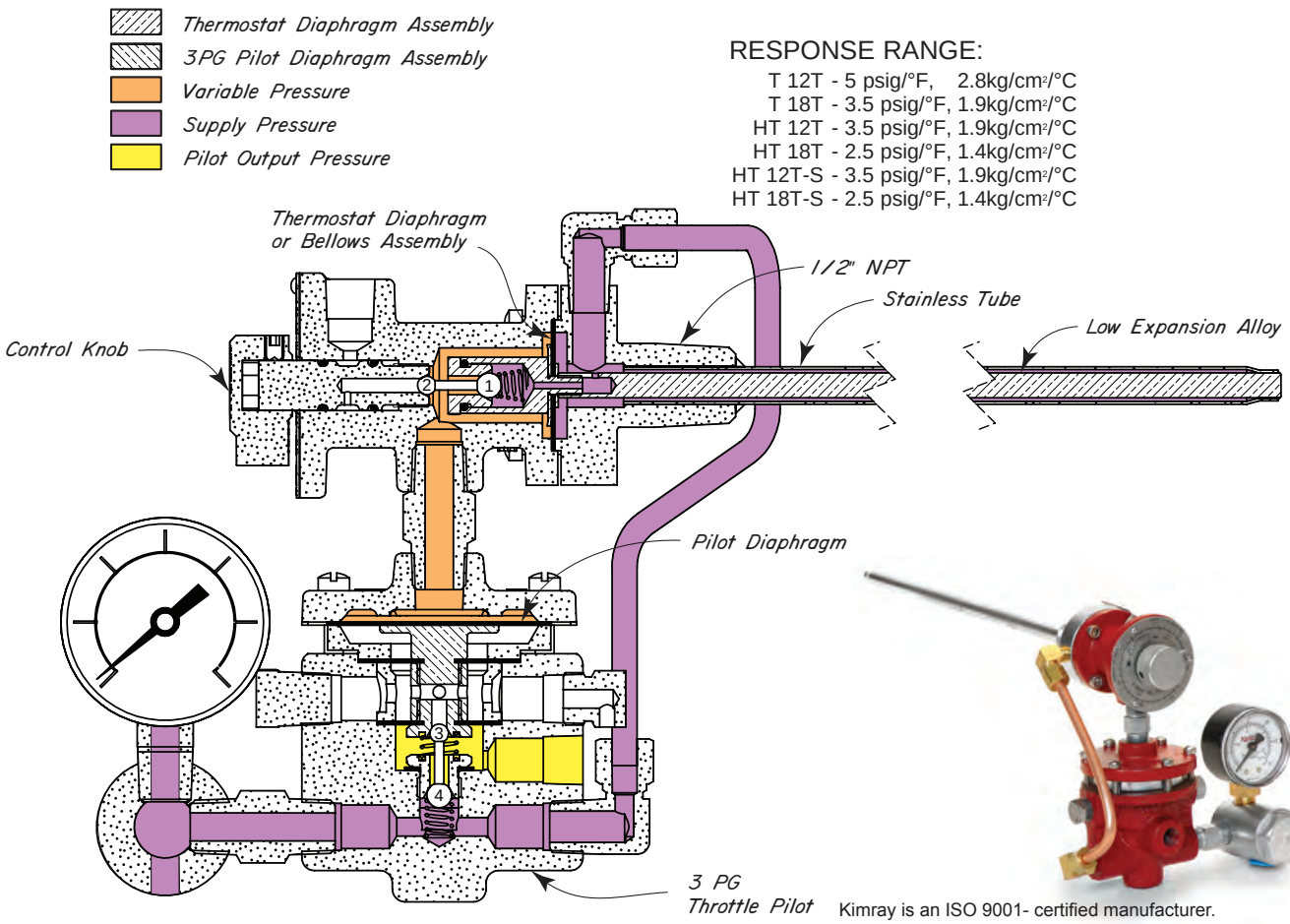
The 3 PG Pilot may be used for snap service when connected as a snapper pilot. For snap connection of the 3 PG Pilot refer to catalog section “Y”.

SUPPLY PRESSURE:

5 to 30 psig
.35 to 2.11 kg/cm²

RESPONSE RANGE:

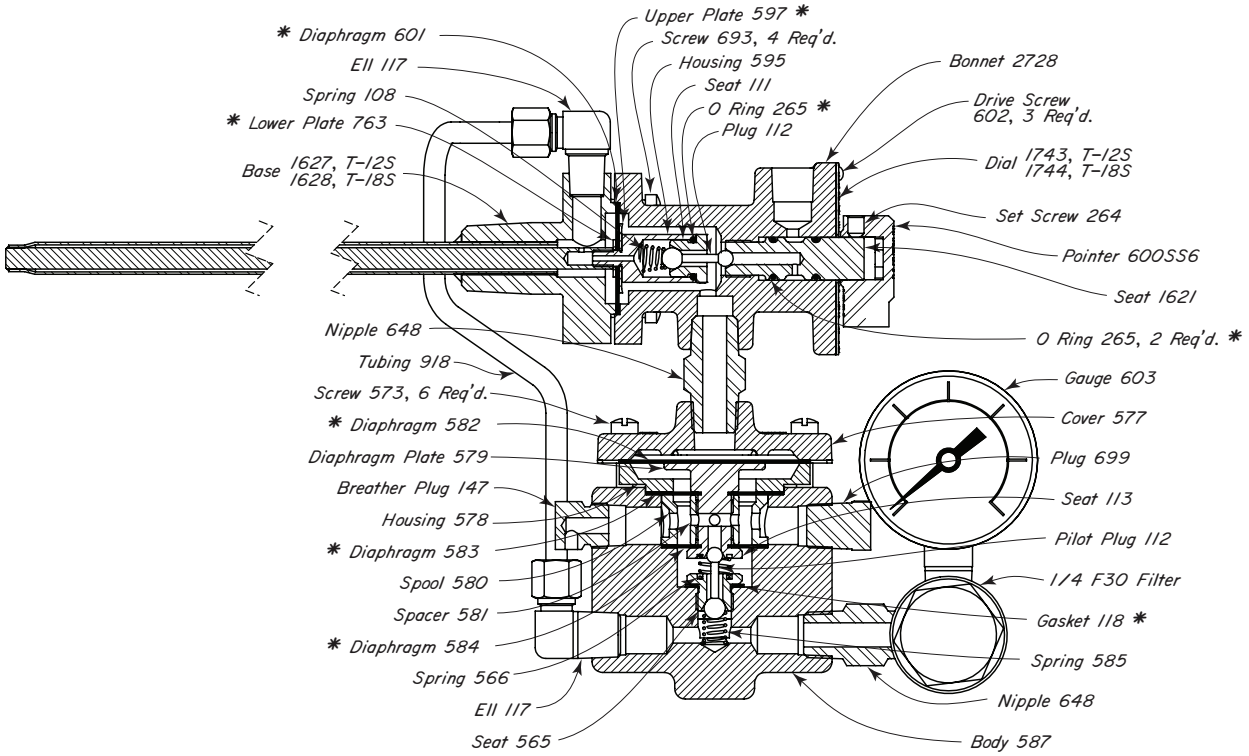
T 12T - 5 psig/°F, 2.8kg/cm²/°C
T 18T - 3.5 psig/°F, 1.9kg/cm²/°C
HT 12T - 3.5 psig/°F, 1.9kg/cm²/°C
HT 18T - 2.5 psig/°F, 1.4kg/cm²/°C
HT 12T-S - 3.5 psig/°F, 1.9kg/cm²/°C
HT 18T-S - 2.5 psig/°F, 1.4kg/cm²/°C



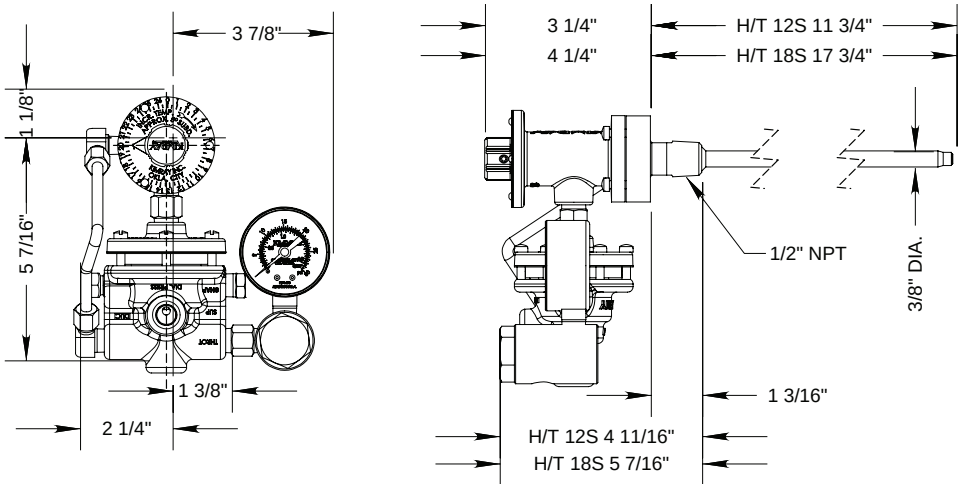
Kimray is an ISO 9001- certified manufacturer.

KIMRAY INC.®

INDIRECT THROTTLE THERMOSTAT
DUCTILE IRON or STEEL



DIMENSIONS



ALL TAPPED OPENINGS ARE 1/4" NPT EXCEPT AS NOTED.

THERMOSTATS AVAILABLE:

CAT. NO.	BASE ASSEMBLY	MAX. TEMP. °F	MAX. TEMP. °C	REPAIR KIT
HAI	T 12 IAT	400	204	RLA
HAJ	T 18 IAT	400	204	RLA
HBI	HT 12 IAT	750	399	RLR
HBJ	HT 18 IAT	750	399	RLR

NOTES:

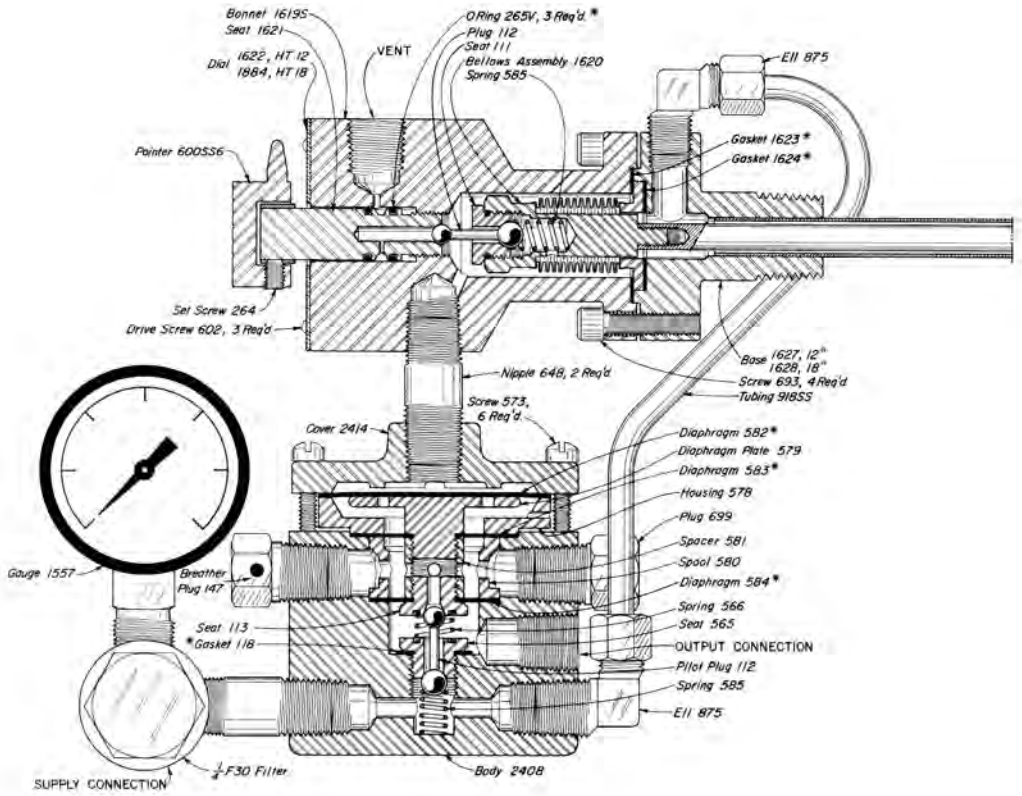
*These are recommended spare parts and are stocked as repair kits.

Separable Sockets are available at extra cost, refer to Table of Contents for ordering.

