

FELTS-HOUSE ENGINEERING, INC.

8131 CRESTWOOD DRIVE
BOISE, IDAHO 83704
PHONE: (208) 375-6018

JOSEPH W. FELTS, P.E.
PATRICK L. HOUSE, P.E.

SYSTEM BALANCING

WATER BALANCE DATA

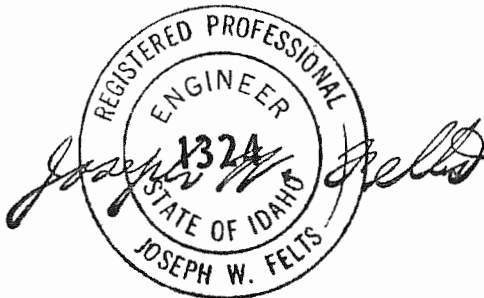
FOR

GEOTHERMAL HEATING RETROFIT

TWIN FALLS HIGH SCHOOL & SAWTOOTH ELEMENTARY SCHOOL

TWIN FALLS, IDAHO

OCTOBER 1985



MECHANICAL Heath Engineering
ENGINEER: Salt Lake City, Utah

MECHANICAL White Plumbing & Heating
CONTRACTOR: Twin Falls, Idaho

PURPOSE:

It is the intent of this work to balance the systems in this building as closely as possible to the design conditions intended in order to obtain optimum comfort conditions and operating economy.

TEST INSTRUMENTS USED:

VOLTAGE AND AMPERAGE METER - TIF POWR-PROBE MODEL LCD-1000
THERMOMETERS - TAYLOR DIAL TYPE
WATER FLOW METER - BELL & GOSSETT CIRCUIT SETTER METER

WATER BALANCE TEST DATA:

1. SUBMERSIBLE WELL PUMP SP-1.

PUMP DATA:

MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	HEAD	GPM
AURORA	6RL-3	70065	120	200

PUMP DRIVE DATA:

MANUFACTURER	HP	RPM	VOLTAGE	AMPERAGE
FRANKLIN	10	3450	460/3	13.8

MOTOR OVERLOAD PROTECTION DATA:

HEATER MANUFACTURER	SIZE	AMPERE RATING
ALLEN BRADLEY	W-59	19.5

PUMP OPERATING CONDITIONS:

RUNNING CURRENT	SYSTEM VOLTAGE	SUCTION PSI	DISCHARGE PSI	TOTAL HEAD FT.	GPM
13.1/14.3/14.0	486/487/489	NO GAUGES			

2. HIGH SCHOOL GEOTHERMAL HOT WATER PUMP P-1.

PUMP DATA:

MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	HEAD	GPM
AURORA	344A-2 1/2-6 1/8	1222	35	170

PUMP DRIVE DATA:

MANUFACTURER	HP	RPM	VOLTAGE	AMPERAGE
US ELECTRIC	3	1740	230/460/3	9.0/4.5

MOTOR OVERLOAD PROTECTION DATA:

HEATER MANUFACTURER	SIZE	AMPERE RATING
ALLEN BRADLEY	W-45	5.13

PUMP OPERATING CONDITIONS:

RUNNING CURRENT	SYSTEM VOLTAGE	SUCTION PSI	DISCHARGE PSI	TOTAL HEAD FT.	GPM
4.0/4.4/4.6	486/487/489	10	25.5	35.8	165

3. SAWTOOTH SCHOOL GEOTHERMAL WATER PUMP P-2.

PUMP DATA:

MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	HEAD	GPM
AURORA	344A-2 1/2-8 1/2		80	170

PUMP DRIVE DATA:

MANUFACTURER	HP	RPM	VOLTAGE	AMPERAGE
US ELECTRIC	7.5	1740	230/460/3	20/10

MOTOR OVERLOAD PROTECTION DATA:

HEATER MANUFACTURER	SIZE	AMPERE RATING
ALLEN BRADLEY	W-55	13.3

SAWTOOTH SCHOOL GEOTHERMAL PUMP P-2 CONT.

PUMP OPERATING CONDITIONS:

RUNNING CURRENT	SYSTEM VOLTAGE	SUCTION PSI	DISCHARGE PSI	TOTAL HEAD FT.	GPM
8.2/9.2/9.4	486/487/489	0	31	71.6	170

The 0 suction pressure indicates this pump may have a slight negative suction pressure. For this reason the 170 gpm is estimated.

4. SHOWER BOOSTER PUMP P-3.

PUMP DATA:

MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	HEAD	GPM
AURORA	361A-AB-1.25 X 1.5 X 7	85-7200	140	30

PUMP DRIVE DATA:

MANUFACTURER	HP	RPM	VOLTAGE	AMPERAGE
US ELECTRIC	3	3460	230/460/3	7.6/3.8

MOTOR OVERLOAD PROTECTION DATA:

HEATER MANUFACTURER	SIZE	AMPERE RATING
ALLEN BRADLEY	W-43	4.24

PUMP OPERATING CONDITIONS:

RUNNING CURRENT	SYSTEM VOLTAGE	SUCTION PSI	DISCHARGE PSI	TOTAL HEAD FT.	GPM
2.0/2.5/2.6	486/487/489	NO GAUGES ON THIS SYSTEM			

5. HEAT EXCHANGER FLOW METER CAPACITIES.

FLOW METER CAPACITIES:

FLOW METER MANUFACTURER

BELL & GOSSETT

LOCATION	MODEL NO.	SIZE	DESIGN GPM	SET	P.D.	ACTUAL GPM
HEAT EXCHANGER HX-1	CB-3	3	62	45	32	66
HEAT EXCHANGER HX-2	CB-3	3	46	50	31.5	49
HEAT EXCHANGER HX-3	CB-3	3	62	36	12	65
SYSTEM TOTAL			170			180

HEAT EXCHANGER HX-4

THERE WAS NO FLOW METER SPECIFIED FOR THIS UNIT.

6. HEAT EXCHANGER HX-4 OPERATING PRESSURES.

GEOHERMAL SIDE ENTERING 24 PSI LEAVING 19 PSI = 5 PSI DROP.

BUILDING SIDE ENTERING 22 PSI LEAVING 18 PSI = 4 PSI DROP.

7. HEAT EXCHANGER OPERATING TEMPERATURES.

ITEM	HX-1	HX-2	HX-3
ENTER GEOTHERMAL	89	89	89
LEAVE GEOTHERMAL	87	85	88
ENTER BUILDING	80	79	84
LEAVE BUILDING	87	85	86

SUMMARY:

To maintain this equipment in proper working order it will be necessary to perform periodic maintenance as outlined in the OPERATION AND MAINTENANCE MANUAL prepared by the Mechanical Contractor.

Due to the complexity of the mechanical systems and the criticalness of the flows it is recommended that no readjustments be made to the systems without the knowledge and consent of the Balancing Engineer. The Balancing Engineer cannot be responsible for the work if this is not done.

WHITE PLUMBING & HEATING, Inc.

P.O. BOX 1741

TWIN FALLS, ID 83303-1741

PHONE 208-733-4556

SHOP DRAWING FOR APPROVAL

TO: Heath Engineering Company DATE 4/10/85

377 West 800 North

Salt Lake City, Utah 84103

CONTRACT NO. J-510 TRANSMITTAL NO. 5 NEW SUBMITTAL XX

RESUBMITTAL TRANSMITTAL NO. P. O. NO. SUB

PROJECT Geothermal Project T.F.H.S. LOCATION Twin Falls, Idaho

SPECIFICATIONS SECTION FOR BUILDING

PAR NO.	DESCRIPTION OF EQUIPMENT	MANUFACTURER	PUB. NO.	COPIES SUB'M.	ACTION TAKEN	COPIES RET'D.
	Felts House Balancing			1		
	Qualifications					

Please return approved copies to this office.

File w/copy

cc: Field

CONTRACTOR

WHITE PLUMBING & HEATING, Inc.

MAILING ADDRESS P.O. Box 1741, Twin Falls, ID 83303-1741

By J. J. White

Supplier: Felts-House Engineering, Inc.

8131 Crestwood Drive
Boise, Idaho 83704

375-6018 Pat House

SUPERCHANGER®

SPECIFICATION SHEET

CUSTOMER. HEATH
SALT LAKE CITY, UTAH
REF: TWIN FALLS H. S.

PROPOSAL NO. SC 27948-33P1
ITEM NUMBER A
ENGINEER CCP
DATE: 2/ 4/85

MODEL NO. UX-296 FRAME TYPE. UJ PLATES PER UNIT. 17
NO. OF UNITS IN PARALLEL. 1 HEAT TRANSFER AREA 60.5 SQ.FT. PER UNIT
PART NUMBER 26UJ0171NN04022202220

* PERFORMANCE	** HOT SIDE **** COLD SIDE **
FLUID CIRCULATED	*GEO WATER *PROCESS WTR
TOTAL FLOW RATE	* 62.00 * 40.00 * GPM
UNIT FLOW RATE	* 62.00 * 40.00 * GPM
SPECIFIC HEAT	* .999 * .999 * BTU/LB.DEG.F
SPECIFIC GRAVITY	* .995 * .996 *
THERMAL CONDUCTIVITY	* .356 * .353 * BTU/HR.FT.DEG.F
VISCOSITY	* .777 * .828 * C.P. AT AVG. TEMP.
INLET TEMPERATURE	* 92.00 * 79.00 * DEG. F
OUTLET TEMPERATURE	* 85.00 * 83.48 * DEG. F
PRESSURE DROP	* 4.89 * 2.30 * PSI
OPERATING PRESSURE	* UNKNOWN * UNKNOWN * PSIG
HEAT EXCHANGED	***** 208737.2 ***** BTU/HR/UNIT

CONSTRUCTION			
DESIGN PRESSURE	* 125	* PSIG	
TEST PRESSURE	* 150	* PSIG	
DESIGN TEMPERATURE	* 125	* DEG.F.	
UNIT NET WEIGHT	* 1263.9	* POUNDS	



* UNIT DIMENSIONS	
A (MAX) *	2.393
A (MIN) *	2.224
B *	13.375
C *	.000
T *	1.000

* MATERIALS	
PLATES *	304
GASKETS *	NBR
NOZZLES *	316L/316L
FRAME *	CS EPOXY PAINTED
BARBS *	STAINLESS STEEL CLAD
BOLTS *	ZN PLATED CS

PASS ARRANGEMENTS

	HOT ***** COLD
H	3 X 1 3 X 1
M	5 X 1 5 X 1

* REMARKS:

☐ NO EXCEPTIONS TAKEN ☐ REJECTED
☒ EXCEPTIONS AS NOTED ☐ REVISE AND RESUBMIT

Checking is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any corrections or comments are subject to the requirements of the plans and specifications. Contractor is responsible for: dimensions which shall be confirmed and correlated at the fabrication processes and techniques of construction satisfactory performance of his work that of all other trades; and the

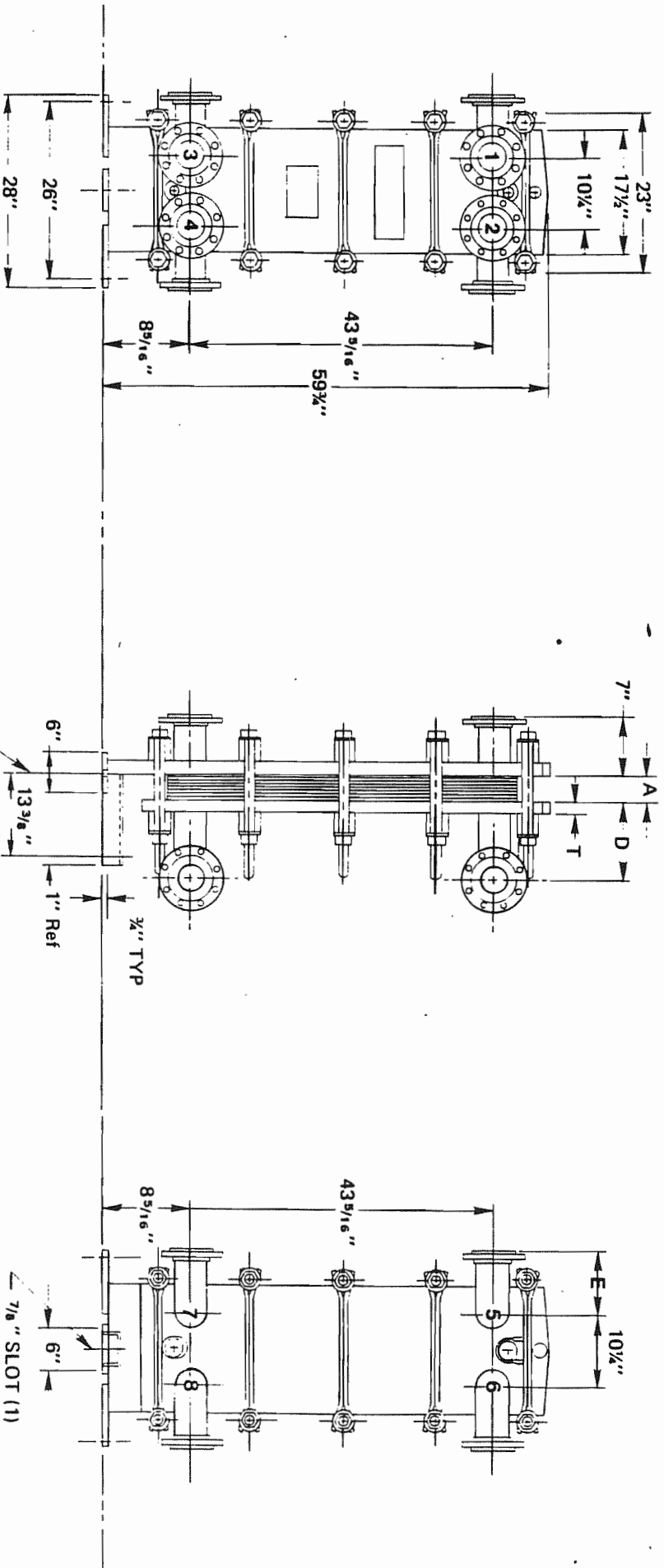
HEATH ENGINEERING COMPANY

By *Samuel D. ...*

"The SUPERCHANGER performance guarantee is based on the accuracy of the data presented above, and the customers ability supply product and operating conditions in conformance with the above."

APR 17 1985

Tranter®



Item A: HE-1 & 3

A = 2.224-2.393
 B = 13.375
 C =
 T = 1.000 (Min.)

Design Press: 125 psig.
 Test Press: 150 psig.
 Design Temp: 125 °F
 Plate Mat'l: 304SS
 Gasket Mat'l: NBR
 No. of Plates: 17
 Surface Area: 60.5 Sq. Ft.
 Weight: 126.3 Lbs.
 Nozzles: 150 lb. A.S.A. C.S. loose Flange with Lap Joint Stud End

NOZZLE SIZE	DIMENSIONS	
	D	E
2"	6"	9 1/2"
4"	9"	9"

ALL DIMENSIONS APPROXIMATE
 NOT TO BE USED FOR
 CONSTRUCTION PURPOSES

Nozzle Location	Function	Size	Material
1	Geo Water IN	2" 316L	
2	Process Wtr OUT	2" 316L	
3	Geo Water OUT	2" 316L	
4	Process Wtr IN	2" 316L	
5	NA		
6	NA		
7	NA		
8	NA		

TEXAS DIVISION - TRANTER, inc.
 Wichita Falls, Texas, U.S.A.

SUPERCHANGER MODEL UX-296-UJ-17

Customer: Heath

Date:

02-12-85

Proposal No.

SC-27848-33R1

SUPERCHANGER®

SPECIFICATION SHEET

CUSTOMER. HEATH
SALT LAKE CITY, UTAH
REF: TWIN FALLS H. S.

PROPOSAL NO. SC 27848-3701
ITEM NUMBER 9
ENGINEER CCP
DATE: 2/4/85

MODEL NO. UX-296 FRAME TYPE. UJ PLATES PER UNIT. 13
NO. OF UNITS IN PARALLEL. 1 HEAT TRANSFER AREA 44.4 SQ.FT. PER UNIT
PART NUMBER 26UJ0131NN04022202220

* PERFORMANCE	** HOT SIDE	**** COLD SIDE	**
FLUID CIRCULATED	* GEO WATER	* PROCESS WTR	
TOTAL FLOW RATE	* 46.00	* 31.00	* GPM
UNIT FLOW RATE	* 46.00	* 31.00	* GPM
SPECIFIC HEAT	* .999	* .990	* BTU/LB.DEG.F
SPECIFIC GRAVITY	* .995	* .996	
THERMAL CONDUCTIVITY	* .356	* .353	* BTU/HR.FT.DEG.F
VISCOSITY	* .777	* .828	* C.P. AT AVG. TEMP
INLET TEMPERATURE	* 92.00	* 78.00	* DEG. F
OUTLET TEMPERATURE	* 85.00	* 88.36	* DEG. F
PRESSURE DROP	* 4.93	* 2.37	* PSI
OPERATING PRESSURE	* UNKNOWN	* UNKNOWN	* PSIG
HEAT EXCHANGED	*****	160035.3	***** BTU/HR/UNIT

* CONSTRUCTION			
DESIGN PRESSURE	* 125	* PSIG	
TEST PRESSURE	* 150	* PSIG	
DESIGN TEMPERATURE	* 125	* DEG.F.	
UNIT NET WEIGHT	* 1241.1	* POUNDS	

**MADE IN
U S A**

* UNIT DIMENSIONS	
A (MAX) *	1.930
A (MIN) *	1.700
B *	13.375
C *	.000
T *	1.000

* MATERIALS	
PLATES *	304
GASKETS *	VBR
NOZZLES *	316L/316L
FRAME *	CS EPOXY PAINTED
BARs *	STAINLESS STEEL CLAD
BOLTS *	ZN PLATED CS

* REMARKS:

PASS ARRANGEMENTS

HOT ***** COLD

H 2 X 1 2 X 1

M 4 X 1 4 X 1

☐ REJECTED ☐ REVISE AND RESUBMIT

☐ NO EXCEPTIONS TAKEN
☒ EXCEPTIONS AS NOTED

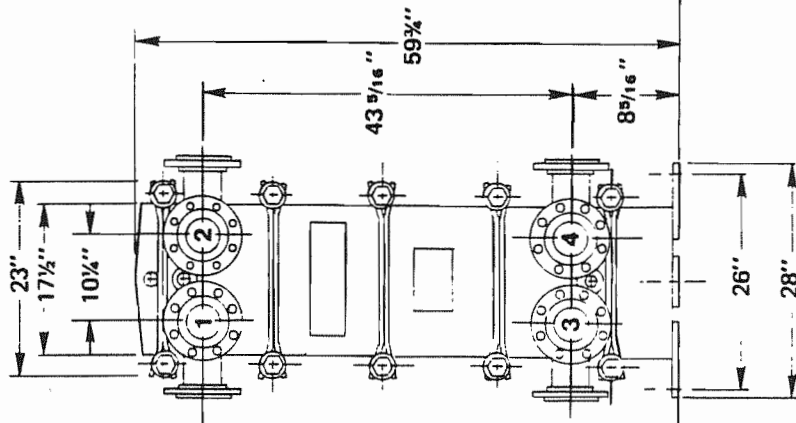
Checking is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any corrections or comments are subject to the requirements of the plans and specifications. Contractor is responsible for: dimensions which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction of his work with that of all other trades; and the accuracy of the data presented above, and the customers ability to supply product and operating conditions in conformance with the above.

HEATH ENGINEERING COMPANY

APR 17 1985

By

Tranter®



Item B: HE-2

A= 1.700-1.830

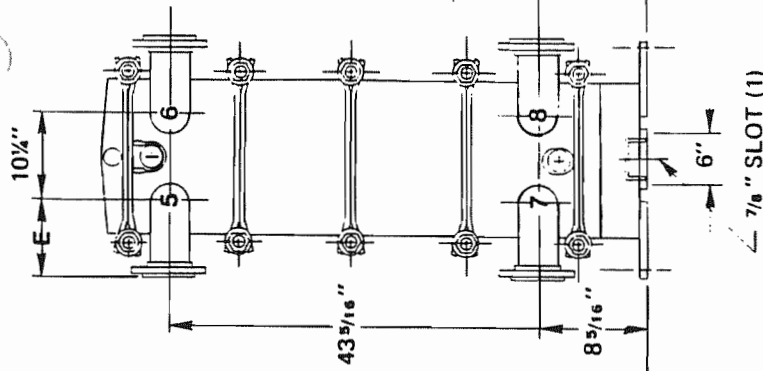
B= 13.375

C=

T= 1.000 (Min.)

NOZZLE SIZE	DIMENSIONS	
	D	E
2"	6"	9 1/2"
4"	9"	9"

ALL DIMENSIONS APPROXIMATE
NOT TO BE USED FOR
CONSTRUCTION PURPOSES



Design Press: 125 psig.

Test Press: 150 psig.

Design Temp: 125 °F

Plate Mat'l: 304SS

Gasket Mat'l: NBR

No. of Plates: 13

Surface Area: 44.4 Sq. Ft.

Weight: 1241.1 Lbs.

Nozzles: 150 lb. A.S.A. C.S. loose Flange with Lap Joint Stub End

TEXAS DIVISION - TRANTER, inc.
Wichita Falls, Texas, U.S.A.

SUPERCCHANGER MODEL IIX-296-UJJ-13

Customer: Heath

Date: 02-12-85 Proposal No. SC-27848-33R1

Nozzle Location	Function	Size	Material
1	Geo Water IN	2"	316L
2	Process Wtr OUT	2"	316L
3	Geo Water OUT	2"	316L
4	Process Wtr IN	2"	316L
5	NA		
6	NA		
7	NA		
8	NA		

SUPERCHANGER®

SPECIFICATION SHEET

CUSTOMER. HEATH
SALT LAKE CITY, UTAH
REF: TWIN FALLS H. S.

PROPOSAL NO. SC 27848-33R1
ITEM NUMBER C
ENGINEER CCP
DATE: 2/ 4/85

MODEL NO. UX-296 FRAME TYPE. UP PLATES PER UNIT. 77
NO. OF UNITS IN PARALLEL. 1 HEAT TRANSFER AREA 302.7 SQ.FT. PER UNIT
PART NUMBER 26UP0771NN14024202220

* PERFORMANCE	** HOT SIDE	**** COLD SIDE	**
FLUID CIRCULATED	* GEO WATER	* PROCESS WTP	
TOTAL FLOW RATE	* 170.00	* 275.00	* GPM
UNIT FLOW RATE	* 170.00	* 275.00	* GPM
SPECIFIC HEAT	* .999	* 1.000	* BTU/LB.DEG.F
SPECIFIC GRAVITY	* .997	* .998	*
THERMAL CONDUCTIVITY	* .350	* .346	* BTU/HR.FT.DEG.F
VISCOSITY	* .893	* .981	* C.P. AT AVG. TEMP..
INLET TEMPERATURE	* 85.00	* 65.00	* DEG. F
OUTLET TEMPERATURE	* 69.00	* 74.75	* DEG. F
PRESSURE DROP	* 2.33	* 6.11	* PSI
OPERATING PRESSURE	* UNKNOWN	* UNKNOWN	* PSIG
HEAT EXCHANGED	***** 1339365.0	*****	* BTU/HR/UNIT

* INSTRUCTION			
DESIGN PRESSURE	* 125	* PSIG	
TEST PRESSURE	* 150	* PSIG	
DESIGN TEMPERATURE	* 125	* DEG.F.	
UNIT NET WEIGHT	* 1723.9	* POUNDS	



* UNIT DIMENSIONS		
A (MAX)	* 10.837	
A (MIN)	* 10.072	
B	* 45.625	
C	* 51.625	
T	* 1.000	

* MATERIALS		
PLATES	* 304	
GASKETS	* NBR	
NOZZLES	* 316L/316L	
FRAME	* CS EPOXY PAINTED	
BAR	* STAINLESS STEEL CLAD	
BOLTS	* ZN PLATED CS	

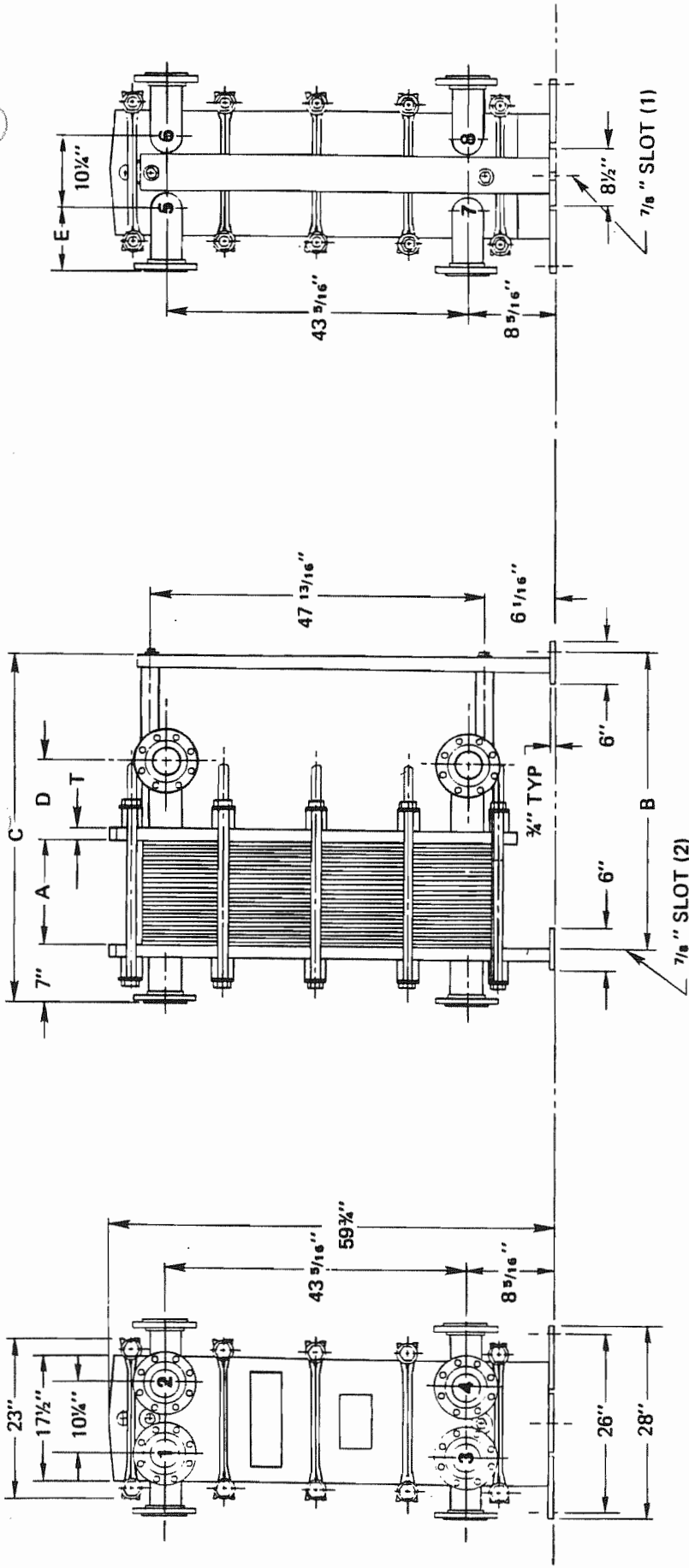
PASS ARRANGEMENTS			
	HOT	*****	COLD
H	23 X 1		23 X 1
M	15 X 1		15 X 1

* REMARKS:

"The SUPERCHANGER performance guarantee is based on the accuracy of the data presented above, and the customers ability supply product and operating conditions in conformance with the above."

☒ NO EXCEPTIONS TAKEN ☐ REJECTED
☐ EXCEPTIONS AS NOTED **EX-4** REVISE AND RESUBMIT
 Checking is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any corrections or comments are subject to the requirements of the plans and specifications. Contractor is responsible for: dimensions which shall be confirmed and correlated on the job site; installation processes and techniques of construction satisfactory performance of his work.
 HEATH ENGINEERING COMPANY
 APR 17 1985 By *Samuel D. Sten*

Tranter®



Item C: HE-4

A= 10.072-10.837
B= 45.625
C= 51.625 (Min.)
T= 1.000

Design Press: 125 psig.
Test Press: 150 psig.
Design Temp: 125 °F
Plate Mat'l: 304SS
Gasket Mat'l: NBR
No. of Plates: 77
Surface Area: 302.7 Sq. Ft.
Weight: 1723.0 Lbs.
Nozzles: 150 lb. A.S.A. C.S. loose Flange with Lap Joint Stub End

TEXAS DIVISION - TRANTER, inc.
Wichita Falls, Texas, U.S.A.

SUPERCCHANGER MODEL IJX-296-IIP-77

Customer: Heath

Date: 02-12-85
Proposal No: SC-27848-33R1

NOZZLE SIZE	DIMENSIONS	
	D	E
2"	6"	9 1/4"
4"	9"	9"

ALL DIMENSIONS APPROXIMATE
NOT TO BE USED FOR
CONSTRUCTION PURPOSES

Nozzle Location	Function	Size	Material
1	Geo Water IN	2"	316L
2	Process Wtr OUT	4"	316L
3	Geo Water OUT	2"	316L
4	Process Wtr IN	4"	316L
5	NA		
6	NA		
7	NA		
8	NA		

STORING SUPERCHANGER PLATE AND FRAME HEAT EXCHANGER UNITS

Storage Procedures

When a SUPERCHANGER plate and frame heat exchanger is to be placed in storage for an extended period of time, the procedures listed below must be followed:

1. If the unit has been recently shipped from our factory and is unused, disregard statements 2, 3 and 4; follow instructions 5-10.
2. If the unit has been used and long term storage is required, it must be completely drained. Prior to draining remove the shroud and let the unit cool to ambient temperature. Units with plate packs arranged with one pass on each side (all nozzles on the stationary end frame) are self-draining. Simply vent at the upper nozzle location and drain from the lower nozzle for each side individually. A two pass/two pass or one pass/two pass plate arrangement is also self-draining, provided all two pass side nozzles are at the lower elevations (numbers 3, 4, 7 and 8). Other units may be self-draining if they have been fitted with separate drain and vent nozzles. Units that are not self-draining must have the plate pack completely loosened to drain all liquids. Before opening the plate pack, wipe off the exterior surfaces to make sure no fluids or debris fall onto the plate pack.
3. Open the plate pack and thoroughly clean the unit internally and externally. Dry the unit. (Blowing dry, hot air at approximately 150° F on all areas is an excellent method.)
4. Install blind flanges with gaskets on all nozzles. Plug all other openings.
5. Coat all unpainted carbon steel component surfaces with light grease, SAE 30 oil, or other rust inhibiting products.
6. Coat all bolt threads with light grease.
7. To minimize gasket compression set, the plate pack length dimension needs to be adjusted. This must be greater than the unit's stated minimum tightening dimension (T.D.). As a guideline, the unit's minimum tightening dimension should be increased by a factor of 1.20 (e.g., 50" T.D. x 1.20 = 60").
8. Protect the unit from direct sunlight, intensive heat radiation, or ultraviolet radiation by loosely covering the unit with an opaque, reflecting type plastic film or similar material. Make sure air is allowed to circulate around the unit.
9. It is preferable to store the unit indoors, well protected from the weather. The temperature in the storage area should ideally be 60° F to 70° F with a relative humidity of 70% or lower. NEVER STORE THE UNIT IN AN AREA WHERE THE TEMPERATURE IS AT 32° F OR LOWER.
10. All potential sources of Ozone, such as operating electric motors, or welding equipment, should be removed from the storage area to preclude Ozone attack on gaskets.

(over)

P.O. BOX 1741

WHITE PLUMBING & HEATING, Inc.

TWIN FALLS, ID 83303-1741

PHONE 208-733-4556

SHOP DRAWING FOR APPROVAL

TO: Heath Engineering Company

DATE 4/19/85

377 West 800 North

Salt Lake City, Utah 84103

CONTRACT NO. J-501 TRANSMITTAL NO. 7 NEW SUBMITTAL XX

RESUBMITTAL TRANSMITTAL NO. P. O. NO. 1233

PROJECT Geothermal Project T.F.H.S. LOCATION Twin Falls, Idaho

SPECIFICATIONS SECTION FOR BUILDING

PAR NO.	DESCRIPTION OF EQUIPMENT	MANUFACTURER	PUB. NO.	COPIES SUB'M.	ACTION TAKEN	COPIES RET'D.
	Gauges, thermometers	Trerice		8		
	Pressure/Temperature Wells	Trerice		8		
	Flow Balancing/measuring	Sisco		8		
	valves	B & G		8		

Please return approved copies to this office.

CONTRACTOR

WHITE PLUMBING & HEATING, Inc.

File

MAILING ADDRESS P.O. Box 1741, Twin Falls, ID 83303-1741

cc:

Field

By

J. J. White

Supplier: Midgley-Huber

P.O. Box 3005
Boise, Idaho 83703

Kip Keto (208) 336-1919

PRESSURE GUAGES

Trerice No. 450B with #865-1 gauge cock and #872-2 snubber

1ea. 0 to 30 psi (P-1)

1ea. 0 to 60 psi (P-2)

THERMOMETERS

Trerice No. BX91406 with 6" stem and separate well

7ea. 30 to 130 degrees F.

PRESSURE/TEMPERATURE WELLS

Sisco p/t plugs no. BNO-500

16ea. 1/2 " NPT

Sisco test kit with

2ea. 1 1/2" pocket thermometer 0 to 220 degrees F.

2ea. 2 1/2" test guage and adaptor 0 to 100 psi

FLOW BALANCING/MEASURING VALVES

B & G circuit setters

3ea. CB-3"

B & G read out kits

1ea. RO-5

☒ NO EXCEPTIONS TAKEN ☐ REJECTED
☒ EXCEPTIONS AS NOTED ☐ REVISE AND RESUBMIT

Checking is only for general conformance with the design concept of the project and general conformity with the information given in the contract documents. Any deviations or omissions are subject to the requirements of the contract documents. The contractor is responsible for, and shall maintain, the accuracy and coordination of his work with that of all other trades; and the satisfactory performance of his work.

