

ITT HAMMEL-DAHL

175 Post Road, Warwick, R. I. 02888
Telephone (401) 781-6200

Process Instruments and Controls
International Telephone and Telegraph Corporation

**CONTROL
ENGINEERING
DATA**

V810/V811 VALVE BODY
SINGLE SEAT GLOBE/ANGLE
MICROFLO SERIES

EFFECTIVE 9/1/67
SUPERSEDES 5/1/67

CONTROL ENGINEERING DATA

CONTROL ENGINEERING DATA IS INTENDED TO PROVIDE A SINGLE SOURCE FROM WHICH ONE CAN DETERMINE, IN DETAIL, THE FULL SCOPE OF THE PRODUCT LINE. IN ADDITION TO MATERIAL, PRESSURE RATING, AND DESIGN VARIATION, IT ALSO PROVIDES CAPACITY RATINGS, DIMENSIONAL DATA, AND A MEANS OF DETERMINING THE DEGREE OF AVAILABILITY, i.e. BLACK PRINT, STANDARD; RED PRINT, SEMI-STANDARD. CONTROL ENGINEERING DATA ALSO PROVIDES A MEANS OF COMMUNICATING BY WAY OF A CODE NUMBER WHICH IS FULLY DESCRIPTIVE OF THE PRODUCT SELECTION.

V810/V811

SINGLE SEATED TOP GUIDED, THIS VALVE CONTAINS FEWER PARTS AND BECAUSE OF A SMALLER SEAT RING BORE CAN HANDLE HIGHER PRESSURE DIFFERENTIALS WITH A GIVEN ACTUATOR THAN A TOP AND BOTTOM GUIDED VALVE OF EQUAL LINE SIZE. UNLIKE THE TOP AND BOTTOM GUIDED VALVE IT IS NOT INVERTIBLE AND A REVERSE ACTING ACTUATOR IS REQUIRED FOR AIR TO OPEN ACTION.

ITT Process Instruments and Controls

1	2	3	4	5	6	7	8	9	10	11
MODEL	SIZE	RATING	BODY MATERIAL	END CONNECTION	BONNET	TRIM CHAR.	TRIM SIZE	TRIM MATERIAL	PACKING	VARIATION

MODEL

V810 GLOBE - SINGLE SEAT - Top Guided PULL-STEM-to-Open = 810

V811 ANGLE - SINGLE SEAT - Top Guided PULL-STEM-to-Open = 811

VALVE SIZE

AVAILABILITY: Materials and End Connections

	STEEL or ALLOYS						CAST IRON		BRONZE	
	150#		300#		Butt Weld Ends		125# Scr.	250# Flg.	300# Scr.	300# Ends
	800# Scr.	1500# Scr.	890# Flg.	1500# Flg.	300# 600#	900# 1500#				
1/2" = D	X	X	X	X	X	X	X	X	X	X
3/4" = E	X	X	X	X	X	X	X	X	X	X
1" = F	X	X	X	X	X	X	X	X	X	X
1-1/2" = H	X	X	X	X	X	X	X	X	X	X
2" = J	X	X	X	X	X	X	X	X	X	X
3" = L			X				X	X		X
4" = N			X				X	X		X
6" = Q			X				X	X		X

*NOTE: V811 is not available in Cast Iron or in sizes larger than 1"

BODY RATING

- | | |
|--------------------|---------------------|
| 125# ASA _____ = A | 600# ASA _____ = F |
| 150# ASA _____ = G | 900# ASA _____ = M |
| 250# ASA _____ = B | 1500# ASA _____ = N |
| 300# ASA _____ = H | |

BODY MATERIAL

- | | |
|---------------------------------|-----------------------|
| Cast Iron _____ = A | 304L Stainless = C |
| Brass _____ = B | 316 Stainless = E |
| Steel _____ = C | 316L Stainless = F |
| St. LCB _____ = R | 347 Stainless = L |
| 3 1/2% Nickel Steel _____ = W | Monel _____ = P |
| Ni _____ = L | Hastelloy B _____ = Y |
| Carbon Moly _____ = J | Hastelloy C _____ = N |
| Chr.Moly 4-5% Chr. 1/2 Moly = K | Durimet 20 _____ = Q |
| 304 Stainless _____ = D | |