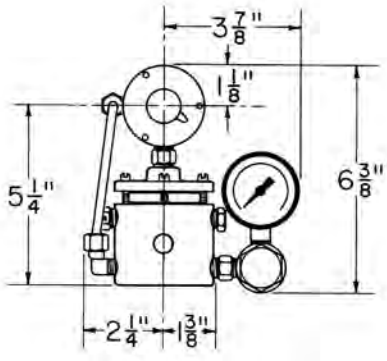
For HT 12T and HT 18T High Temperature Base Assembly parts, refer to "Base Assemblies " in Table of Contents.

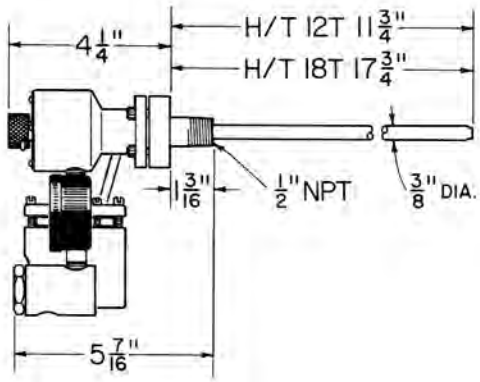
Kimray is an ISO 9001- certified manufacturer.

INDIRECT THROTTLE THERMOSTAT
ALL STEEL



DIMENSIONS





ALL TAPPED OPENINGS ARE 1/4" NPT EXCEPT AS NOTED.

THERMOSTATS AVAILABLE:

CAT. NO.	BASE ASSEMBLY	MAX. TEMP. °F	MAX. TEMP. °C	REPAIR KIT
HBP	HT 12 IAT-S	750	399	RLR
HBR	HT 18 IAT-S	750	399	RLR

NOTES:

*These are recommended spare parts and are stocked as repair kits.

Separable Sockets are available at extra cost, refer to Table of Contents for ordering.

Kimray is an ISO 9001- certified manufacturer.

Kimray is an ISO 9001- certified manufacturer.

ACTION:

Direct throttle; Pilot Output Pressure (Yellow) increases with temperature rise.

APPLICATION:

For temperature control in indirect and direct heaters, emulsion treaters, reboilers, steam generators, heat exchangers cooler shutter controllers, and salt bath heaters.

WORKING PRESSURE (sensing element):

psig	kg/cm²	
500	35.15	max. without Separable Socket
4000	281.23	max. with Separable Socket
7000	492.15	max. with Special Separable Socket

Separable Socket is an extra price item and must be ordered separately, if desired. To order Separable Sockets refer to Table of Contents

TEMPERATURE RANGE:

T 12TDA, 18TDA	-30°F minimum to 400°F maximum
	-34°C minimum to 204°C maximum
HT 12TDA, HT 18TDA	-30°F minimum to 750°F maximum
	-34°C minimum to 399°C maximum

OPERATION:

These Thermostats consist of Indirect throttle action Base Assemblies connected to a 3 PGRA which reverses and amplifies the signal to provide direct throttle action.

Assume the set temperature of the Thermostat is above the temperature of the system being controlled. Then the seats at BALLS 1 and 4 are open. The seats at BALL 2 and 3 are closed.

As the system temperature rises, the STAINLESS TUBE increases in length, moving the Thermostat Diaphragm (or Bellows) Assembly so as to first close the seat at BALL 1 (Violet to Red) and open the seat at BALL 2 (Red to Atmosphere). As the Controlled Variable Pressure (Red) decreases, the PILOT SPRING forces the Pilot Diaphragm Assembly downward closing the seat at BALL 4 (Yellow to Atmosphere) and opening the seat at BALL 3 (Violet to Yellow). This increases the Pilot Output Pressure (Yellow).

As the system temperature decreases the action of the controller is reversed, decreasing the Pilot Output Pressure (Yellow).

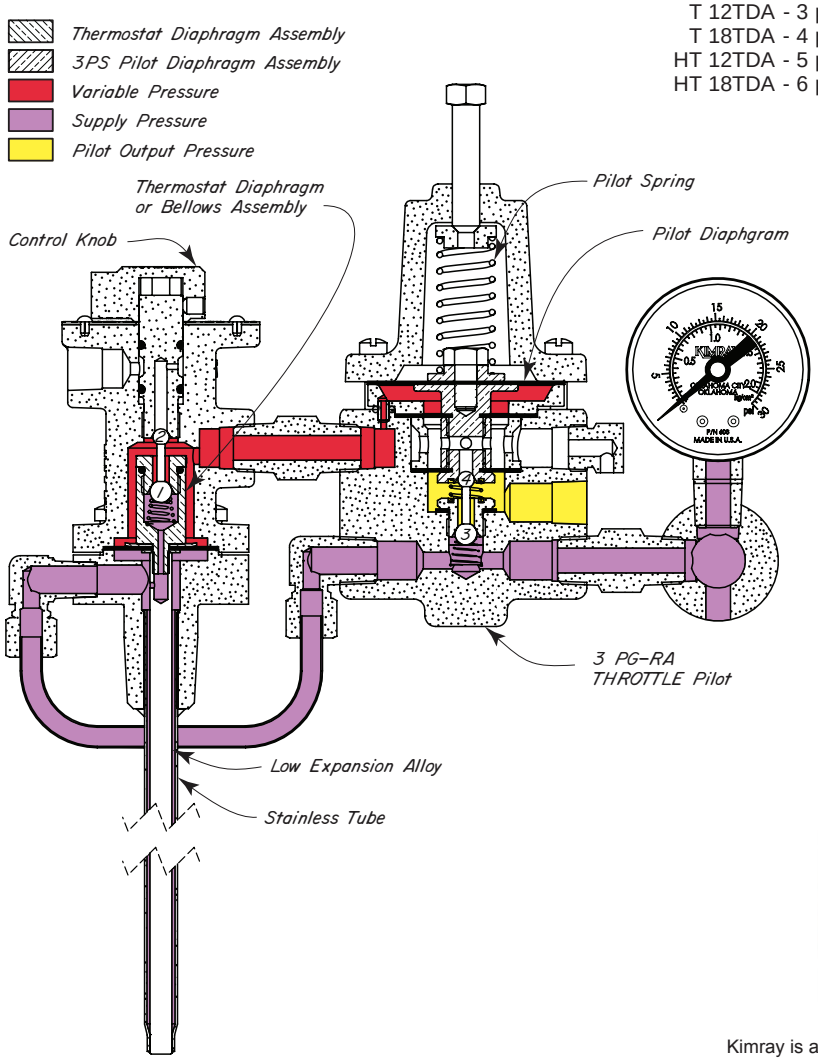
Pilot Output Pressure (Yellow) may be connected to any type of diaphragm controller such as a 3-way motor valve on the heat exchanger of a low temperature separation unit.

SUPPLY PRESSURE:

5 to 25 psig
.35 to 1.75 kg/cm²

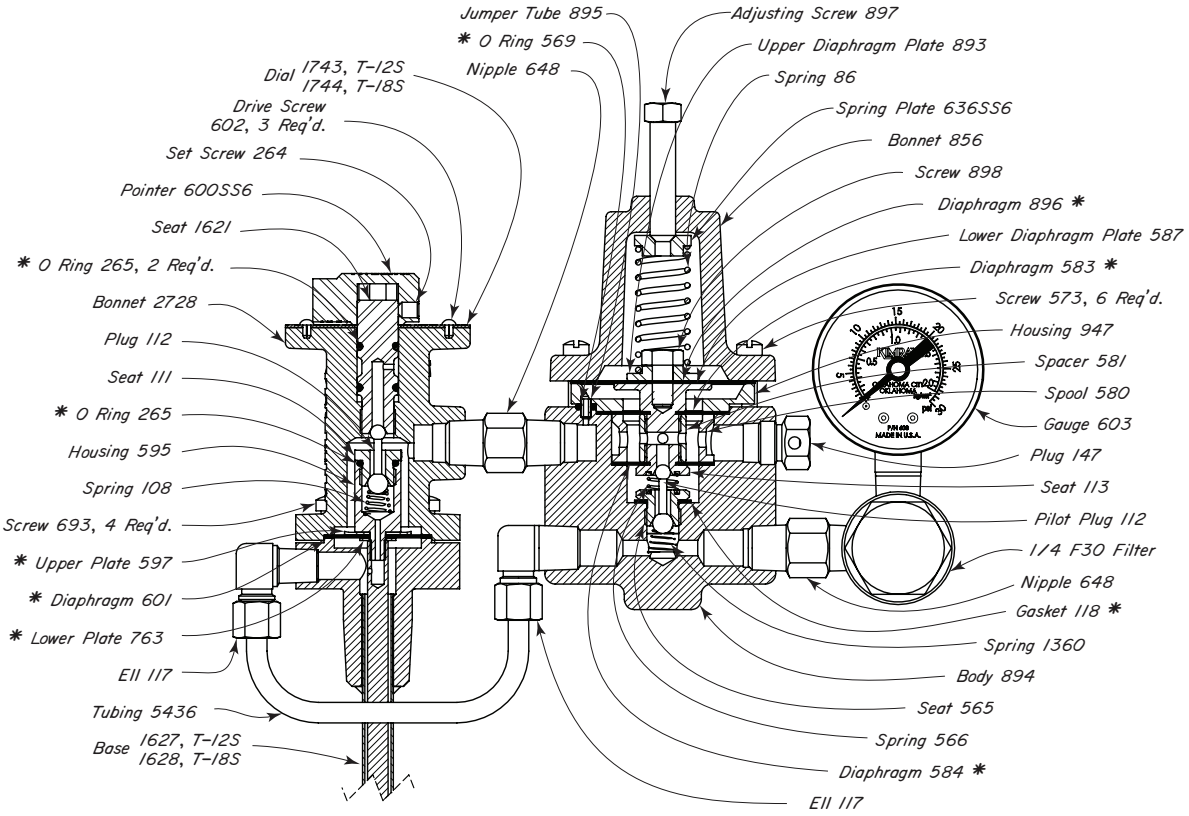
RESPONSE RANGE:

T 12TDA - 3 psig/°F,	.38 kg/cm²/°C
T 18TDA - 4 psig/°F,	.50 kg/cm²/°C
HT 12TDA - 5 psig/°F,	.63 kg/cm²/°C
HT 18TDA - 6 psig/°F,	.76 kg/cm²/°C

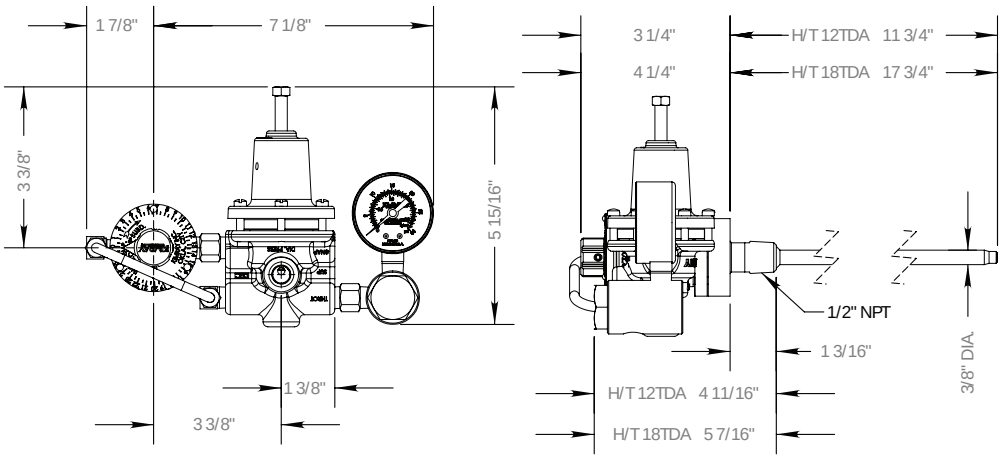


Kimray is an ISO 9001- certified manufacturer.

DIRECT THROTTLE THERMOSTAT
DUCTILE IRON or STEEL



DIMENSIONS



ALL TAPPED OPENINGS ARE 1/4" NPT EXCEPT AS NOTED.

THERMOSTATS AVAILABLE:

CAT. NO.	BASE ASSEMBLY	MAX. TEMP. °F	MAX. TEMP. °C	REPAIR KIT
HAK	T 12DAT	400	204	RLK
HAL	T 18DAT	400	204	RLK
HBK	HT 12DAT	750	399	RLX
HBL	HT 18DAT	750	399	RLX

NOTES:

*These are recommended spare parts and are stocked as repair kits.

Separable Sockets are available at extra cost, refer to Table of Contents for ordering.

For HT 12TDA and HT 18TDA Thermostat Base Assembly parts, refer to "Base Assemblies " in Table of Contents.

Kimray is an ISO 9001- certified manufacturer.

ACTION:

Direct semi-throttle; Pilot Output Pressure (Yellow) increases with temperature rise.

APPLICATION:

For temperature control in indirect and direct heaters, emulsion treaters, reboilers, steam generators, heat exchangers cooler shutter controllers, and salt bath heaters.