HEATH-ENGINEERING COMPANY
Date APR 29 1985 By Samuel D. Stone

Job No. 501

Submittal No. 7

P.O. No. 1233

Date 4/19

Spec. Section _____

Treerice

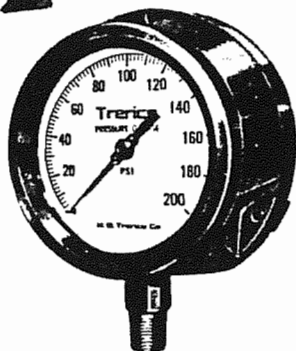
PRESSURE GAUGES

NO. 450 SERIES

4 1/2" SIZE

SELECT FROM FOUR BASIC TYPES

SOLID FRONT — BLOW OUT BACK



No. 450B

NO. 450B (Dry)

MOVEMENT — Brass with bronze bushings, rotary type. Stainless steel movement available.

BOURDON TUBE — Phosphor bronze, silver brazed to socket & tip.

ACCURACY — ± 1% of range, ANSI Grade 1A B40.1. 1/2% Grade 2A available.

SOCKET — Brass — 1/4" N.P.T. standard. 1/2" N.P.T. and B.S.P.T. available.

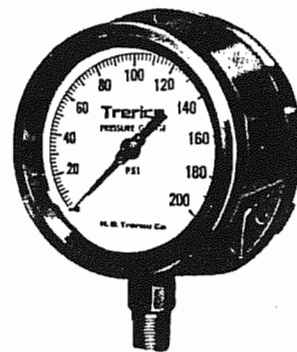
No. 450SA or 450SS (Dry)

MOVEMENT — Stainless stl. with s.s. bushings & s.s. sector gear.

BOURDON TUBE — Type 316 stainless steel, Heliarc welded to socket and tip.

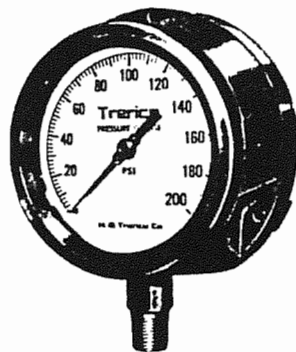
ACCURACY — ± 1% of range, ANSI Grade 1A B40.1. 1/2% Grade 2A available

SOCKET — Series No. 450SA made from alloy steel, Series No. 450SS made from type 316 stainless steel. 1/2" N.P.T. standard. 1/4" N.P.T. & B.S.P.T. also available.



No. 450SA or 450SS

SOLID FRONT — BLOW OUT BACK — LIQUID FILLED



NO. 450LFB

NO. 450LFB (Wet)

MOVEMENT — Brass with bronze bushings, rotary type.

BOURDON TUBE — Phosphor bronze, silver brazed to socket & tip.

ACCURACY — ± 1% of range, ANSI Grade 1A B40.1. 1/2% Grade 2A available.

SOCKET — Brass — 1/4" N.P.T. standard. 1/2" N.P.T. & B.S.P.T. available.

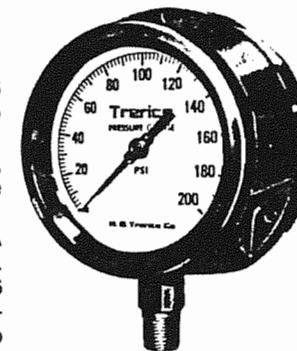
No. 450LFSA OR 450LFSS (Wet)

MOVEMENT — Stainless stl. with s.s. bushings & s.s. sector gear.

BOURDON TUBE — Type 316 stainless steel. Heliarc welded to socket and tip.

ACCURACY — ± 1% of range, ANSI Grade 1A B40.1. 1/2% Grade 2A available.

SOCKET — Series No. 450LFSA made from alloy steel, Series No. 450LFSS made from type 316 stainless steel — 1/2" N.P.T. standard. 1/4" N.P.T. & B.S.P.T. are also available.



No. 450LFSA or 450LFSS

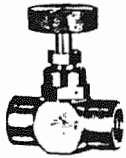
NOTE: For correct use and application of pressure gauges, see PRESSURE GAUGE STANDARD ANSI B40.1.

STANDARD PRESSURE, COMPOUND & VACUUM RANGES FOR NO. 450 GAUGE

Bourdon tube materials available in following ranges	†ENGLISH RANGES						METRIC RANGES					
	Dial Range		fig. intervals		Minor Div.		cm. hg. vac.		Kg. (force) per cm ²		Kilo-pascals (SI)	
	In. hg. vac.	psig	In. of vac.	psig	In. of vac.	psig	cm. hg. vac.		Fig. Inter.	Minor Div.	Vac.	Press.
PHOSPHOR BRONZE	30 to 0	0	5 — 0	0	.2 — 0	0	76 to 0	0	15 cm	1 cm	100 to 0	10
	30 to 15	15	10 — 5	5	.5 — .2	2	76 to 1	1	20cm .5	5cm .1	100 to 100	20
	30 to 30	30	10 — 5	5	1 — .5	5	76 to 2	2	20cm .5	5cm .1	100 to 200	50
	30 to 60	60	10 — 10	10	1 — 1	1	76 to 4	4	25cm 1	5cm .1	100 to 400	50
	30 to 100	100	30 — 10	10	2 — 1	1	76 to 7	7	76 1	15cm .2	100 to 600	100
	30 to 150	150	30 — 25	25	5 — 2	2	76 to 10	10	76 1	15cm .2	100 to 1000	100
	30 to 300	300	30 — 50	50	5 — 2	2	76 to 21	21	76 3	38cm .5	100 to 2000	400
	0 to 15	15		3	.1	0 to 1	0 to 1	1	.2	.02	0 to 100	10
	0 to 30	30		5	.2	0 to 2	0 to 2	2	.2	.05	0 to 200	20
	0 to 60	60		10	.5	0 to 4.2	0 to 4.2	4.2	.5	.1	0 to 400	50
316 ST. STL.	0 to 100	100		10	1	0 to 7	0 to 7	7	1	.2	0 to 700	100
	0 to 160	160		20	2	0 to 11	0 to 11	11	1	.1	0 to 1200	200
	0 to 200	200		20	2	0 to 14	0 to 14	14	2	.2	0 to 1500	300
	0 to 300	300		50	2	0 to 21	0 to 21	21	3	.2	0 to 2000	200
	0 to 400	400		50	5	0 to 28	0 to 28	28	4	.5	0 to 3000	500
	0 to 600	600		50	5	0 to 42	0 to 42	42	6	1	0 to 4000	500
	0 to 800	800		100	10	0 to 56	0 to 56	56	8	1	0 to 6000	1000
	0 to 1000	1000		100	10	0 to 70	0 to 70	70	10	1	0 to 7000	1000
	0 to 1500	1500		300	10	0 to 100	0 to 100	100	10	1	0 to 10000	1000
	0 to 2000	2000		200	20	0 to 140	0 to 140	140	20	2	0 to 14000	2000
403 St. Stl.	0 to 3000	3000		300	20	0 to 210	0 to 210	210	30	2	0 to 20000	2000
	0 to 5000	5000		500	50	0 to 350	0 to 350	350	35	5	0 to 35000	5000
	0 to 10000	10000		1000	100	0 to 700	0 to 700	700	100	10	0 to 60000	10000
	*0 to 15000	3000		100	100	*0 to 1000	*0 to 1000	1000	100	10	*0 to 100000	10000
	*0 to 20000	2000		200	200	*0 to 1400	*0 to 1400	1400	200	20	*0 to 140000	20000

†English ranges are stock ranges *Not available in 1/4" N.P.T. connection. Ranges 1500 psi and above are furnished standard with 316 stainless steel tube.

TRERICE SERIES NO. 735 & NO. 740 NEEDLE VALVES



Type FFG — No. 735



Type FFG — No. 740



Type MFG — No. 740



Type MFA — No. 740

SPECIFICATIONS & CATALOG NUMBERS FOR SERIES NO. 735 & NO. 740 NEEDLE VALVES

Cat. No.	E.D.P. No.	Type	Conn. N.P.T.	Body Material	Seat	Valve and Stem	Packing	Handle	Maximum Operating Press. (psi)	Maximum Operating Temp.
735-2	D315	FFG	1/4"	Brass	Brass	Brass	Teflon	Brass	2000	300°F
735-4	D316	FFG	1/4"	carbon S.	Teflon	Stainless steel	Buna N O Ring	Steel	5000	225°F
735-6	D317	FFG	1/4"	303 S.S.	303 S.S.	Kel F Tip	Teflon	Black Phenolic	3000	400°F
735-8	D318	FFG	1/4"	316 S.S.	316 S.S.	Kel F Tip	Teflon	Black Phenolic	3000	400°F
735-9	D377	MFG	1/4"	316 S.S.	316 S.S.	Stainless steel	Teflon	S.S. (bar)	3000	400°F
740-3	D319	FFG	1/2"	carbon S.	carbon S.	303 S.S.	Teflon	Steel	10000	300°F
740-4	D320	MFG	1/2"	carbon S.	carbon S.	303 S.S.	Teflon	Steel	10000	300°F
740-5	D321	MFA	1/2"	carbon S.	carbon S.	303 S.S.	Teflon	Steel	10000	300°F
740-6	D322	FFG	1/2"	303 S.S.	303 S.S.	303 S.S.	Teflon	303 S.S.	10000	300°F
740-7	D323	MFG	1/2"	303 S.S.	303 S.S.	303 S.S.	Teflon	303 S.S.	10000	300°F
740-9	D324	MFG	1/2"	316 S.S.	Delrin	316 S.S.	Teflon	316 S.S.	6000	200°F
740-11	D325	FFG	1/2"	316 S.S.	Delrin	316 S.S.	Teflon	316 S.S.	6000	200°F

SPECIFICATIONS & CATALOG NUMBERS FOR TRERICE SERIES NO. 865 & NO. 880 GAUGE COCKS



No. 865



No. 865MFG



No. 865L



No. 865-1



No. 880
(Union Connection)

CATALOG NUMBER	E.D.P. NUMBER	TYPE	CONNECTION N.P.T.	BODY MATERIAL	PLUG	HANDLE TYPE	MAX. PRESS. Oil, Air & Water
865	D326	FFG	1/4"	Brass	Brass	"T"	200 psi
865MFG	D378	MFG	1/4"	Brass	Brass	"T"	200 psi
865L	D379	FFG	1/4"	Brass	Brass	Level "L"	200 psi
865-1	D327	FFG	1/4"	Brass	Brass	"T"	300 psi
880	D328	MFG	1/4"	Brass	Brass	Lever	200 psi

NOTE: Since there is no packing gland to prevent leakage, care must be taken in the application of these cocks on service where leakage might create damage. For tight shut off and prevention of external leakage on air, water, gas and other fluids, we recommend our No. 735 Series Needle Valves.



No. 765
(E.D.P. No. D329)

NO. 765 TRERICE POINTER JACK

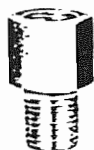
A jack should always be used in removing the hand from gauges to prevent injury to the movement.

Trerice

PRESSURE GAUGES ACCESSORIES



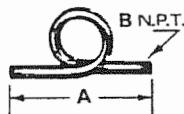
No. 870
IMPULSE
DAMPENER



No. 872
SNUBBER



No. 133-233
Snubber Screw



No. 885

NO. 870 SERIES TRERICE IMPULSE DAMPENERS

No. 870 TRERICE Pressure Impulse Dampeners are designed to prevent wear on delicate gauge mechanisms by slowing up quick pressure changes and reducing shock & chattering. They should be installed in any line to a gauge where sudden pressure changes are noticeable.

These dampeners are supplied in brass or stainless steel with proper graduations of grooves for use on air, water, steam and gas lines, gasoline & light oils, and for lubricating and heavy oils under pressure.

The Trerice Pressure Dampener is simple and will last indefinitely. To clean simply remove core and brush grooves.

CATALOG NO. 870 SERIES IMPULSE DAMPENERS

Service	Brass Body & Insert		Stainless Steel Body & Insert			
	1/4" N.P.T.		1/4" N.P.T.		1/2" N.P.T.	
	Cat. No.	E.D.P. No.	Cat. No.	E.D.P. No.	Cat. No.	E.D.P. No.
Air, water, steam, gases	870-1	D342	*870-7	D345	*870-10	D348
Gasoline & light oils	870-2	D343				
Lubricating & heavy oils	870-3	D344				
Ammonia	N.A.	N.A.				
Maximum Pressure (psi)	1000		5000		10000	

* Comes with 3 inserts to provide levels of dampening. N.A. means not available.

NO. 872 SERIES TRERICE PRESSURE SNUBBERS

No. 872 TRERICE Series Pressure Snubbers are installed on a gauge to prevent wear on the movement and reduce shock to the gauge. They should be installed in any line where sudden pressure changes, due to surging, oscillations and vibrations are noticeable. If the snubber does not correct the pulsating it is recommended to place another snubber in series after the first one.

This ruggedly constructed unit is supplied in brass or stainless steel with 1/4" or 1/2" N.P.T. connection. The porous core may be cleaned in the body of the snubber. The snubber should be washed in a solvent such as benzine or in boiling caustic soda. If you use the caustic soda rinse in running water generously. Do not force the solvent thru the core as this will tend to plug it up. If the snubber cannot be clean, install a new one.

CATALOG NO. 872 SERIES PRESSURE SNUBBERS

Service	Material & Thread Size							
	Bronze Body & Core				Stainless Steel Body & Core			
	1/4" N.P.T.		1/2" N.P.T.		1/4" N.P.T.		1/2" N.P.T.	
	Cat. No.	E.D.P. No.	Cat. No.	E.D.P. No.	Cat. No.	E.D.P. No.	Cat. No.	E.D.P. No.
Air & Gases	872-1	D351	872-7	D357	872-4	D354	872-10	D360
Gasoline, light oils, steam & water	872-2	D352	872-8	D358	872-5	D355	872-11	D361
Lubricating & heavy oils	872-3	D353	872-9	D359	872-6	D356	872-12	D362
Maximum Pressure (psi)	1000		5000		2000		10000	

NO. 133-233 SERIES TRERICE PRESSURE SNUBBER SCREWS FOR NO. 450 & NO. 650 SERIES GAUGES

Cat. No. 133-233 Series Snubber Screws - Body - 1/4-20 - UNC Thread		
Service	S.S. Body - S.S. Core	
	Cat. No.	E.D.P. No.
Air & other gases	133-233.2	D368
Vapor & low viscosity fluids under 30 S.S.U.	133-233.4	D369
Water & oils 30 S.S.U. to 250 S.S.U.	133-233.6	D370
*Heavy oils & viscous fluids - 250 S.S.U. to 500 S.S.U.	133-233.8	D371

*.040 orifice - porous metal core omitted.

NO. 885 SERIES TRERICE COIL SYPHONS

No. 885 TRERICE Coil Syphons are used on steam service to form a pocket of water between the gauge and steam, thereby preventing the steam from reaching the bourdon tube of the gauge. These syphons are 1/4" or 1/2" male pipe thread each end. See table below.

CATALOG NO. 885 SERIES TRERICE COIL SYPHONS

Cat. No.	E.D.P. No.	MATERIAL	DIMENSIONS		Working Pressure P.S.I.	Working Temp. °F.
			"B"	"A"		
885-1	D363	Steel	1/4 - 18	4.3	600	750
885-1.1	D3630	Steel	1/2 - 14	9.0	800	650
885-2	D364	Brass	1/4 - 18	5.7	250	406
885-3	D365	Chrome Plated Brass	1/4 - 18	5.7	250	406
885-4	D366	Stainless Steel	1/4 - 18	4.3	1300	650
885-4.1	D367		1/2 - 14	9.0	1000	650

Trerice

INDUSTRIAL THERMOMETERS 7", 9" & 12" ALUMINUM CASE ADJUSTABLE ANGLE

TRERICE "Adjustable Angle" Thermometers are used on pipelines of all types in building construction, process piping, tanks, air ducts, etc., and are approved by architects, consulting engineers, and contractors everywhere. Truly a quality thermometer at a budget price. One TRERICE Adjustable Angle Thermometer does the job of six specific form thermometers. It may be adjusted for any desired angle while installation is being made.

FEATURES

CASE

Furnished standard in 7", 9" & 12" sizes of smooth die cast aluminum with metallic blue black finish.

WINDOW

Clear acrylic plastic up thru 300°F. (150°C.) and double strength glass above 300°F. (150°C.) held in place with removable stainless steel cap.

TUBE

Lens front red appearing mercury tubing.

SCALE

White background with jet black embossed figures and markings. Permanent legibility is ensured by a special hot stamp process.

STEM

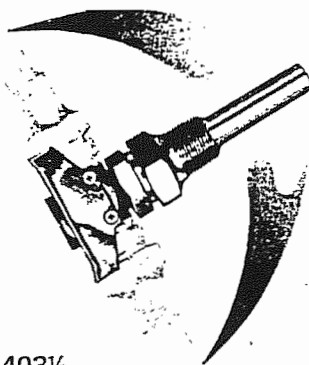
Stems are furnished standard in aluminum with socket connections and in brass with union connections. Maximum range available on the adjustable angle thermometer is 550°F. (290°C.)

BULB CHAMBER

Bulb chambers are tapered to fit a matched taper in the sockets, giving metal to metal contact and maximum sensitivity.

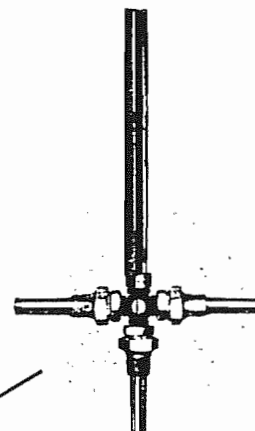
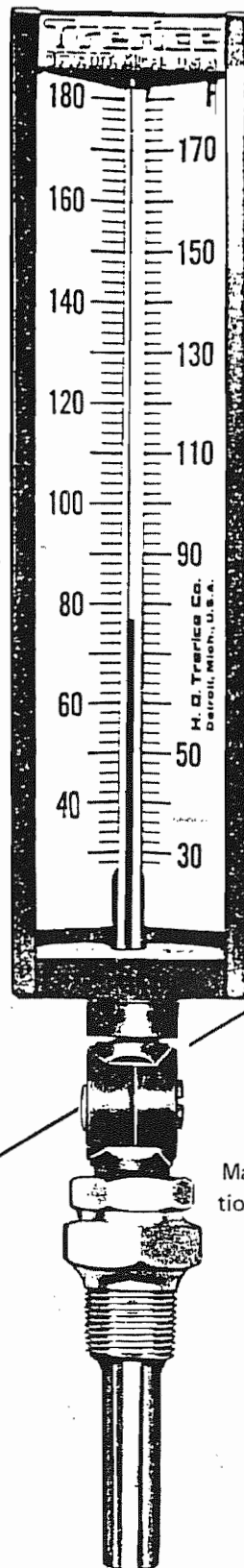
ADJUSTABLE ANGLE HINGE ASSEMBLY

With non-slip teeth to teeth engagement.



BX91403½

E.D.P. No. A00506 shown with
Cat. No. 3-4F2 Socket Connection
E.D.P. No. A105



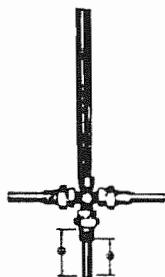
May be adjusted to any position for maximum readability.

NOTE: E.D.P. No. refers to "Electronic Data Processing Number". All orders should include the E.D.P. No. in addition to the Catalog No.

FOR PIPE LINES, TANKS, ETC.

SELECT THERMOMETER HERE — SOCKETS OR HUBS ON PAGE 9.

① Insertion Length	② Stem Length	N.P.T.	7" SCALE CASE			9" SCALE CASE			12" SCALE CASE		
			Old Cat. No.	New Cat. No.		Old Cat. No.	New Cat. No.		Old Cat. No.	New Cat. No.	
				Alum Stem	Brass Stem		Alum Stem	Brass Stem		Alum Stem	Brass Stem
2½"	3½"	¾"	AX91403½	A001	A401	BX91403½	A005	A405	CX91403½	A009	A409
5"	6"	¾"	AX91406	A002	A402	BX91406	A006	A406	CX91406	A010	A410
7"	8"	¾"	AX91408	A003	A403	BX91408	A007	A407	CX91408	A011	A411
11"	12"	1"	AX91512	A004	A404	BX91512	A008	A408	CX91512	A012	A412



New Cat. No. A00501
Shown with Socket
New Cat. No. 138-0015.2
Fully adjustable to any angle

The above catalog numbers do not include the socket or union hub. Refer to page 9 for these items.

For stem lengths over 12" and intermediate lengths, see price sheet.
Thermometers with aluminum stems must be used with sockets.

HOW TO ORDER: State quantity, (combined new catalog number of thermometer and range number), name, range. See accessories page 9 for type of connection, fittings, etc. desired.

EXAMPLE:

Thermometer only

1 each A00401 Thermometer
Range: —40 to 110°F

Separable Socket
only

1 each 138-0015.2
Brass Socket

Thermometers in shaded areas above are normally carried in stock in range no's — 01, 02, 03, 04, 06, 07, 08, 09 & 10.

SELECT RANGE HERE

FAHRENHEIT		CELSIUS		FAHRENHEIT & CELSIUS	
Range No.	Range	Range No.	Range	Range No.	Range
01	—40 to 110	17	—40 to 40	41	—40 to 110°F & —40 to 40°C
02	0 to 100	24	—18 to 38	42	0 to 100°F & —18 to 38°C
03	30 to 130	25	0 to 55	43	30 to 130°F & 0 to 55°C
04	0 to 160	26	—18 to 70	44	0 to 160°F & —18 to 70°C
06	30 to 180	27	0 to 82	46	30 to 180°F & 0 to 82°C
07	30 to 240	19	0 to 115	47	30 to 240°F & 0 to 115°C
08	30 to 300	20	0 to 150	48	30 to 300°F & 0 to 150°C
09	50 to 400	28	10 to 205	49	50 to 400°F & 10 to 205°C
10	100 to 550	29	40 to 290	50	100 to 550°F & 40 to 290°C

Adjustable Angle Thermometer not supplied in range over 550°F (290°C).

TRERICE ADJUSTABLE ANGLE AIR DUCT THERMOMETERS

This fine Air Duct Thermometer is furnished with all the features of the aluminum case series thermometer, and comes standard with a 3" O.D. reversible aluminum flange, perforated aluminum bulb guard for maximum sensitivity in air ducts and the popular adjustable angle feature for ease of installation and readability. This thermometer is screwed to the duct with three sheet metal screws.

CATALOG NUMBERS

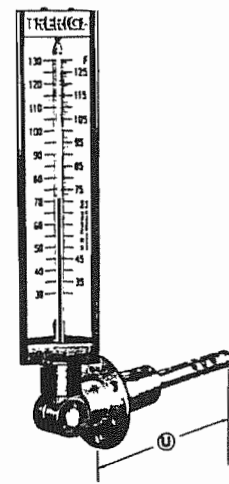
① Stem Insertion Length	7" Scale Case		9" Scale Case		12" Scale Case	
	Old Cat. No.	New Cat. No.	Old Cat. No.	New Cat. No.	Old Cat. No.	New Cat. No.
6"	AX99006	A013	BX99006	A015	CX99006	A017
12"	AX99012	A014	BX99012	A016	CX99012	A018

For longer stem lengths and intermediate lengths see price sheet.

HOW TO ORDER: State quantity, (combined new catalog number of thermometer & range number), name, range. See accessories page 9 for type of connection, fittings, etc., desired.

EXAMPLE: 1 each A01501 Thermometer
Range: —40 to 110°F.

Air duct thermometers in shaded areas above are normally carried in stock in range no's — 03, 04, 06 & 07.



New Cat. No. A01503
Fully adjustable to any angle

SPECIFICATIONS

Y.	Number	Size	Body/Cap Material	Valve Core Material	Maximum Temperature
—	BNE-025	1/4" NPT	Brass	Neoprene	200°F
—	BNO-025	1/4" NPT	Brass	Nordel	300°F
—	SSNE-025	1/4" NPT	316 s/s	Neoprene	200°F
—	SSNO-025	1/4" NPT	316 s/s	Nordel	300°F
16	BNE-500	1/2" NPT	Brass	Neoprene	200°F
—	BNO-500	1/2" NPT	Brass	Nordel	300°F
—	SSNE-500	1/2" NPT	316 s/s	Neoprene	200°F
—	SSNO-500	1/2" NPT	316 s/s	Nordel	300°F

GAUGE ADAPTERS

—	GA-063	1/16" dia.	316 s/s probe
—	GA-125	1/8" dia.	316 s/s probe

THERMOMETERS

1" or 1 1/2" dial face—5" stem with external calibration

Number	Range	Graduations
1" dia. 1 1/2" dia.		
T-125	25° to 125°F	1°
T-160 TX-160	-40° to 160°F	2°
T-220 TX-220	0° to 220°F	2°
T-500	50° to 500°F	5°

PRESSURE/TEMPERATURE TEST KIT

Includes one 2 1/2" test gauge (specify range) with 1/4" NPT bottom connection, one GA-063 adapter and two (2) 1" dial size test thermometers, 1 0-220°F and 1 500-500°F (substitute if required) all in a compact, fitted carrying case.

2EA. GAUGES 0-60
2EA. THERMOMETERS 0-220

DATE _____

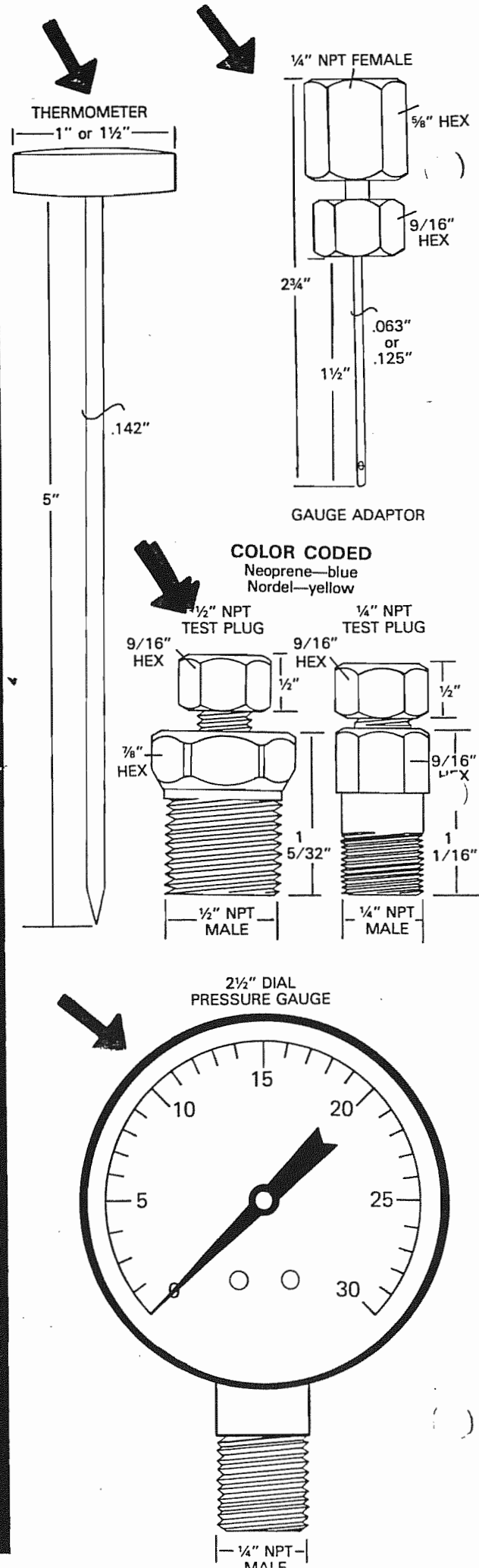
CUSTOMER _____

PROJECT _____

ORDER NO. _____

SISCO P/T PLUGS

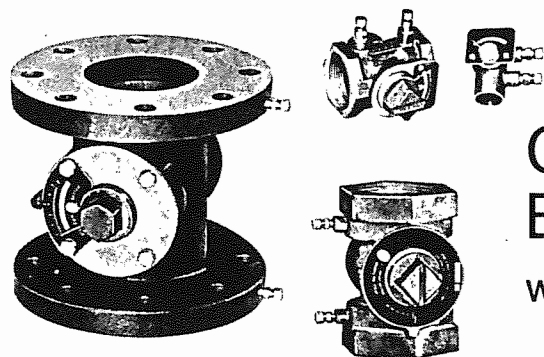
P.O. BOX 197 RIVERTON, N.J. (609) 829-8686
SHIPPING POINT — PALMYRA, N.J. 08065



BELL & GOSSETT

SUBMITTAL

A-551A



Circuit Setter® Balance Valves

with NPT, Flanged and Solder Connections

JOB _____	B & G REPRESENTATIVE _____	
UNIT TAG NO. _____	ORDER NO. _____	DATE _____
ENGINEER _____	SUBMITTED BY _____	DATE _____
CONTRACTOR _____	APPROVED BY _____	DATE _____

DESCRIPTION

A precision machined dual purpose balancing instrument precisely calibrated for use as a presetable balancing valve and adjustable flow meter to match system flow rate with design requirements.

Bell & Gossett Circuit Setter Balance Valves are equipped with readout valves which are fitted with an integral check valve designed to protect the user from the system fluid while balancing the system and monitoring system flow. Differential pressure readings taken across the orifice of Bell & Gossett Circuit Setters facilitate an exact determination of actual flow with the aid of the Circuit Setter Balance Valve Calculator.

Circuit Setter Balance Valves are furnished with preformed polyurethane insulation which is used to protect the Circuit

Setter during shipment and insulate it upon completion of balancing the system.

CONSTRUCTION

Body: Bronze, all models except the CB-4.

Cast iron, Model CB-4 only.

Plug/Vane: Bronze.

Readout Valves: Brass with EPT Check Valve.

MAXIMUM WORKING PRESSURE

- NPT models: 300 PSIG
- Sweat and Flanged models: 125 PSIG

MAXIMUM OPERATING TEMPERATURE

250° F

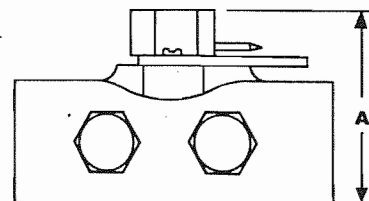
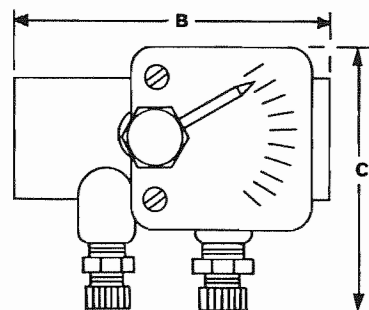
DIMENSIONS AND WEIGHTS

Model No.	DIMENSIONS IN INCHES							Weight in Lbs.
	Size	A		B		C		
		Normal	Insul	Normal	Insul	Normal	Insul	
CB-½S	½	1⅝	4¼	2¼	4¼	2⅜	4¼	½
CB-¾S	¾			2⅝		2½		½

S - Denotes sweat connections

SCHEDULE

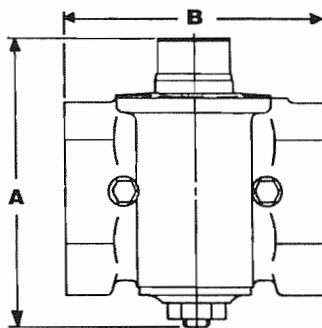
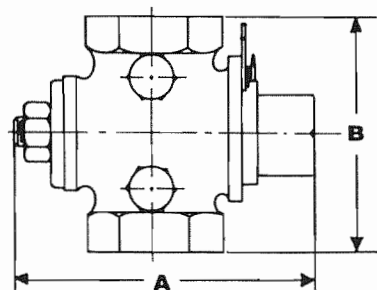
Model No.	Tagging Information	Quantity
CB-½S		
CB-¾S		



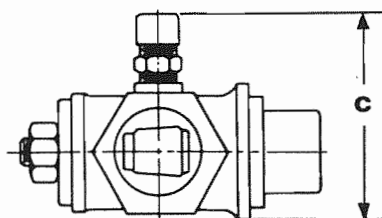
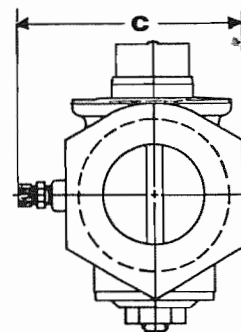
CB-½S and CB-¾S

BELL & GOSSETT ITT
FLUID HANDLING DIVISION

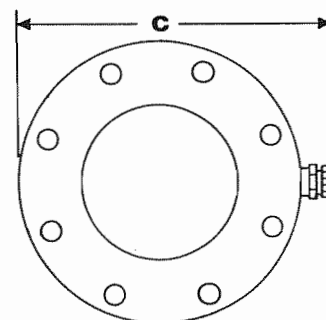
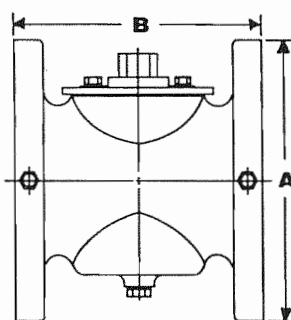
CIRCUIT SETTER® BALANCE VALVES



CB-2½ and CB-3



CB-½ THRU CB-2



CB-4

DIMENSIONS AND WEIGHTS

Model No.	DIMENSIONS IN INCHES								Weight in Lbs.
	Size		A		B		C		
			Normal	Insul	Normal	Insul	Normal	Insul	
CB-½	½	NPT	2¾	4¼	2⅛	4¼	2¼	4¼	½
CB-¾	¾		2⅞		2¼		2⅝		¾
CB-1	1		3½	5½	2⅝	3⅝	2⅝	4¾	1½
CB-1¼	1¼		3⅞		3		2⅞		2
CB-1½	1½		4⅞	6¼	3⅝	4¼	3⅝	6	3
CB-2	2		5⅞		4⅞		3⅝		5
CB-2½	2½		5½	8½	5	6	4⅝ ₁₆	6¼	8½
CB-3	3	7⅞	6		4⅞		14¾		
CB-4	4	FLG	9	9⅞	8	8	10⅞	10⅞	52

TYPICAL SPECIFICATIONS

Furnish and install calibrated balance valves with (Select one: A, B, or C)

A. NPT connections suitable for 300 PSIG

B. Sweat connections suitable for 125 PSIG

C. Flanged connections suitable for 125 PSIG.

Working Pressure at 250°F, equipped with brass readout valves fitted with an integral EPT insert, and check valve designed to minimize system fluid loss during the balancing and monitoring process. Each balancing valve shall have a calibrated nameplate to assure specific valve settings, be constructed with internal seals to prevent leakage, and be supplied with preformed polyurethane insulation suitable for use on heating and cooling systems.