END CONNECTION TYPE

- | | |
|---------------------------|--------------------------------|
| Flat Face _____ = 2 | ① Butt Weld Sched. 10 pipe = 7 |
| Raised Face _____ = 3 | ② " " " 40 " = 8 |
| Screwed _____ = 4 | ③ " " " 80 " = 9 |
| Ring-Joint _____ = 5 | ④ " " " 160 " = A |
| Socket Weld (Thru 2") = 6 | Brased Ends _____ = B |

BONNET TYPE

- | | |
|-----------------------|--|
| Plain _____ = 2 | ** { Steel Bellows Housing = 5
316 Bellows Housing = 6
Alloy Bellows Housing = 7 |
| Normalizing _____ = 3 | |
| Plain(Ext.) _____ = 4 | |
- *Alloy Housing same material as Valve Body
**Available through 2" valve size only

TRIM CHARACTERISTIC

- | | |
|----------------------------|--------------------------------------|
| Quick Opening _____ = A | Equal Percent Contour _____ = E |
| Linear Contoured _____ = C | Spline - Equal Percent #1-5 only = N |
| | Spline - Linear #6-15 Only _____ = P |

TRIM SIZE

- | |
|----------------------------|
| Full Area _____ = A |
| 1 size Red. _____ = B |
| 2 size Red. _____ = C |
| Cv 2.5 3/8" Red. _____ = G |
| Cv 1.7 1/4" " _____ = H |
| Cv 1.0 3/16" " _____ = J |
| Cv .83 " _____ = K |
| Cv .4 " _____ = L |
| #1 Spline Cv .83 _____ = M |
| #2 " Cv .4 _____ = N |
| #3 " _____ = P |
| #4 " _____ = Q |
| #5 " _____ = R |
| #6 " _____ = S |
| #7 " _____ = T |
| #8 " _____ = U |
| #9 " _____ = V |
| #10 " _____ = W |
| #11 " _____ = X |
| #12 " _____ = Y |
| #13 " _____ = 2 |
| #14 " _____ = 3 |
| #15 " _____ = 4 |

AVAILABILITY BY CHARACTERISTIC, FORM & SIZE			
QUICK OPEN.	LINEAR		EQUAL PERCENT
	1/2"-6"	1/2" thru 6"	1/2" thru 6"
N.A.	1/2" thru 6"	1/2" thru 6"	N.A.
N.A.	1/2" thru 5"	1/2" thru 6"	N.A.
N.A.	1"	N.A.	N.A.
N.A.	3/4" & 1"	3/4" & 1"	N.A.
N.A.	1/2", 3/4" & 1"	1/2", 3/4" & 1"	N.A.
N.A.	1/3", 3/4" & 1"	1/3", 3/4" & 1"	N.A.
N.A.	1/2", 3/4" & 1"	1/2", 3/4" & 1"	N.A.
N.A.	N.A.	1/2", 3/4" & 1"	N.A.
N.A.	N.A.	1/2", 3/4" & 1"	N.A.
N.A.	N.A.	2/3", 3/4" & 1"	N.A.
N.A.	N.A.	1/2", 3/4" & 1"	N.A.
N.A.	N.A.	1/2", 3/4" & 1"	N.A.
N.A.	1/2", 3/4" & 1"	N.A.	N.A.
N.A.	1/2", 3/4" & 1"	N.A.	N.A.
N.A.	1/2", 3/4" & 1"	N.A.	N.A.
N.A.	1/2", 3/4" & 1"	N.A.	N.A.
N.A.	1/2", 3/4" & 1"	N.A.	N.A.
N.A.	1/2", 3/4" & 1"	N.A.	N.A.
N.A.	1/2", 3/4" & 1"	N.A.	N.A.
N.A.	1/2", 3/4" & 1"	N.A.	N.A.