WORKING PRESSURE (sensing element):

psig	kg/cm²	
500	35.15	max. without Separable Socket
4000	281.23	max. with Separable Socket
7000	492.15	max. with Special Separable Socket

Separable Socket is an extra price item and must be ordered separately, if desired. To order Separable Sockets refer to Table of Contents.

TEMPERATURE RANGE:

-30°F minimum to 400°F maximum
-34°C minimum to 204°C maximum

OPERATION:

These Thermostats consist of Direct Acting Base Assembly sending a direct semi-throttle signal to a 3 PG Pilot. The 3 PG Pilot is connected as a throttle pilot and amplifies this signal increasing the sensitivity of the Base Assembly.

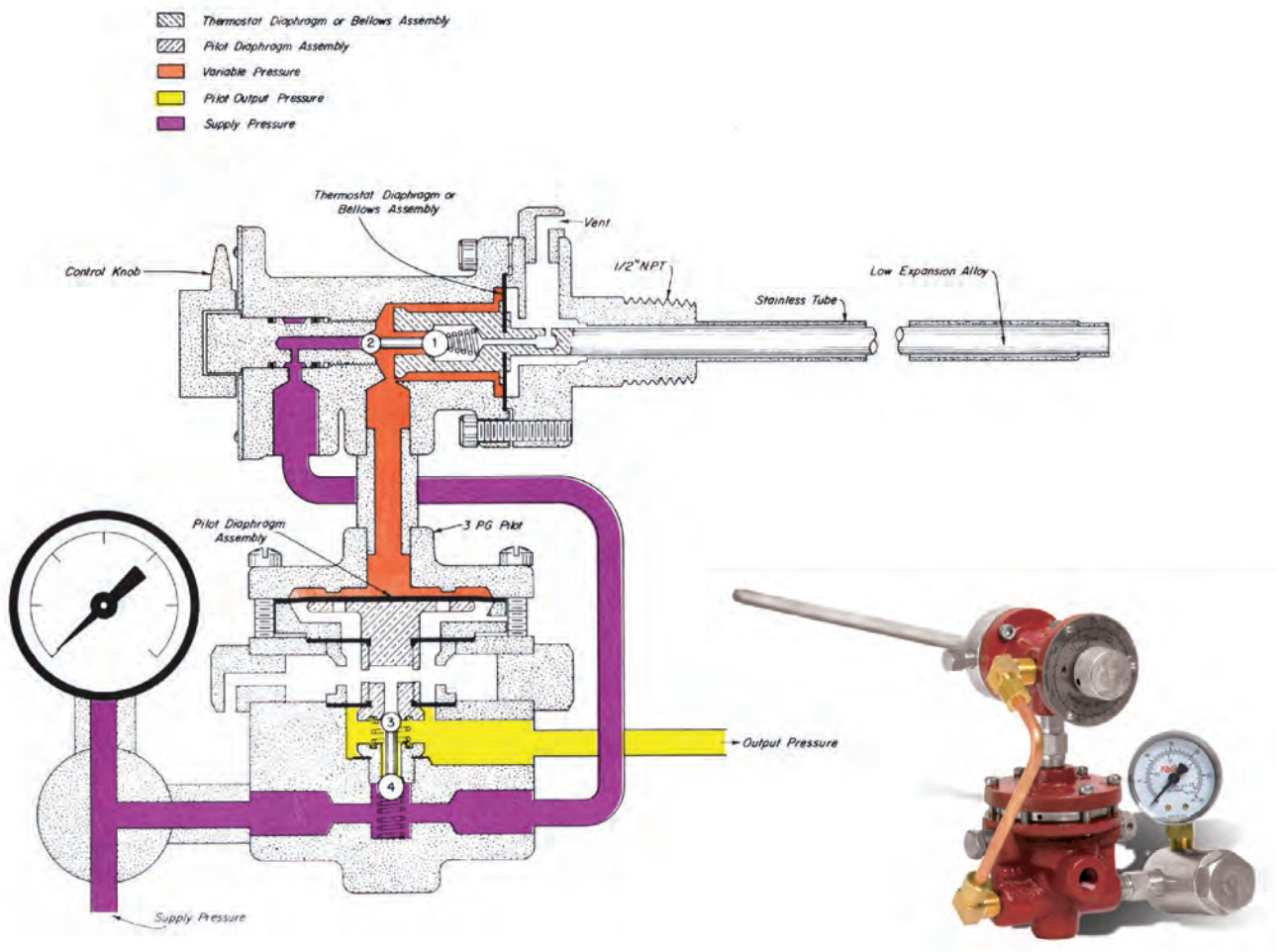
Assume the set temperature of the Thermostat is above that of the system. The inlet at BALL 2 (Violet to Orange) is closed and the vent a BALL 1 (Orange to Atmosphere) is open, the vent BALL 3 (Yellow to Atmosphere) is open, and the inlet BALL 4 (Violet to Yellow) is closed. Output Pressure (Yellow) is vented to atmosphere, no signal is sent to a Pilot or Motor Valve.

As the temperature rises in the system, the STAINLESS TUBE increases in length to move the Thermostat Diaphragm Assembly in a direction to first close the seat at BALL 1 (Orange to Atmosphere) and open the seat at BALL 2 (Violet to Orange) As Variable Pressure (Orange) increases, the 3 PG Pilot Diaphragm Assembly moves downward to close the seat at BALL 3 (Yellow to Atmosphere) and open the seat at BALL 4 (Violet to Yellow). Output Pressure (Yellow) is sent to cause the desired Pilot or Motor Valve action.

As the temperature in the system lowers, Variable Pressure (Orange) is vented moving the 3 PG Pilot Diaphragm Assembly upward to close the seat at BALL 4 (Violet to Yellow) and open the vent at BALL 3 (Yellow to Atmosphere). The Output Pressure (Yellow) is vented.

SUPPLY PRESSURE:

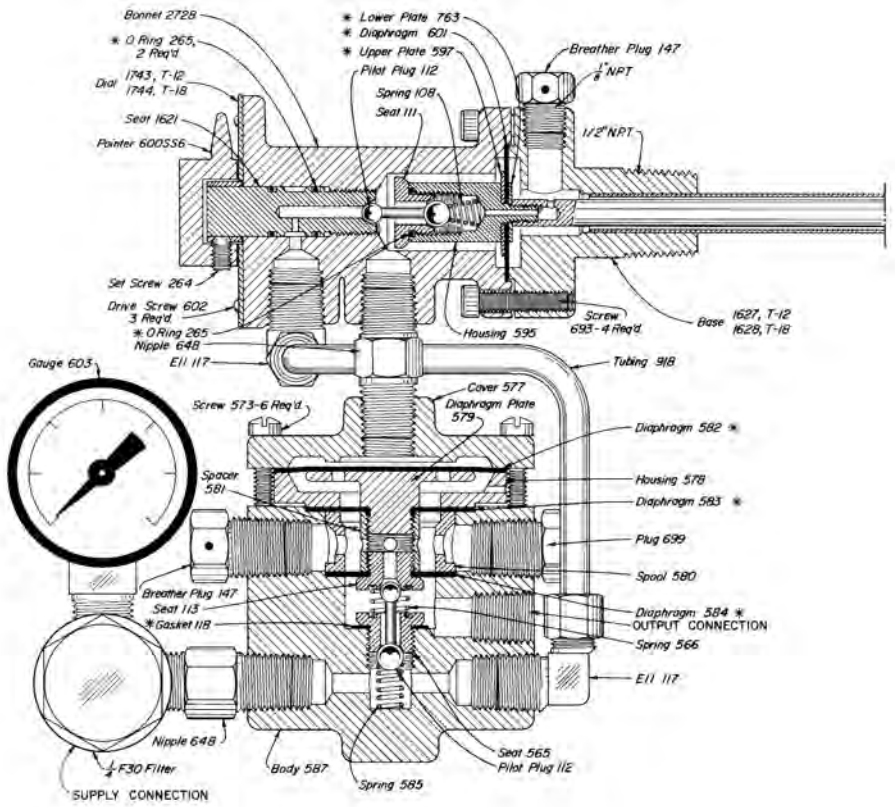
5 to 30 psig
.35 to 2.11 kg/cm²



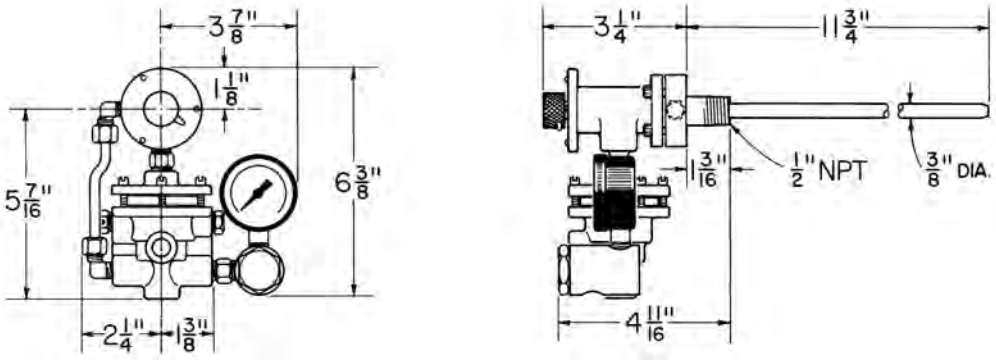
Kimray is an ISO 9001- certified manufacturer.

KIMRAY INC.®

DIRECT SEMI-THROTTLE THERMOSTAT
DUCTILE IRON



DIMENSIONS



ALL TAPPED OPENINGS ARE 1/4" NPT EXCEPT AS NOTED.

THERMOSTATS AVAILABLE:

CAT. NO.	BASE ASSEMBLY	MAX. TEMP. °F	MAX. TEMP. °C	REPAIR KIT
HAS	T 12DAT	400	204	RLO

NOTES:

*These are recommended spare parts and are stocked as repair kits. To order repair kit, specify; "T12DAT Repair Kit, RLO."

Separable Sockets are available at extra cost, refer to Table of Contents for ordering.

Kimray is an ISO 9001- certified manufacturer.

ACTION:

Indirect throttle; Pilot Output Pressure (Yellow) decreases with temperature rise.

APPLICATION:

Used to control temperature in indirect heaters, emulsion treaters, reboilers, steam generators, heat exchangers, cooler shutter controls, and salt bath heaters.

WORKING PRESSURE (sensing element):

psig	kg/cm^2	
500	35.15	max. without Separable Socket
4000	281.23	max. with Separable Socket
7000	492.15	max. with Special Separable Socket

Separable Socket is an extra price item and must be ordered separately, if desired. To order Separable Sockets refer to Table of Contents.

TEMPERATURE RANGE:

TC 12, TC 18	-30°F minimum to 400°F maximum
	-34°C minimum to 204°C maximum
HTC 12, HTC 18	-30°F minimum to 750°F maximum
	-34°C minimum to 399°C maximum

OPERATION:

These Controllers consist of an Indirect Throttle Action Base Assembly operating a 1" Pressure Opening Motor Valve. A Filter Pop Valve is provided as a relief valve in the event the Upstream or Supply Pressure (Red) gets to high for the Base Assembly to control.

Assume the set temperature of the Thermostat is above the temperature of the system being controlled and the Motor Valve is open. When the Motor Valve is open, the Output Pressure (Yellow) under the the Motor Valve Diaphragm opposes the spring.

As the temperature rises in the system, the STAINLESS TUBE increases in length to move the Thermostat Diaphragm (or Bellows) Assembly in a direction to first close the seat at BALL 1 (Red to Yellow) and open the seat at BALL 2 (Yellow to Atmosphere). As the Output Pressure (Yellow) decreases, the spring on the Motor Valve Stem Assembly moves the inner valve toward a closed position.