Each unit to be ITT Bell & Gossett Model Number CB-____ Circuit Setter Balance Valve or approved equal.

NOTE: 1. Bell & Gossett NPT Circuit Setter Balance Valves are designed in such a manner as to facilitate their use as service valves to restrict flow, but not as a drop tight shut-off valve.

CAUTION: CIRCUIT SETTER BALANCE VALVES WITH FLANGED OR SOLDER CONNECTIONS ARE TO BE USED FOR BALANCING ONLY. THEY ARE NOT DESIGNED FOR POSITIVE SHUT-OFF OF FLUID AND THEY SHOULD NOT BE USED AS A SERVICE VALVE.

2. Bell & Gossett Circuit Setter Balance Valves are not recommended for use with meter connections pointing downward.

SCHEDULE

Model No.	Tagging Information	Quantity
CB- ½		
CB- ¾		
CB-1		
CB-1¼		
CB-1½		
CB-2		
CB-2½		
CB-3		
CB-4		

IMPORTANT:

When monitoring system flow care must be exercised to avoid direct skin or eye contact with liquids that may escape. Liquids with temperatures in excess of 120°F may cause burns.

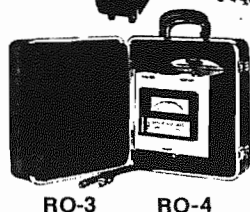
BELL & GOSSETT

SUBMITTAL

A-552A



RO-2



RO-3

RO-4



RO-5

Engineered Products Read Out Kits

JOB _____	B & G REPRESENTATIVE _____	
UNIT TAG NO. _____	ORDER NO. _____	DATE _____
ENGINEER _____	SUBMITTED BY _____	DATE _____
CONTRACTOR _____	APPROVED BY _____	DATE _____

DESCRIPTION

B&G Readout Kits are designed for use with B&G Circuit Setter Balance Valves and Circuit Sensor Flow Meters. They may also be used to check differential pressures across other system components including B&G pumps,

Suction Diffusers, strainers, coils, etc. All readout kits feature full overrange protection and are equipped with hoses, readout probes, carrying case and Circuit Setter Balance Valve calculator.

MODEL NO.	SCALE			HOSE LENGTH FEET	TAGGING INFORMATION	QUANTITY
	RANGE*	INCREMENTS	ACCURACY** ±%			
	FEET OF WATER					
RO-2	0-100	0.5	.5	10		
RO-3	0-16	1.0	1.0			
RO-4	0-35					
RO-5†	0-25	0-5 FT. @ 1.25 FT. 5-25 FT. @ 1.0 FT.	3.0	5		
	0-0.7 kg/cm	0.05 kg/cm				

*Contact your local Bell & Gossett Representative for the availability of Readout Kits with scales other than shown.

**Full Scale

†Dual Scale 0-25 ft of water and 0-0.7kg/cm²

MAXIMUM OPERATING TEMPERATURE

All Models: 250°F Liquids and Gasses compatible with Nylon, Viton, Buna N. Brass, Aluminum and 316 Stainless Steel

MODEL NO.	LENGTH	WIDTH	HEIGHT
RO-2, RO-3, RO-4	12"	7½"	12¾"
RO-5	12¼"	6¾"	6"

TYPICAL SPECIFICATION

Provide a portable Readout Meter with provision for hanging, capable of indicating pressure differential across a system component. Unit to be complete with all

necessary hoses, shut-off and vent valves, and carrying case. Reading range to be _____. Readout Kits to be ITT Bell & Gossett Model # _____.

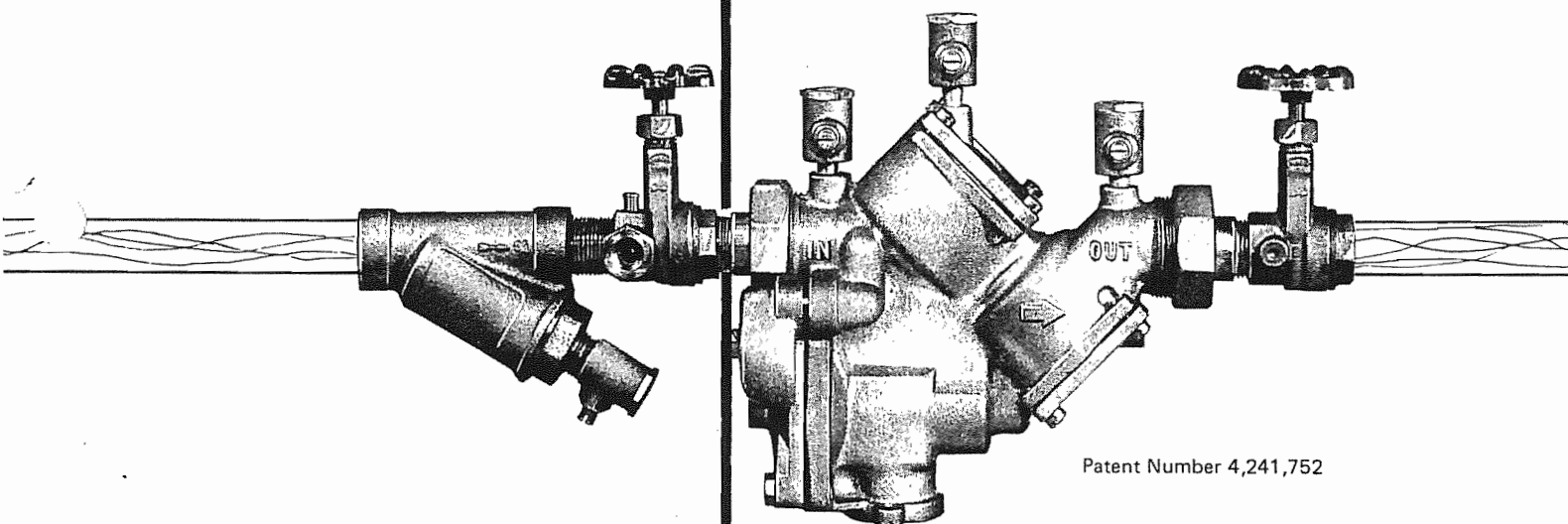
WATTS REGULATOR

THE
NAME
THAT
PROTECTS
YOUR
NAME

Series 909

SIZES $\frac{3}{4}$ " to 10"

REDUCED PRESSURE
PRINCIPLE
BACKFLOW PREVENTERS



Patent Number 4,241,752

POSITIVE CROSS CONNECTION CONTROL

- **INSTALLATION**
- **SERVICE**
- **REPLACEMENT PARTS**
- **and MAINTENANCE**

For Field Testing Procedure request Bulletin S-FT-TK-9A.

WATTS REGULATOR COMPANY

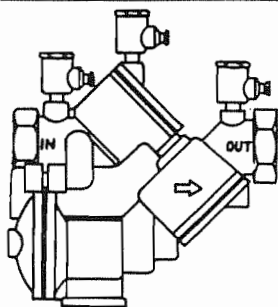
TORONTO, CANADA

• LAWRENCE, MASS., U.S.A. 01842

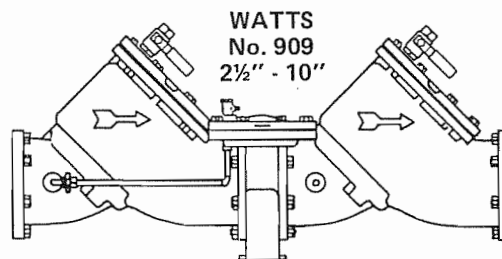
SOESTDUINEN, THE NETHERLANDS

Manufacturers of the largest and most complete line of plumbing and heating safety valves and controls.

Basic Installation Instructions



WATTS
No. 909
3/4" - 2"



WATTS
No. 909
2 1/2" - 10"

A. WATTS Series 909 Backflow Preventers may be installed in either a vertical or horizontal position. If installed vertically, the direction of flow must be up for 3/4" - 2" and down for 2 1/2" - 10".

B. They should always be installed in an accessible location to facilitate testing and servicing. Check the local codes to insure that the unit is installed the proper height above the ground.

C. Pipe lines should be thoroughly flushed to remove foreign material before installing the unit. A strainer should be installed as shown, ahead of No. 909 Series devices to protect the discs from unnecessary fouling.

CAUTION: Do not install with strainer when backflow preventer is used on seldom-used water lines which are called upon only during emergencies, such as fire sprinkler lines, etc.

D. Water discharge from the relief valve should be vented in accordance with code requirements. The relief valve should never be solidly piped into a drainage ditch, sewer, or sump. The discharge pipe should be terminated approximately 12" above the ground or through an air gap piped to a floor drain.

E. After initial installation, a discharge from the relief valve opening may occur until all seating surfaces have become seated or due to inadequate initial flushing of pipe lines to eliminate dirt and pipe compounds. If flushing will not clear, remove the first check valve and clean thoroughly. See page 4 or 6.

F. When a reduced pressure principle backflow preventer is installed for dead-end service applications, such as for boiler feed lines, cooling tower make-up and other periodic flow requirements, such a backflow preventer cannot function according to its designed pur-

pose and tested performance without causing discharge from the relief vent when the water supply pressure fluctuates during static no flow conditions.

Therefore, to avoid discharge where objectionable, use a check valve ahead of the installation to "lock-in" the downstream pressure so as not to affect the operation pressure differential between the supply and downstream of the first check in the backflow preventer.

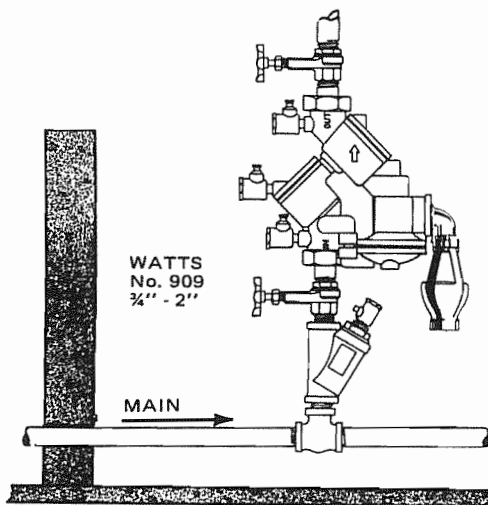
G. Backflow preventers should never be placed in pits unless absolutely necessary and then only when and as approved by local codes. In such cases, provision should be made to always vent above flood level or for a pit drain to insure an adequate air gap below the relief port. Consult your local or state plumbing or health inspector.

H. It is important that Series 909 Backflow Preventers be inspected periodically for any discharge from the relief valve which will provide a visual indication of need for cleaning or repair of check valves. Also, testing for proper operation of the device should be made periodically in compliance with local codes, but at least once a year or more often, depending upon system conditions. See Watts instruction manual for test procedures.

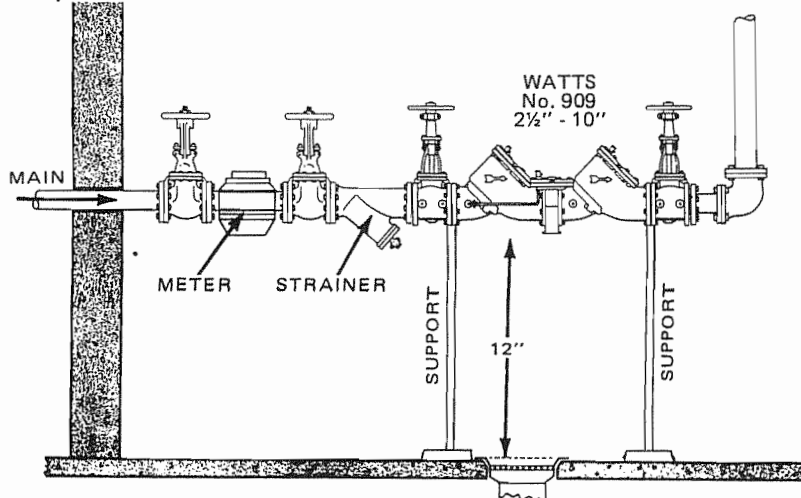
I. Relief vent will discharge water, when during no-flow periods (1) the first check valve is fouled, or (2) the inlet supply pressure to the device drops sufficiently due to upstream pressure fluctuations to affect the required operating differential between the inlet pressure and the reduced pressure zone. Otherwise such relief ("spitting") can occur when the second check is fouled during emergency backflow or resulting from a water hammer condition. (See tag on valve for preventive and corrective means.)

Installation - Indoors, Figure 1

For indoor installations, it is important that the device be easily accessible to facilitate testing and servicing. Series 909 may be installed either vertically or horizontally. If installed vertically, flow must be up 3/4" - 2" and down 2 1/2" - 10". If it is located in a line close to a wall, be sure the test cocks are easily accessible. A drain line should be piped from the relief valve as shown, where evidence of discharge will be clearly visible and so that water damage will not occur. Therefore, never install in concealed locations. In sizes 2 1/2" - 10", the complete relief valve unit can be removed and mounted on the opposite side of the device, in order to provide better accessibility for servicing.



INDOORS, MAIN LINE



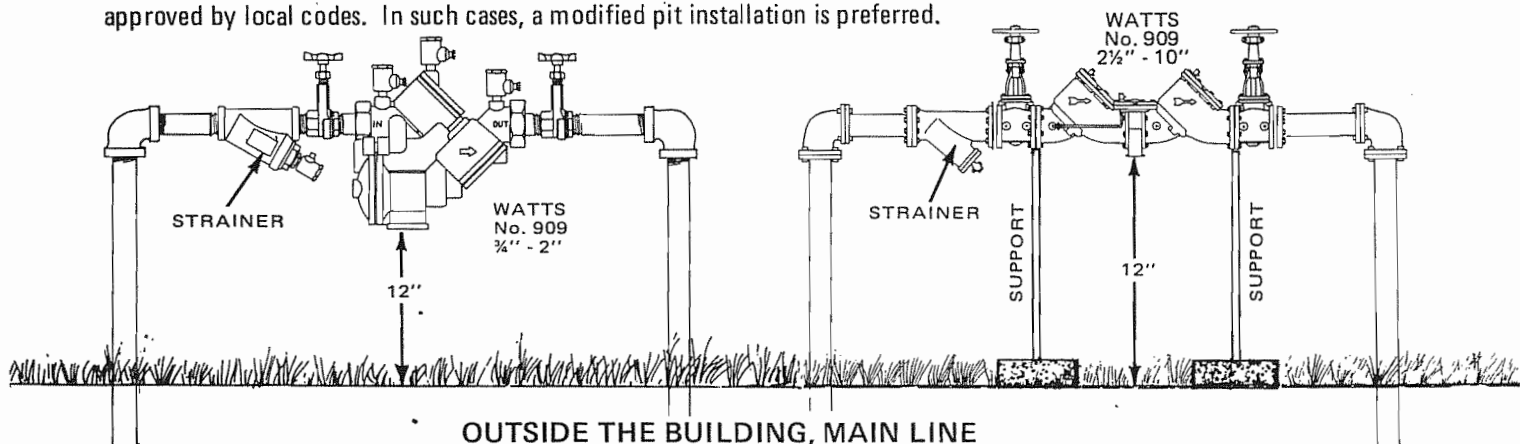
Installation - Outside Building Above Ground, Figure 2

In an area where freezing conditions do **not** occur, Series 909 can be installed outside of a building. The most satisfactory installation is above ground and should be installed in this manner whenever possible.

In an area where freezing conditions **can** occur, Series 909 should be installed in a properly insulated utility building or shelter.

Series 909 may be installed in a vertical or horizontal line and in an accessible location to facilitate testing and servicing. A discharge line should be piped from the relief valve connection making sure that there is adequate drainage. Never pipe the discharge line directly into a drainage ditch, sewer, or sump. Series 909 should never be installed where any part of the unit could become submerged in standing water. Consideration should be given to the installation of external support structure as applicable on larger sizes.

It is generally recommended that backflow preventers never be placed in pits unless absolutely necessary and then only when approved by local codes. In such cases, a modified pit installation is preferred.



Installation - Parallel Devices Figure 3

CONSULT LOCAL
CODES FOR APPROVAL

An optional installation of Series 909 Backflow Preventers is the use of two or more smaller size devices piped in parallel (where approved) to serve a larger supply pipe main. This type of installation is employed whenever it is vital to maintain a continuous supply of water and where interruptions for testing and servicing would be unacceptable. It also has the advantage of providing increased capacity where needed beyond that provided by a single valve and permits testing or servicing of an individual valve without shutting down the complete line.

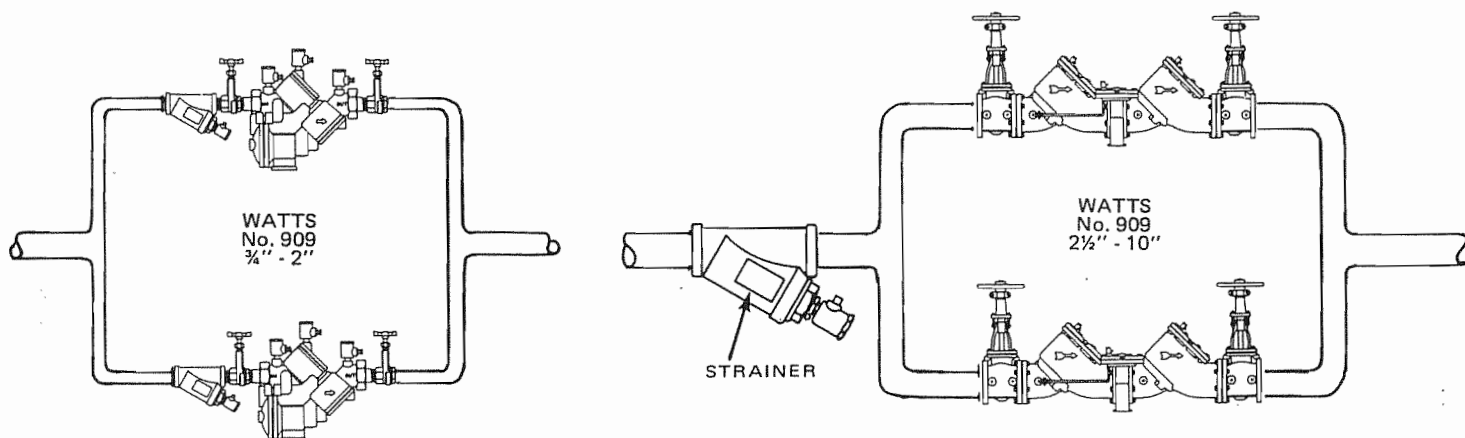
For a two-valve installation as shown, the total capacity of the devices should equal or exceed that required by the system. Table One listing the size No. 909 devices required to meet a certain capacity.

The number of devices used in parallel should be determined by the engineer's judgement based on the operating conditions of a specific installation.

TABLE ONE - CAPACITY REQUIRED FOR SYSTEM

50 GPM	100 GPM	150 GPM	200 GPM	250 GPM	350 GPM	450 GPM	640 GPM	1000 GPM	2000 GPM	3000 GPM	5000 GPM
Two ¾" Devices	Two 1" Devices	Two 1¼" Devices	Two 1½" Device	Two 1½" Devices	Two 2" Devices	Two 2½" Devices	Two 3" Devices	Two 4" Devices	Two 6" Devices	Two 8" Devices	Two 10" Devices

Table shows total capacity provided with dual valve installations of various sizes.



Servicing First and Second Check Valves

Sizes: $\frac{3}{4}$ " to 2"

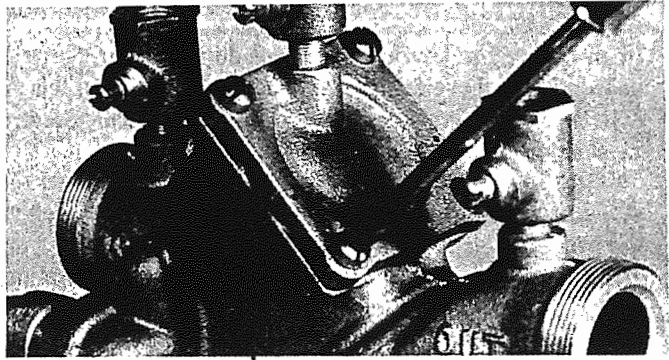
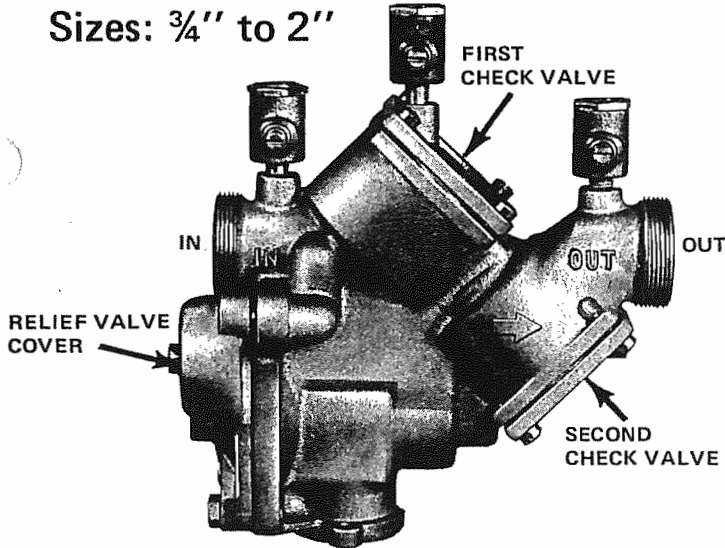


Figure 2

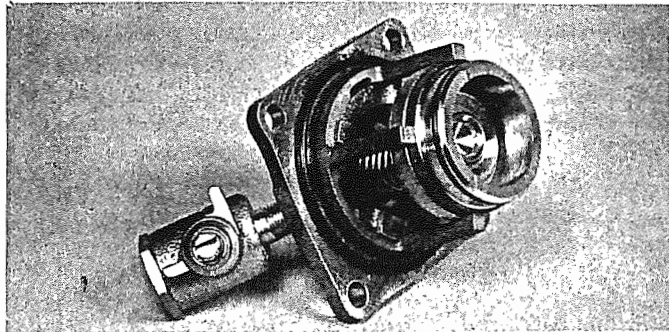


Figure 3

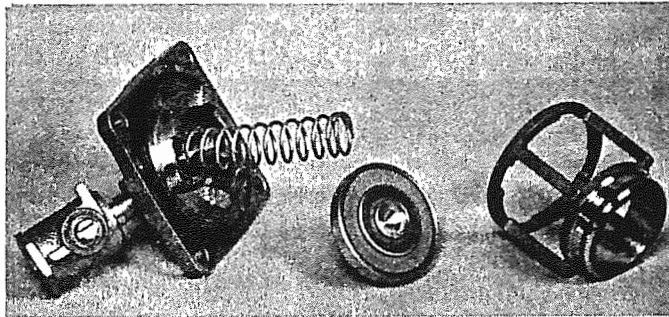
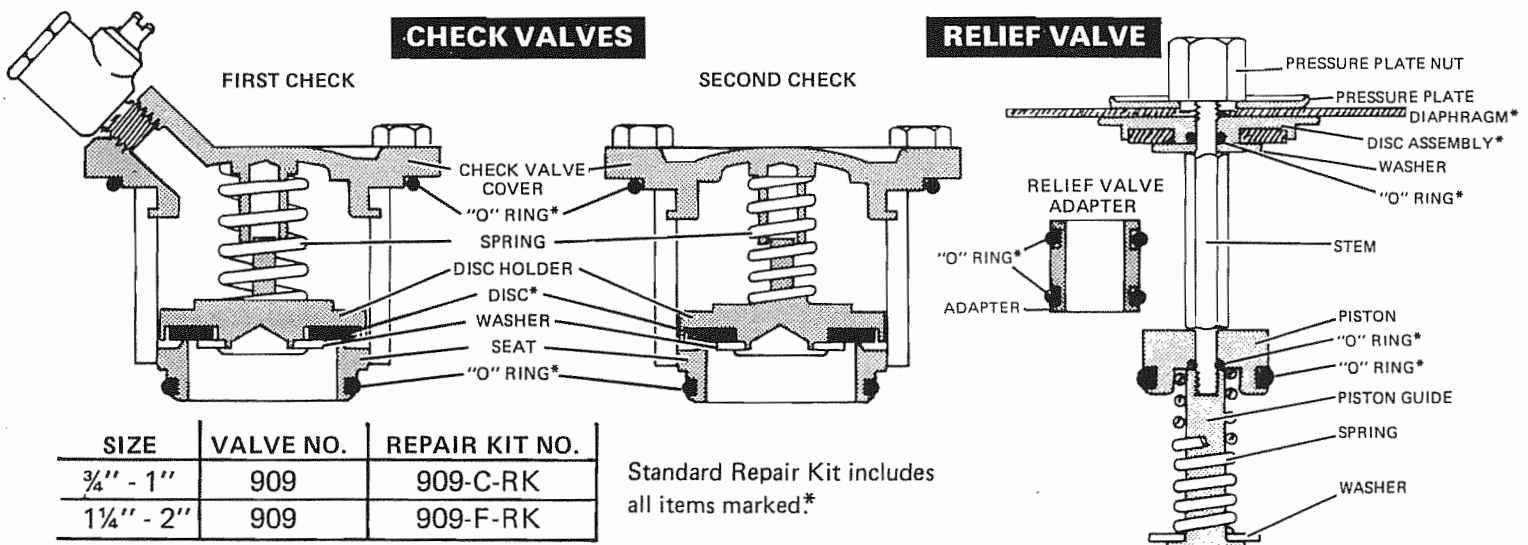


Figure 4

1. Remove the four screws holding the first check valve cover. Figure 2.
2. Lift off the first check valve cover. The check valve inside will come out with the cover and is attached with a bayonet type locking arrangement. Figure 3.
3. Holding the check valve module in both hands, rotate the assembly $\frac{1}{4}$ turn. This will disengage the disc assembly, spring and seat cover into individual components. Figure 4.
4. The disc assembly may be cleaned and reassembled, or depending upon its condition, it may be discarded and replaced with a new assembly from the service kit. "O" rings should be cleaned or replaced as necessary and lightly greased with the FDA approved silicon grease which is also furnished with the service kit.
5. Reassemble the check valve module in the reverse order. Service is identical for both the first and second check valves.

Note: The springs and covers of the first and second check valves are not interchangeable.

$\frac{3}{4}$ " - 2" Replacement Parts



SIZE	VALVE NO.	REPAIR KIT NO.
$\frac{3}{4}$ " - 1"	909	909-C-RK
$1\frac{1}{4}$ " - 2"	909	909-F-RK

Standard Repair Kit includes all items marked*.

Servicing the Relief Valve

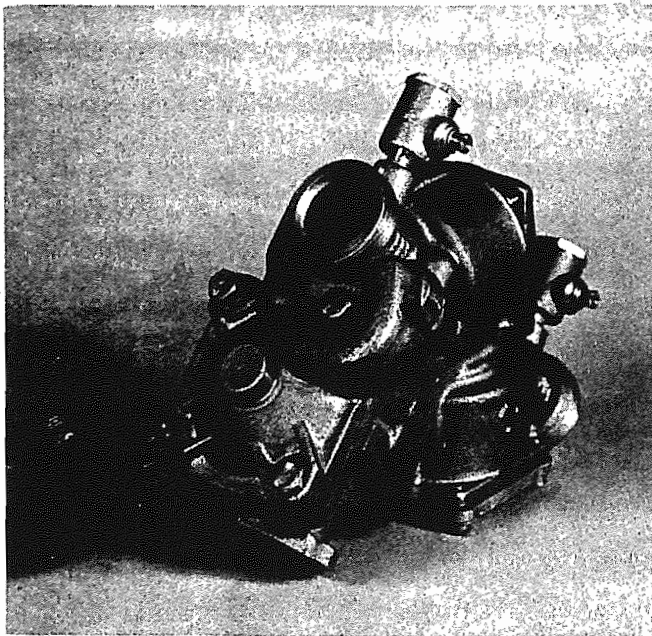


Figure 5

1. Remove the four bolts that hold the relief valve cover in place. Figure 5.
2. Remove the cover. The stainless steel adapter, with "O" rings attached, will be free to be removed simultaneous with the removal of the cover. Figure 6. Pull out the relief valve assembly. Figure 6. Note: the spring tension in the relief valve assembly is contained in the design of the relief valve; therefore, the relief valve can be removed in a one-piece spool-type assembly. Figure 7.
3. The relief valve seat and disc may be cleaned without disassembly of the relief valve assembly. If it is determined that the relief valve diaphragm and or disc should be replaced, the relief valve module can be readily disassembled without the use of special tools.
4. To disassemble the relief valve module, (Figure 7) hold the center hexagonal stem with an open end or an adjustable wrench (Figure 8). While simultaneously turning the hex head on the end of the relief valve assembly. The relief valve spring will unload during disassembly. Repeat procedure turning hex nut on the diaphragm end. Figure 9 shows complete disassembly of module.
5. The relief valve diaphragm and or relief valve disc may be replaced with new parts from the service kit. Reassembly of the relief valve module may be accomplished in the reverse order. "O" rings should be replaced as necessary and lightly greased with FDA approved silicon grease which is furnished with the service kit. Care should be taken to insure that, when bolting the relief valve into place, the relief valve module and stainless steel adapter are in position. Do not force the cover into place as damage may result from misalignment.

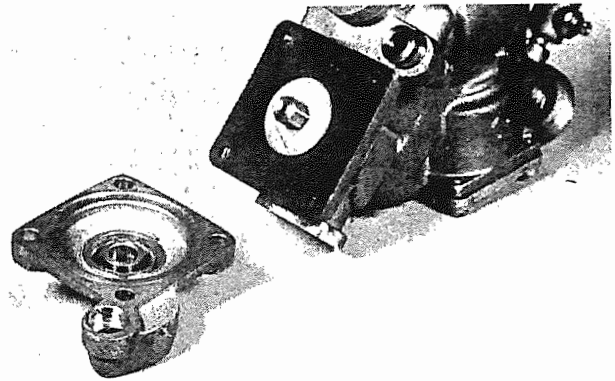


Figure 6

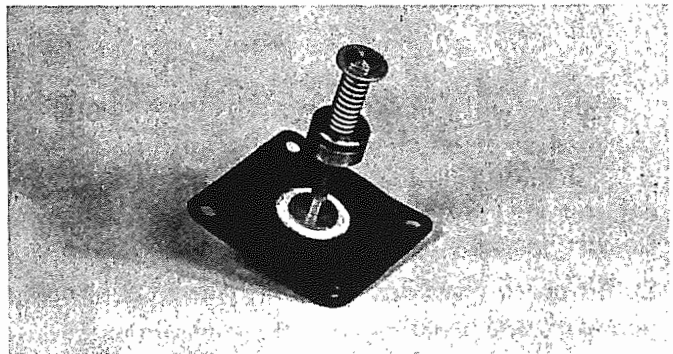


Figure 7

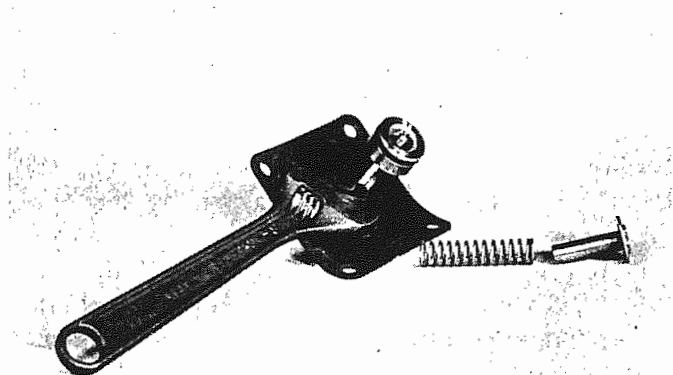


Figure 8

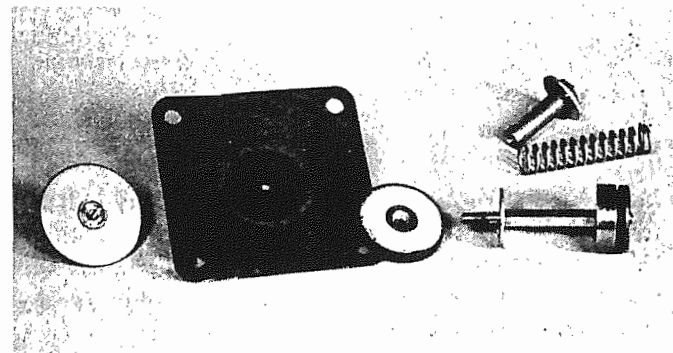
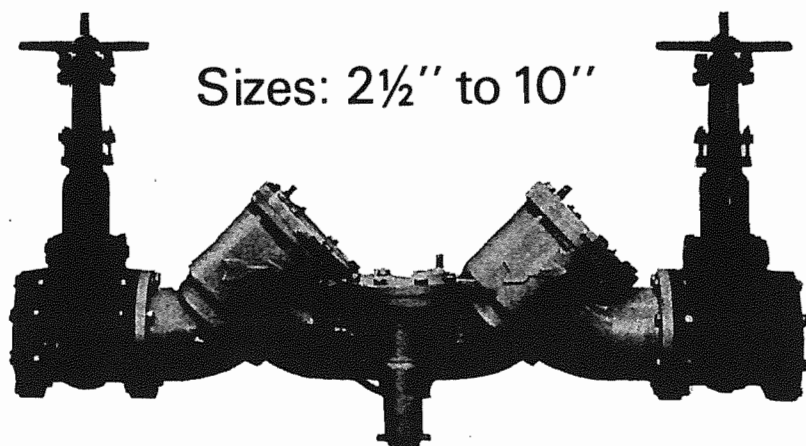


Figure 9

Servicing First and Second Checks



Sizes: 2½" to 10"

First and Second Checks are not Interchangeable.