See Next Page

NOTES
(See Last Page)

ITT Process Instruments and Controls

TRIM MATERIAL COMBINATIONS

Valve Plug(6)	Seat Ring (5)	Plug Stem(6)	Guide Bushing (13)	Pkg.Fc11.(14)	
316	316	316	440C	316	= A
316	316	316	316	316	= B
316 S.F.S.	316 S.F.S.	316	440C	316	= C
316 S.F.S.	316 S.F.S.	316	316	316	= D
316 S.F.S.&P (3)	316 S.F.S.	316	316 S.F.	316	= E
Monel	Monel	Monel	Monel	Monel	= F
Hastelloy B	Hastelloy B	Hastelloy B	Hastelloy B	Hastelloy B	= G
Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	= H
Durimet 20	Durimet 20	Durimet 20	Durimet 20	Durimet 20	= J
Nickel	Nickel	Nickel	Nickel	Nickel	= K
440C	316 S.F.S.	316	440C	316	= L
Bronze	Bronze	316	316	316	= M
Stellite Spline	Stellite insert in 316 Ring	316	None	316	= S
316 Post	316 Post	316	None	316	= T
Tung Carb Spline	Tung Carbide insert in 316 Ring	316	None	316	= T
316 Post	316 Post	316	None	316	= T
Monel Spline	Monel	Monel	None	Monel	= C
(#1 thru 5 only)					
Hast. D Spline	Hastelloy D	Hastelloy D	None	Hastelloy D	= V
316 & Teflon	316	316	440C	316	= W
316 & Teflon	316	316	316	316	= X

PACKING

Teflon Impregnated Asbestos with oil JM2012 No Lubricator	= A
" " " " " " With Lubricator & Isolating Valve	= B
" " " " without oil JM2011 No Lubricator	= C
" " " " With Lubricator & Isolating Valve	= D
Mica Impregnated Asbestos JM-399 No Lubricator	= E
" " " " With Lubricator & Isolating Valve	= F
Teflon V-Ring with packing spacer & No Lubricator	= G
" " " " With Lubricator and Isolating Valve	= H
Teflon V-Ring Spring Loaded No Lubricator	= J
" " " " With Lubricator & Isolating Valve	= K
Shredded Teflon No Lubricator	= L
" " With Lubricator	= M
Garlock 256 No Lubricator	= N
" 256 With Lubricator	= P
Crane 187 No Lubricator	= Q
" " With Lubricator	= R
Durametallic Packing No Lubricator	= S
" " With Lubricator	= T
Garlock #5888 No Lubricator	= U
" " With Lubricator	= V
Crane Superseal #3 without Grease (No Lubricator)	= W
" " with Lubricator & Isolating Valve	= X
Rod PAX Grade B No Lubricator	= 2
" " " " With Lubricator & Isolating Valve	= 3
316 Bellows Assembly	= 4
347 Bellows Assembly	= 5
Monel Bellows Assembly	= 6
Inconel Bellows Assembly	= 7

VARIATIONS*

*Use when one of the listed variations from our standard offering is required. When no variation from standard is required enter dash (-); when more than one (1) variation is required or the variation is not listed enter 2.

Teflon Body Gasket	= 2
Soft Iron Body Gasket	= 3
Flexitalllic 316 Clad Teflon Body Gasket	= 5
Flexitalllic 316 Clad Asbestos Body Gasket	= 6
Flexitalllic Monel Clad Teflon Body Gasket	= 7
Stainless Steel Studs & Nuts	= 8
Stainless Steel Lubricator & Isolating Valve	= 9
Steel Lubricator & Stainless Isolating Valve	= 0

MATERIALS OF CONSTRUCTION OF BODY SUB-ASSEMBLIES -- EXCLUDING TRIM

PC. NO.	PART	CAST IRON	BRONZE	STEEL	304 SST	316 SST	316L SST	NICKEL STL. 347	CARBON MOLY	CHROME MOLY	NICKEL	HAST. B	HAST. C	MONEL	DURIMET 20
1	Body	C.I.	Bronze	Steel	304	316	316L	N. Stl. 347	Car.Moly	Chr.Moly	Nickel	Hast. B	Hast. C	Monel	Dur. 20
2	Bonnet	C.I.	Bronze	Steel	304	316	316L	N. Stl. 347	Car.Moly	Chr.Moly	Nickel	Hast. B	Hast. C	Monel	Dur. 20
4	Body Gasket	Asb.	Asb.	St.Stl.	316	316	316	316	316	316	Asb.	Asb.	Asb.	Asb.	Asb.
9 (B)	Body Stud Nut	Steel	Steel	B7	B7	B7	B7	B7	B7	B7	B7	B7	B7	B7	B7
10 (C)	Body Stud Nut	Steel	Steel	2H	2H	2H	2H	2H	2H	2H	2H	2H	2H	2H	2H
16 (A)	Lub. Plug	Steel	Bronze	Steel	316	316	316	316	316	316	---	---	---	Monel	---
21	Lubricator	Steel	Bronze	Steel	Steel	Steel	Steel	Steel	Steel	Steel	---	---	---	---	---
22	Isol. Valve	Steel	Bronze	Steel	316	316	316	316	316	316	---	---	---	---	---