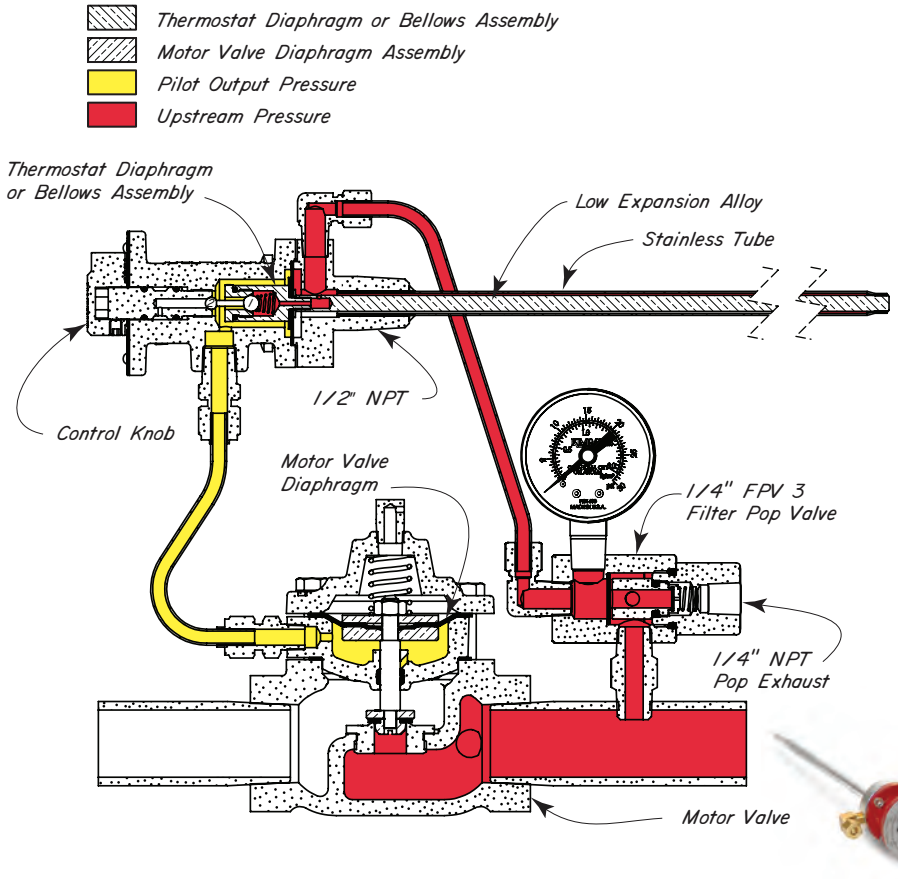
As the temperature decreases, the action is reversed to increase the Output Pressure (Yellow) and move the inner valve to an open position.

SUPPLY PRESSURE:

5 to 5 psig
.35 to 1.75 kg/cm^2

RESPONSE RANGE:

TC 12 - 2.5° F, 1.4°C
TC 18 - 1.75° F, 1.0°C
HTC 12 - 2.0° F, 1.1°C
HTC 18 - 1.5° F, .8°C

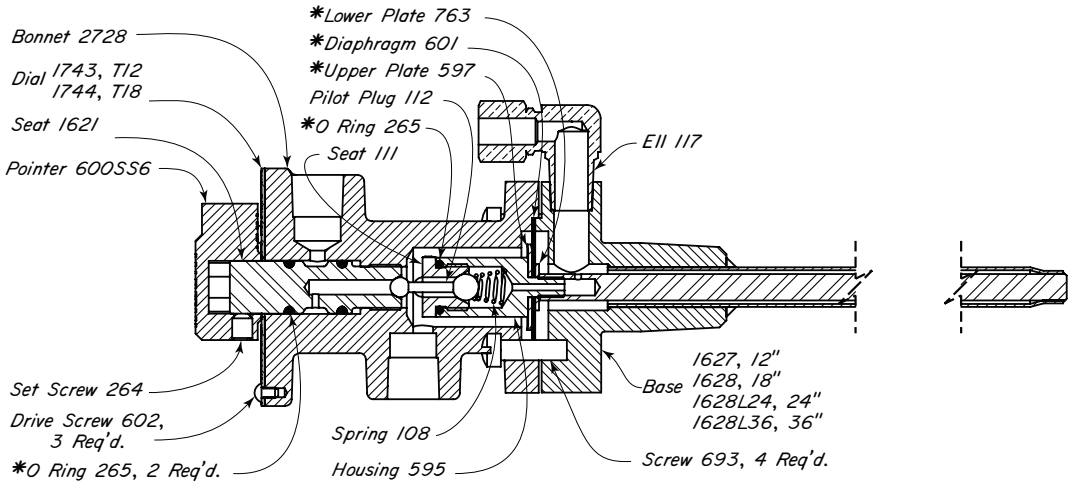


Kimray is an ISO 9001- certified manufacturer.

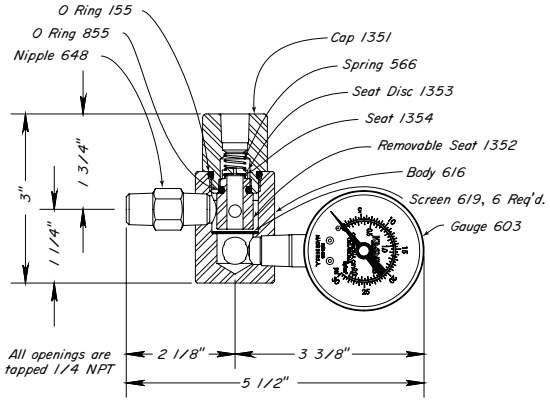
KIMRAY INC.®

"TC" THROTTLE
DUCTILE IRON or STEEL

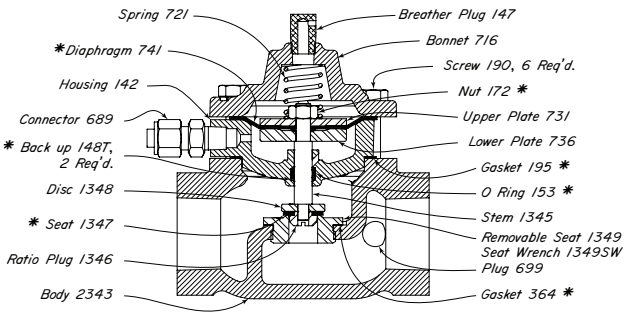
1" TC 12/18 500 lbs. W.P.



FILTER-POP VALVE 1/4 FPV 3



112 SMT DAB CAST IRON 125 lbs. W.P.



CONTROLLERS AVAILABLE:

CAT. NO.	BASE ASSEMBLY	MAX. TEMP. °F	MAX. TEMP. °C	REPAIR KIT
HAE	1TC 12	400	204	RLD
HAF	1TC 18	400	204	RLD
HBE	1HTC 12	750	399	RLE
HBF	1HTC 18	750	399	RLE

NOTES:

*These are recommended spare parts and are stocked as repair kits.

Separable Sockets are available at extra cost, refer to Table of Contents for ordering.

For parts reference of the High Temperature Base Assemblies for HTC 12 and HTC 18, refer to "Base Assemblies " in Table of Contents.

Kimray is an ISO 9001- certified manufacturer.

INDIRECT HIGH TEMPERATURE SHUT-DOWN

ACTION:

Indirect; Pilot Output Pressure (Yellow) decreases with temperature rise.

APPLICATION:

For temperature controlled system shutdown until manually reset.

WORKING PRESSURE (sensing element):

psig	kg/cm²	
500	35.15	max. without Separable Socket
4000	281.23	max. with Separable Socket
7000	492.15	max. with Special Separable Socket

Separable Socket is an extra price item and must be ordered separately, if desired. To order Separable Sockets refer to Table of Contents.

TEMPERATURE RANGE:

T 12M, T 18M	-30°F minimum to 400°F maximum
	-34°C minimum to 204°C maximum
HT 12M, HT 18M	-30°F minimum to 750°F maximum
	-34°C minimum to 399°C maximum

OPERATION:

These Thermostats consist of Base Assemblies sending an Indirect Throttle signal to a 3 PGM Pilot. The 3 PGM pilot is connected so that once the Output Pressure (Yellow) is vented, it must be manually reset to resume service.

Assume the set temperature of the Thermostat is above the temperature of the system being controlled and Pilot Output Pressure (Yellow) is being sent to any Pilot or Motor Valve.

As the system temperature rises, the STAINLESS TUBE increases in length to move the Thermostat Diaphragm (or Bellows) Assembly in a direction to first close the seat at BALL 1 (Yellow to Red) and open the seat at BALL 2 (Red to Atmosphere). As Variable Pressure (Red) decreases, the 3 PGM Pilot Diaphragm Assembly moves upward to close the seat at BALL 4 (Violet to Yellow) and open the seat at Ball 3 (Yellow to Atmosphere). Output Pressure (Yellow) decreases to cause the desired Pilot or Motor Valve action.

Once the Output Pressure (Yellow) has been vented, the Thermostat is shut down until the temperature of the system is below the set temperature and the RESET LEVER is used to reset the Pilot. If desired the RESET LEVER can also be used to manually vent Output Pressure (Yellow) and shut-down the thermostat.

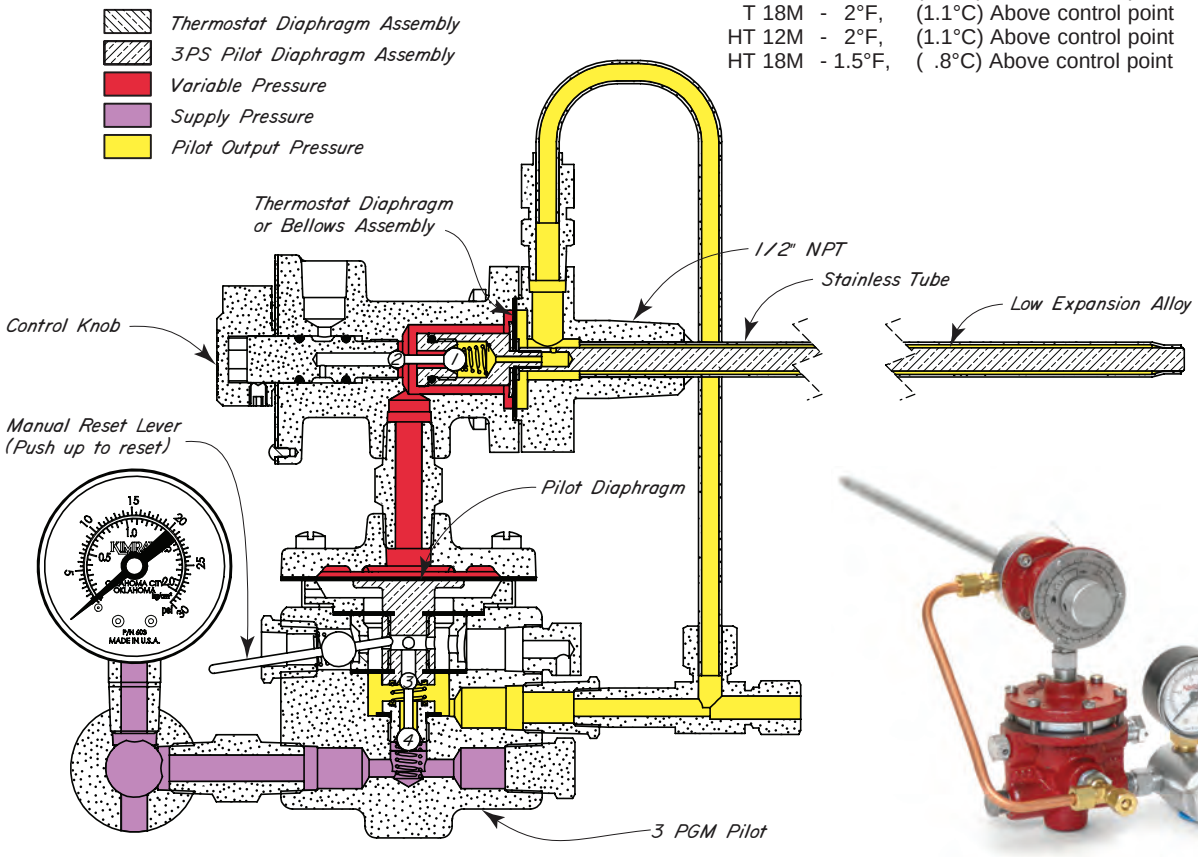
The 112 SMT-T is the recommended Motor valve for this thermostat configuration. Refer to “Burner Valves” in Table of Contents for more information.