1. Remove hatch cover bolts. NOTE: The 909 is designed so that when the bolts are backed off ½", all the spring load is released from the cover and retained by the check module. **CAUTION:** Be sure to verify this before removing all the bolts.

2. Lift check valve module straight out taking care not to hit and damage seat ring.

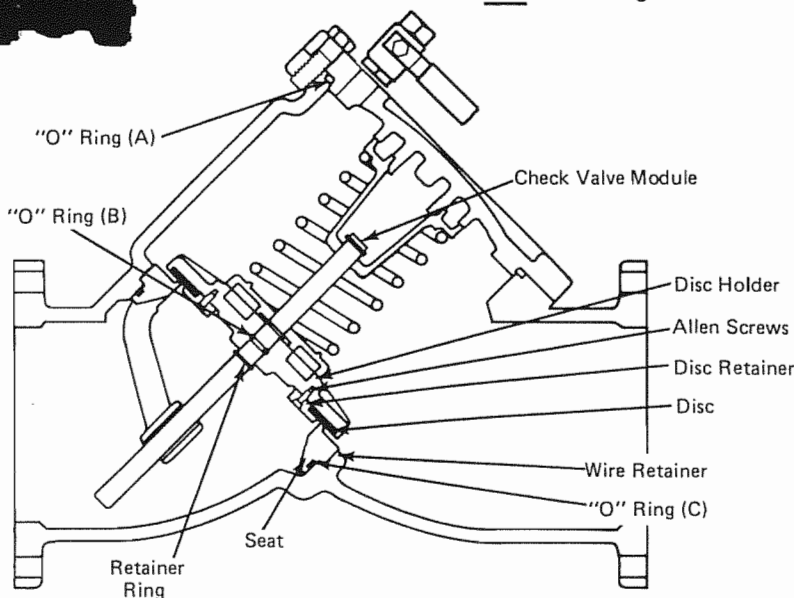
3. The seat ring may be removed and replaced by pulling out the two wire retainers. The wire retainers are 10" long. One is drawn out clockwise and the other is drawn out counter clockwise.

4. With the retainer wires removed, the seat ring can be lifted straight up and removed.

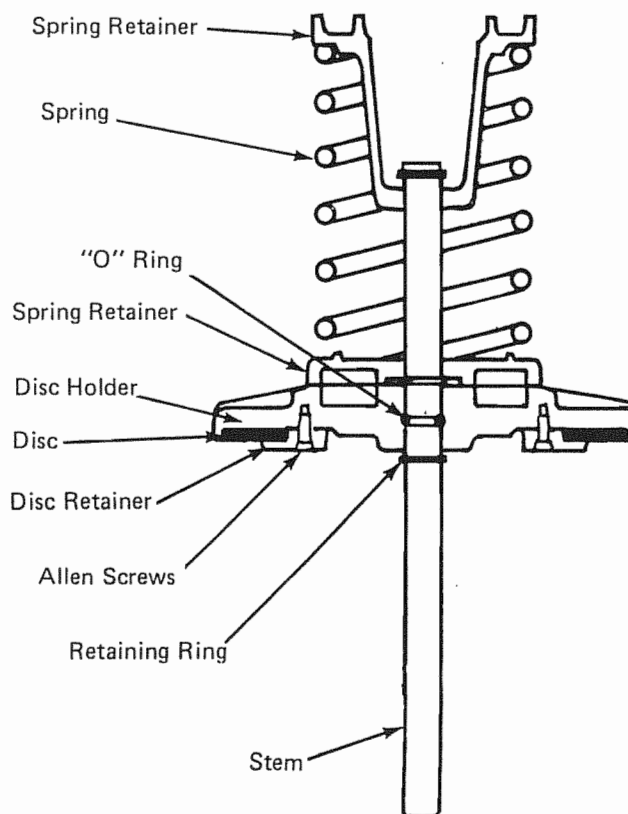
5. **CAUTION:** The check valve spring is in compression. The spring load is captured by the two spring retainers and the stem. The spring retainers are not to be removed for servicing. If there is a need to replace the spring, spring retainer or stem, an assembled module must be obtained from the factory.

6. To replace the disc, simply remove the Allen head socket screws. Lift off the disc retaining plate and the disc. Reverse this procedure to install the new disc.

7. If the disc holder has been damaged by freezing or severe water hammer, it can be replaced in the field. Remove the retaining ring and slide the disc holder off the stem. Remove the "O" ring from the stem and replace with a new one. Apply grease to the "O" ring and slide the new disc holder into place. Re-install the retaining ring. NOTE: the disc holder should not be removed when servicing only the disc.



CHECK MODULE ASSEMBLY



Servicing the Relief Valve

1. Remove the relief valve cover bolts. Note the 909 is designed so that when the bolts are backed off $\frac{1}{2}$ " all the relief valve spring load is retained by the bottom plug spring module. **Caution:** Be sure to verify this before removing all the bolts.

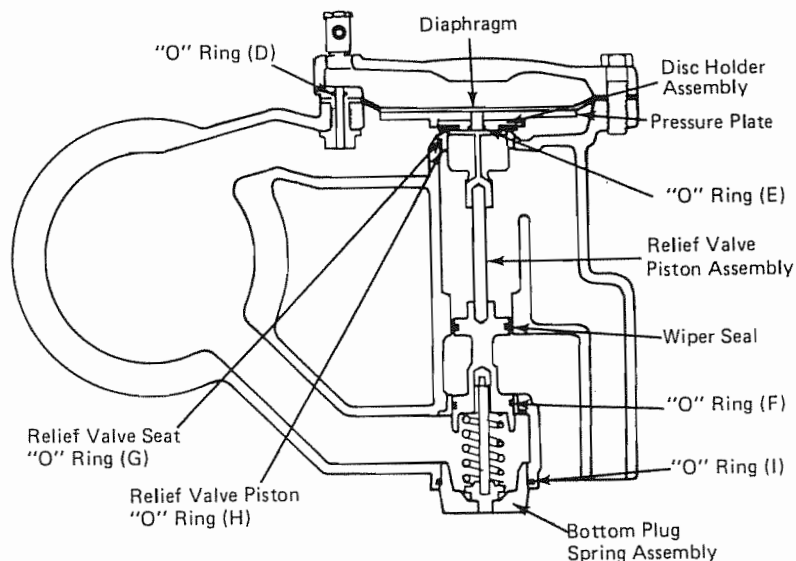
2. Remove the cover and diaphragm. The relief valve piston assembly can be lifted straight up and out.

3. Replace the wiper seal and piston "O" ring and apply grease to the "O" ring.

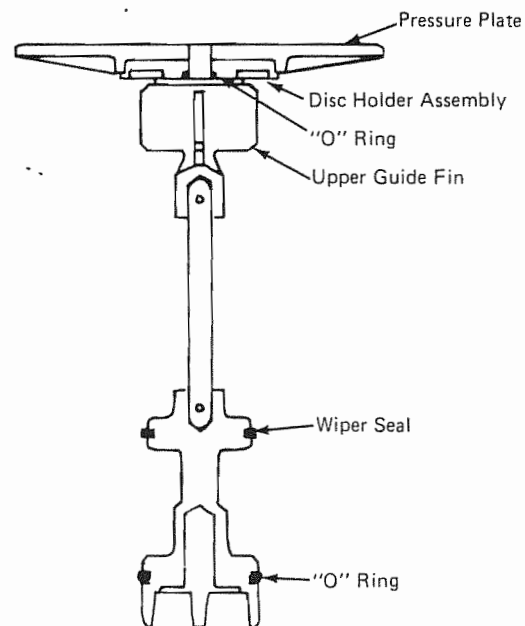
4. To replace the relief valve disc, hold the upper guide fin and unscrew the diaphragm pressure plate. It may be necessary to lightly tap the cast webs and the pressure plate to loosen. Replace with a new disc holder assembly and "O" ring. Note: the disc rubber is molded into the disc holder and is supplied as a disc holder assembly.

5. Removal of the bottom spring assembly. During normal field service there is no need to remove the bottom plug spring assembly other than inspection. It can be removed by simply unscrewing with a large pipe wrench.

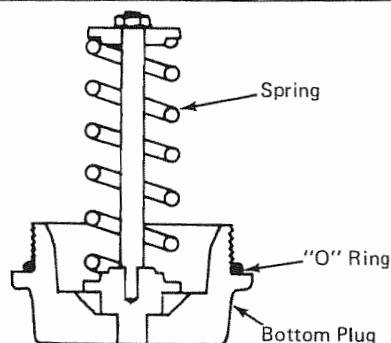
Caution: The spring as retained on the bottom plug is highly loaded. NO attempt should be made in the field to remove the spring. For replacement, a complete bottom plug assembly must be obtained from the factory.



RELIEF VALVE PISTON ASSEMBLY



BOTTOM PLUG SPRING ASSEMBLY



2½" - 10" Replacement Parts

SERVICE PARTS KIT NUMBERS

Valve Size	Check Modules	Relief Valve
2½", 3"	909-G-RK	909-H-RK
4"	909-J-RK	909-JK-RK
6"	909-K-RK	909-JK-RK
8"	909-L-RK	909-M-RK
10"	909-N-RK	909-M-RK

CHECK MODULE KIT CONTAINS

(2) "O" Rings (A)
(2) Disc

RELIEF VALVE KIT CONTAINS

Set of "O" Rings (D), (E), (F)
Diaphragm
Disc Holder Assembly
Wiper Seal

Series 909 Trouble Shooting Guide

PROBLEM	CAUSE	SOLUTION
VALVE SPITS PERIODICALLY FROM THE VENT.	Fluctuating supply pressure.	Place a soft seated check valve immediately upstream of the device.
VALVE DRIPS CONTINUALLY FROM THE VENT.	Fouled first check.	Flush valve. If flushing does not resolve problem, disassemble valve and clean or replace the first check.
	Damaged or fouled relief valve seat.	Clean or replace the relief valve seat.
	Relief valve piston "O" ring not free to move due to pipe scale, dirt or build up of mineral deposits.	Clean, grease or replace the piston "O" ring.
	Excessive backpressure, freezing, or water hammer has distorted the second check.	Eliminate source of excessive backpressure or water hammer in the system downstream of the device. Replace defective second check assembly. In case of freezing; thaw, disassemble, and inspect internal components. Replace as necessary.
	Electrolysis	Electrically ground the piping system and/or electrically isolate the device with plastic pipe immediately upstream and downstream of the device.
VALVE EXHIBITS HIGH PRESSURE DROP.	Fouled strainer (if present)	Clean strainer element or replace.
	Valve too small for flows encountered.	Install proper size device based upon flow requirements.
NO WATER FLOWS DOWNSTREAM OF VALVE.	Valve installed backwards.	Install valve in accordance with flow direction arrow.
VALVE QUICKLY AND REPEATEDLY FOULS FOLLOWING SERVICING.	Debris in pipe line.	Install a strainer. If already equipped with a strainer, install finer mesh strainer element in the strainer.

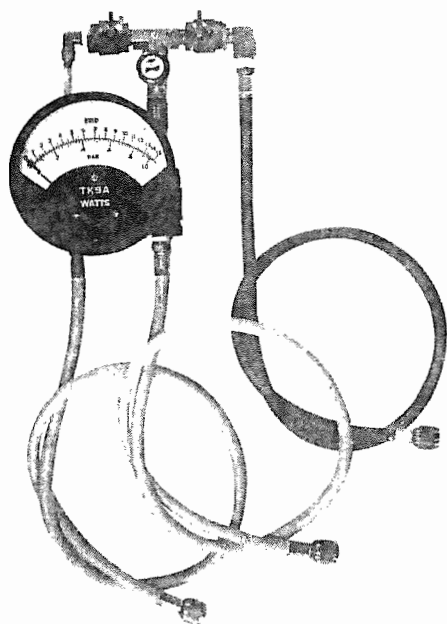


THE NAME THAT PROTECTS YOUR NAME
 Box 628, Lawrence, MA 01842 (617) 688-1811
 Toronto, Canada Soestduinen, The Netherlands

LIMITED WARRANTY: Watts Regulator Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including, without limitation, damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemicals, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication or improper installation of the product. **THE COMPANY MAKES NO OTHER WARRANTIES EXPRESS OR IMPLIED EXCEPT AS PROVIDED IN THIS LIMITED WARRANTY.**

WATTS REGULATOR

THE
NAME
THAT
PROTECTS
YOUR
NAME

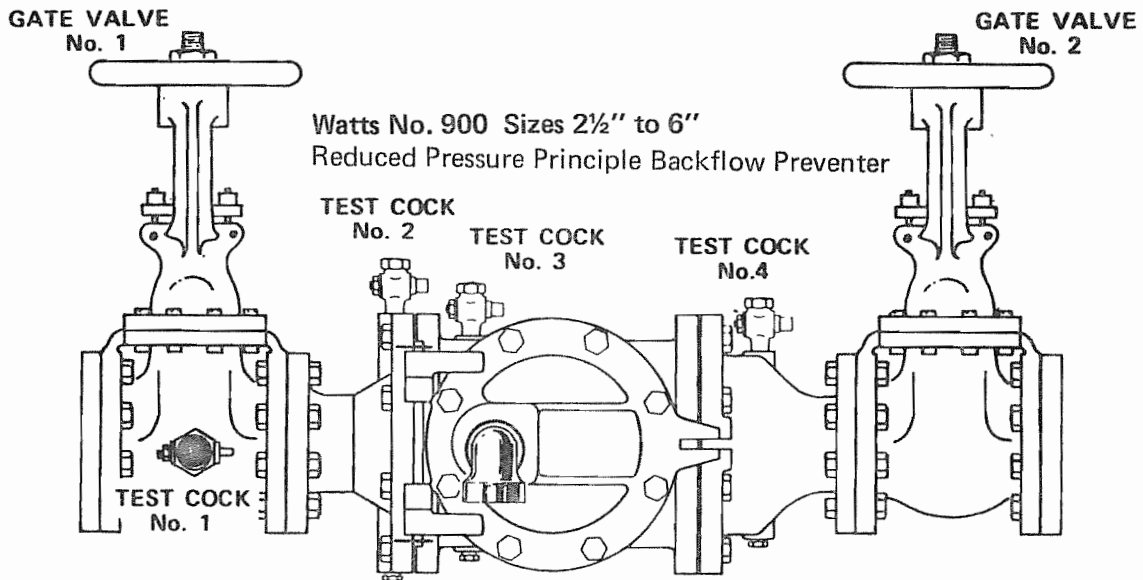
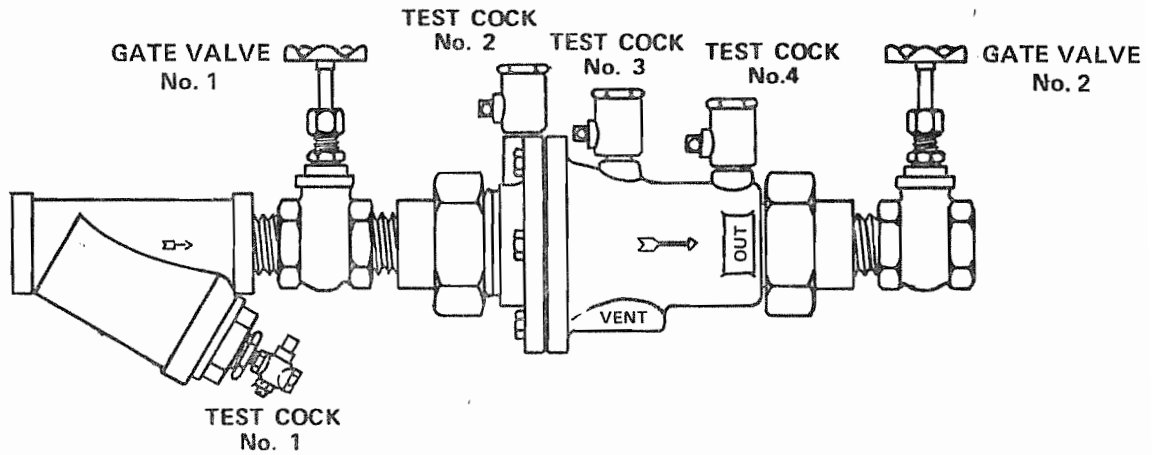


The Watts No. TK-9 Mod. "A" Backflow Preventer Test Kit is a compact portable testing device especially made for testing all Reduced Pressure Principle Backflow Prevention Devices. The TK-9 Mod. "A" is easily connected to any RPZ device enabling accurate testing of "zone" differential pressure, relief valve opening differential, fouled check valves or similar problems that visual inspections cannot locate. The unit is encased in a rugged carrying case for easy handling and accessibility.

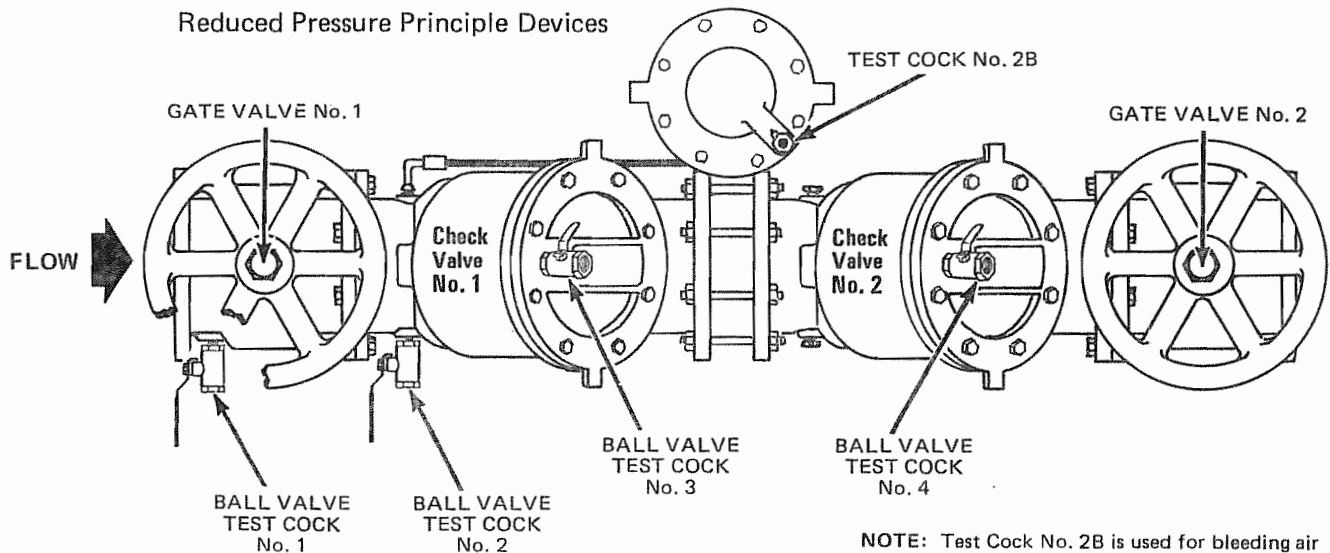
SPECIFICATIONS

- Maximum working pressure – 175 psi.
- Maximum working temperature – 210°F.
- Gauge – 4½" diameter face dual scale
0-15 psid and 0-1 kg/cm², ±2% accuracy full scale.
- Test Valves – (2) ball valves and (1) needle valve.
- Hoses – (3) 3' with female threaded swivel couplings.
- Adapters – (3) ¼" threaded coupling adapters
(3) ½" x ¼" bushings
(3) ¾" x ¼" bushings
- 1 – 16" securing strap.
- 1 – Moisture resistant instruction guide.
- Case – light weight, shock resistant molded plastic with foam inserts.

Watts No. 900 Sizes $\frac{3}{4}$ " to 2"
Reduced Pressure Principle Backflow Preventer

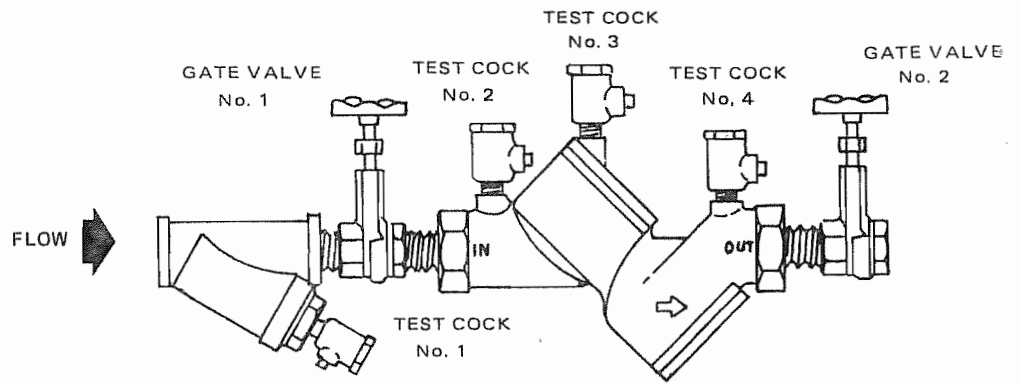


Watts No. 909 Sizes $2\frac{1}{2}$ " to 10"
Reduced Pressure Principle Devices

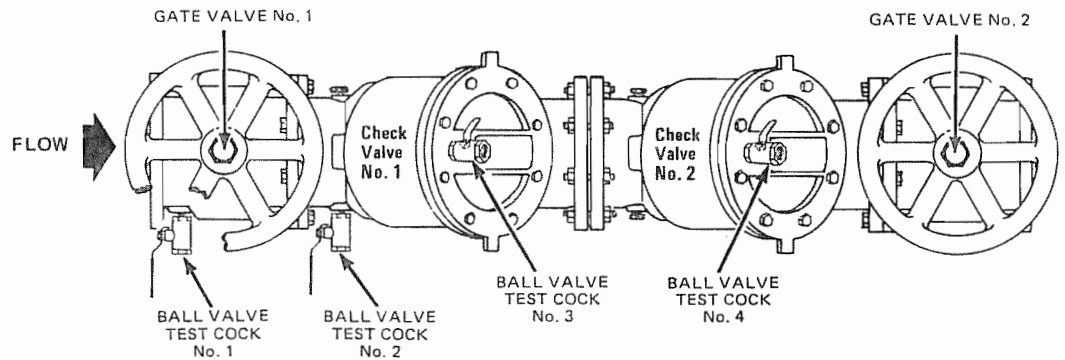


NOTE: Test Cock No. 2B is used for bleeding air and should not be used for testing.

Watts No. 709
Sizes ¾" to 2"
Double Check Valve Assembly



Watts No. 709
Sizes 2½" to 10"
Double Check Valve Assembly



TEST PROCEDURE Double Check Valves

TESTING OF NO. 1 CHECK VALVE

- STEP NO. 1** Close No. 1 and No. 2 gate valves.
- STEP NO. 2** Open test cocks No. 2, 3 and 4. Verify that No. 1 gate valve is holding tight by observing that the discharge of water from test cock No. 2 stops.
- STEP NO. 3** Attach test kit "Vent" hose to No. 1 test cock; "Low" hose to No. 2 test cock and "High" hose to No. 3 test cock. At this point valves (A) and (C) should be open and (B) should be closed.
- STEP NO. 4** Close test cock No. 4.
- STEP NO. 5** Open test cock No. 1. The needle on the differential gauge will indicate a pressure in excess of 15 PSID.
- STEP NO. 6** Slowly open needle valve (B) until the differential gauge reads 10 PSID. Then close (B). The gauge reading will not change if No. 1 check is holding tight. If No. 1 check is leaking, the gauge will drop to 0.

TESTING OF NO. 2 CHECK VALVE

- STEP NO. 1** Close test cock No. 1.
- STEP NO. 2** Open test cock No. 4.
- STEP NO. 3** Change "Low" hose from test cock No. 2 to test cock No. 3. Change "High" hose from test cock No. 3 to test cock No. 4. On the test kit, valves (A) and (C) should be open and valve (B) should be closed.
- STEP NO. 4** Open test cock No. 1. The pressure differential gauge will indicate a pressure in excess of 15 PSID.
- STEP NO. 5** Slowly open needle valve (B) until the gauge reads 10 PSID, then close. If the gauge reading does not change, No. 2 check valve is holding tight. If No. 2 check is leaking, the gauge will drop to 0.
- NOTE in the above testing:** minor leakage in gate valve No. 2 will not affect the test results. However, in testing the No. 1 check, leaking No. 1 gate would cause a good first check to fail the test.

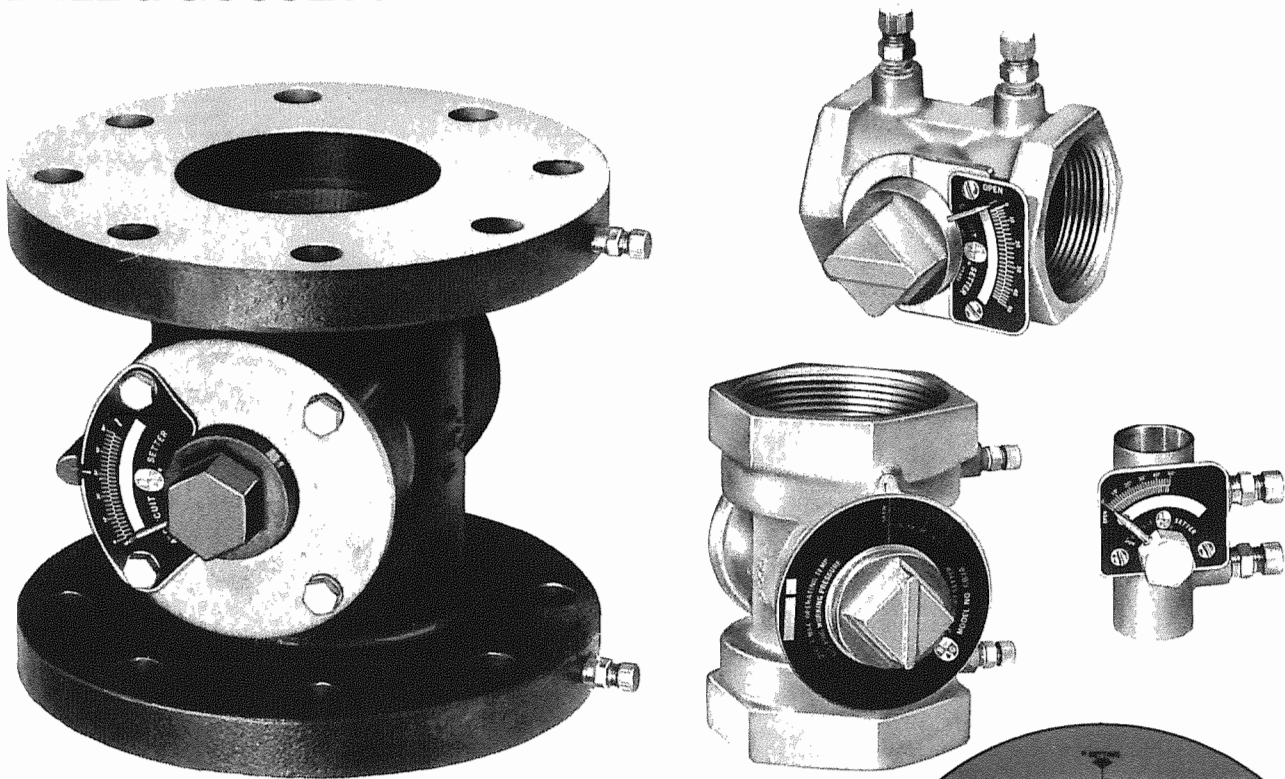


HEADQTRS:
 Box 628, Lawrence, MA 01842 (617) 688-1811
 Telex: 94-7460 Watts Reg Law
International Subsidiaries:
 Watts Regulator of Canada Ltd. Telex: 06527137
 Watts Regulator (Nederland) b.v. Telex: 43786

LIMITED WARRANTY: Watts Regulator Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including, without limitation, damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemicals, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication or improper installation of the product. **THE COMPANY MAKES NO OTHER WARRANTIES EXPRESS OR IMPLIED EXCEPT AS PROVIDED IN THIS LIMITED WARRANTY.**

BELL & GOSSETT

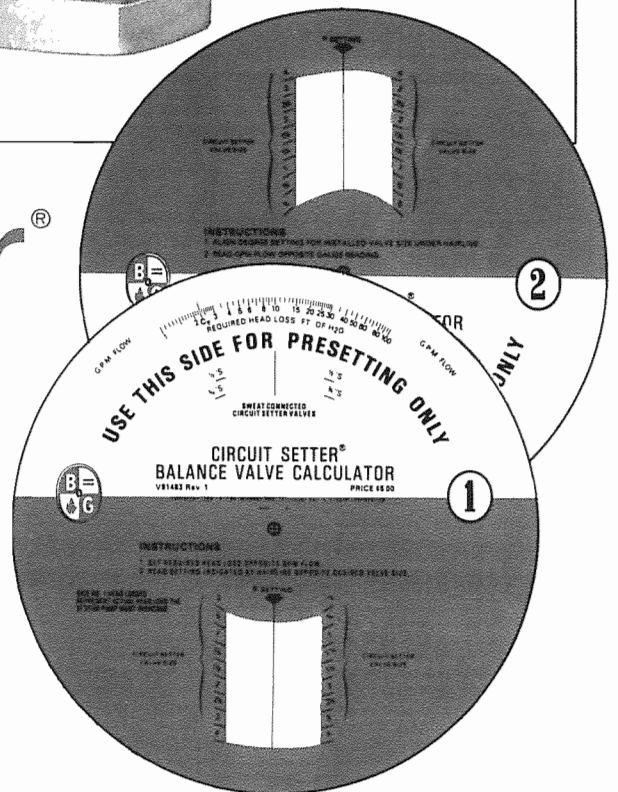
Bulletin A-507A



Circuit Setter® BALANCE VALVE

**ACCURATE FLUID FLOW CONTROL
AT YOUR FINGERTIPS**

- PRESETS
- BALANCES
- METERS SYSTEM FLOW



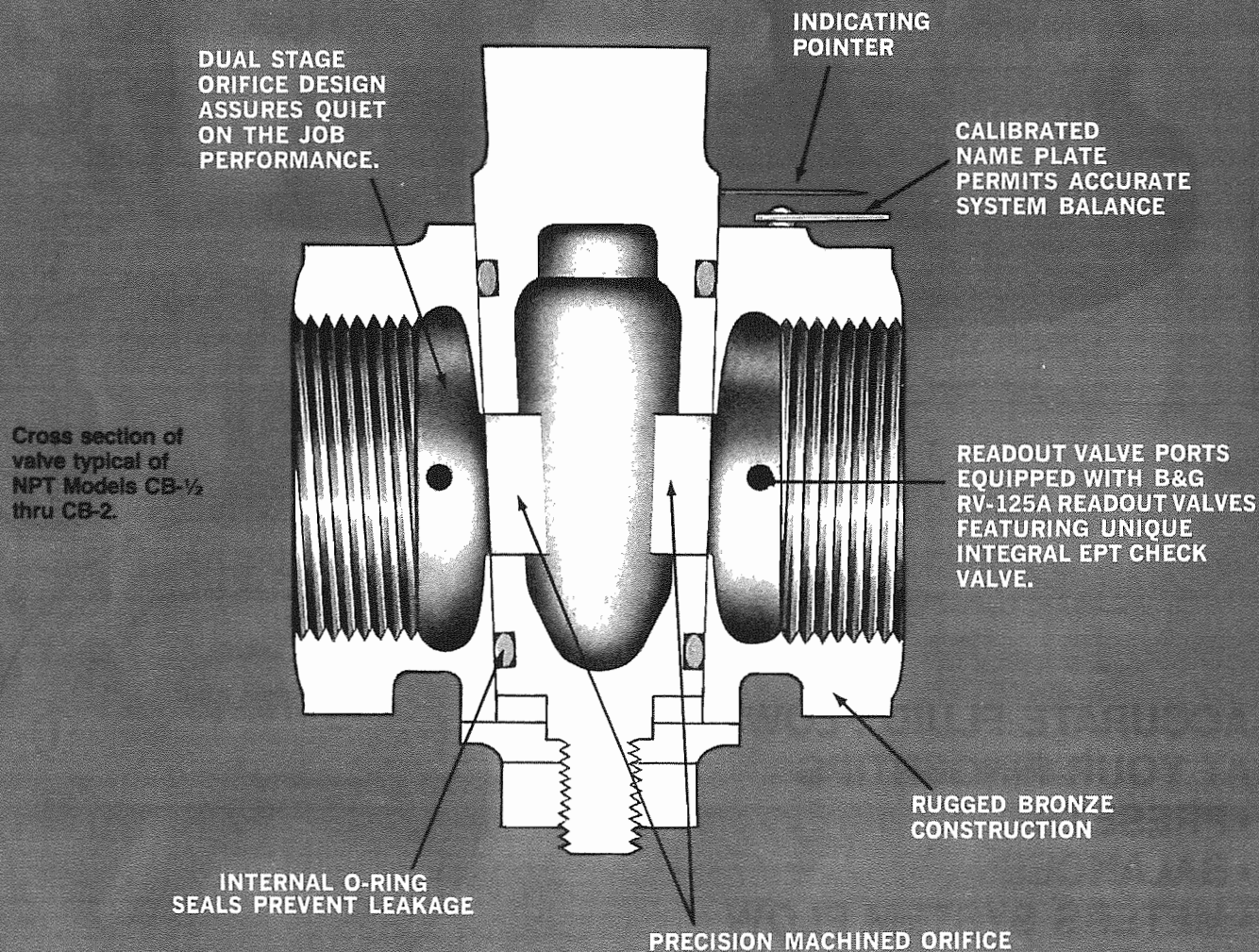
BELL & GOSSETT **ITT**
FLUID HANDLING DIVISION

THE B&G CIRCUIT SETTER BALANCE VALVE

A precision machined dual purpose balancing instrument precisely calibrated for use as a presetable balancing valve and adjustable flow meter to match system flow rate with design requirements.