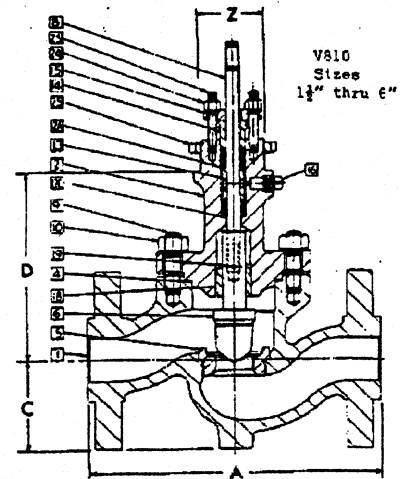
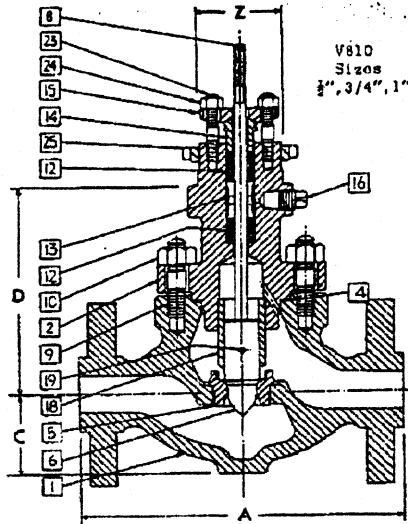
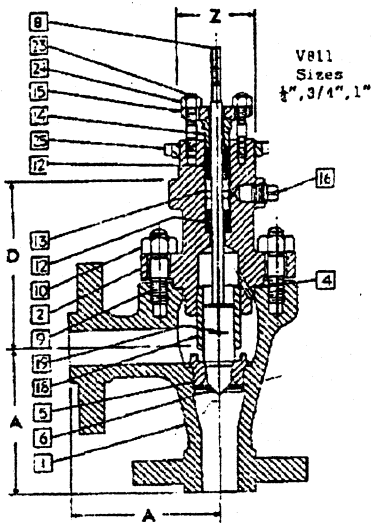
(A) Supplied only with bellows seal construction as plug for tell-tale gauge connection.

(B) Temperature limitations for studs and nuts of B7 and 2H are minus 40°F plus 1000°F. For other temperatures consult factory.

NOTES

(See Last Page)

1	2	3	4	5	6	7	8	9	10	11
MODEL	SIZE	RAVING	BODY MATERIAL	END CONNECTION	BONNET	TRIM CHAR.	TRIM SIZE	TRIM MATERIAL	PACKING	VARIATION



FACE TO FACE DIMENSIONS FOR V810 IN ACCORDANCE WITH ISA RECOMMENDED PRACTICE RP4.1
 FIG. DIM. FOR CAST IRON, CAST STEEL & ALLOY BODIES. MSS STD. FLG. DIM. FOR BRONZE BODIES