SUPPLY PRESSURE:

5 to 30 psig
.35 to 2.11 kg/cm²

RESPONSE RANGE:

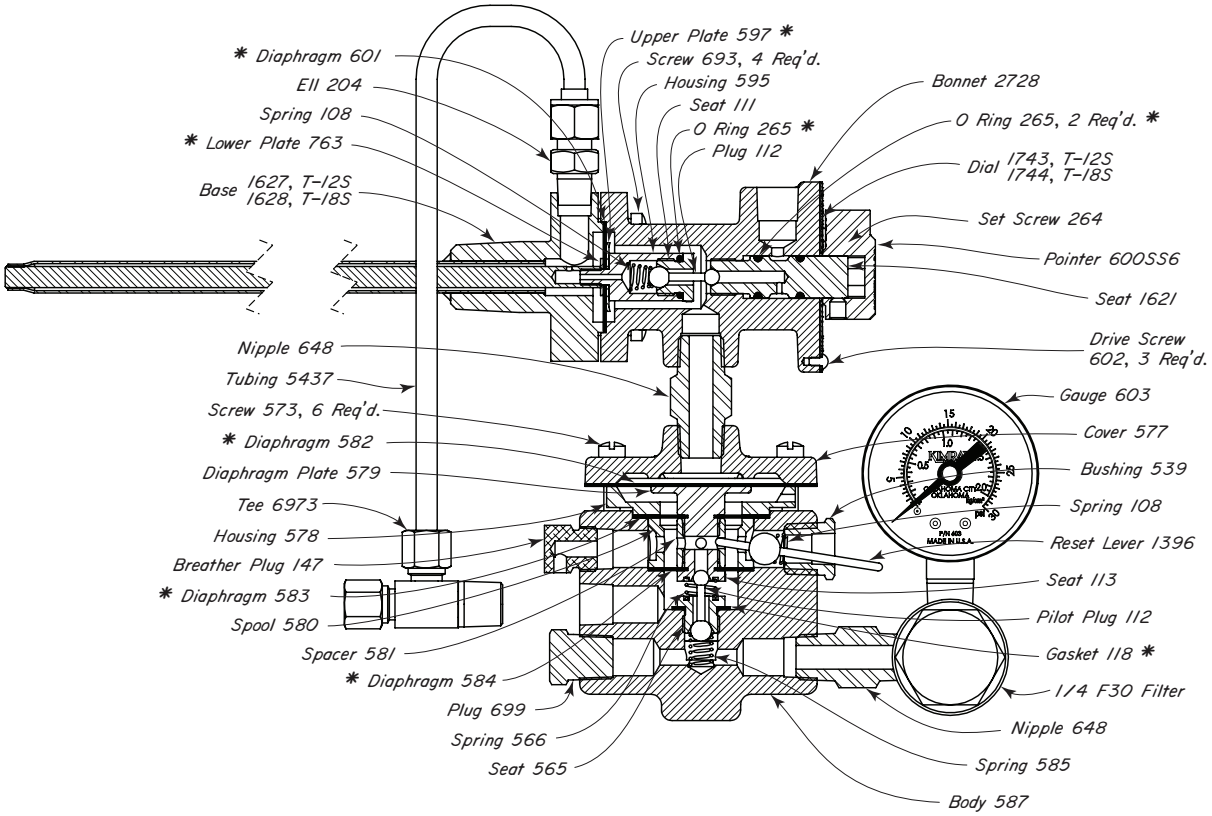
T 12M	- 3°F,	(1.7°C) Above control point
T 18M	- 2°F,	(1.1°C) Above control point
HT 12M	- 2°F,	(1.1°C) Above control point
HT 18M	- 1.5°F,	(.8°C) Above control point



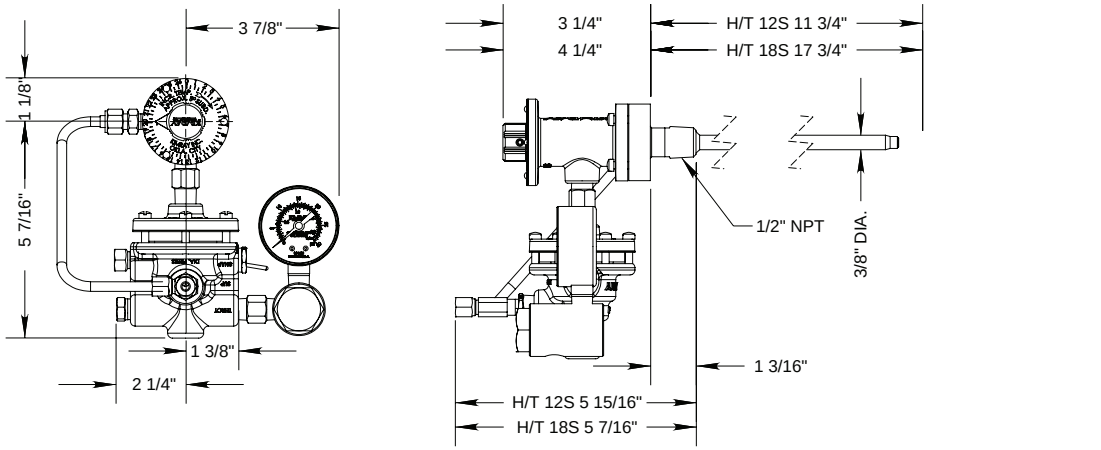
Kimray is an ISO 9001- certified manufacturer.

KIMRAY INC.®

INDIRECT HIGH TEMPERATURE SHUT-DOWN
DUCTILE IRON or STEEL



DIMENSIONS



ALL TAPPED OPENINGS ARE 1/4" NPT EXCEPT AS NOTED.

THERMOSTATS AVAILABLE:

CAT. NO.	BASE ASSEMBLY	MAX. TEMP. °F	MAX. TEMP. °C	REPAIR KIT
HAM	T 12 IAM	400	204	RLF
HAN	T 18 IAM	400	204	RLF
HBM	HT 12 IAM	750	399	RLT
HBN	HT 18 IAM	750	399	RLT

NOTES:

*These are recommended spare parts and are stocked as repair kits.

Separable Sockets are available at extra cost, refer to Table of Contents for ordering.

For HT 12M and HT 18M High Temperature Base Assembly parts, refer to “Base Assemblies ” in Table of Contents.

Kimray is an ISO 9001- certified manufacturer.

DIRECT LOW TEMPERATURE SHUT-DOWN

ACTION:

Direct; Pilot Output Pressure (Yellow) increases with temperature rise.

APPLICATION:

For temperature controlled system shutdown until manually reset.

WORKING PRESSURE (sensing element):

psig	kg/cm²	
500	35.15	max. without Separable Socket
4000	281.23	max. with Separable Socket
7000	492.15	max. with Special Separable Socket

Separable Socket is an extra price item and must be ordered separately, if desired. To order Separable Sockets refer to Table of Contents.

TEMPERATURE RANGE:

-30°F minimum to 400°F maximum
-34°C minimum to 204°C maximum

SUPPLY PRESSURE:

5 to 30 psig
.35 to 2.11 kg/cm²

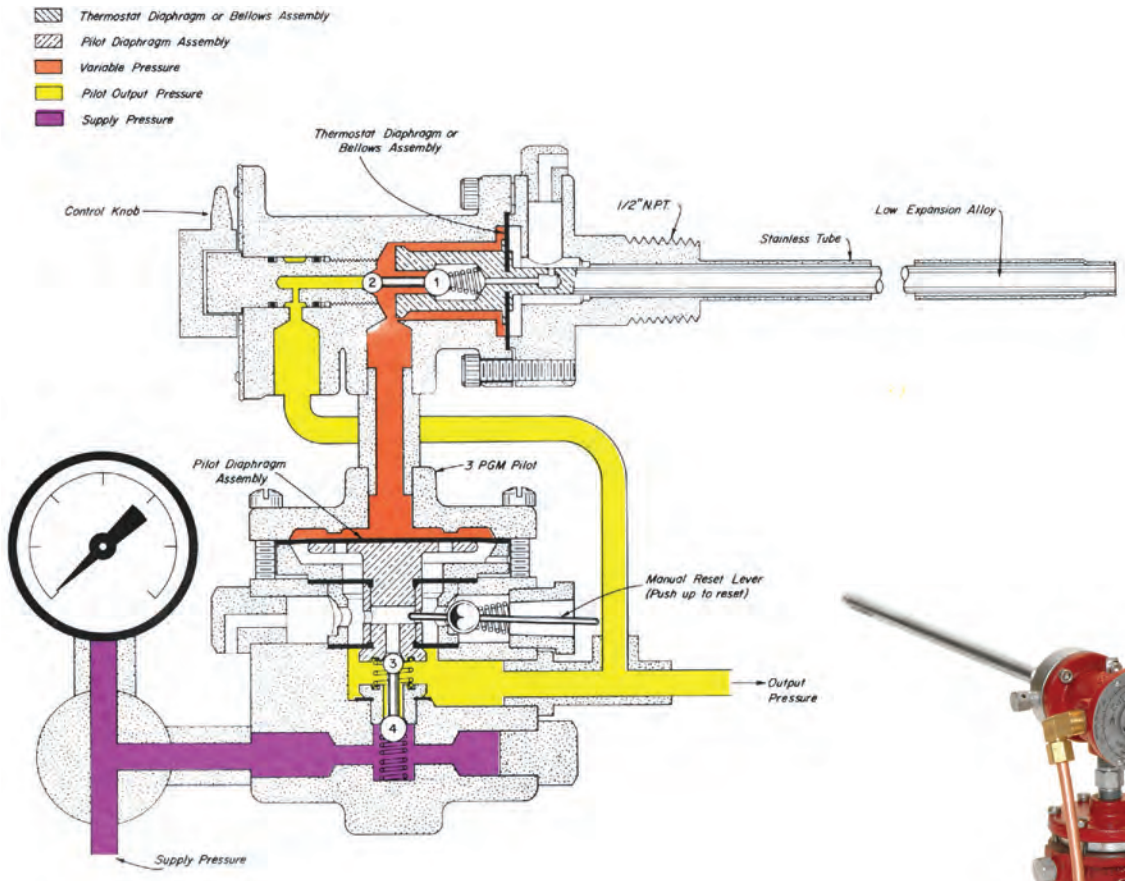
OPERATION:

This Thermostat consists of a Direct Action Base Assembly sending a signal to a 3 PGM Pilot. The 3 PGM Pilot is connected so that once the Output Pressure (Yellow) is vented, it must be manually reset to resume service.

Assume the set temperature of the Thermostat is below that of the system. The vents at BALL 1 (Orange to Atmosphere) and BALL 3 (Yellow to Atmosphere) are closed. The Inlets at BALL 2 (Yellow to Orange) and BALL 4 (Violet to Yellow) are open. Output Pressure (Yellow) is being sent to any Pilot or Motor Valve.

As the temperature decreases in the system, the STAINLESS TUBE decreases in length to move the Thermostat Diaphragm Assembly in a direction to first close the seat at BALL 2 (Yellow to Orange) and open the seat at BALL 1 (Orange to Atmosphere). Venting Variable Pressure (Orange) moves the 3 PG Pilot Diaphragm Assembly upward to close the seat at BALL 4 (Violet to Yellow) and open the seat at BALL 3 (Yellow to Atmosphere). Output Pressure (Yellow) decreases to cause the desired Pilot or Motor Valve action.

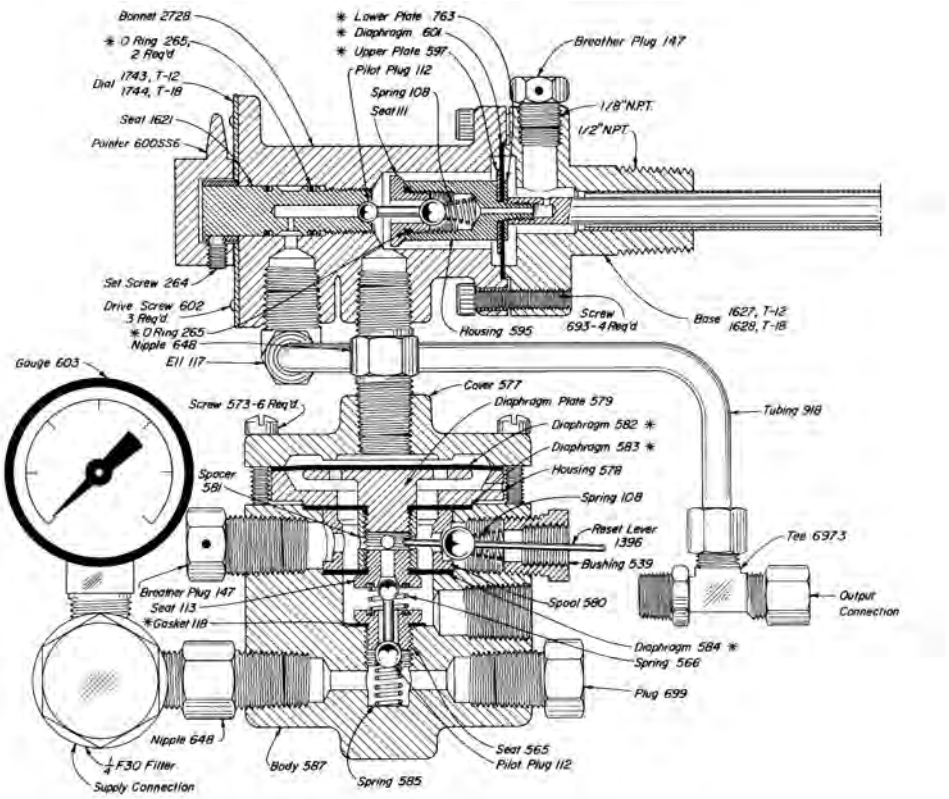
Once the Output Pressure (Yellow) has been vented the Thermostat is shut-down until the temperature of the system is above the set temperature and the RESET LEVER is used to reset the Pilot. If desired the RESET LEVER can also be used to manually vent Output Pressure (Yellow) and shut-down the thermostat.