Bell & Gossett Circuit Setter Balance Valves are equipped with readout valves which are fitted with an integral check valve designed to protect the user from the system fluid while balancing the system and monitoring system flow. Differential pressure readings taken across the orifice of Bell & Gossett Circuit Setters facilitate an exact determination of actual flow with the aid of the Circuit Setter Balance Valve Calculator.

Circuit Setter Balance Valves are furnished with preformed polyurethane insulation which is used to protect the Circuit Setter during shipment and insulate it upon completion of balancing the system.



1. OPERATION LIMITATIONS

Maximum Working Pressure

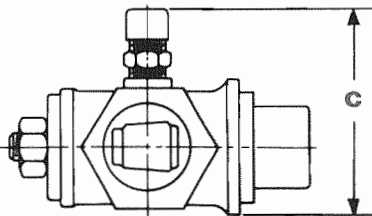
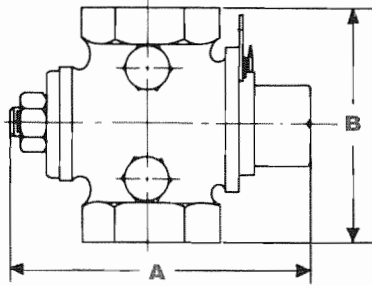
- NPT Models: 300 PSIG
- Sweat and Flanged Models: 125 PSIG

2. To retain full calibrated accuracy, a minimum length of unrestricted pipe equivalent to 3 pipe diameters upstream and at least a close nipple downstream should be maintained immediately adjacent to Circuit Setter Balance Valves.

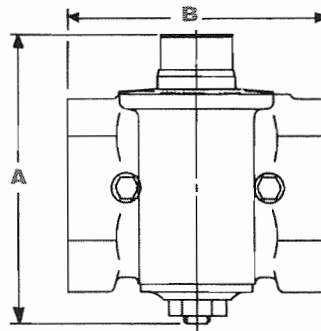
3. IMPORTANT

When monitoring system flow care must be exercised to avoid direct skin or eye contact with liquids that may escape. Liquids with temperatures in excess of 120°F may cause burns.

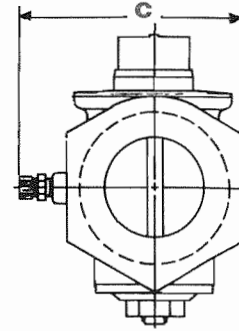
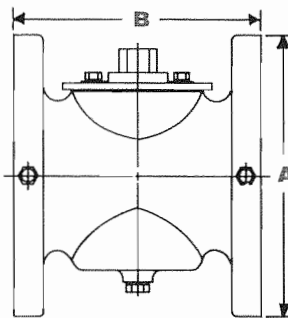
DIMENSIONS AND WEIGHTS



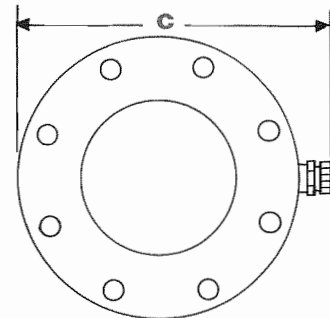
CB-½ THRU CB-2



CB-2½ and CB-3



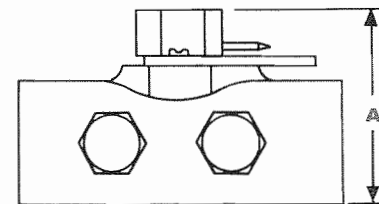
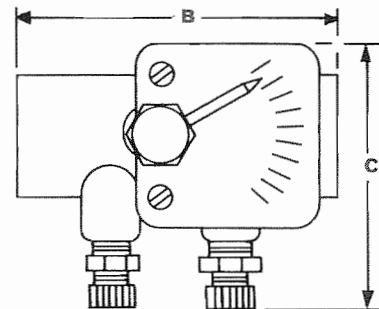
CB-4



NPT AND FLANGED MODELS

Model No.	DIMENSIONS IN INCHES								Weight in Lbs
	Size		A		B		C		
			Normal	Insul	Normal	Insul	Normal	Insul	
CB-½	½	NPT	2¾	4¼	2⅞	4¼	2¼	4¼	¾
CB-¾	¾		2⅞		2¼		2⅜		1
CB-1	1		3½	5½	2⅝	3⅜	2⅝	4¾	1½
CB-1¼	1¼		3⅞		3		2⅞		2
CB-1½	1½		4⅜	6¼	3⅜	4¼	3⅜	6	3½
CB-2	2		5⅞		4⅞		3⅝		5½
CB-2½	2½		5½	8½	5	6	4⅝⅓	6¼	8½
CB-3	3		7⅞		6		4⅞		14¾
CB-4	4	FLG	9	9⅞	8	8	10⅞	10⅞	52

Models CB-2½ thru CB-3 are bronze. Models CB4 has a Cast Iron Body and Brass Vane.



CB-½S and CB-¾S

SWEAT MODELS (BRONZE)

Model No.	DIMENSIONS IN INCHES							Weight in Lbs.
	Size	A		B		C		
		Normal	Insul	Normal	Insul	Normal	Insul	
CB-½S	½	1 ⅝	4 ¼	2 ¼	4 ¼	2 ⅜	4 ¼	½
CB-¾S	¾			2 ⅝		2 ½		

TYPICAL SPECIFICATION

Furnish and install calibrated balance valves with (Select one: A, B, or C)

A. NPT connections suitable for 300 PSIG

B. Sweat connections suitable for 125 PSIG

C. Flanged connections suitable for 125 PSIG.

Working Pressure at 250°F, equipped with brass readout valves fitted with an integral EPT insert, and check valve designed to minimize system fluid loss during the balancing and monitoring process. Each balancing valve shall have a calibrated nameplate to assure specific valve settings, be constructed with internal seals to prevent leakage, and be supplied with preformed polyurethane insulation suitable for use on heating and cooling systems.

Each unit to be ITT Bell & Gossett Model Number

CB-_____ Circuit Setter Balance Valve or approved equal.

IMPORTANT

Note: 1. Bell & Gossett NPT Circuit Setter Balance Valves are designed in such a manner as to facilitate their use as service valves to restrict flow, but not as a drop tight shut-off valve.

CAUTION: CIRCUIT SETTER BALANCE VALVES WITH FLANGED OR SOLDER CONNECTIONS ARE TO BE USED FOR BALANCING ONLY. THEY ARE NOT DESIGNED FOR POSITIVE SHUT-OFF OF FLUID AND THEY SHOULD NOT BE USED AS A SERVICE VALVE.

2. Bell & Gossett Circuit Setter Balance Valves are not recommended for use with meter connections pointing downward.

BELL & GOSSETT PRODUCTS

Stocked...Sold...Serviced **EVERYWHERE!**

FOR MORE DETAILS CALL YOUR LOCAL BELL & GOSSETT REPRESENTATIVE

ALABAMA

Mangham & Associates, Inc.
Birmingham—205/251-2085

ALASKA

Larry Harrington Co., Inc.
Bellevue (Seattle) WA—206/455-0800

ARIZONA

J & B Sales Company
Phoenix—602/258-1545

ARKANSAS

Johnson & Scott
Little Rock—501/372-5667
R E Meyers & Associates, Inc.
Shreveport, LA—318/221-0303
Boone & Boone Sales Co., Inc.
Tulsa, OK—918/664-9756

CALIFORNIA

California Hydronics Corp.
Foster City (San Francisco)—415 574-1313
Sacramento—916/447-2442
Richard S Dawson Company
Altadena (Los Angeles)—213-797-9710
San Diego—619/276-5552

COLORADO

J E McNevin Company
Denver—303/322-0165

CONNECTICUT

The Bernard M Packtor Company
Hamden (New Haven) 203/288-5241

DELAWARE

R D Bitzer Co., Inc.
Philadelphia, PA—215/224-2112
Cummins-Wagner Co., Inc.
Annapolis Junction, MD—800/638-4427

FLORIDA

George A. Israel Jr., Inc.
Jacksonville—904/387-1678
Bradenton—813/792-3592
Miami—305/649-3240
Orlando—305/423-5078
Tallahassee—904/877-2774
Tampa—813/839-2161
Mangham & Associates, Inc.
Birmingham, AL—205/251-2085

GEORGIA

Clary & Associates, Inc.
Atlanta—404/873-1861
George A. Israel Jr., Inc.
Jacksonville, FL—904/387-1678
Tallahassee, FL—904/877-2774

HAWAII

Richard S Dawson Company
Altadena (Los Angeles), CA—213/797-9710

IDAHO

Gritton & Associates, Inc.
Salt Lake City, UT—801/486-0767
Larry Harrington Company, Inc.
Portland, OR—503/228-4324

ILLINOIS

Bornquist, Inc.
Chicago—312/774-2800
Blackmore & Glunt, Inc.
Maryland Heights (St. Louis) MO—314/878-4313
John A. Sandberg Co., Inc.
East Moline—309/796-2371
Peoria Heights—309/682-0700
Jackson Engineering Co., Inc.
Carmel (Indianapolis) IN—800/692-6262

INDIANA

Jackson Engineering Co., Inc.
Evansville—800/692-6262
Fort Wayne—800/692-6262
Carmel (Indianapolis)—317/844-4828
South Bend—800/692-6262
Bornquist, Inc.
Griffith—312/774-2800
Fluid Handling Division
Cincinnati, OH—513/489-5225

IOWA

Products, Inc.
Des Moines—515 288-5738
John A. Sandberg Co., Inc.
East Moline, IL—309 796-2371
Verne Simmonds Company
Omaha, NE—402 342-3566

KANSAS

Blackmore & Glunt, Inc.
Lenexa (Kansas City) 913 888-6715

KENTUCKY

Fluid Handling Division
Cincinnati, OH—513 489-5225
Blackmore & Glunt, Inc.
Maryland Heights (St. Louis) MO—314 878-4313
Jackson Engineering Co., Inc.
Evansville, IN—800 692-6262
Johnson & Scott
Hendersonville, TN—615 824-6658

LOUISIANA

R E Meyers & Associates, Inc.
New Orleans—504/827-1163
Shreveport—318/221-0303

MAINE

F I A, Inc.
Woburn (Boston) MA—617/938-8900

MARYLAND

Cummins-Wagner Co., Inc.
Annapolis Junction—800/492-1277
Thermoflo Equipment Co., Inc.
Pittsburgh, PA—412/931-8840

MASSACHUSETTS

F I A, Inc.
Woburn (Boston)—617/938-8900
The Bernard M Packtor Company
Hamden (New Haven) CT—203/288-5241
Albany, NY—518/459-1060

MICHIGAN

R L Deppmann Company
Southfield (Detroit)—313/354-3710
Grand Rapids—616/957-0630
Saginaw—517/777-2960
Hydro-Flo Products, Inc.
Brookfield (Milwaukee) WI—414/781-2810

MINNESOTA

Bernard J. Mulcahy Company, Inc.
Bloomington—612/854-3621

MISSISSIPPI

R E Meyers & Associates, Inc.
Jackson—601/969-7045
Johnson & Scott
Tupelo—601/842-9355

MISSOURI

Blackmore & Glunt, Inc.
Lenexa (Kansas City) KS—913/888-6715
Maryland Heights (St. Louis)—314/878-4313
Johnson & Scott
Memphis, TN—901/345-3404

MONTANA

Larry Harrington Company, Inc.
Spokane, WA—509/466-4911

NEBRASKA

Verne Simmonds Company
Omaha—402/342-3566

NEVADA

California Hydronics Corp.
Sacramento, CA—916/447-2442
Richard S Dawson Co.
Altadena (Los Angeles), CA—213/797-9710
Gritton & Associates, Inc.
Salt Lake City, UT—801/486-0767

NEW HAMPSHIRE

F I A, Inc.
Woburn (Boston) MA—617/938-8900

NEW JERSEY

Wallace-Eannace Assoc., Inc.
Franklin Lakes—201/891-9550
R D Bitzer Co., Inc.
Philadelphia, PA—215/224-2112

NEW MEXICO

Boyd Engineering Company, Inc.
Albuquerque—505/243-2247

NEW YORK

Wallace-Eannace Assoc., Inc.
New York—212/490-0052
Plainview—516/454-9300
Frank P. Langley Company, Inc.
Horseheads—607/796-9718
Tonawanda (Buffalo)—716/691-7575
Rochester—716/271-6565
The Bernard M Packtor Company
Albany—518/459-1060
Syracuse Thermal Products, Inc.
East Syracuse—315/437-7321

NORTH CAROLINA

James M. Pleasants Company, Inc.
Greensboro—919/288-0076

NORTH DAKOTA

Bernard J. Mulcahy Co., Inc.
Bloomington, MN—612/854-3621

OHIO

Fluid Handling Division
Cincinnati—513/489-5225
Cleveland—216/243-7000
Steffens-Shultz, Inc.
Columbus—614/274-5515
Dayton—513/278-7903
Thermoflo Equipment Co., Inc.
Pittsburgh, PA—412/931-8840

OKLAHOMA

Boone & Boone Sales Co., Inc.
Oklahoma City—405/525-7475
Tulsa—918/664-9756

OREGON

Larry Harrington Company, Inc.
Portland—503/228-4324

PENNSYLVANIA

R D Bitzer Co., Inc.
Philadelphia—215/224-2112
Thermoflo Equipment Co., Inc.
Pittsburgh—412/931-8840
Frank P. Langley Co., Inc.
Tonawanda (Buffalo) NY—716/691-7575

RHODE ISLAND

F I A, Inc.
Woburn (Boston) MA—617/938-8900

SOUTH CAROLINA

James M. Pleasants Co., Inc.
Greensboro, NC—919/288-0076

SOUTH DAKOTA

Bernard J. Mulcahy Co., Inc.
Bloomington, MN—612/854-3621
Verne Simmonds Co.
Omaha, NE—402/342-3566

TENNESSEE

Johnson & Scott
Hendersonville—615/824-6658
Memphis—901/345-3404
Clary & Associates, Inc.
Atlanta, GA—404/873-1861
James M. Pleasants Co., Inc.
Greensboro, NC—919/288-0076

TEXAS

Boyd Engineering Company, Inc.
El Paso—915/533-7575
Oslin Nation Company
Dallas—214/631-5650
Houston—713/789-1450
San Antonio—512/342-6433

UTAH

Gritton & Associates, Inc.
Salt Lake City—801/486-0767

VERMONT

F I A, Inc.
Woburn (Boston) MA—617/938-8900
The Bernard M Packtor Co.
Albany, NY—518/459-1060

VIRGINIA

Taylor, Lipscomb & Appel, Inc.
Richmond—804/321-4444
Virginia Beach—804/497-3567
Cummins-Wagner Co., Inc.
Annapolis Junction, MD—800/638-4427

WASHINGTON

Larry Harrington Company, Inc.
Seattle—206/455-0800
Spokane—509/325-1654

WASHINGTON, DC

Cummins-Wagner Co., Inc.
Annapolis Junction, MD—301/953-9370

WEST VIRGINIA

Fluid Handling Division
Cincinnati, OH—513/489-5225
Taylor, Lipscomb & Appel, Inc.
Richmond, VA—804/321-4444
Thermoflo Equipment Co., Inc.
Pittsburgh, PA—412/931-8840

WISCONSIN

Hydro-Flo Products, Inc.
Brookfield (Milwaukee)—414/781-2810
Bernard J. Mulcahy Co., Inc.
Bloomington, MN—612/854-3621

WYOMING

Gritton & Associates, Inc.
Salt Lake City, UT—801-486-0767
J E McNevin Co.
Denver, CO—303/322-0165

FLUID HANDLING DIVISION FOREIGN COUNTRIES

Contact: Export Dept.
ITT Bell & Gossett
8200 N. Austin Avenue
Morton Grove, IL 60053
Phone: Area Code 312/463-4040
Cable: BELGOSSETT
Morton Grove, IL

IN CANADA Contact: ITT Fluid Products, 55 Royal Road,
Guelph, Ontario, N1H 1T1, Canada—Phone: Area Code 519/821-1900

WHITE PLUMBING & HEATING, Inc.

P.O. BOX 1741

TWIN FALLS, ID 83303-1741

PHONE 208-733-4556

SHOP DRAWING FOR APPROVAL

TO: Heath Engineering Company DATE 4/15/85
377 West 800 North
Salt Lake City, Utah 84103

CONTRACT NO. J-501 TRANSMITTAL NO. 8 NEW SUBMITTAL XX

RESUBMITTAL TRANSMITTAL NO. P. O. NO. 1232

PROJECT Geothermal T.F.H.S. LOCATION Twin Falls, Idaho

SPECIFICATIONS SECTION FOR BUILDING

PAR NO	DESCRIPTION OF EQUIPMENT	MANUFACTURER	PUB. NO.	COPIES SUB'M.	ACTION TAKEN	COPIES RET'D.
	Valves - blow-out-proof	Apollo		8		
	" Swing Check Valves	Stockham		8		
	" Gate Valves	"		8		
	" non-slam check valves (globe)	Jenkins		8		

Please return approved copies to this office.

File w/copy

cc: Field

CONTRACTOR WHITE PLUMBING & HEATING, Inc.

MAILING ADDRESS P.O. Box 1741, Twin Falls, ID 83303-1741

By J. J. White

Supplier: Paramount Supply

P.O. Box 5628
Boise, Idaho 83705

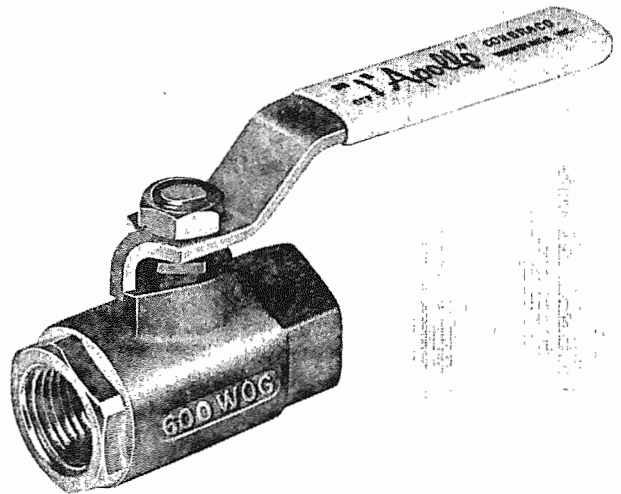
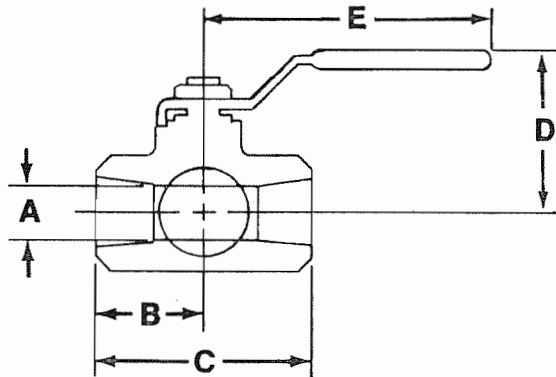
Gary 1-800-632-5911

☒ NO EXCEPTIONS TAKEN ☐ REJECTED
☐ EXCEPTIONS AS NOTED ☐ REVISE AND RESUBMIT
 Checking is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any corrections or comments are subject to the requirements of the plans and specifications. Contractor is responsible for, dimensions which shall be confirmed and correlated at the job site; fabrication, erection, and installation of construction; coordination of his work with that of all other trades; and the satisfactory performance of his work.

APR 29 1985
 HEATH ENGINEERING COMPANY
 By Samuel D. Stone
Samuel D. Stone

THE ORIGINAL "Apollo"®

BLOW-OUT-PROOF STEM DESIGN



- CHROMIUM PLATED BALL—EXTREMELY HARD WEAR SURFACE REDUCES FRICTION, SEAT WEAR AND EROSION EFFECTS OF STEAM AND OTHER MEDIA.
- HIGH PERFORMANCE REINFORCED TEFLON* SEATS AND STUFFING BOX RING ARE STANDARD ON 1/4" THRU 2" VALVES. 2 1/2" AND 3" VALVES HAVE TEFLON* SEATS.

- OPTIONS -

- 316 STAINLESS STEEL BALL AND STEM
- 1 1/4" & 2 1/4" EXTENDED STEMS
- CHAIN OPERATED LEVER KIT AVAILABLE FOR VERTICAL OR HORIZONTAL OVERHEAD OR REMOTE SERVICE
- BALANCING STOPS
- STEEL TEE HANDLE FOR VALVES THRU 2"
- LOCKED RETAINER
- STATIC GROUNDING DEVICES
- AUTOMATIC DRAIN THRU 2"
- ROUGH CHROME PLATING
- ROUND HANDLES THRU 2"

Job No. 501
 Submittal No. 8
 P.O. No. 1232
 Date 4/15
 Spec. Section _____

BRONZE THREADED ENDS

NUMBER	SIZE	A	B	C	D	E	Cv**
70-101	1/4	.37	1.03	2.06	1.75	3.87	6.8
70-102	3/8	.37	1.03	2.06	1.75	3.87	6.8
70-103	1/2	.50	1.12	2.25	1.81	3.87	9.8
70-104	3/4	.68	1.50	3.00	2.12	4.87	25
70-105	1	.87	1.68	3.37	2.25	4.87	35
70-106	1 1/4	1.00	2.00	4.00	2.62	5.50	47
70-107	1 1/2	1.25	2.18	4.37	2.87	5.50	81
70-108	2	1.50	2.34	4.68	3.06	5.50	105
70-109	2 1/2	2.50	3.25	6.50	4.12	8.00	440
70-100	3	2.50	3.37	6.75	4.12	8.00	390

**The Cv factor is the gallons of water per minute that the valve will pass with 1 p.s.i. pressure drop.

MEETS WW-V35B TYPE: II CLASS: A STYLE: 3

*DuPont Reg. T.M.

IRON
VALVES

G-927
G-929
G-931
G-933

125-Pound IRON BODY

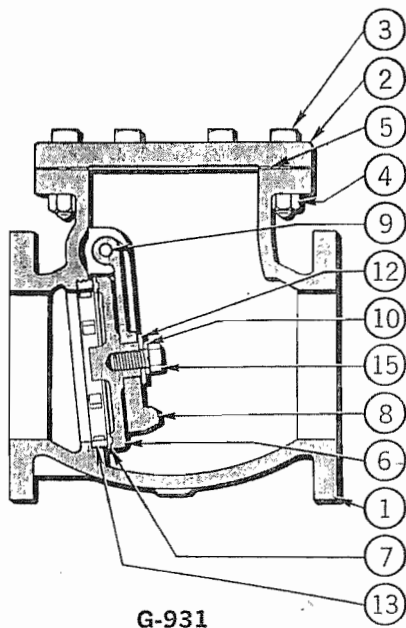
Swing Check Valves

BOLTED CAP

See page 110 for pressure-temperature rating.

SERVICE FEATURES

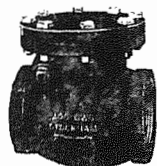
- Generally recommended to pre flow with minimum resistance to open position.
- Available with lever and weight to or decelerate disc closing.
- Suitable for nonshock steam, water and air services within pressure-temperature ratings.



Job No. 501
Submittal No. 8
P.O. No. 1232
Date 4/15
Spec. Section _____

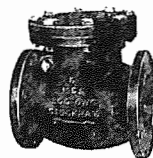
NO.	DESCRIPTION	MATERIAL	ASTM SPEC.
1	BODY	CAST IRON	A-126 Class B
2	CAP	CAST IRON	A-126 Class B
3	CAP BOLT	STEEL	A-307 Grade B
4	CAP BOLT NUT	STEEL	A-307 Grade B
5	CAP GASKET	ASBESTOS	
6	DISC	G-927, G-931 BRONZE (2-3½)	B-62
		G-929, G-933 CAST IRON (4-30)	A-126 Class B
7	DISC RING	G-927, G-931 BRONZE (4-30)	B-62
8	HINGE	G-927, G-931 BRONZE (2-3½)	B-62
		MALL. IRON (4-24)	A-197
		DUCTILE (30)	A-445
9	HINGE PIN	G-929, G-933 MALL. IRON	A-197
		G-927, G-931 BRASS	B-16
10	LOCKWASHER	G-929, G-933 STAINLESS STEEL	A-276 Type 410
		G-927, G-931 BRASS (2-3½)	B-98 Alloy 651
		G-927, G-931 STEEL (4-6)	
12	PLAIN WASHER	G-929, G-933 STEEL	
		G-927, G-931 BRASS (2-3½)	B-36 Alloy 268
		G-927, G-931 STEEL (4-6)	
13	SEAT RING	G-929, G-933 BRONZE	B-62
		G-927, G-931 CAST IRON	A-126 Class B
*14	SIDE PLUG	G-929, G-933 BRONZE	B-62
		G-927, G-931 MALL. IRON (2-4)	A-197
		CAST IRON (5-24)	A-126 Grade B
15	CAPSCREW	G-929, G-933 STEEL (2-16)	A-307 Grade B
		G-927, G-931 BRASS (2-3½)	B-16
		STEEL (4-16)	A-307 Grade B
*16	STUD	G-931, G-933 STEEL (18-30)	A-307 Grade B
*17	STUD NUT	G-931, G-933 STEEL (18-30)	A-307 Grade B
*18	STUD PIN	G-931, G-933 STEEL (18-30)	A-108

*Not Shown



G-927 IBBM, THREADED
G-929 ALL IRON, THREADED

SIZE	WGT.	B	M
2	21	4 ¹³ / ₁₆	7 ³ / ₈
2½	30	5 ⁵ / ₈	7 ⁷ / ₈
3	39	6	8½
3½	50	6 ¹⁵ / ₁₆	9½
4	75	8	10½
5	102	8 ¹⁵ / ₁₆	11¾
6	137	9¾	12¾



G-931 IBBM, FLANGED
G-933 ALL IRON, FLANGED

SIZE	WGT.	B	M	SIZE	WGT.	B	M
2	30	4 ¹³ / ₁₆	8	10	473	13 ¹ / ₁₆	24½
2½	41	5 ⁵ / ₈	8½	12	695	15¼	27½
3	51	6	9½	14	1048	16 ⁷ / ₈	31
3½	67	6 ¹⁵ / ₁₆	10½	16	1500	19 ¹ / ₁₆	36
4	94	8	11½	18	1970	24	38
5	131	8 ¹⁵ / ₁₆	13	20	2590	27 ¹ / ₁₆	42
6	166	9¾	14	24	3705	31	46
8	294	11¾	19½	30	6463	38	60

CLASS 150 (125/150 PSI)

BRONZE SWING CHECK

FIG. 92-A, Threaded, 1/4"-3"

150 psi (125 psi) Saturated Steam

300 psi Non-Shock Cold Water, Oil, Gas

See Page 73 for Pressure-Temperature Ratings

Regrounding Bronze Disc

Valve conforms to MSS SP-80 and Fed. Spec. WW-V-51e (1973), Type IV, Class A and B, Style 1

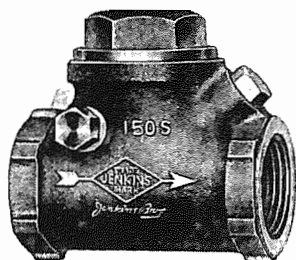
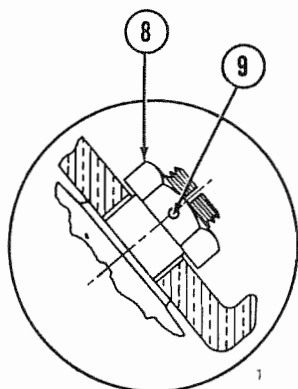
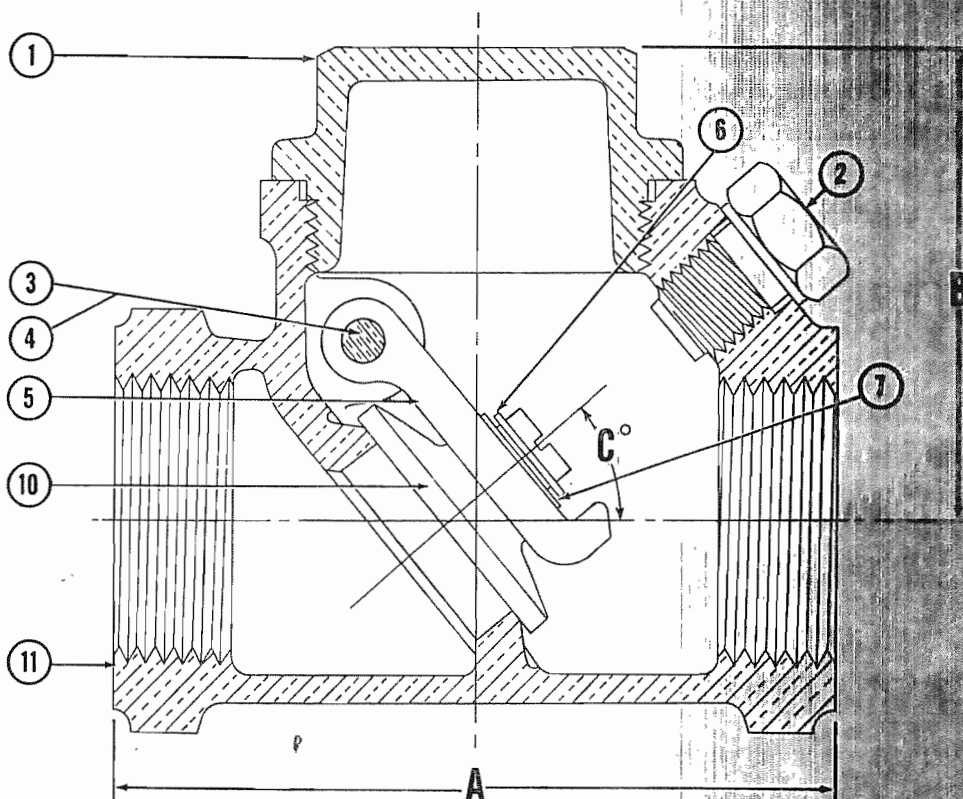


FIG. 92-A



HANGER ASSEMBLY
2 1/2" and 3" valves



MATERIALS LIST

PART	SPECIFICATION
1 CAP	ASTM B62, Bronze
2 STOP PLUG	ASTM B16, Brass Rod
3 SIDE PLUGS	ASTM B16, Brass Rod
4 HANGER PIN	ASTM B16, Brass Rod
5 HANGER	ASTM B61, Bronze
6 RETAINING RING	1/4"-2" only, Beryllium Copper
7 WASHER	1"-2" only, ASTM B21, Alloy 464 Naval Brass
8 HANGER NUT	2 1/2" and 3", ASTM B16, Brass Rod
9 HANGER NUT PIN	2 1/2" and 3", Phosphor Bronze Cotter Pin
10 DISC	1/4"-3/4", ASTM B140, Alloy 314, Bronze Rod 1"-2", ASTM B62, Bronze 2 1/2", 3", ASTM B61, Bronze
11 BODY	ASTM B62, Bronze

DIMENSIONS - INCHES

SIZE	A	B	C
1/4	2	1 1/16	40°
3/8	2 1/8	1 1/16	40°
1/2	2 3/8	1 1/16	40°
3/4	2 1/2	1 1/16	40°
1	3 5/16	2 3/16	40°
1 1/4	3 13/16	2 7/16	40°
1 1/2	4 1/4	2 3/4	40°
2	5 1/4	3 5/16	40°
2 1/2	6 3/16	3 3/4	40°
3	6 15/16	4 1/2	40°

Job No. 30.1
 Submittal No. 8
 P.O. No. 1232
 Date 1/15
 Spec. Section _____

WEIGHTS-POUNDS

SIZE	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Fig. 92-A	.4	.6	.6	1.3	1.6	2.5	3.4	5.9	10.5	16.5

BRONZE
VALVES

B-120
B-122
B-124

150-Pound BRONZE

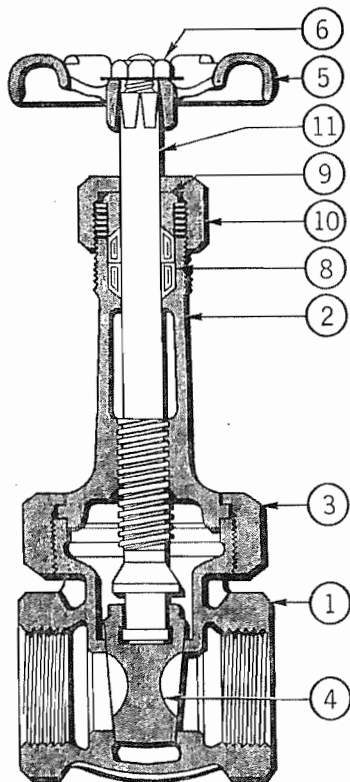
Gate Valves

RISEING STEM • SOLID DISC

150 PSI Saturated Steam
300 PSI Nonshock Cold Water, Oil, or Gas

SERVICE FEATURES

- May be repacked under pressure full open position.
- Union bonnet preferred for heavy applications where valves are repeatedly opened and closed.
- Rising stem visibly indicates position.
- Disc clears port area completely in open position.

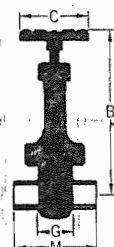
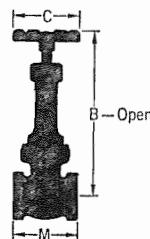
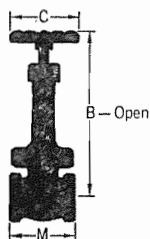


B-120

NO.	DESCRIPTION	MATERIAL	ASTM SPEC.
1	BODY	BRONZE	B-62
2	BONNET	BRONZE	B-62
3	BONNET RING B-120, B-124	BRONZE	B-62
4	DISC	BRONZE	B-62
5	HANDWHEEL	ALUMINUM (1/2-1 1/4)	B-85 Alloy S12-A
		MALL. IRON (1/4-3/4, 1 1/2-3)	A-197
6	HANDWHEEL NUT	BRASS	B-16
8	PACKING	TEFLON® IMPREGNATED ASBESTOS	
9	PKG. GLAND	BRASS	B-16
10	PKG. NUT	BRONZE	B-62
11	STEM	COPPER-SILICON ALLOY	B-371 Alloy 694

†Sizes 2 1/2 & 3 (B-120) Have Bolted Bonnet Connection.