VALVE SIZE (Inch)	A DIMENSIONS (FLANGED)				SCR'D N.P.T. SOCK. WELD	BUTT WELD	C	D			SOCKET WELD END CONN.	
	125# ASA*	250# ASA**	600# ASA	900# AND 1500# ASA				D ₁	D ₂	D ₃	J	K
1/2 (1)	7-1/3	7-1/2	8	-	7	-	2-7/16	5-9/16	9-3/4	12-7/8	1.065	1/2
3/4	7-1/4	7-5/8	8-1/8	-	7	-	2-7/16	5-9/16	9-3/4	12-7/8	1.330	1/2
1	7-1/4	7-3/4	8-1/4	9 3/8	-	-	2-7/16	5-9/16	9-3/4	12-7/8	1.915	1/2
1-1/2	8-3/4	9-1/4	9-7/8	-	9-7/8	-	3-7/16	6-1/2	11-3/8	14-5/8	2.405	5/8
2	16	10-1/2	11-1/4	-	11-1/4	-	3-3/8	6-7/8	11-3/4	15-1/2	-	-
3	11-3/4	12-1/2	13-1/4	-	-	-	13-1/4	3-1/2	7-1/4	13-1/4	-	-
4	13-7/8	14-1/2	15-1/2	-	-	-	15-1/2	4-1/16	9-1/2	15-1/2	-	-
5	17-3/4	18-5/8	20	-	-	-	20	6-3/4	10-1/4	16-1/4	-	-

* Flat Face D₁ - Plain Bonnet D₃ - Bellows Bonnet
 ** 1/16" Raised Face D₂ - Normalizing Bonnet

- ① 1/2" Flanged valves available in steel and alloys only.
- ② For 150 lb. and 300 lb. cast steel or alloy bodies with flat face flanges, reduce A by 1/8"

BODY DIMENSIONS FOR V811 ANGLE MICROFLO VALVES
 ASA STANDARD FLANGE DIMENSIONS - - STEEL AND ALLOYS

VALVE SIZE (Inch)	*SCR. or SOCKET WELD END CONNECTIONS		SOCKET WELD END CONN.				FLANGED END CONNECTIONS				D		
	STEEL or ALLOYS		STEEL and ALLOYS				STEEL and ALLOYS				D ₁	D ₂	D ₃
	A ₁	A ₂	C	J	K	150# ASA	300# ASA	600# ASA	900# 1500# ASA				
1/2	2 1/8	2 3/8	1/2	.855	3/8	-	-	-	-	4 3/4	8 7/8	12 1/8	
3/4	2 1/8	2 3/8	3/4	1.065	1/2	3 5/8	3 13/16	4 1/16	-	4 3/4	8 7/8	12 1/8	
1	2 1/8	2 3/8	1	1.330	1/2	3 5/8	3 7/8	4 1/8	4 11/16	4 3/4	8 7/8	12 1/8	

D₁ - PLAIN BONNET D₂ - NORMALIZING BONNET D₃ - BELLWOS BONNET

A₁ = FROM SIDE OF BODY TO CENTER LINE OF THE BOTTOM CONNECTION.
 A₂ = FROM BOTTOM OF BODY TO CENTER LINE OF SIDE CONNECTION.

* Screwed or Socket Weld Valves are Barstock.

VALVE BODY DATA

VALVE SIZE (Inch)	VALVE TRAVEL (Inch)	PLUG STEM CONN. (Inch)	BONNET MOUNT DIA. Z	"UD" POSITION	PLUG STEM DIA. (Inch)
1/2	1	5/16	2 1/8	4 1/2	3/8
3/4	1 1/8	7/16	2 1/8	4 1/2	7/16
1	1 1/2	3/8	2 3/8	5 3/4	5/8
1 1/2	1 1/2	5/8	2 3/8	5 3/4	3/4
2	2 1/4	7/8	3 3/8	7 1/4	1

VALVE SIZE (Inch)	FLOW COEFFICIENTS	
	FULL AREA	REDUCED
1/2	3.0	** 2.5 1.0 ** 1.7 0.63
3/4	5.0	** 3.5 1.7 ** 2.5 0.63 ** 1.0 0.40
1	13.0	** 5.0 2.5 ** 3.5 1.0 ** 1.7 0.63 ** 0.40
1 1/2	30.0	** 13.0 ** 6.0
2	48.0	** 30.0 ** 13.0
3	65.0	** 48.0 ** 30.0
4	100.0	** 105.0 ** 48.0
6	390.0	** 190.0 ** 105.0