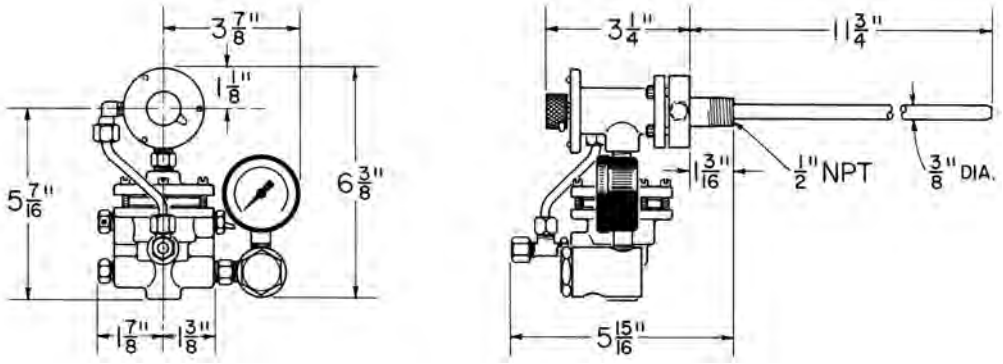
Kimray is an ISO 9001- certified manufacturer.

KIMRAY INC.®

DIRECT LOW TEMPERATURE SHUT-DOWN
DUCTILE IRON



DIMENSIONS



ALL TAPPED OPENINGS ARE 1/4" NPT EXCEPT AS NOTED.

THERMOSTATS AVAILABLE:

CAT. NO.	BASE ASSEMBLY	MAX. TEMP. °F	MAX. TEMP. °C	REPAIR KIT
HAT	T 12DAM	400	204	RLP

NOTES:

*These are recommended spare parts and are stocked as repair kits.

Separable Sockets are available at extra cost, refer to Table of Contents for ordering.

Kimray is an ISO 9001- certified manufacturer.

ACTION:

Direct action; Pilot Output Pressure (Yellow) increases with temperature rise. As long as the temperature is above the set point, the output will remain at supply pressure. If the pilot flame goes out, the pressure decreases and drops to zero.

APPLICATIONS:

Used as a Pilot safety shutdown or as a high stack temperature shutdown.

TEMPERATURE RANGE:

-30°F minimum to 2100°F maximum
-34°C minimum to 1149°C maximum

SUPPLY PRESSURE:

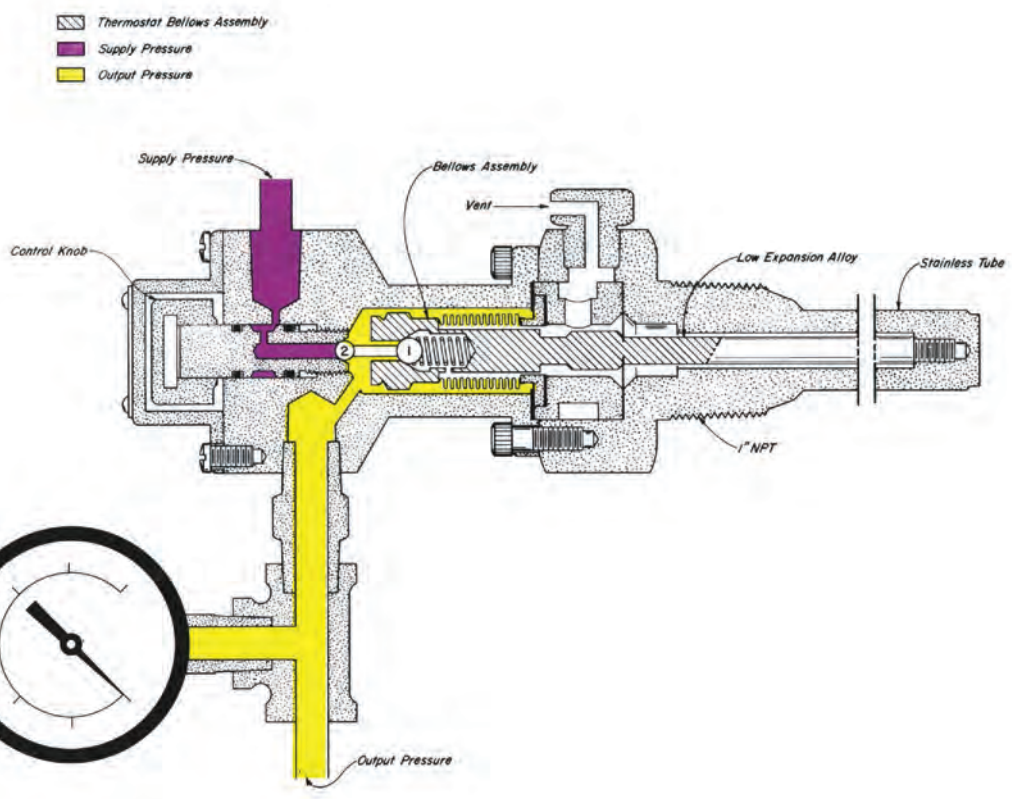
5 psig minimum to 30 psig maximum.

OPERATION:

This Thermostat consists of a STAINLESS TUBE for monitoring the pilot flame, which is connected by a Low Expansion Alloy Rod to a BELLOWS ASSEMBLY. The changes in the length of the STAINLESS TUBE operate a PILOT PLUG seat. The PILOT PLUG consists of two stainless balls rigidly connected together. The seat at BALL 1 is the Output Pressure vent (Yellow to Atmosphere). The seat at BALL 2 is the Supply Pressure inlet (Violet to Yellow).

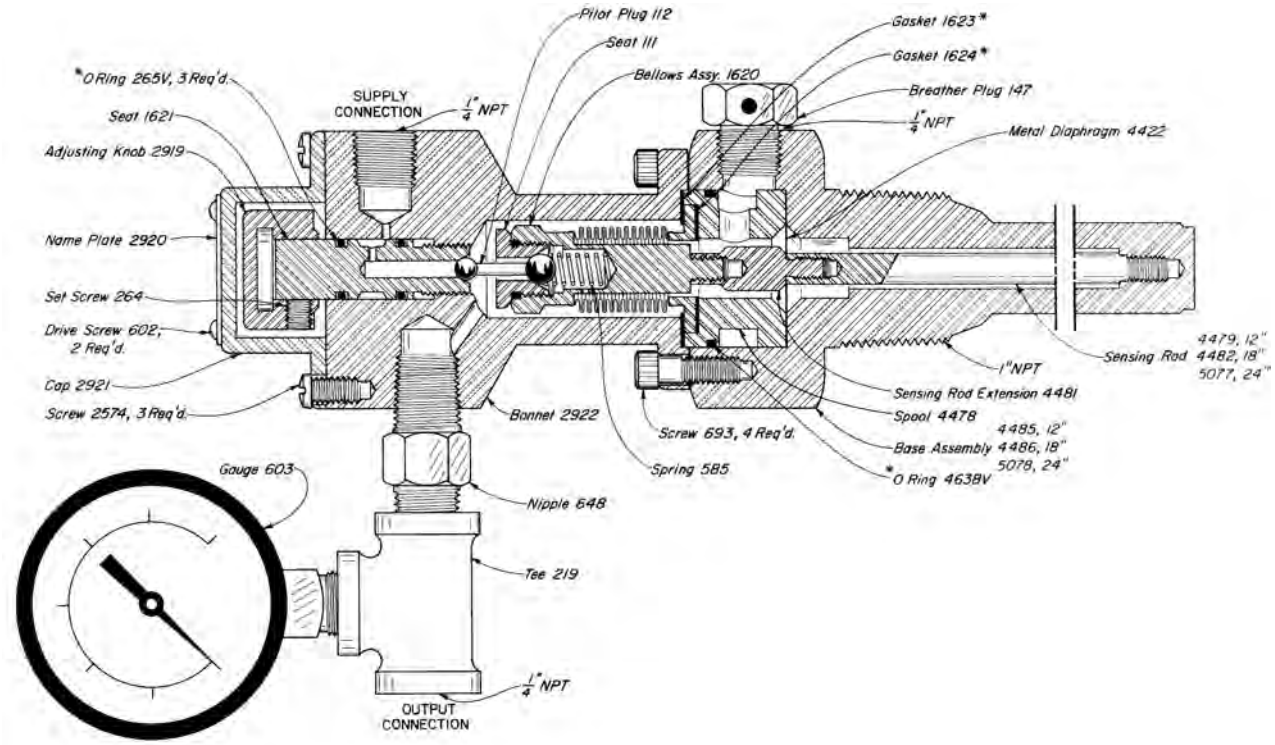
Assume the set point on the HT 12PG is above the temperature of the system. The vent at BALL 1 is open and the inlet at BALL 2 is closed. Output Pressure (Yellow) is at 0 psig or vented.

As the temperature rises in the system, the STAINLESS TUBE or outer tube increases in length to move the Thermostat Bellows Assembly in a direction to first close the seat at BALL 1 (Yellow to Atmosphere) and open the seat at Ball 2 (Violet to Yellow). Output Pressure (Yellow) increases, opening a safety valve which was blocking gas supply for the burner and pilot light system.

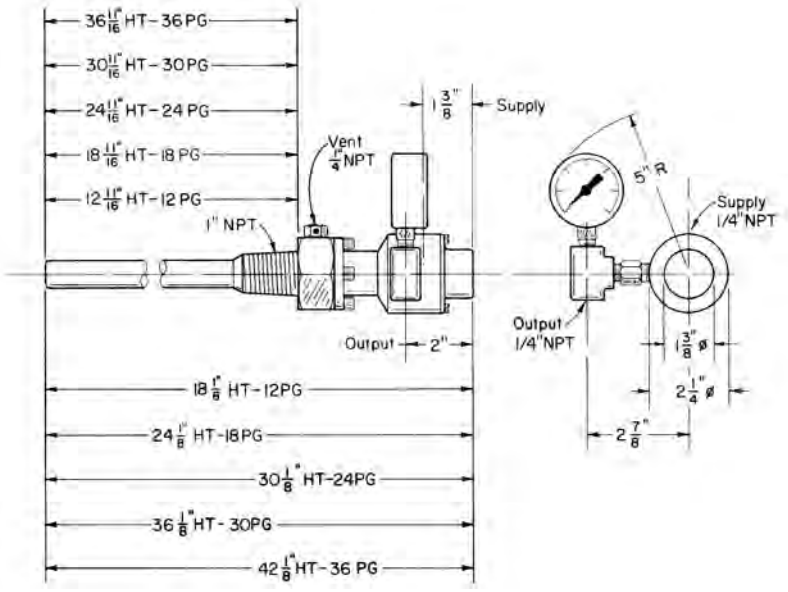


Kimray is an ISO 9001- certified manufacturer.

HIGH TEMPERATURE PILOT GUARD STEEL



DIMENSIONS



PILOT GUARDS AVAILABLE:

CAT. NO.	BASE ASSEMBLY	MAX. TEMP. °F	MAX. TEMP. °C	REPAIR KIT
HBT	HT 12 PG	2100	1149	RLQ
HBU	HT 18 PG	2100	1149	RLQ
HBV	HT 24 PG	2100	1149	RLQ
HBW	HT 30 PG	2100	1149	RLQ
HBX	HT 36 PG	2100	1149	RLQ

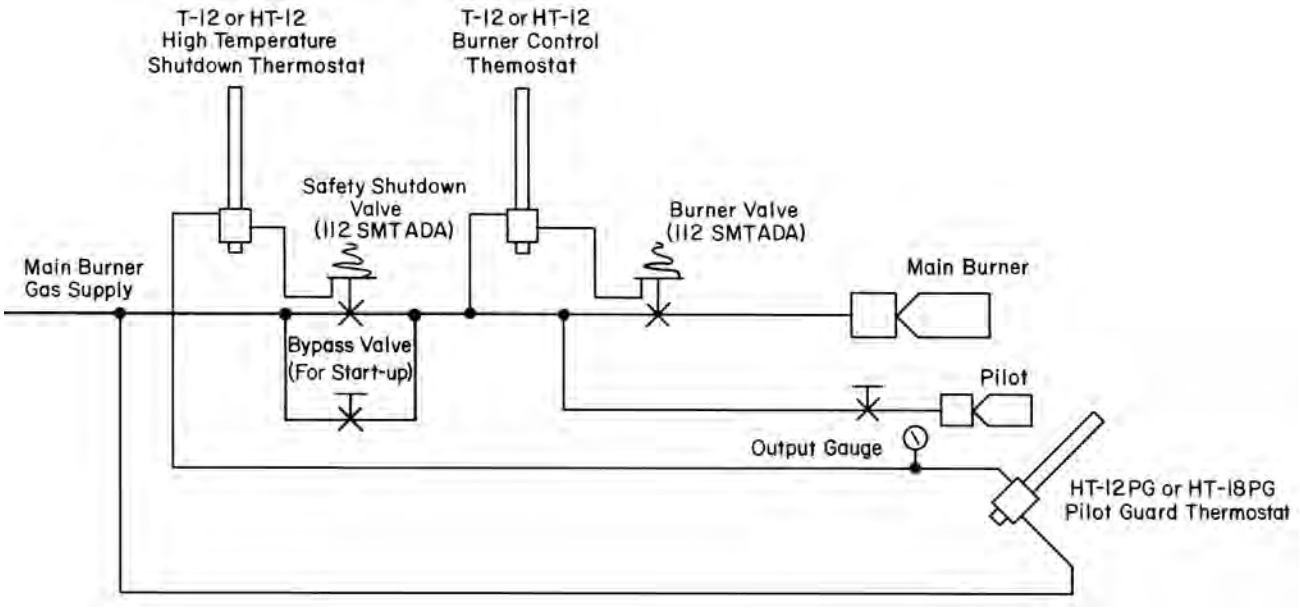
NOTES:

*These are recommended spare parts and are stocked as repair kits.