Job No. 501
 Submittal No. 8
 P.O. No. 1232
 Date 4/15
 Spec. Section _____



B-120, UNION BONNET, THREADED

SIZE	WGT.	B	C	M
1/8	1.1	4 5/8	2 1/16	1 15/16
1/4	1.1	4 5/8	2 1/16	1 15/16
3/8	1.1	4 5/8	2 1/16	1 15/16
1/2	1.3	5 3/32	2 1/4	2 3/16
3/4	2.1	6 21/32	2 1/2	2 19/32
1	3.2	8 1/32	2 7/8	2 7/8
1 1/4	5.0	9 7/16	3 3/8	3 1/4
1 1/2	7.2	10 7/8	3 13/16	3 1/2
2	11	13 3/32	4 5/16	4
2 1/2	21	15 21/32	5 1/16	4 5/8
3	30	18 1/32	6	5 3/8

B-122, SCREWED BONNET, THREADED

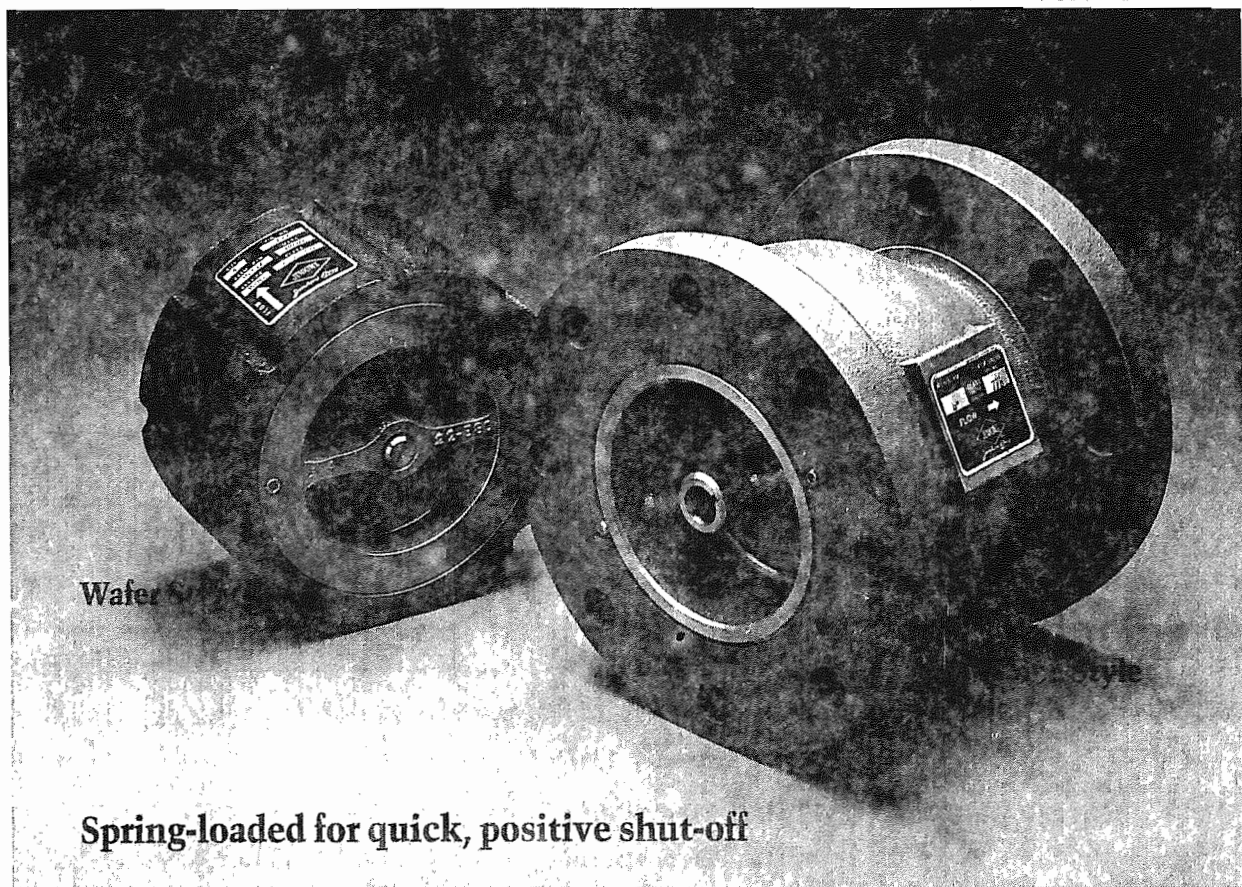
SIZE	WGT.	B	C	M
1/8	1.1	4 5/8	2 1/16	1 7/8
1/4	1.1	4 5/8	2 1/16	1 7/8
3/8	1.1	4 5/8	2 1/16	1 7/8
1/2	1.3	5 3/32	2 1/4	2 3/16
3/4	2.1	6 21/32	2 1/2	2 3/8
1	3.2	8 1/32	2 7/8	2 3/4
1 1/4	5.0	9 7/16	3 3/8	3 3/8
1 1/2	7.2	10 7/8	3 13/16	3 7/16
2	11	13 3/32	4 5/16	4
2 1/2	21	15 21/32	5 1/16	4 5/8
3	30	18 1/32	6	5 3/8

B-124, UNION BONNET, SOLDERED

SIZE	WGT.	B	C	G
3/8	.8	4 5/8	2 1/16	3 1/8
1/2	1.2	5 3/32	2 1/4	1
3/4	1.9	6 21/32	2 1/2	1 3/8
1	2.9	8 1/32	2 7/8	1 1/2
1 1/4	4.1	9 7/16	3 3/8	1 1/2
1 1/2	5.9	10 7/8	3 13/16	1 29/32
2	9.3	13 3/8	4 5/16	1 29/32
2 1/2	15	15 21/32	5 1/16	2 3/8
3	24	18 1/32	6	2 3/8

* Piping Make-Up Dimension

Jenkins non-slam check valves



Spring-loaded for quick, positive shut-off

JENKINS

Jenkins non-slam check valves

Fig. 777 Wafer Style

Fig. 778-779 Globe Style

Not recommended for use in systems where fluid velocity exceeds 12 feet per second.

Recommended for use with flat face flanges and full face gaskets. Other body and trim material available.

MATERIALS

Part	Specifications
BODY	ASTM A-126 CL. B, Cast Iron
SEAT RING	ASTM B-62, Bronze
DISC	ASTM B-62, Bronze
SCREW	Type 303/304, Stainless Steel
SPRING	Type 302, Stainless Steel
GUIDE BUSHING	ASTM B-16, Brass

Part	Specifications
BODY	ASTM A-48 CL. 35, Iron
SEAT RING	ASTM B-62, Bronze
DISC	ASTM B-62, Bronze
SPRING	Type 18-8, Stainless Steel
BUSHING	ASTM B-16
SET SCREW	Type 304, Stainless Steel

C_v VALUES

Size	2½	3	4	5	6	8	10	12
†C _v Value	57	87	150	230	340	590	925	1330

†C_v: flow of water in GPM at pressure drop of 1 psi

Size	2½	3	4	5	6	8	10	12
†C _v Value	105	155	278	435	625	1115	1770	2500

†C_v: flow of water in GPM at pressure drop of 1 psi

PRESSURE/TEMPERATURE RATINGS

Maximum allowable non-shock pressure-PSI		
Material: ASTM A 126 Class B		
PRESSURE CLASS	125/150 PSI*	250/300 PSI
Temperature Degrees-F	Sizes 2½"-12"	Sizes 2½"-12"
-20 to 150	200	500
200	190	460
225	180	440
250	175	415
275	170	395
300	165	375
325	155	355
350	150	335
375	145	315
400	140	290
425	130	270
450	125	250

Both styles may be used in vertical lines where flow is upward. They are intended for liquid service only.

For detailed engineering information
Please write Jenkins Bros. 101 Merritt 7,
Norwalk, CT 06851

Form #269 Printed in U.S.A.

Job No. 501
Submittal No. 8
P.O. No. 1232
Date 4/15
Spec. Section _____

JENKINS



ANSI MAXIMUM WORKING PRESSURE

Mission DUO-CHEK II The High Performance Check Valve

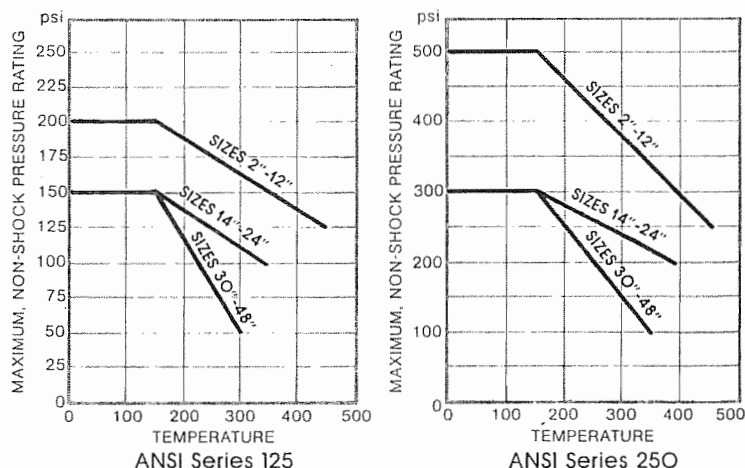
Pressure-Temperature Ratings of Steel and 316 Stainless Steel (ANSI B16.34, 1977)

Temp. °F	Maximum Non-Shock Service Pressure, psi (ANSI Series)													
	Series 150		Series 300		Series 400		Series 600		Series 900		Series 1500		Series 2500	
	Steel	316SS	Steel	316SS	Steel	316SS	Steel	316SS	Steel	316SS	Steel	316SS	Steel	316SS
-20 to 100	285	275	740	720	990	960	1480	1440	2220	2160	3705	3600	6170	6000
150	270	255	705	670	945	890	1410	1340	2120	2010	3540	3345	5895	5580
200	260	240	675	620	900	825	1350	1240	2025	1860	3375	3095	5625	5160
250	245	225	665	590	885	800	1330	1180	1995	1770	3325	2945	5545	4910
300	230	215	655	560	875	725	1315	1120	1970	1680	3280	2795	5470	4660
350	215	205	645	535	860	705	1290	1075	1935	1610	3225	2680	5375	4470
400	200	195	635	515	845	685	1270	1030	1900	1540	3170	2570	5280	4280
450	185	180	615	495	820	660	1235	990	1845	1485	3080	2480	5135	4130
500	170	170	600	480	800	635	1200	955	1795	1435	2995	2390	4990	3980
550	155	155	575	465	765	615	1145	930	1715	1395	2865	2320	4925	3870
600	140	140	550	450	730	600	1095	905	1640	1355	2735	2255	4560	3760
650	125	125	535	445	715	590	1075	890	1610	1330	2685	2220	4475	3700
700	110	110	535	430	710	575	1065	865	1600	1295	2665	2160	4440	3600
750	95	95	505	425	670	565	1010	845	1510	1270	2520	2110	4200	3520
800	80	80	410	415	550	555	825	830	1235	1245	2060	2075	3430	3460
850	65	65	270	405	355	540	535	810	805	1215	1340	2030	2230	3320
875	55	55	220	400	290	530	440	800	660	1195	1100	2000	1830	3300
900	50	50	170	395	230	525	345	790	515	1180	860	1970	1430	3280
925	40	40	135	390	185	520	275	780	410	1170	685	1950	1145	3250
950	35	35	105	385	140	515	205	775	310	1160	515	1930	860	3220
975	25	25	75	375	105	500	155	750	230	1125	385	1875	645	3125
1000	20	20	50	365	70	485	105	725	155	1090	260	1820	430	3030
Hydro-static ambient	450	425	1125	1100	1500	1450	2225	2175	3350	3250	5575	5400	9275	9000

ALUMINUM-BRONZE DUO-CHEK II PRESSURE-TEMPERATURE RATINGS ASTM B148 ALLOY 952

Temperature Degrees °F	MAXIMUM, NON-SHOCK SERVICE PRESSURE - PSI	
	125 & 150 Series	250 & 300 Series
0-150	225	500
175	220	490
200	215	475
250	205	450
300	195	425
350	180	400
400	170	375
450	160	350
500	150	325
550	140	300

CAST IRON DUO-CHEK II PRESSURE-TEMPERATURE RATINGS ASTM A126 CLASS B (ANSI B16.1)



INDEPENDENT PLATE SUSPENSION

Duo-Chek II check valves (24-inch and larger) have a unique hinge design that reduces friction forces 66 percent and significantly improves valve response. In earlier designs of dual-plate valves, the weight of one hinge and plate rests upon the other hinge when a valve is operated in the hori-

zontal flow position. This causes three times more frictional resistance during closure, so one plate closes first. The Duo-Chek II employs support sleeves inserted through the outboard hinges. Thus, during valve operation, the upper hinge does not rest on the lower hinge, but is independently supported

by the lower sleeve so plates may close at the same time.

This patented feature, combined with independent spring action, produces unprecedented valve response and performance in the Duo-Chek II, The High Performance Check Valve.

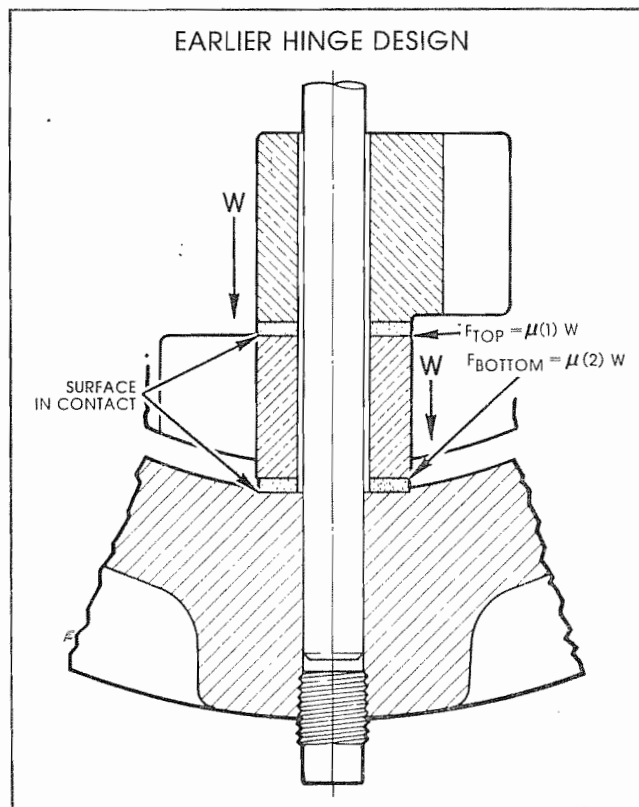
COMPARISON OF EARLIER HINGE DESIGN VERSUS NEW DUO-CHEK II HINGE

This analysis shows the reduction of frictional force on the bottom plate of the Duo-Chek II.

Weight of Plate (left or right) = W

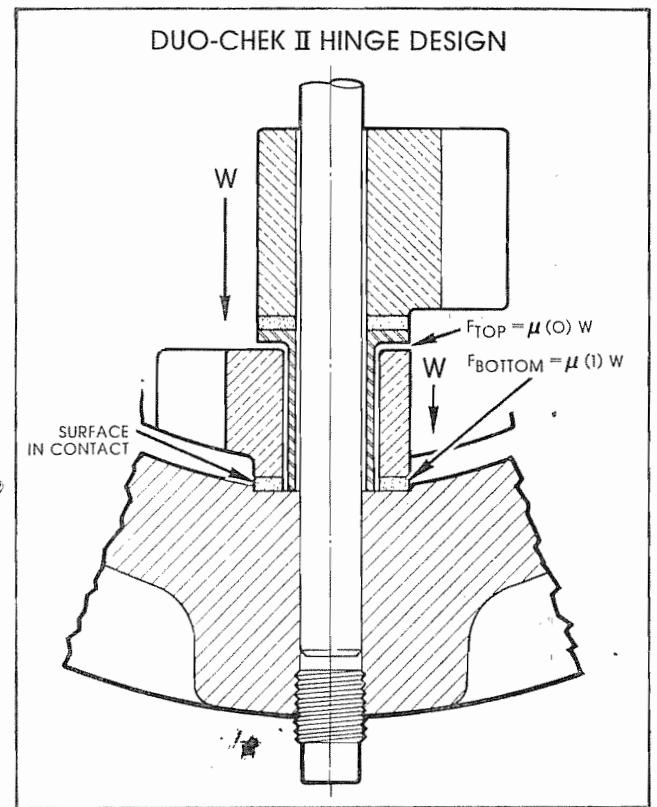
Coefficient of Friction = μ

Total Friction Force on Bottom (left) Plate = μ times (number of) W



Total Friction Force on Bottom Plate = F_f

$$\begin{aligned} F_f &= F_{TOP} + F_{BOTTOM} \\ &= \mu(1)W + \mu(2)W \\ &= \mu(3)W \end{aligned}$$



Total Friction Force on Bottom Plate = F_f

$$\begin{aligned} F_f &= F_{TOP} + F_{BOTTOM} \\ &= \mu(0)W + \mu(1)W \\ &= \mu(1)W \end{aligned}$$

With the Duo-Chek II independent suspension, the friction force on the bottom plate is reduced by two-thirds (66%) over earlier designs.

COMPARISON OF PERFORMANCE

Conventional Swing Check Valve

- Tapered wedge seat
- Disc obstructed flow way
- Fluid supports weight of plate
- Less flow area

New Duo-Chek II Check Valve

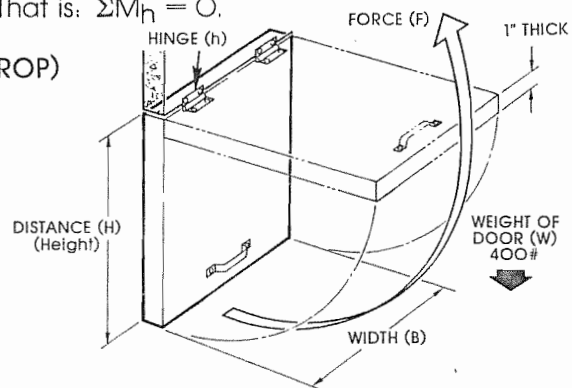
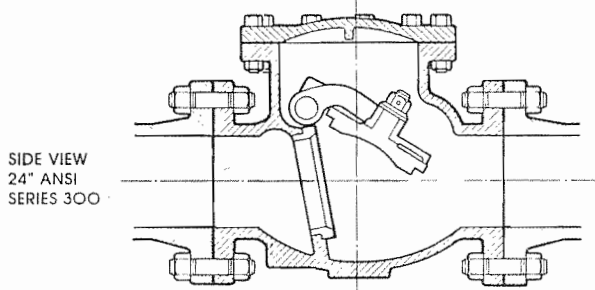
- Free release flat seats
- Streamline flow way
- Fluid does not support weight of plate
- More flow area

The design of the Duo-Chek II divides the total force in half, since each plate covers only one-half the area of a swing check disc. With one-half the force on each plate (for equal design parameters), the Duo-Chek II plate requires only one-half the thickness or one-fourth the mass of a swing check disc (flapper).

The following analysis uses the formula:

Summation (Σ) of moments (M) about the hinge (h) = 0. That is: $\Sigma M_h = 0$.

CONVENTIONAL SWING CHECK VALVE (HIGHER PRESSURE DROP)



F_f (hinge friction force) plus W (weight) times $1/2H$ (height) minus F (force) times H (distance) equals zero.

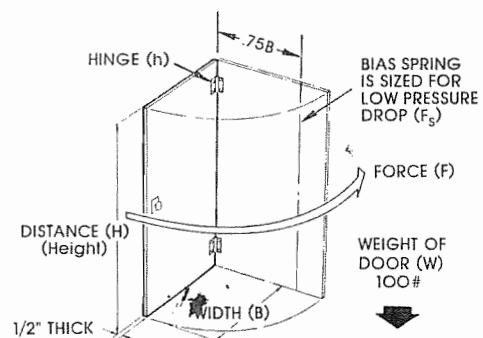
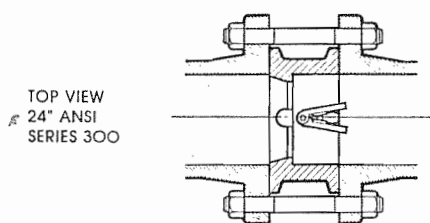
$$F_f \text{ (Friction of Hinge)} + W \frac{H}{2} - FH = 0$$

Therefore,

$$F = \frac{W}{2} + \frac{F_f \text{ (Friction of Hinge)}}{H}$$

The weight of the door ($W = 400\#$) significantly increases the force required.

DUO-CHEK II VALVE (LOWER PRESSURE DROP)



F_f (hinge friction) plus F_s (spring force) times $3/4B$ (force point) minus F (force) times B (width) equals zero.

$$F_f \text{ (Friction of Hinge)} + F_s (.75B) - FB = 0$$

Therefore,

$$F = .75F_s + \frac{F_f \text{ (Friction of Hinge)}}{B}$$

The weight of the plates do not increase the force required.

This analysis demonstrates why the Duo-Chek II has a lower ΔP than a swing check. Only the hinge friction and bias spring offer resistance in the Duo-Chek II (Opening a door which is hinged on the side).

70-100 SERIES

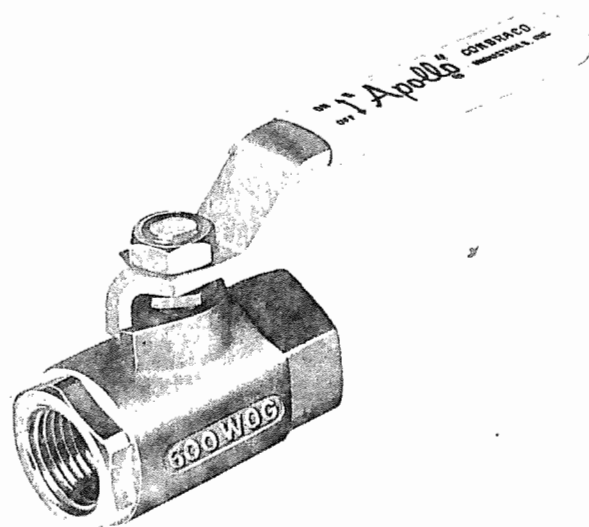
The Original Apollo®

FEATURES

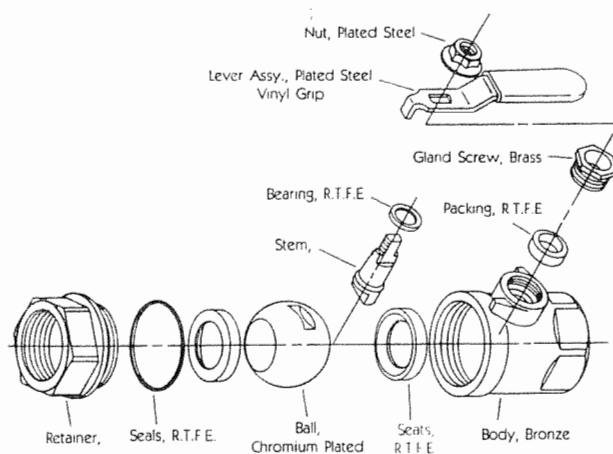
- Chromium plated ball
- Reinforced Teflon* seats and stuffing box ring
- Blow-out-proof stem design

OPTIONS

- 316 stainless steel ball and stem
- 1¼" & 2¼" extended stems
- Chain operated lever kit available for vertical or horizontal overhead or remote service
- Balancing stops
- Steel tee handle for valves through 2"
- Locked retainer
- Static grounding devices
- Automatic drain through 2"
- Rough chrome plating
- Round handles through 2"



Component Breakdown



SPECIFICATIONS

Approved valves shall comply with all requirements as specified herein and the following: Federal: WWV-35B, Type II, Class A, Style: 3. Testing per MMS SP-72, all valves tested 100%—Conbraco Industries, Inc. Apollo® 70-100 Series or equal.

*Dupont Reg. T.M.

CLASS 150 (125/150 PSI)

BRONZE SWING CHECK

FIG. 92-A, Threaded, 1/4"-3"

150 psi (125 psi) Saturated Steam

300 psi Non-Shock Cold Water, Oil, Gas

See Page 73 for Pressure-Temperature Ratings

Regrounding Bronze Disc

Valve conforms to MSS SP-80 and Fed. Spec. WW-V-51e (1973); Type IV, Class A and B, Style I

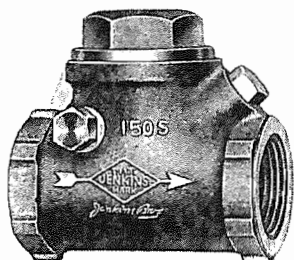
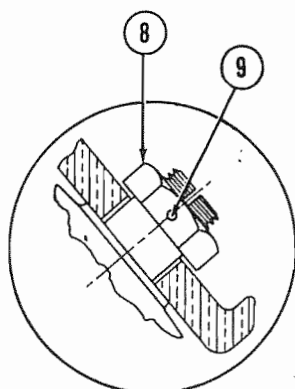
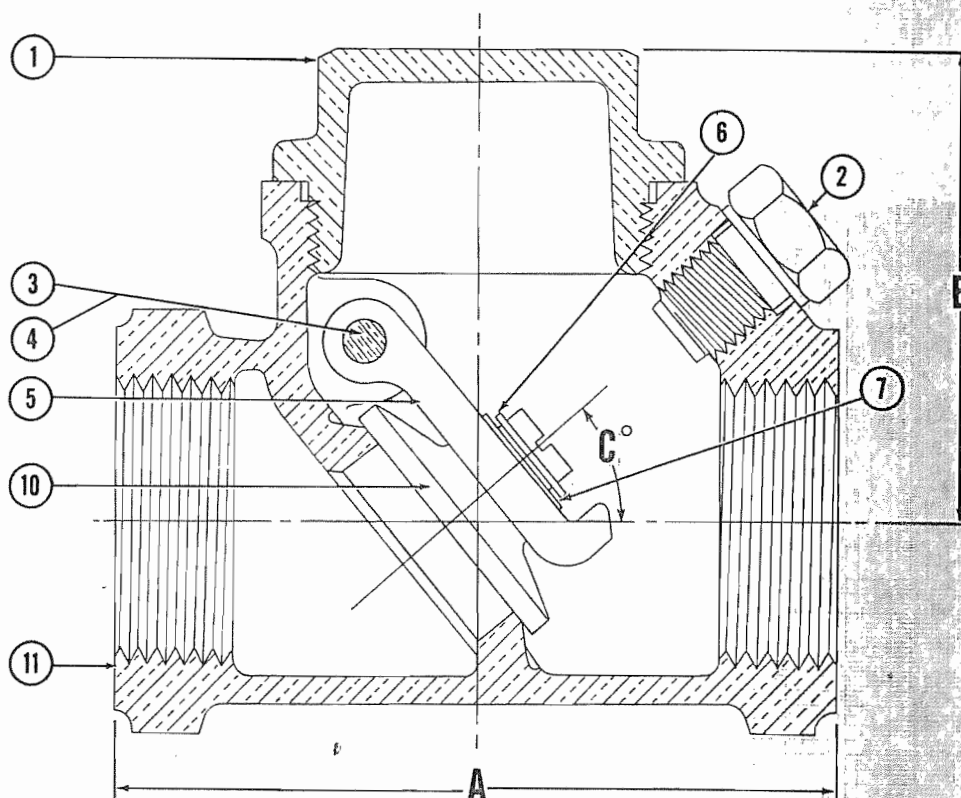


FIG. 92-A



HANGER ASSEMBLY
2 1/2" and 3" valves



MATERIALS LIST

PART	SPECIFICATION
1 CAP	ASTM B62, Bronze
2 STOP PLUG	ASTM B16, Brass Rod
3 SIDE PLUGS	ASTM B16, Brass Rod
4 HANGER PIN	ASTM B16, Brass Rod
5 HANGER	ASTM B61, Bronze
6 RETAINING RING	1/4"-2" only, Beryllium Copper
7 WASHER	1"-2" only, ASTM B21, Alloy 464 Naval Brass
8 HANGER NUT	2 1/2" and 3", ASTM B16, Brass Rod
9 HANGER NUT PIN	2 1/2" and 3", Phosphor Bronze Cotter Pin
10 DISC	1/4"-3/4", ASTM B140, Alloy 314, Bronze Rod 1"-2", ASTM B62, Bronze 2 1/2", 3", ASTM B61, Bronze
11 BODY	ASTM B62, Bronze

DIMENSIONS - INCHES

SIZE	A	B	C
1/4	2	1 1/8	40°
3/8	2 1/8	1 1/8	40°
1/2	2 3/8	1 1/8	40°
3/4	2 1/2	1 7/8	40°
1	3 1/8	2 1/8	40°
1 1/4	3 3/8	2 1/8	40°
1 1/2	4 1/4	2 3/4	40°
2	5 1/4	3 3/8	40°
2 1/2	6 1/8	3 3/4	40°
3	6 1/8	4 1/2	40°

WEIGHTS-POUNDS

SIZE	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Fig. 92-A	.4	.6	.6	1.3	1.6	2.5	3.4	5.9	10.5	16.5

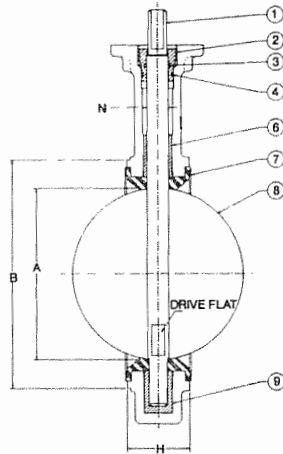


200 psi butterfly valves

Ductile Iron Body • Extended Neck • Geometric Drive
Molded-in Seat Liner • Lug and Wafer Type

Sizes 2" through 12"

Applicable Specifications: MSS-SP67, MSS-SP25, API-609



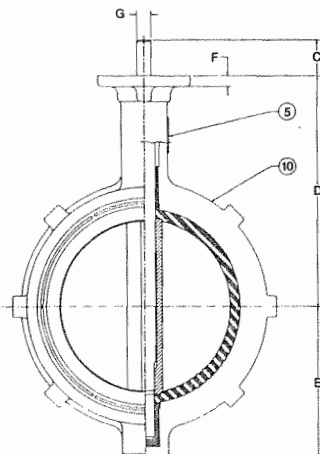
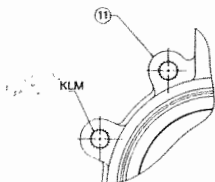
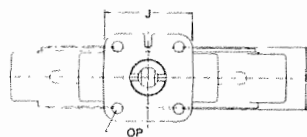
MATERIAL LIST

Part	Specification
1. Stem	Stainless Steel, ASTM A-582 Type 416
2. Collar Bushing	Brass, ASTM B-16
3. Stem Seal	EPDM Rubber
4. Body Seal	EPDM Rubber
5. Nameplate	Aluminum
6. Upper Bushing	Brass, ASTM B-16
7. Liner	EPDM Rubber
8. Disc	Al. Bronze, ASTM B-148 Alloy 954
9. Lower Bushing	Brass, ASTM B-16
10. Body (Wafer)	Ductile Iron, ASTM A-536
11. Body (Lug)	Ductile Iron, ASTM A-536

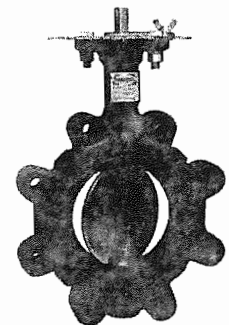
DIMENSIONS — WEIGHTS

Size	A	B	C	D	E	F	G	Metal H	Rubber I	J Square
2	2.15	4.0	1.25	5.38	2.62	.38	.312	1.688	1.812	3.25
2½	2.65	4.75	1.25	5.88	3.12	.38	.370	1.812	1.938	3.25
3	3.15	5.25	1.25	6.12	3.38	.38	.370	1.812	1.938	3.25
4	4.15	6.75	1.25	6.88	4.00	.38	.403	2.062	2.188	3.25
5	5.15	7.62	1.25	7.38	4.75	.38	.496	2.188	2.312	3.25
6	6.15	8.62	1.25	8.00	5.25	.38	.496	2.188	2.312	3.25
8	8.15	10.87	1.25	9.25	6.50	.50	.560	2.375	2.500	3.25
10	10.15	13.25	1.25	10.50	8.00	.50	.686	2.688	2.812	4.75
12	12.15	16.0	1.25	12.00	9.25	.50	.748	3.000	3.125	4.75

Size	N	O B.C.	P Dia.	K No.	L Dia.	Capscrew Data/Stud Data		M B.C.	Lug Approx. Net Wt. (lbs.)	Wafer Approx. Net Wt. (lbs.)
						Wafer Length	Lug Length			
2	.500	3.25	.437	4	¾-11unc	4	1¼	4¾	7	6
2½	.562	3.25	.437	4	¾-11unc	4¼	1½	5½	9	8
3	.562	3.25	.437	4	¾-11unc	4¼	1½	6	9½	8½
4	.625	3.25	.437	8	¾-11unc	5	1¾	7½	15	12
5	.750	3.25	.437	8	¾-10unc	5¼	1¾	8½	19	15
6	.750	3.25	.437	8	¾-10unc	5¼	2	9½	24	18
8	.875	3.25	.437	8	¾-10unc	5¼	2¼	11¼	35	29
10	1.125	5.00	.562	12	¾-9unc	6¼	2¼	14¼	56½	45½
12	1.250	5.00	.562	12	¾-9unc	6¼	2½	17	87	72



2"



LD 2000
lug style
With EPDM
Liner and
Aluminum
Bronze Disc



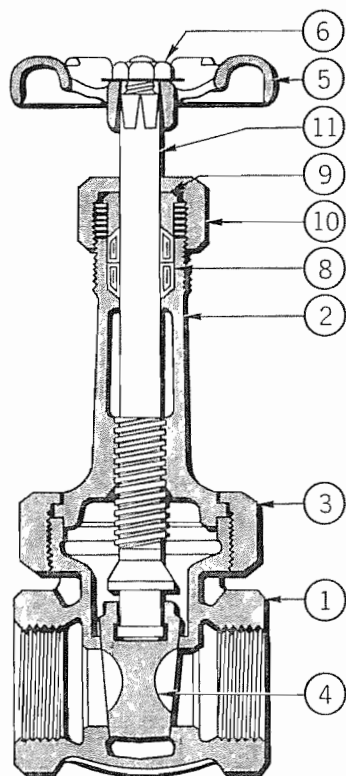
WD 2000
wafer style
With EPDM
Liner and
Aluminum
Bronze Disc

Gate Valves

RISING STEM • SOLID DISC

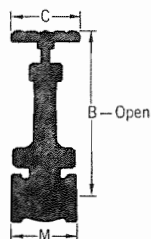
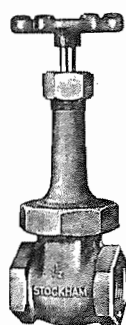
150 PSI Saturated Steam
300 PSI Nonshock Cold Water, Oil, or Gas**SERVICE FEATURES**

- May be repacked under pressure when in full open position.
- Union bonnet preferred for heavy duty applications where valves are repeatedly dismantled.
- Rising stem visibly indicates position of disc.
- Disc clears port area completely in open position.