A 1" NPT mounted collet for adjusting the HT 12 PG pilot guard for optimum sensing of the pilot flame is available. To order specify Cat. No. "YDE".

Kimray is an ISO 9001- certified manufacturer.

HIGH TEMPERATURE PILOT GUARD SCHEMATIC INSTALLATION



INSTALLATION:

It is recommended that a separate (Pressure Opening) safety (burner and pilot shutdown) valve be controlled by the HT 12PG. A bypass valve around this safety valve is recommended to assist during start up and restart. The bypass valve allows pilot lighting with no output from the pilot guard (cold start). After the pilot has heated the thermostat, the HT 12PG output pressure will hold the safety valve open and the bypass should be closed. If the bypass valve is omitted, the HT 12PG must be reset each time the unit is restarted.

Because of the high temperature of the pilot flame, the probe should only be placed in the outer most region of the pilot flame. The probe should not be put in the main burner flame.

Once the pilot guard has been installed, it is necessary to fine tune the set point to allow for rapid shutdown. Since each system's heat losses, mounting positions, etc, are different, there is not preset set point. By following the Start-up & Adjustment Procedure, the pilot guard can be tuned to each system for rapid system shutdown in the event of flame loss.

START UP & ADJUSTMENT PROCEDURE:

1. Open the bypass valve around the safety valve. If the bypass valve is omitted, proceed to step 2.

2. Adust the HT 12PG for an output gauge pressure reading of approximately 50% of the supply pressure. (Counterclockwise to increase pressure and clockwise to decrease pressure).

3. Light the pilot light according to the standard procedures taking all necessary safety precautions.

4. Watch the output gauge. As the temperature increases, the pressure on the output gauge will rise upward. As this occurs, readjust the HT 12PG control knob to maintain an output pressure of approximately 50% of the supply pressure. (Adjust the control knob clockwise to decrease the output pressure).

5. Continue the process in step 4 until little change in the pressure reading on the output gauge is observed. (This time interval could be 15-20 minutes or longer). This process adjusts the HT 12PG to the maximum pilot flame temperature and insures a rapid system shutdown if the pilot flame goes out.

6. When the output pressure stabilizes, the control knob can be turned counterclockwise for 100% output pressure. The HT 12PG is now set. Close the bypass valve.

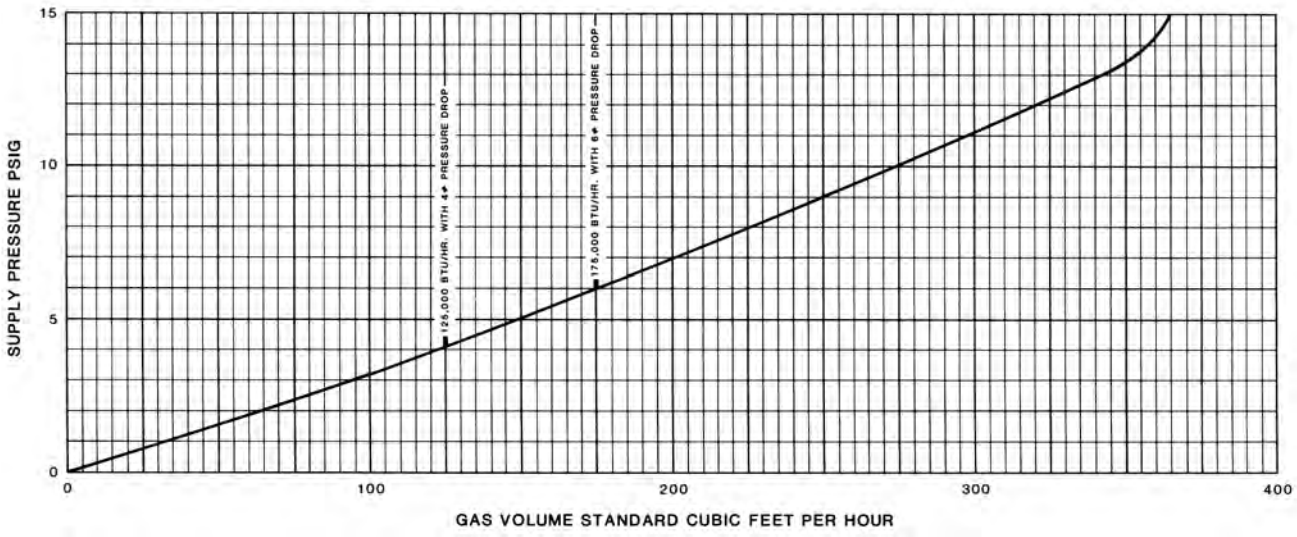
7. The burner system should now be cycled. Occasionally, drafting occurs during the burner cycle and cools down the HT 12PG enough for shutdown. If this occurs, turn the control knob counterclockwise approximately 1/8 of a turn at a time, until drafting will not cause a system shutdown.

8. Should the system ever shutdown, it is necessary to determine what caused the shutdown. If a cooling effect, due to drafting occurred, readjust the control knob counterclockwise approximately 1/8 of a turn at a time, until drafting will not cause a system shutdown.

9. To restart after shutdown, open the bypass valve and light the pilot. When the output pressure of the HT 12PG reaches 100% of the supply pressure, the system is operating and the bypass valve must be closed. If the bypass valve has been omitted, repeat steps 2-8.

Kimray is an ISO 9001- certified manufacturer.

3 PG CAPACITY CHART

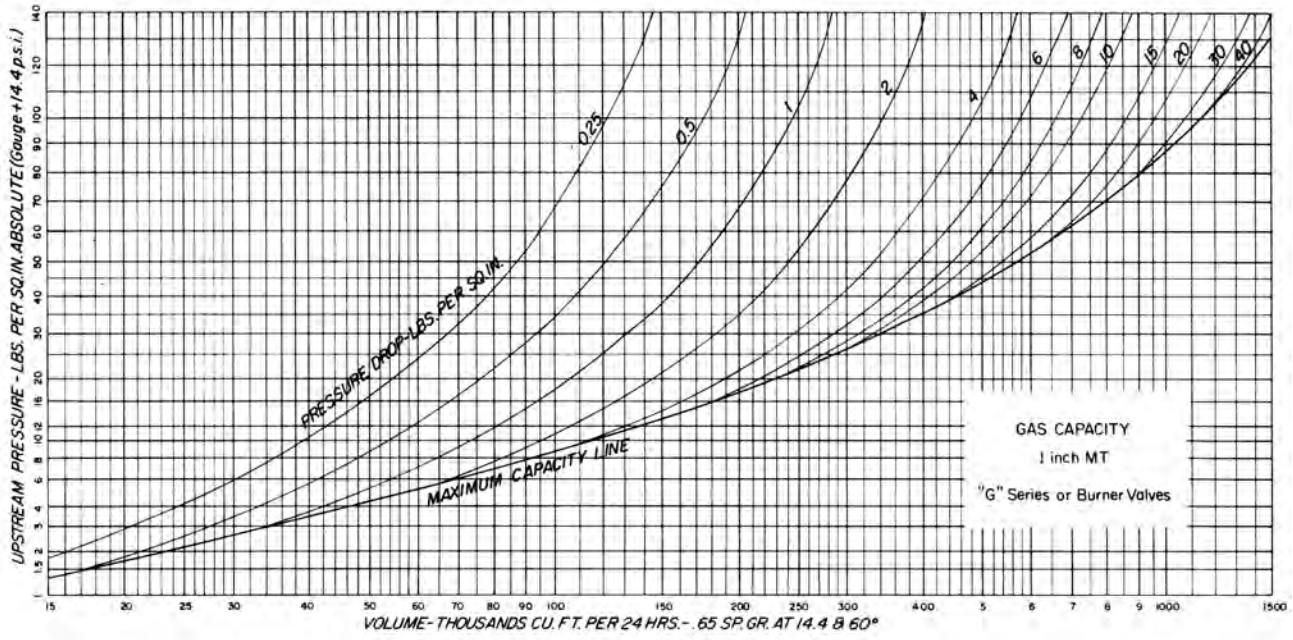


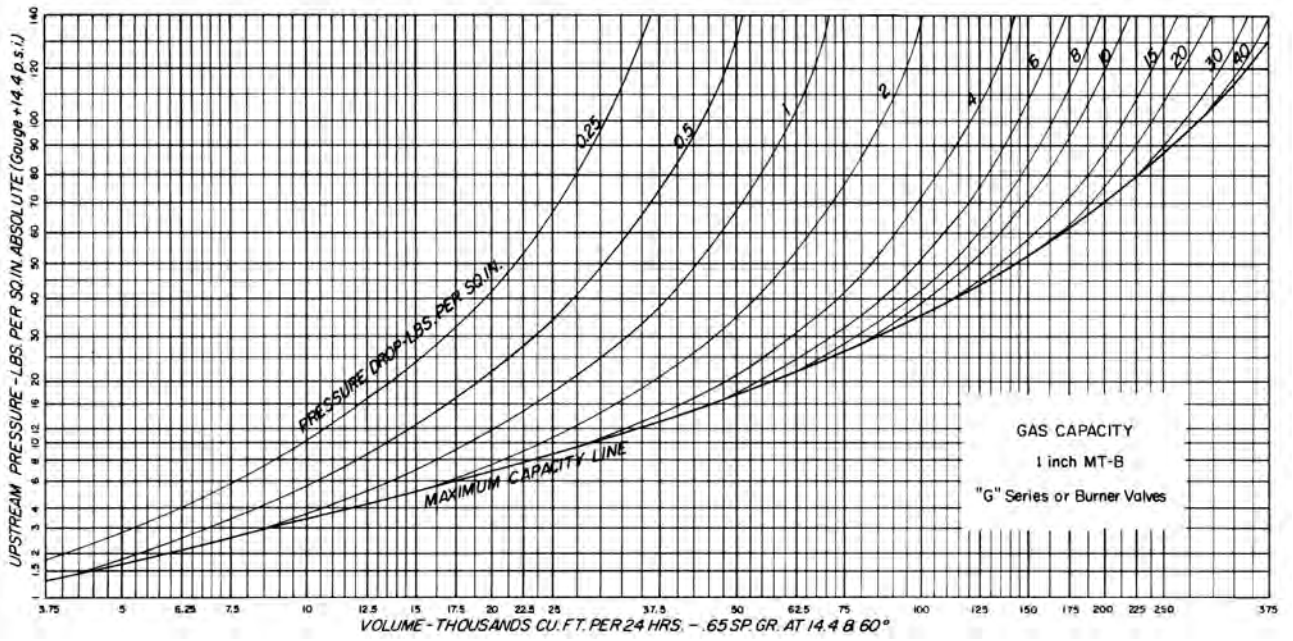
Gas capacities are based on the SUPPLY PRESSURE taken immediately upstream the pilot in a wide open position.

HOW TO USE THE CHART: Locate SUPPLY PRESSURE at left of chart. Project the SUPPLY PRESSURE horizontally to the curve and read the VOLUME directly below.

*For gravity correction multiply above capacities by $\sqrt{\frac{.65}{G}}$:where G equals specific gravity of gas.

BURNER VALVE CAPACITY CHART





Gas capacities are based on pressure taken immediately upstream and downstream from the regulator in a wide open position.

Critical flow exists across the orifice of the valve when the downstream absolute pressure is approximately half of the upstream absolute pressure. Any decrease in downstream pressure will not increase the flow through the valve. Critical flow conditions on the charts are represented by the MAXIMUM CAPACITY LINE.