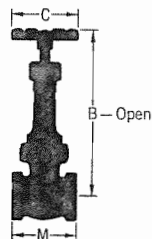
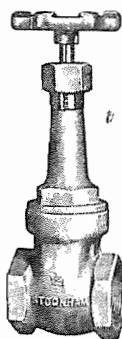
**B-120**

NO.	DESCRIPTION	MATERIAL	ASTM SPEC.
1	BODY	BRONZE	B-62
† 2	BONNET	BRONZE	B-62
† 3	BONNET RING B-120, B-124	BRONZE	B-62
4	DISC	BRONZE	B-62
5	HANDWHEEL	ALUMINUM (½-1¼)	B-85 Alloy S12-A
		MALL. IRON (⅛-¾, 1½-3)	A-197
6	HANDWHEEL NUT	BRASS	B-16
8	PACKING	TEFLON® IMPREGNATED ASBESTOS	
9	PKG. GLAND	BRASS	B-16
10	PKG. NUT	BRONZE	B-62
11	STEM	COPPER-SILICON ALLOY	B-371 Alloy 694

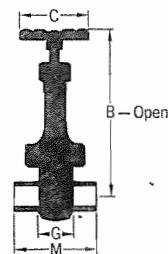
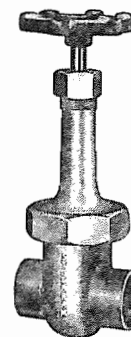
† Sizes 2½ & 3 (B-120) Have Bolted Bonnet Connection.

**B-120, UNION BONNET, THREADED**

SIZE	WGT.	B	C	M
⅛	1.1	4⅝	2⅛	1⅝
¼	1.1	4⅝	2⅛	1⅝
⅜	1.1	4⅝	2⅛	1⅝
½	1.3	5⅞	2¼	2⅞
¾	2.1	6⅞	2½	2⅞
1	3.2	8⅞	2⅞	2⅞
1¼	5.0	9⅞	3⅞	3¼
1½	7.2	10⅞	3⅞	3½
2	11	13⅞	4⅞	4
2½	21	15⅞	5⅞	4⅞
3	30	18⅞	6	5⅞

**B-122, SCREWED BONNET, THREADED**

SIZE	WGT.	B	C	M
⅛	1.1	4⅝	2⅛	1⅞
¼	1.1	4⅝	2⅛	1⅞
⅜	1.1	4⅝	2⅛	1⅞
½	1.3	5⅞	2¼	2⅞
¾	2.1	6⅞	2½	2⅞
1	3.2	8⅞	2⅞	2¾
1¼	5.0	9⅞	3⅞	3⅞
1½	7.2	10⅞	3⅞	3⅞
2	11	13⅞	4⅞	4
2½	21	15⅞	5⅞	4⅞
3	30	18⅞	6	5⅞

**B-124, UNION BONNET, SOLDER ENDS**

SIZE	WGT.	B	C	G*	I
⅜	.8	4⅝	2⅛	⅜	1
½	1.2	5⅞	2¼	1	2
¾	1.9	6⅞	2½	1⅞	2
1	2.9	8⅞	2⅞	1⅞	3
1¼	4.1	9⅞	3⅞	1½	3
1½	5.9	10⅞	3⅞	1⅞	3
2	9.3	13⅞	4⅞	1⅞	4
2½	15	15⅞	5⅞	2⅞	5
3	24	18⅞	6	2⅞	5

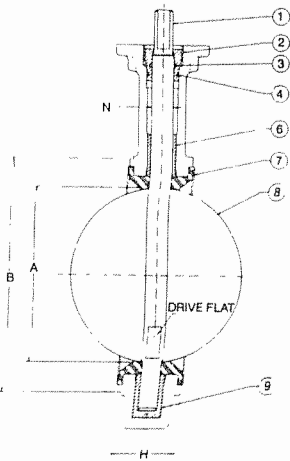
* Piping Make-Up Dimension

250 psi butterfly valves

Ductile Iron Body • Extended Neck • Geometric Drive
Molded-in Seat Liner • Lug and Wafer Type

Sizes 2" through 12"

Applicable Specifications: MSS-SP67, MSS-SP25, API-609



MATERIAL LIST

Part	Specification
1 Stem	Stainless Steel, ASTM A-582 Type 416
2 Collar Bushing	Brass, ASTM B-16
3 Stem Seal	EPDM Rubber
4 Body Seal	EPDM Rubber
5 Nameplate	Aluminum
6 Upper Bushing	Brass, ASTM B-16
7 Liner	EPDM Rubber
8 Disc	Ductile Iron, ASTM A-395 (Plated)
9 Lower Bushing	Brass, ASTM B-16
10 Body (Wafer)	Ductile Iron, ASTM A-536
11 Body (Lug)	Ductile Iron, ASTM A-536

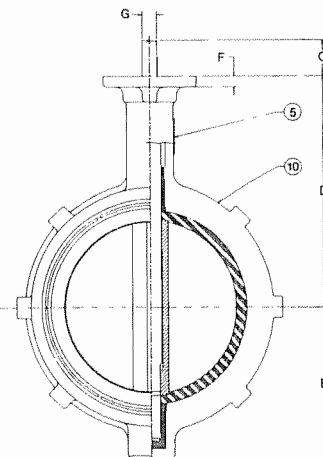
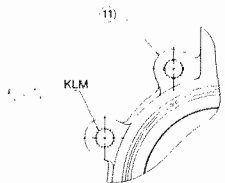
DIMENSIONS — WEIGHTS

Size	A	B	C	D	E	F	G	Metal H	Rubber I	J Square
2	2.15	4.0	1.25	5.38	2.62	.38	.312	1.688	1.812	3.25
2½	2.65	4.75	1.25	5.88	3.12	.38	.370	1.812	1.938	3.25
3	3.15	5.25	1.25	6.12	3.38	.38	.370	1.812	1.938	3.25
4	4.15	6.75	1.25	6.88	4.00	.38	.403	2.062	2.188	3.25
5	5.15	7.62	1.25	7.38	4.75	.38	.496	2.188	2.312	3.25
6	6.15	8.62	1.25	8.00	5.25	.38	.496	2.188	2.312	3.25
8	8.15	10.87	1.25	9.25	6.50	.50	.560	2.375	2.500	3.25
10	10.15	13.25	1.25	10.50	8.00	.50	.686	2.688	2.812	4.75
12	12.15	16.0	1.25	12.00	9.25	.50	.748	3.000	3.125	4.75

LD 3010
lug style
With EPDM
Liner and
Ductile Disc



WD 3010
wafer style
With EPDM
Liner and
Ductile Disc



G-927
G-929
G-931
G-933

125-Pound IRON BODY

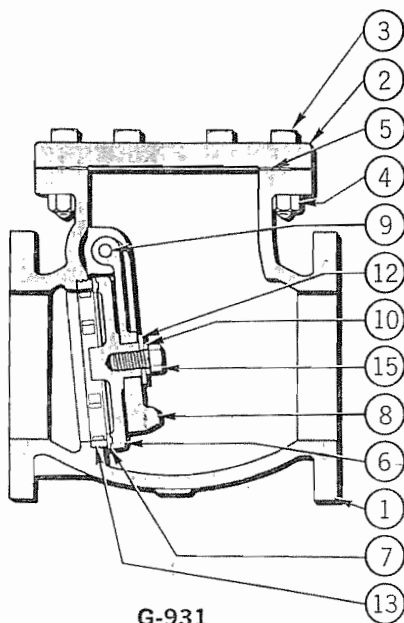
Swing Check Valves

BOLTED CAP

See page 110 for pressure-temperature rating.

SERVICE FEATURES

- Generally recommended to prevent back flow with minimum resistance to flow in open position.
- Available with lever and weight to accelerate or decelerate disc closing.
- Suitable for nonshock steam, water, oil, gas and air services within pressure-temperature ratings.



NO.	DESCRIPTION	MATERIAL	ASTM SPEC.
1	BODY	CAST IRON	A-126 Class B
2	CAP	CAST IRON	A-126 Class B
3	CAP BOLT	STEEL	A-307 Grade B
4	CAP BOLT NUT	STEEL	A-307 Grade B
5	CAP GASKET	ASBESTOS	
6	DISC	G-927, G-931 BRONZE (2-3½) G-929, G-933 CAST IRON (4-30)	B-62 A-126 Class B
7	DISC RING	G-927, G-931 BRONZE (4-30)	B-62
8	HINGE	G-927, G-931 BRONZE (2-3½) MALL. IRON (4-24) DUCTILE (30)	B-62 A-197 A-445
9	HINGE PIN	G-927, G-931 BRASS G-929, G-933 STAINLESS STEEL	B-16 A-276 Type 410
10	LOCKWASHER	G-927, G-931 BRASS (2-3½) G-927, G-931 STEEL (4-6) G-929, G-933 STEEL	B-98 Alloy 651
12	PLAIN WASHER	G-927, G-931 BRASS (2-3½) G-927, G-931 STEEL (4-6) G-929, G-933 STEEL	B-36 Alloy 268
13	SEAT RING	G-927, G-931 BRONZE G-929, G-933 CAST IRON	B-62 A-126 Class B
*14	SIDE PLUG	G-927, G-931 BRONZE G-929, G-933 MALL. IRON (2-4) CAST IRON (5-24)	B-62 A-197 A-126 Grade B
15	CAPSCREW	G-927, G-931 BRASS (2-3½) STEEL (4-16) G-929, G-933 STEEL (2-16)	B-16 A-307 Grade B A-307 Grade B
*16	STUD	G-931, G-933 STEEL (18-30)	A-307 Grade B
*17	STUD NUT	G-931, G-933 STEEL (18-30)	A-307 Grade B
*18	STUD PIN	G-931, G-933 STEEL (18-30)	A-108

*Not Shown



G-927 IBBM, THREADED
G-929 ALL IRON, THREADED

SIZE	WGT.	B	M
2	21	4 ¹³ / ₁₆	7 ³ / ₈
2½	30	5 ⁵ / ₈	7 ⁷ / ₈
3	39	6	8½
3½	50	6 ¹⁵ / ₁₆	9½
4	75	8	10½
5	102	8 ¹⁵ / ₁₆	11¾
6	137	9¾	12¾



G-931 IBBM, FLANGED
G-933 ALL IRON, FLANGED

SIZE	WGT.	B	M	SIZE	WGT.	B	M
2	30	4 ¹³ / ₁₆	8	10	473	13 ¹³ / ₁₆	24½
2½	41	5 ⁵ / ₈	8½	12	695	15¼	27½
3	51	6	9½	14	1048	16 ⁷ / ₈	31
3½	67	6 ¹⁵ / ₁₆	10½	16	1500	19 ¹ / ₁₆	36
4	94	8	11½	18	1970	24	38
5	131	8 ¹⁵ / ₁₆	13	20	2590	27 ⁹ / ₁₆	42
6	166	9¾	14	24	3705	31	46
8	294	11¾	19½	30	6463	38	60

WHITE PLUMBING & HEATING, Inc.
TWIN FALLS, ID 83303-1741
SHOP DRAWING FOR APPROVAL

P.O. BOX 1741

PHONE 208-733-4556

TO: Heath Engineering Company DATE 4/22/85
377 West 800 North
Salt Lake City, Utah 84103
CONTRACT NO. J-501 TRANSMITTAL NO. 9 NEW SUBMITTAL XX
RESUBMITTAL TRANSMITTAL NO. P. O. NO. SUB
PROJECT Geothermal T.F.H.S./Sawtooth LOCATION Twin Falls, Idaho
SPECIFICATIONS SECTION FOR BUILDING

PAR NO.	DESCRIPTION OF EQUIPMENT	MANUFACTURER	PUB. NO.	COPIES SUB'M.	ACTION TAKEN	COPIES RET'D.
	Insulation	CertainTeed		8		

Please return approved copies to this office.

File w/copy
cc: Field

CONTRACTOR **WHITE PLUMBING & HEATING, Inc.**

MAILING ADDRESS P.O. Box 1741, Twin Falls, ID 83303-1741

By J. J. White

Supplier: State Insulation

Box 4478
Boise, Idaho 83704

(208) 344-8666 Dick

☒ NO EXCEPTIONS TAKEN ☐ REJECTED
☐ EXCEPTIONS AS NOTED ☐ REVISE AND RESUB.
Checking is only for general conformance with the design of the project and general compliance with the design in the contract documents. Any contractor or subcontractor responsible for dimensions, materials and methods of construction at the job site; fabrication, processes and techniques of construction; coordination of his work with that of all other trades; and the satisfactory performance of his work.
HEATH ENGINEERING COMPANY
Date APR 29 1985 By Samuel D. Stone

CertainTeed EI

FIBER GLASS PIPE INSULATION

500° Snap*On

description

CertainTeed 500° Snap*On® Pipe Insulation is a heavy density preformed insulation composed of fine glass fibers bonded together with a thermosetting resin molded in one-piece 3' long sections. Made with a single seam, CertainTeed 500° Snap*On spreads open to receive the pipe and snaps closed after placement.

The standard insulation is furnished with a vapor barrier All Service Jacket (ASJ) factory-applied, composed of a reinforced white kraft and aluminum foil laminate. Jacket is available with or without Self Sealing Lap (SSL) feature which facilitates closing the longitudinal and end joints. Unjacketed insulation is available for interior layers of multilayer applications. (See Available Sizes and Thickness table, Page 7.)

uses

CertainTeed 500° Snap*On Pipe Insulation is designed for hot and cold service piping from -20 to 500°F. Typical uses are:

Domestic Hot and Cold Service Water	Steam and Condensate Fuel Oil Piping
Heating Hot Water	Tempered Water
High Temperature Chilled Water	Booster Heater Water
Dual Temperature	Refrigerated Lines
	Process Lines

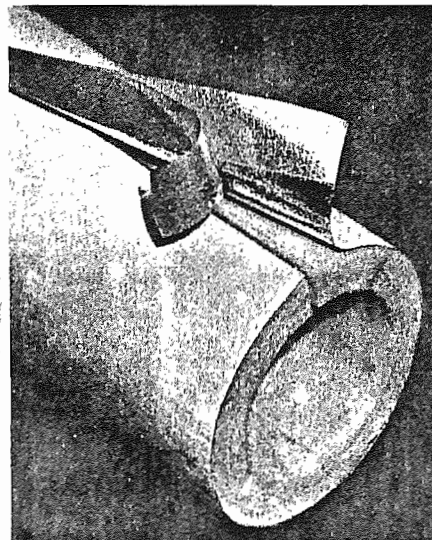
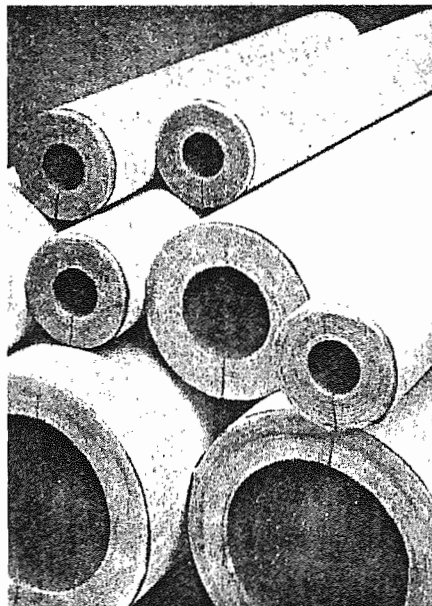
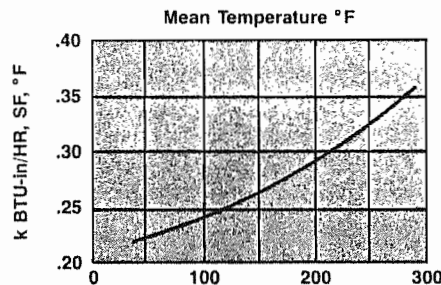
Jacketed insulation may be used for outdoor hot or cold lines with the addition of a suitable and separate weatherproofing jacket.

Unjacketed insulation may be used for outdoor hot lines with addition of a suitable and separate weatherproofing jacket.

benefits

- Lower Energy Costs
Efficient fiber glass has low thermal conductivity and single seam to minimize heat loss or gain.
- Low Fire Hazard Classification
Meets fire and safety requirements of building codes and government guide specifications.
- Neat, Functional Appearance
White ASJ jacket is an extremely efficient vapor barrier which also provides the finished appearance. No painting required, but the jacket may be painted (when new and/or clean) if desired.

thermal performance (ASTM C 335)



performance characteristics

Fire Safety: UL 723 (ASTM E 84)

Composite of insulation and jacket as tested and listed by Underwriters' Laboratory has a Fire Hazard Classification flame spread, and smoke developed not to exceed 25, and 50 respectively.

Jacket Permeability: ASTM E 96, procedure A
Perm rating not to exceed .02 perms
(HH-B-100B, Type 1)

Temperature Limit: ASTM C 411
500°F

Moisture Absorption: ASTM C 553, part 15
Less than 0.2% by volume

Corrosivity: HH-I-558B (4.4.3)
(steel, copper, aluminum) does not accelerate corrosion

Shrinkage: ASTM C 356
negligible

specification compliance

CertainTeed 500° Snap*On Pipe Insulation furnished plain or with ASJ jacket has physical properties that regularly meet the requirements of ASTM C 547 "Mineral Fiber Preformed Pipe Insulation", Class 2, up to a maximum service temperature of 500°F (260°C).

When so specified on a purchase order, CertainTeed 500° Snap*On Pipe Insulation will be manufactured to meet the requirements of Federal Specification HH-I-558B FORM D, Class 12 (to 450°F) or Class 13 (to 500°F) or Military Specification MIL-I-22344B to 370°F, MIL-I-24244B (stress corrosion cracking type 3 & 4 Austenitic Stainless Steel). Contact Valley Forge for special provisions applying to MIL-I-24244B.

The ASJ jacket has physical properties that meet the requirements of Federal Specification HH-B-100B "Barrier Material Vapor" (for pipe, duct and equipment thermal insulation) Type 1.

Job No. _____

Submittal No. _____

P.O. No. _____

Date _____

Spec. Section _____

CertainTeed

CertainTeed Corporation
P. O. Box 860, Valley Forge, PA 19482

Available Sizes and Thicknesses 500° Snap-On Pipe Insulation (Standard sizes are blue shaded) Multiple Layers Only

Nom Pipe Size	Pipe O.D.	½"		1"		1½"		2"		2½"		3"		3½"		4"	
		Wall	Insul. O.D.	Wall	Insul. O.D.	Wall	Insul. O.D.	Wall	Insul. O.D.	Wall	Insul. O.D.	Wall	Insul. O.D.	Wall	Insul. O.D.	Wall	Insul. O.D.
½"	.84	.50	1.90	.99	2.88	1.55	4.00	2.05	5.00	2.86	6.63	3.36	7.63	—	—	—	—
¾"	1.05	.63	2.38	.88	2.88	1.44	4.00	1.94	5.00	2.75	6.63	3.25	7.63	—	—	—	—
1"	1.32	.49	2.38	1.06	3.50	1.56	4.50	2.09	5.56	2.62	6.63	3.12	7.63	—	—	—	—
1¼"	1.66	.60	2.88	.91	3.50	1.66	5.00	1.94	5.56	2.47	6.63	2.97	7.63	—	—	—	—
1½"	1.90	.47	2.88	1.03	4.00	1.53	5.00	2.34	6.63	2.84	7.63	3.34	8.63	—	—	—	—
2"	2.38	.59	3.50	1.03	4.50	1.56	5.56	2.09	6.63	2.59	7.63	3.09	8.63	3.59	9.63	4.15	10.75
2½"	2.88	.53	4.00	1.03	5.00	1.84	6.63	2.34	7.63	2.84	8.63	3.34	9.63	3.91	10.75	4.41	11.75
3"	3.50	.46	4.50	.99	5.56	1.52	6.63	2.02	7.63	2.52	8.63	3.02	9.63	3.59	10.75	3.99	11.75
3½"	4.00	.46	5.00	1.27	6.63	1.77	7.63	2.27	8.63	2.77	9.63	3.34	10.75	3.84	11.75	4.34	12.75
4"	4.50	.51	5.56	1.04	6.63	1.54	7.63	2.04	8.63	2.54	9.63	3.10	10.75	3.60	11.75	4.10	12.75
4½"	5.00	.73	6.63	1.23	7.63	1.73	8.63	2.23	9.63	2.79	10.75	3.29	11.75	3.79	12.75	4.41	14.00
5"	5.56	.48	6.63	.98	7.63	1.48	8.63	1.98	9.63	2.54	10.75	3.04	11.75	3.54	12.75	4.17	14.00
6"	6.63	.45	7.63	.95	8.63	1.45	9.63	2.01	10.75	2.51	11.75	3.01	12.75	3.64	14.00	4.14	15.00
7"	7.63	—	—	.95	9.63	1.52	10.75	2.02	11.75	2.52	12.75	3.15	14.00	3.65	15.00	4.15	16.00
8"	8.63	—	—	1.02	10.75	1.52	11.75	2.02	12.75	2.65	14.00	3.15	15.00	3.65	16.00	4.15	17.00
9"	9.63	—	—	1.02	11.75	1.52	12.75	2.14	14.00	2.64	15.00	3.14	16.00	3.64	17.00	4.14	18.00
10"	10.75	—	—	.95	12.75	1.57	14.00	2.07	15.00	2.57	16.00	3.07	17.00	3.57	18.00	4.07	19.00
11"	11.75	—	—	1.07	14.00	1.57	15.00	2.07	16.00	2.57	17.00	3.07	18.00	3.57	19.00	4.07	20.00
12"	12.75	—	—	1.05	15.00	1.56	16.00	2.06	17.00	2.56	18.00	3.06	19.00	3.56	20.00	4.06	21.00
14"	14.00	—	—	.93	16.00	1.43	17.00	1.93	18.00	2.43	19.00	2.93	20.00	3.43	21.00	3.93	22.00
15"	15.00	—	—	.93	17.00	1.43	18.00	1.93	19.00	2.43	20.00	2.93	21.00	3.43	22.00	3.93	23.00
16"	16.00	—	—	.93	18.00	1.43	19.00	1.93	20.00	2.43	21.00	2.93	22.00	3.43	23.00	3.93	24.00
17"	17.00	—	—	.93	19.00	1.43	20.00	1.93	21.00	2.43	22.00	2.93	23.00	3.43	24.00	3.93	25.00
18"	18.00	—	—	.93	20.00	1.43	21.00	1.93	22.00	2.43	23.00	2.93	24.00	3.43	25.00	3.93	26.00
19"	19.00	—	—	.93	21.00	1.43	22.00	1.93	23.00	2.43	24.00	2.93	25.00	3.43	26.00	3.93	27.00
20"	20.00	—	—	.93	22.00	1.43	23.00	1.93	24.00	2.43	25.00	2.93	26.00	3.43	27.00	3.93	28.00
21"	21.00	—	—	.93	23.00	1.43	24.00	1.93	25.00	2.43	26.00	2.93	27.00	3.43	28.00	3.93	29.00
22"	22.00	—	—	.93	24.00	1.43	25.00	1.93	26.00	2.43	27.00	2.93	28.00	3.43	29.00	3.93	30.00
23"	23.00	—	—	.93	25.00	1.43	26.00	1.93	27.00	2.43	28.00	2.93	29.00	3.43	30.00	3.93	31.00
24"	24.00	—	—	.93	26.00	1.43	27.00	1.93	28.00	2.43	29.00	2.93	30.00	3.43	31.00	3.93	32.00
25"	25.00	—	—	.93	27.00	1.43	28.00	1.93	29.00	2.43	30.00	2.93	31.00	3.43	32.00	3.93	33.00
26"	26.00	—	—	.93	28.00	1.43	29.00	1.93	30.00	2.43	31.00	2.93	32.00	3.43	33.00	3.93	34.00
27"	27.00	—	—	.93	29.00	1.43	30.00	1.93	31.00	2.43	32.00	2.93	33.00	3.43	34.00	3.93	35.00
28"	28.00	—	—	.93	30.00	1.43	31.00	1.93	32.00	2.43	33.00	2.93	34.00	3.43	35.00	3.93	36.00
29"	29.00	—	—	.93	31.00	1.43	32.00	1.93	33.00	2.43	34.00	2.93	35.00	3.43	36.00	3.93	37.00
30"	30.00	—	—	.93	32.00	1.43	33.00	1.93	34.00	2.43	35.00	2.93	36.00	3.43	37.00	3.93	38.00
31"	31.00	—	—	.93	33.00	1.43	34.00	1.93	35.00	2.43	36.00	2.93	37.00	3.43	38.00	3.93	39.00
32"	32.00	—	—	.93	34.00	1.43	35.00	1.93	36.00	2.43	37.00	2.93	38.00	3.43	39.00	—	—
33"	33.00	—	—	.93	35.00	1.43	36.00	1.93	37.00	2.43	38.00	2.93	39.00	—	—	—	—
36"	36.00	—	—	.93	38.00	1.43	39.00	—	—	—	—	—	—	—	—	—	—

½"	¾"	.51	1.66	1.12	2.88	1.43	3.50	1.93	4.50
¾"	1"	.73	2.38	.98	2.88	1.55	4.00	2.05	5.00
1"	1¼"	.63	2.38	.88	2.88	1.44	4.00	1.94	5.00
1¼"	1½"	.49	2.38	1.06	3.50	1.50	4.50	2.09	5.56
1½"	2"	.60	2.88	.91	3.50	1.41	4.50	1.94	5.56
2"	2½"	.68	3.50	.93	4.00	1.43	5.00	2.24	6.63
2½"	3"	.68	4.00	.92	4.50	1.46	5.56	1.99	6.63
3"	3½"	.67	4.50	.92	5.00	1.73	6.63	—	—
3½"	4"	.67	5.00	.95	5.56	1.46	6.63	—	—
4"	4½"	.70	5.56	1.23	6.63	1.73	7.63	—	—
5"	5½"	.72	6.63	1.22	7.63	1.72	8.63	—	—
6"	6½"	.72	7.63	1.22	8.63	1.72	9.63	—	—

Copper Tubing

Inasmuch as CertainTeed has no control over installation design, installation workmanship, accessory materials, or conditions of application, CertainTeed does not warrant the performance or results of any installation containing their products. This warranty disclaimer includes all implied warranties, including the warranties of merchantability and fitness for a particular purpose.

Sales Districts

Atlanta District
P.O. Box 80725
Atlanta, GA 30341
404/457-1172

Baltimore District
4756 Trident Court
Baltimore, MD 21227
301/247-2170

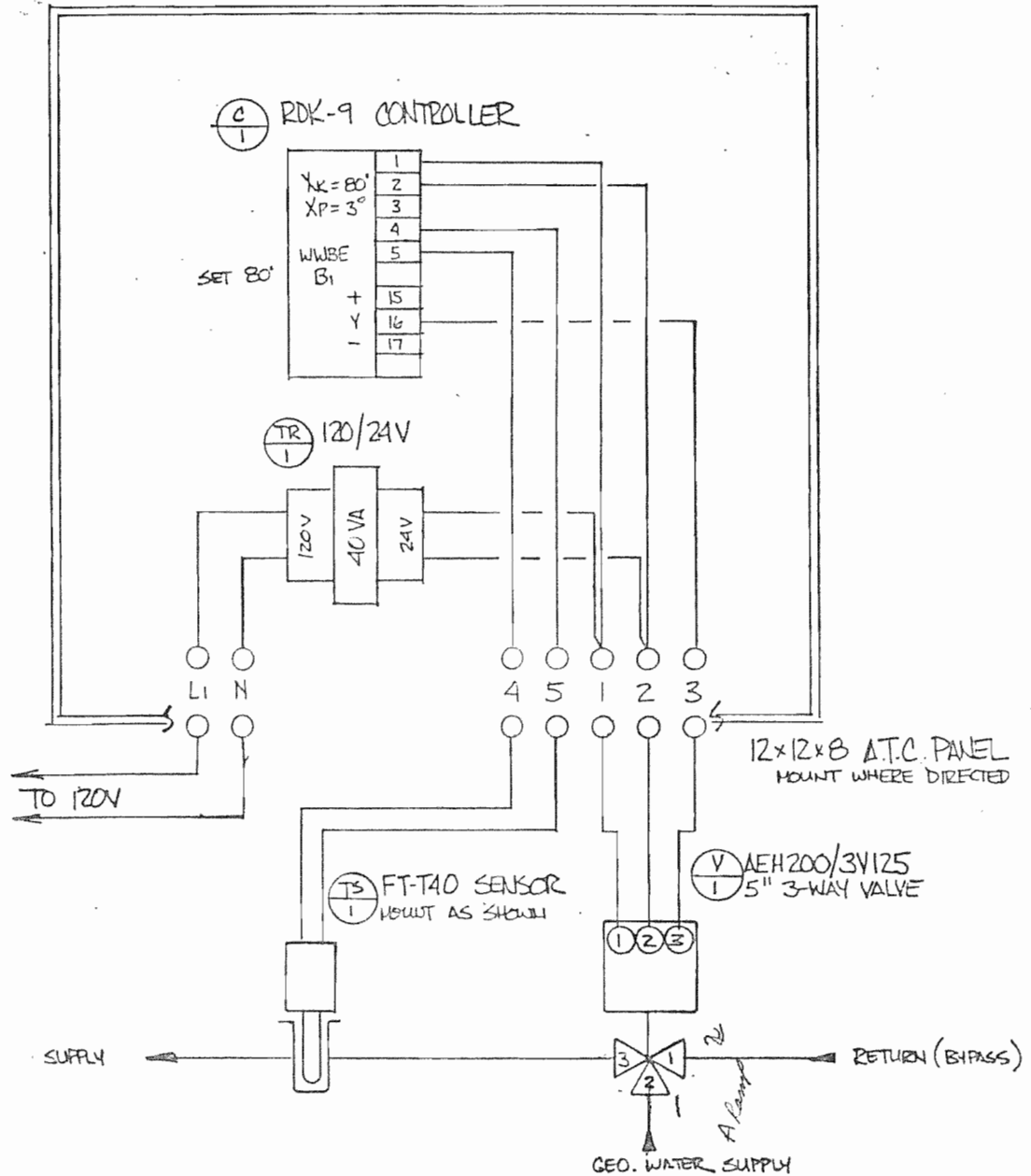
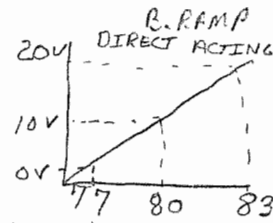
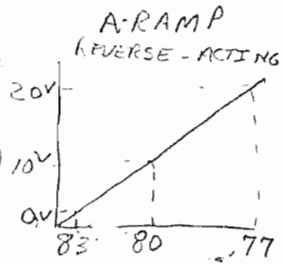
Chicago District
854 Fairway Drive
Sensenville, IL 60108
312/921-6123

Houston District
9896 Bissonnet/One
Suite 677
Houston, TX 77036
713/988-4411

Kansas City District
Fox Hill Office Building
Suite 201
4550 W. 109th Street
Overland Park, KS 66211
913/381-9010

Los Angeles District
2151 Michelson Dr.
Suite 222
Irvine, CA 92715

New York District
220 Raritan Center Parkway
Edison, NJ 08817
201/225-1555



JOB: TWIN FALLS H.S. GEOTHERMAL

CUSTOMER: WHITE PREG & HIG

JOB #: C8512 DATE: MAY '85



Precision
Control Service, Inc.

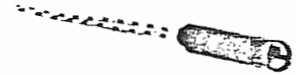
562 West Fine Drive, Salt Lake City, Utah 84115 (801) 263-3332

APPLICATION:

Temperature sensors are used in conjunction with SCS-control equipment for measuring and controlling temperature in HVAC systems.