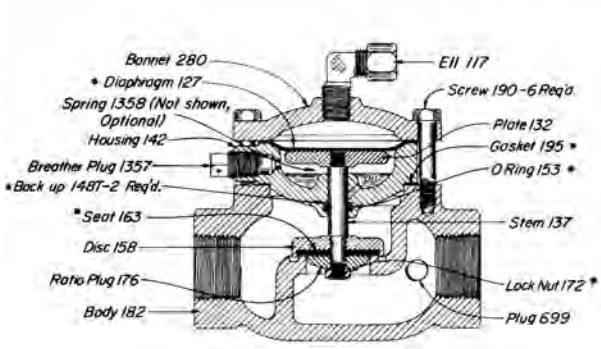
HOW TO USE CHARTS: Locate UPSTREAM PRESSURE at left of chart. Follow horizontally across to PRESSURE DROP (upstream minus downstream pressure). Read VOLUME directly below. If the horizontal projection of the upstream pressure does not intersect the given pressure drop, flow is critical. In this case project UPSTREAM PRESSURE horizontally to the MAXIMUM CAPACITY LINE and read VOLUME directly below.

*For gravity correction multiply above capacities by $\sqrt{\frac{.65}{G}}$:where G equals specific gravity of gas.

112 SMT

APPLICATION:

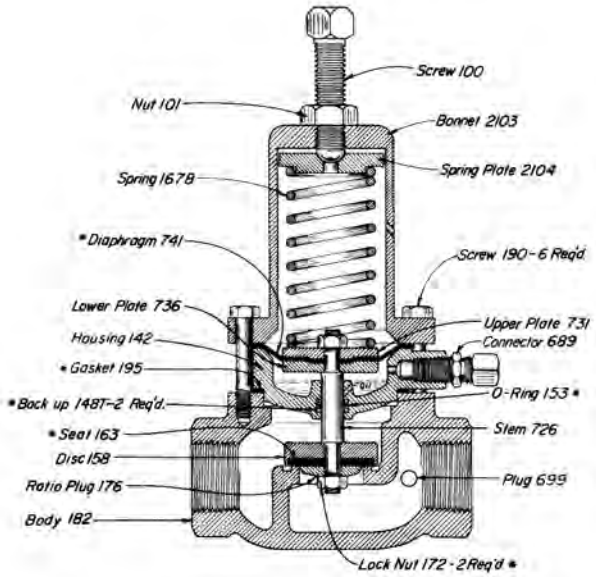
As a pressure closing burner valve for snap action service.



112 SMT ADA

APPLICATION:

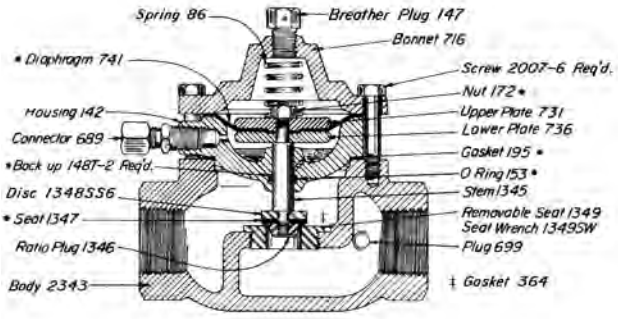
As a pressure opening burner valve for throttling or snap action service and where manifold pressures do not exceed 40 psi.



112 SMT DAB

APPLICATION:

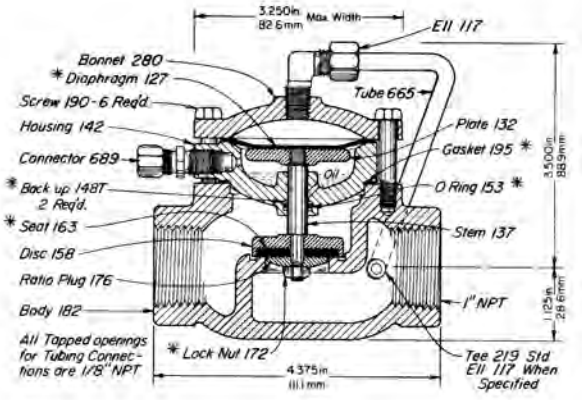
As a pressure opening or pressure closing burner valve where a reduced inner valve is desired and manifold pressures do not exceed 25 psi.



112 SMT T

APPLICATION:

As a pressure opening burner valve for throttling action service or shut in against pressures up to 300 psi. For safety valve (130 SMT-T).



THRU VALVES AVAILABLE:

CAT. NO.	SIZE TYPE	BURNER VALVE	OPER. PRES.	MAX W.P.	KIT
ABC	1" SCRD.	112 SMT ADA	40	175	RGS
EMB	1" SCRD.	112 SMT	175	175	RCM
EMB3	1" SCRD.	112 SMT DAB	30-40	175	RHE
EMY	1" SCRD.	112 SMT-T	175	175	RCM

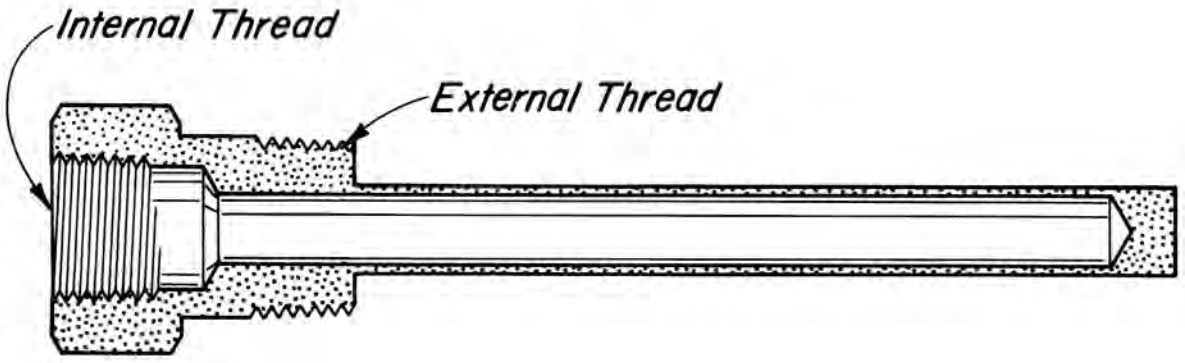
NOTES:

*These are recommended spare parts and are stocked as repair kits. To order repair kit, specify; 1" MT-T Repair Kit.

For other Motor Valves refer to catalog section E2

Kimray is an ISO 9001- certified manufacturer.

THERMOMETER WELLS
304 SS & 316 SS STEEL



THERMOWELLS AVAILABLE:

PART NO.	EXTERNAL THREAD	INTERNAL THREAD	LENGTH
4498L2SS6	1/2" NPT	1/4" NPT	2"
4499L2SS6	1/2" NPT	1/2" NPT	2"
4500L4SS6	1/2" NPT	1/4" NPT	4"
4501L4SS6	1/2" NPT	1/2" NPT	4"
2994[A]	3/4" NPT	1/2" NPT	5 1/2"
4502L6SS6	1/2" NPT	1/4" NPT	6"
4231[A]	1/2" NPT	1/2" NPT	6"
4503L6SS6	1/2" NPT	1/2" NPT	6"
4232[A]	3/4" NPT	1/2" NPT	6"
4504L8SS6	1/2" NPT	1/4" NPT	8"
4505L8SS6	1/2" NPT	1/2" NPT	8"
4506L10SS6	1/2" NPT	1/4" NPT	10"
4507L10SS6	1/2" NPT	1/2" NPT	10"
4508L12SS6	1/2" NPT	1/4" NPT	12"
4509L12SS6	1/2" NPT	1/2" NPT	12"
4509L18SS6	1/2" NPT	1/2" NPT	18"

NOTES:

APPLICATION:

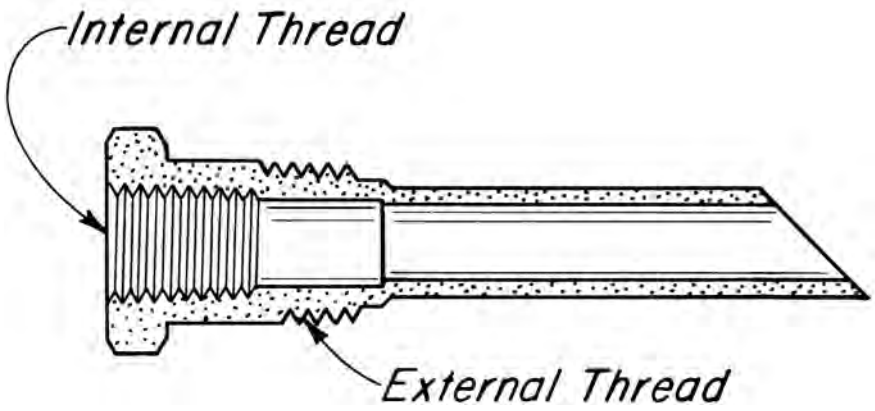
Allows thermometer removal for maintenance without losing vessel pressure.

1000 TO 4000[A] lbs. W.P.

[A]One piece construction

Kimray is an ISO 9001- certified manufacturer.

GAS SAMPLE PROBES
316 SS STEEL



PROBES AVAILABLE:

PART NO.	EXTERNAL THREAD	INTERNAL THREAD	LENGTH
4229SS6[A]	1" NPT	1/2" NPT	3 3/16"
4538L2SS6	1/2" NPT	1/4" NPT	3 3/8"
4541L6SS6	1/2" NPT	1/4" NPT	5 1/2"

NOTES:

APPLICATIONS:

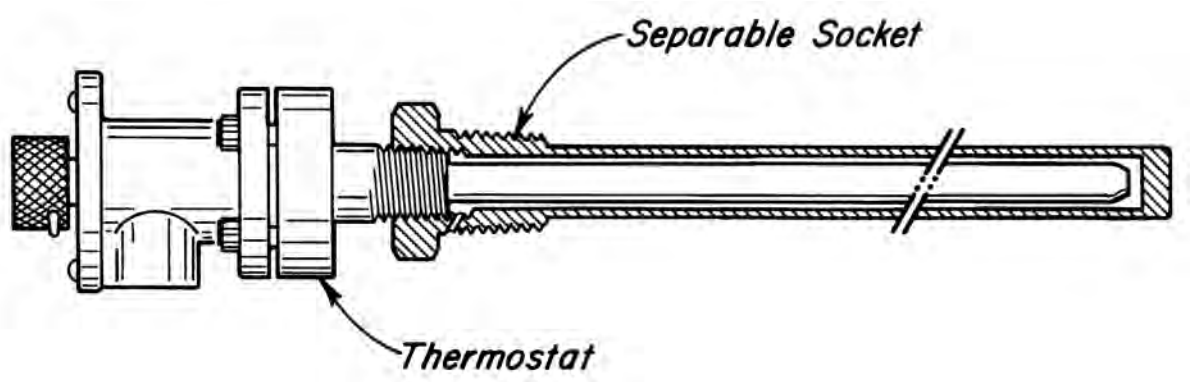
For use in retrieving a sample of gas from the center of the pipe.

[A]ONE PIECE CONSTRUCTION

Kimray is an ISO 9001- certified manufacturer.

KIMRAY INC.®

SEPARABLE SOCKETS
STEEL & 316 SS STEEL



SOCKETS AVAILABLE:

CAT. NO.	MALE THD. SIZE,NPT	MODEL NUMBER	MATERIAL	MAX W.P. psig	MAX W.P. kg/cm²
HCA	1"	SS-4	STL	4,000	281.23
HCB	1"	SS-6	STL	4,000	281.23
HCC	1"	SS-12	STL	4,000	281.23
HCD	1"	SS-18	STL	4,000	281.23
HCE	1"	SS-12SS	SS6	4,000	281.23
HCF	1"	SS-18SS	SS6	4,000	281.23
HCG[a]	1"	S-SS-12SS	SS6	7,000	492.15
HCH	3/4"	3/4SS-12	STL	4,000	281.23
HCI	3/4"	3/4SS-18	STL	4,000	281.23
HCJ	3/4"	3/4SS-12SS	SS6	4,000	281.23
HCK	3/4"	3/4SS-18SS	SS6	4,000	281.23
HCL	3/4"	3/4SS-4	STL	4,000	281.23
HCM	3/4"	3/4SS-6	STL	4,000	281.23
HCMSS6	3/4"	3/4SS-6SS	SS6	4,000	281.23
HCN	1"	SS-6SS	SS6	4,000	281.23
HCP	3/4"	SS-4SS	SS6	4,000	281.23
HCR[a]	3/4"	S-SS-12SS	SS6	5,000	351.53
HCS[a]	1"	S-SS-6SS	SS6	7,000	492.15

NOTES:

APPLICATION:

Increases working pressure of Thermostat Sensing Element. All Separable Sockets are filled with high temperature grease. Allows Thermostat removal without losing vessel pressure.

[a]One piece construction

Kimray is an ISO 9001- certified manufacturer.