Sensor element

F-T40

TECHNICAL DATA:

F-T40

Measuring Range	54-108°F (12-42°C)
Adjustment Range (KK-40/Q820 Scale)	54-104°F (12-41°C)
Resistance Range	7.7-2.7 kohms
Measuring Element	NTC Thermistor

CONSTRUCTION:

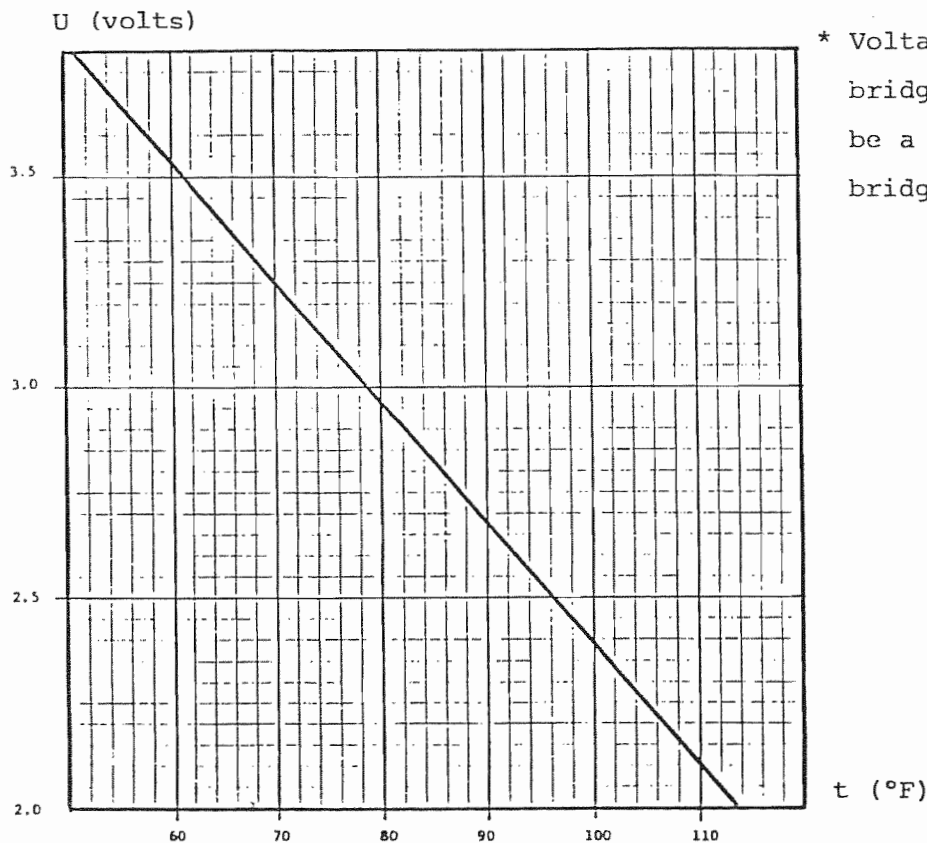
The NTC Thermistor and two resistors (series/parallel) are connected to color coded leads and sealed in epoxy. The assembly is placed in a red protective plastic housing.

AVAILABLE HOUSING:

FR -	Room Mounted
FK -	Duct Mounted
FT -	Well Mounted

COLOR CODE:

Two yellow wire leads.

VOLTAGE/TEMPERATURE CURVE: *

* Voltage curve as shown is for a bridge voltage of 6 vdc. There will be a shift in the curve for other bridge voltages.

Application

The SCS-klimo electronic controllers, types RDK.. and RDK..G are used to control temperature, humidity and pressure in ventilation and air conditioning systems and also for on/off control of compressors, humidifiers, pumps etc.

They may be used in conjunction with the following controlled devices:

- Valves
 - SCS-magnetic
 - SCS-motoric
- Damper motors
 - SCS-push pull
- Electronic positioning devices
 - SCS-puls
 - Step controllers

Technical data

Supply voltage *	24V $\begin{smallmatrix} +15 \\ -10 \end{smallmatrix}$ %, 50 ... 60 Hz
Power consumption (without valve)	max. 5 VA
Output signal	Y ₁ , Y ₂ , Y ₃ : proportional (designation 9) each 0 ... 20V DC phase cut on/off (designation 2) Indicator lamps indicate the output signals
Output power	max. 40 VA at 20 V DC (sum of all Y outputs) or 1 voltage-free SPDT contact 220/240V AC, 2A inductive, 5A resistive.
Measuring ranges	see leaflet A5/0
Proportional band	
xP1, xP2, xP3	
Switching differential	
xD1, xD2, xD3	adjustable ± 5 K (°C) ± 10 % rH each factory setting 0 K, 0 % rH
Dead zone	
xK1, xK2, xK3	
Direction of operation	all outputs are reversible
Ambient temperature	0 ... 50 °C

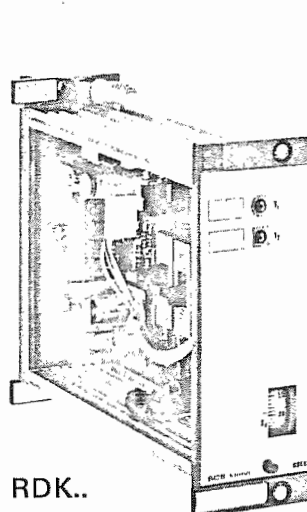
* Only transformers which have a screen between the primary and secondary coils and which are wound on the same former may be used (separate adjacent coils are not acceptable).

Controller with limit control

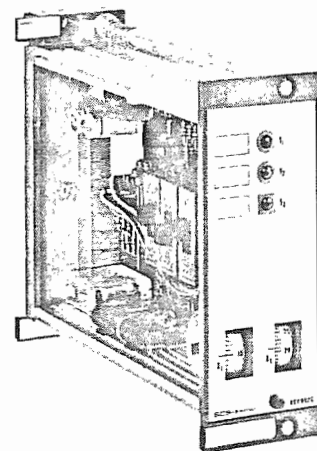
- Selection of low or high limit control with switch
- Factor k for increasing the proportional band in the limit range
adjustable 1 ... 4, factory setting 2

Devices which may be used for supplementary control functions

- WSK4 Reset transmitter for summer or winter compensation for gradual increase in room temperature (for max. of 5 control loops)
- WSK1 Reset transmitter for summer and winter compensation (for max. of 100 control loops)
- WSU1 Universal reset transmitter for more complex reset/interference programmes
- SCS-indicate Indicators for monitoring



RDK..



RDK..G

Adjustments

Setpoint X_K is adjustable on the front of the controller.

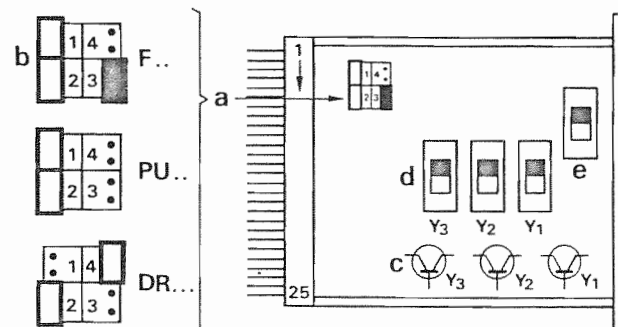
All controllers are supplied with standard scale strips with 0–30 °C temperature range on one side and 30–80 % rH range on the other. For pressure sensors and for other temperature and humidity sensors, the scale strips supplied with these sensors should be fitted in place of the standard strip.

The potentiometers are located under the front plate (proportional band x_p, switching differential x_D, dead zone with x_{K1}, x_{K2}, x_{K3}, and, on the controllers with limit control, the factor k for increasing the proportional band). The front plate is removed by applying light pressure to the red knob at its lower edge.

Indicator lamps show the output status, thus facilitating adjustment.

There are selector switches on the printed circuit board for changing the direction of operation of each individual controller output.

On the printed circuit board there is also a pinboard with plug-in resistors. Sensor-setpoint combinations are achieved by altering the position of a maximum of three resistors (in order, for example, to render the built-in potentiometer inoperative when a remote setpoint potentiometer is used). The position of the resistors should be altered to suit the type of sensor, setpoint potentiometer or setpoint potentiometer combination being used.



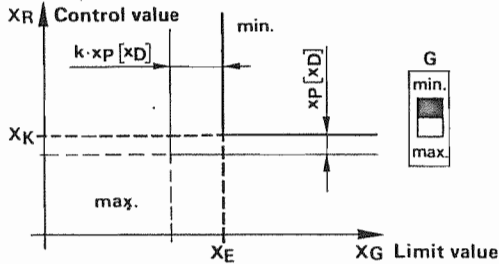
- a pinboard
- b position on delivery
- c fuses for proportional outputs Y₁, Y₂, Y₃

- d direction of operation change-over switch for outputs Y₁, Y₂, Y₃
- e change-over switch for low outputs

Controller with limit control

The controller with limitation operates as an absolute limit controller. Both the setpoint X_K and the setpoint knob for limitation X_E are accessible externally. The direction of operation can be changed from high to low limit with a switch on the printed circuit board.

On the limit controller the total of all the proportional bands x_p and dead zones x is increased by the pre-selected factor k .



Adjustment examples

Example a:

Pre-selected proportional band x_p	1.5 K (°C)
Multiplication factor k	2
Proportional band when limit control is operative $k \cdot x_p$	3.0 K (°C)

Example b:

Pre-selected proportional band x_p	1 % rH
Multiplication factor k	3
Proportional band when limit control is operative $k \cdot x_p$	3 % rH

Principle of operation

The RDK controller is a self-contained module comprising:

- power supply
- measuring loop
- 1 to 3 control amplifiers

Integrated circuits amplify the signal from a temperature, humidity or pressure sensor to give either a proportional output signal 0 ... 20 V DC (designation 9) or an on/off switched output (designation 2). This allows direct connection of all final control elements such as valves, damper motors, step controllers, power controllers, compressors etc.

There is a separate indicator lamp for each individual controller output. The limit controllers operate in principle in the same way as those without limitation but have the additional feature of operating as absolute limit controllers. There is a switch for setting a high or low limit.

Construction

The RDK.. controller is designed to occupy the minimum control panel surface area while making optimum use of its depth.

It consists of a baseplate and a plug-in control unit with keyed sockets and pins which ensure location of the correct control unit.

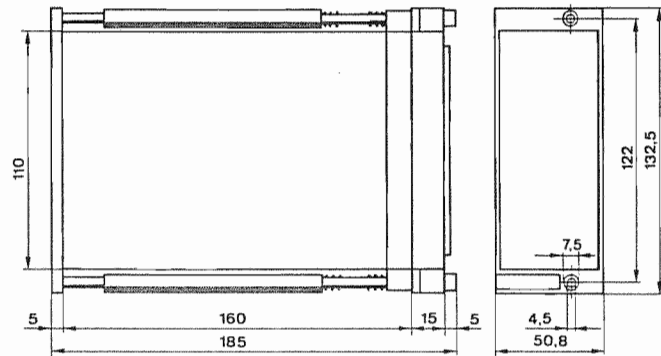
Two retaining rods provide a secure connection between the control unit and baseplate.

All SCS-klimo controllers are suitable for mounting in SCS racks.

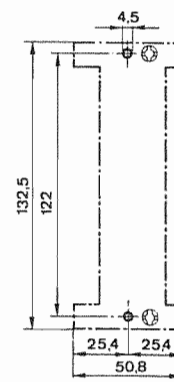
Mounting

First the baseplate is mounted and connected. The control unit is then inserted and secured with the retaining rods.

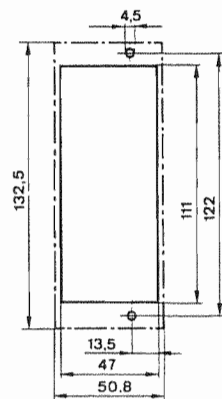
Dimensions [mm]



Drilling layout (base plate)



Front panel installation dimensions



Type code

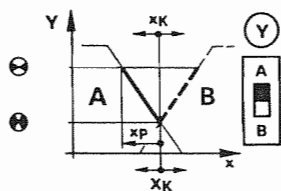
R D K 9 9 2 G

Controller	_____
For use in ventilation and air conditioning systems	_____
Multiple purpose controller	_____
Proportional output 0...20V DC	_____
Proportional output 0...20V DC	_____
On/off output	_____
Limit control	_____

Types

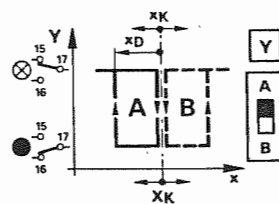
RDK9, RDK9G

1 proportional output 0...20V DC

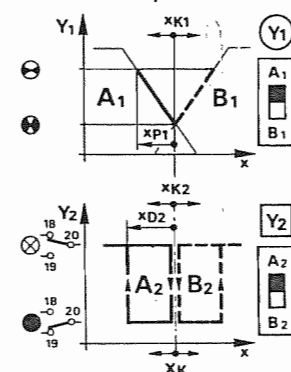


RDK2, RDK2G

1 on/off output

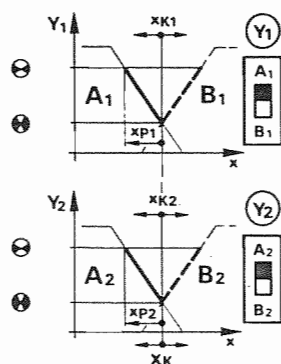


RDK92, RDK92G

1 proportional output 0...20V DC
1 on/off output

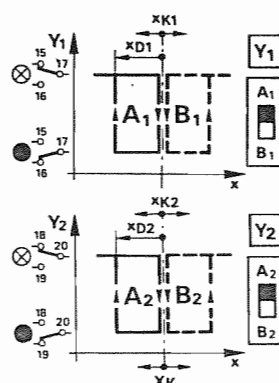
RDK99, RDK99G

2 proportional outputs 0...20V DC

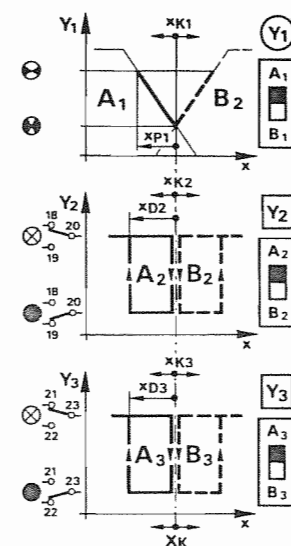


RDK22, RDK22G

2 on/off outputs

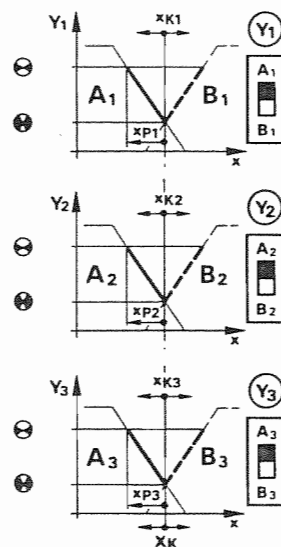


RDK922, RDK922G

1 proportional output 0...20V DC
2 on/off outputs

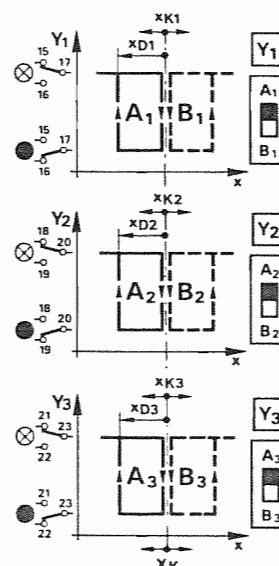
RDK999, RDK999G

3 proportional outputs 0...20V DC

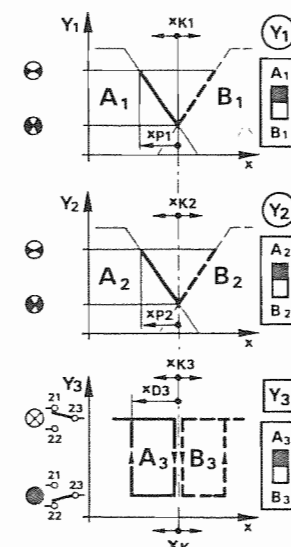


RDK222, RDK222G

3 on/off outputs

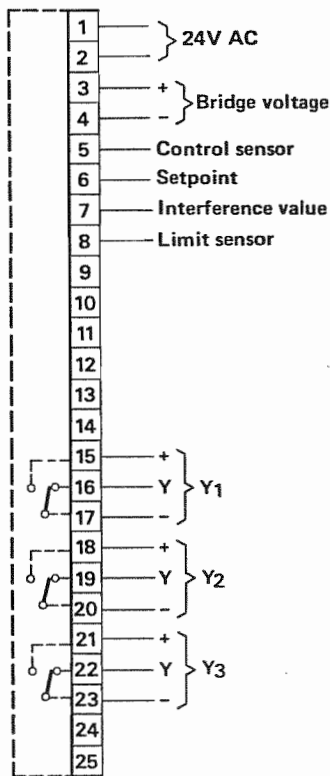
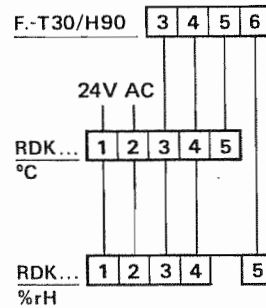


RDK992, RDK992G

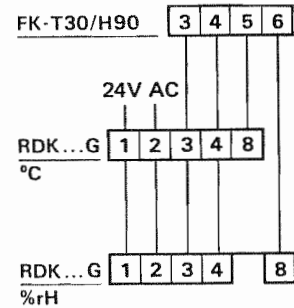
2 proportional outputs 0...20V DC
1 on/off output

Connection diagram

Terminal layout RDK..

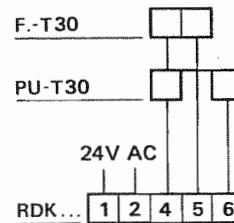
Temperature and humidity sensor
as control sensor

as limit sensor

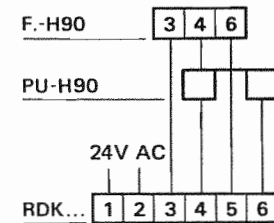


Setpoint potentiometer

Temperature



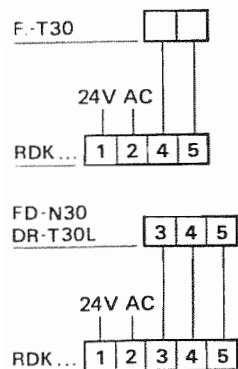
Humidity



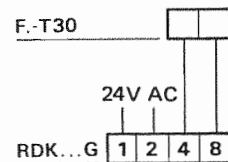
Controller inputs

Temperature sensor

as control sensor

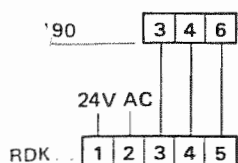


as limit sensor

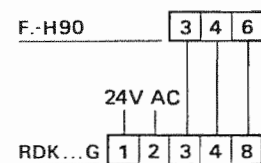


Humidity sensor

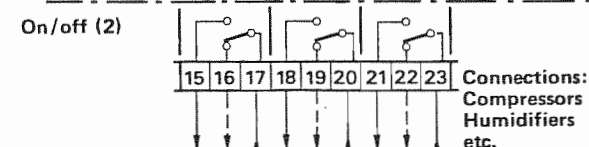
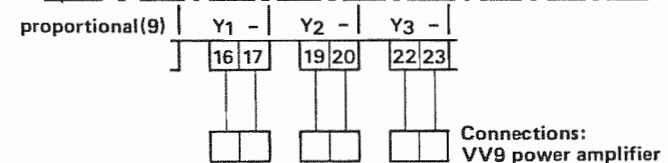
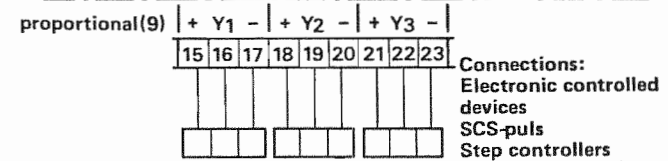
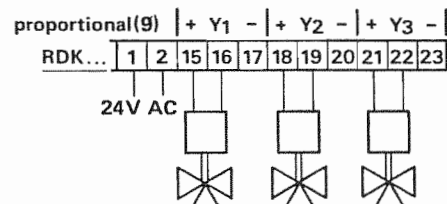
as control sensor



as limit sensor



Controller outputs



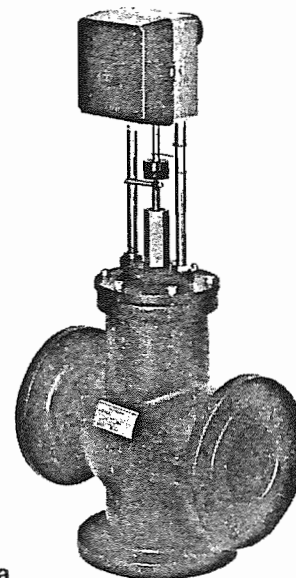
Application

SCS-motoric valves are used in conjunction with the appropriate controllers for the control of LPHW and CHW. The valve body can be used in combination with different motors. This feature makes the valves suitable for a variety of applications, such as primary hot and chilled water distribution systems and in heating, air-conditioning and ventilation plants in residential buildings, schools, hospitals, commercial premises, hotels, industrial buildings etc.

The three-way valve is used in principle only as a mixing device.

Ports 1 and 2 may both be used for control purposes thus making it possible to simplify the piping layout in certain cases.

A.H200/2V
A.H200/3V



Types

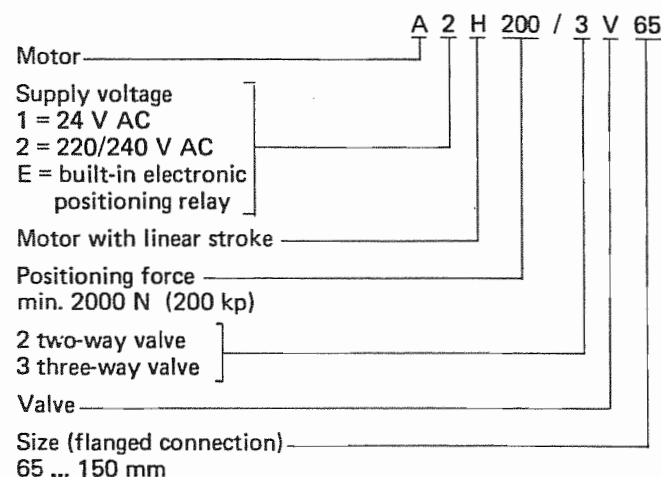
Motors

Type	Type of operation	Control voltage	Power consumption
A1H200/...	3 point	24 V AC	3,5
A2H200/...	3 point	220 V AC	3,5
AEH200/...	proportional	0...20V DC	5,0

Valve bodies

Type	Valve	
.../2V...	two-way	For further details, see Table entitled "Operating data", page 2
.../3V...	three-way	

Type code



Technical data

Motor with linear stroke

Control voltage	}	see "Types" section
Power consumption		
Stroke	}	see "Operating data" table
Positioning time		
Positioning force		min. 2000 N (200 kp)
Type of protection		IP42 [DIN]
Admissible ambient temperature		2 ... 50 °C

Valve

Valve body material	cast iron
Seat/inner valve material	chrome nickel steel / special alloy
Nominal pressure rating	PN 16
Operating pressure p_e max	1,6 MPa (16 bar)
Maximum admissible pressure differential Δp_v max	see "Operating data" table
Leakage 1 → 3	0,02 % k_{VS}
2 → 3	0,05 % k_{VS}
Water temperature	2 ... 135 °C
Valve characteristic (stroke k_V)	quadratic
Rangeability (stroke, k_V)	$\frac{k_{VS}}{k_{VR}} > 50$
Mounting position	upright to horizontal

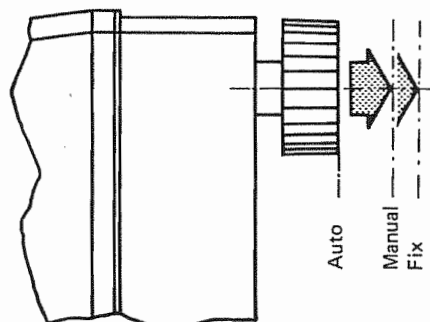
Principle of operation

S-motoric control valve has been specially designed for use in primary hot and chilled water distribution systems and in heating and air-distribution plants. The rack and pinion gearing used for power transmission provides smooth but firm operation.

The end switches are force-operated. This feature simplifies assembly of the valve considerably and also provides excellent protection against mechanical overload.

Manual adjustment

If the handwheel is pulled out into the "manual" position, the inner valve can be adjusted to any position desired. By pulling the handwheel out further into the "fix" position, it can be locked at four points each 90° apart.



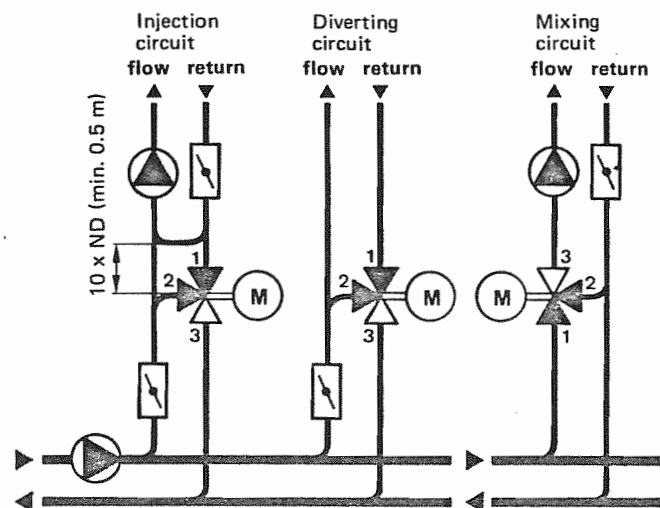
Construction

The motor and the valve-body are supplied separately and are assembled on site. As the end switches operate automatically, the motor and valve body can be assembled without regard to the position of the end switches.

In the case of motors A1H200 and A2H200, the end switches may also be used for indicating the end position (see diagram, page 4).

Indication of position is not possible on the AEH200.

Installation



We recommend installation of a strainer in front of the valve.

Operating data

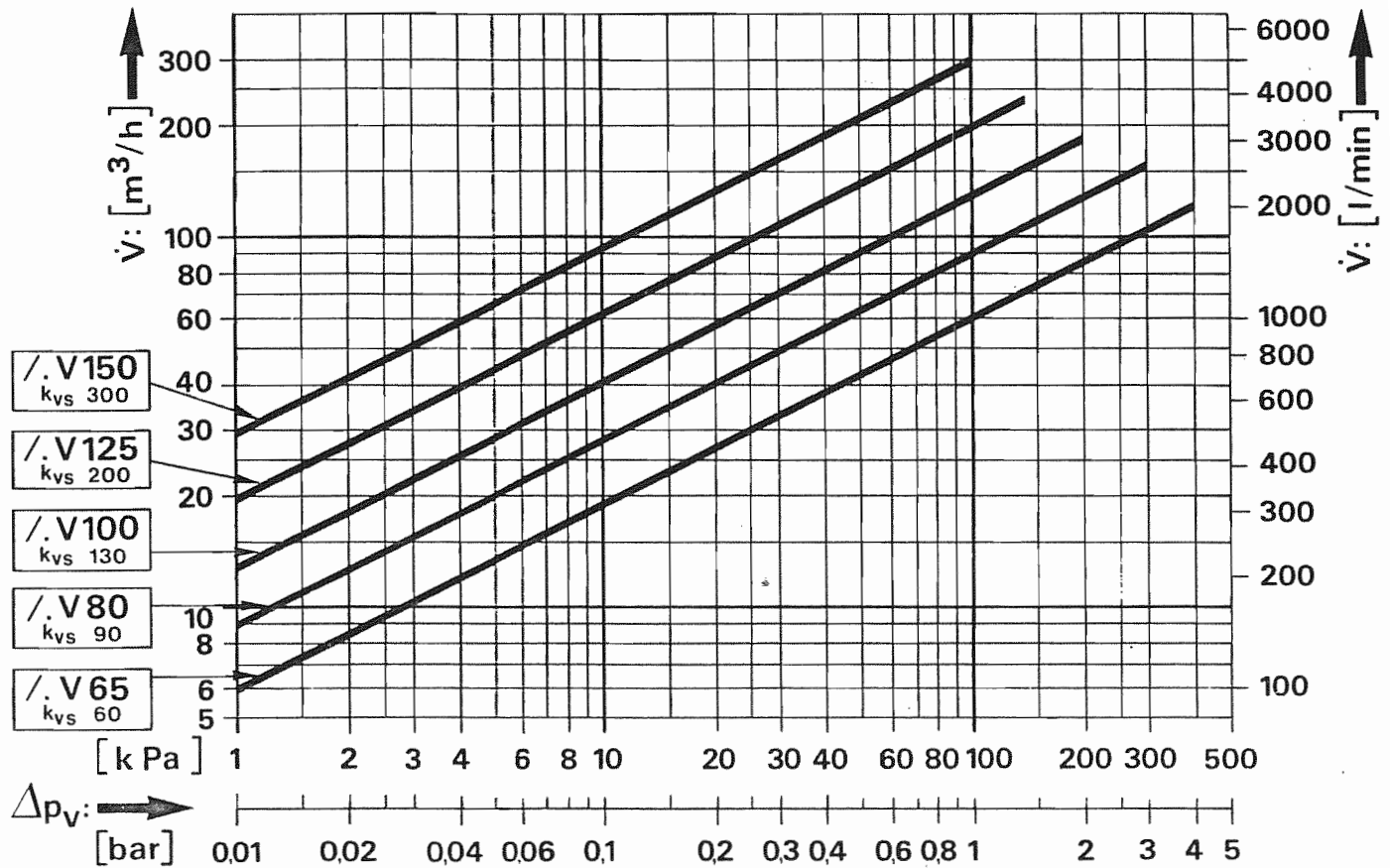
Type two-way valve *	three-way valve	ND [mm]	k_{vs} [m ³ /h]	Stroke [mm]	Positioning time [s]	maximum admissible pressure differential Δp_v max	
						[kPa]	[bar]
A.H200/2V65	A.H200/3V65	65	60	38	266	400	4
A.H200/2V80	A.H200/3V80	80	90	38	266	300	3
A.H200/2V100	A.H200/3V100	100	130	38	266	200	2
A.H200/2V125	A.H200/3V125	125	200	45	315	140	1,4
A.H200/2V150	A.H200/3V150	150	300	50	350	100	1,0

* On the straight-through valve, connection "2" is blanked off at the factory.

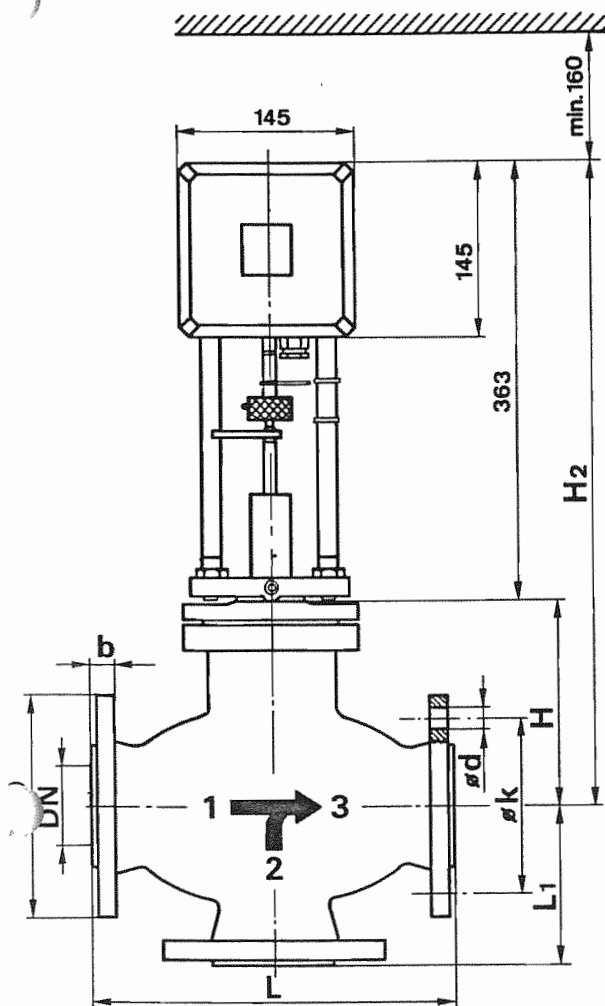
Water flow diagram
for SCS-motoric valves

Flow as a function of pressure differential

k_{VS} signifies the volume of water $\dot{V}$ in m^3/h which flows through the open valve at a pressure differential Δp_V of 100 kPa (1 bar).



Dimensions [mm] and weights [kg]



Flange dimensions according to DIN 2533, PN 16

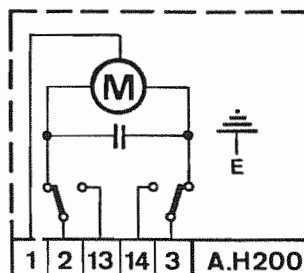
DN	L	L ₁	D	b	k	d	H	Weight
65	290	125	185	20	145	4x18	166	26
80	310	140	200	22	160	8x18	185	32
100	350	160	220	24	180	8x18	212	43
125	400	160	250	26	210	8x18	106	46
150	480	180	285	26	240	8x23	120	63

Motor type	Installation height H ₂				
	DN				
	65	80	100	125	150
A.H200	529	548	575	469	483

Terminal connections

A1H200 and A2H200 motors for 3-point controller

- 1 Phase 24 V or neutral wire 220/240 V AC
- 2 Phase 24 V or 220/240 V AC
spindle retracts (passage 1 → 3 closed)
- 3 Phase 24 V or 220 V AC
spindle extends (passage 1 → 3 open)
- 13 and 14 signal outputs (end position)

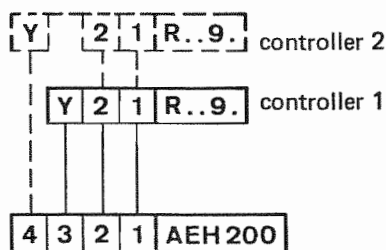


To reverse operation, connections 2 and 3 should be changed round.

AEH200 motor with built-in electronic positioning relay for proportional controllers.

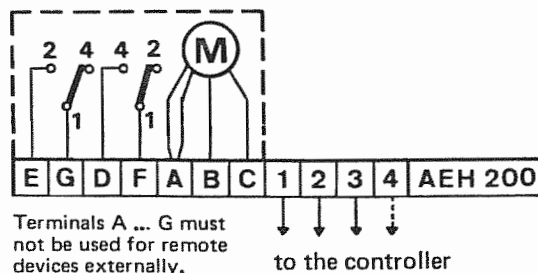
2 controllers may be connected to the same motor for override

- controller 1: Y at terminal 3 (e.g. cooling)
- controller 2: Y at terminal 4 (e.g. dehumidifying)



As delivered from the factory:

At a control voltage U = 0 V DC the spindle is retracted.



To reverse operation so that the spindle is extended at a voltage U = 0 V DC connections F and G on the printed circuit board terminals should be changed round.