* One Size Reduced
 ** Two Size Reduced

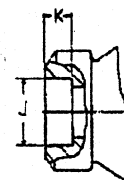
EQUAL PERCENT	FLOW COEFFICIENTS	
	SPLINE (Q)	
	EQUAL PERCENT	LINEAR
#1 - .63	#6 - .063	#7 - .040
#2 - .40	#8 - .025	#9 - .016
#3 - .25	#10 - .010	#11 - .0063
#4 - .16	#12 - .0040	#13 - .0025
#5 - .10	#14 - .0016	#15 - .0010

① For valves thru 1" only

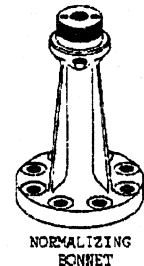
PARTS LIST

- BODY
- BONNET
- BONNET GASKET
- SEAT RING
- VALVE PLUG
- PLUG STEM
- BODY STUD
- BODY STUD NUT
- PACKING
- PACKING RING
- PACKING WASHER
- LANTERN RING
- PACKING FOLLOWER
- PACKING FLANGE
- BONNET LUB. PLUG
- GUIDE BUSHING
- PLUG STEM FIN
- PACKING STUD
- PACKING NUT
- CLAMP NUT

* RECOMMENDED SPARE PARTS



SOCKET WELD. END CONN.



NORMALIZING BONNET

NOTES

- ① V810 only.
- ② Normalizing bonnet not available with bellows seal, as standard bellows seal bonnets have sufficient heat transfer surface for both high & low temperature service.
- ③ S.F.S. & P. = Stellite Faced Seat & Post.

**ITT HAMMEL DAHL
CONOFLOW**

175 Post Road, Warwick, Rhode Island 02888
Telephone 401/781-6200 Telex 927726

Service and Installation

**HDC 13004-9
Single Seat Globe Valve
V810 Series
Effective 5/1/77**

MICROFLO VALVE BODY ASSEMBLIES V810 Series Globe Body 1/2 - 6 Inch

Storage

When a valve is to be stored for an extended period, remove the line connection covers and spray a light coating of machine oil on the internals. Replace the covers to prevent foreign matter from entering the valve body. Exposed parts should also be sprayed with a protective film of oil.

A packing list, containing a complete description of the valve and accessories (such as a valve positioner etc.), accompanies each valve when shipped. This list should be checked soon after the shipment has been received.

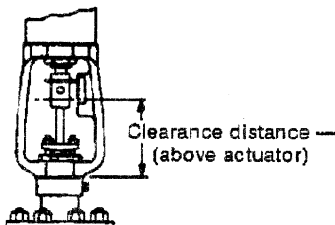
When hoisting the valve, make sure that ropes or cables are of sufficient strength and are positioned so that any tubing or accessories will not be damaged.

Installation

The valve performs best when placed in a straight run of the main line away from pipe bends or sections of abnormal velocity. The valve may be installed in any position provided the correct direction of flow is maintained.

Clearance should be provided above the actuator to permit its removal for servicing, or for inspection of the pull-stem-top-open plug.

Clearance determination for servicing valve in line:



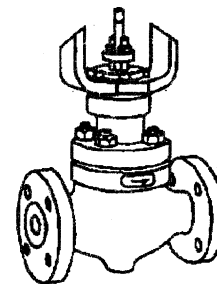
By-Pass: The conventional three valve by-pass should be installed if it is necessary to continue operation during periods of control valve servicing.

Connections: Pipe threads should be clean and sharp. Use pipe compound on the male threads only.

When making flanged connections, tighten the bolts

evenly to avoid placing a strain on the body or cracking a flange.

Instruments: An air supply pressure regulator with filter should be installed in the air line ahead of any valve-mounted instruments. Mounted positioners are piped and adjusted at the factory.



V810
Globe body

Excessive delay in response occurs when air control instruments are placed more than 100 feet from the valve.

Packing Adjustment: Standard teflon impregnated asbestos — Tighten packing flange nuts (24) evenly for optimum seal pressure on valve stem and packing box walls. Slightly more than hand tightening is adequate to stop any stem leakage. Over-tightening will restrict stem movement.

See page 6 for other packing materials.

Special bonnets: The special valve bonnets shown on page 3 are designed to protect the stem packing from extremes of line temperature. Radiation fin bonnets dissipate heat and must not be wrapped with any form of insulating material.

Final check: After the valve has been installed, make a final check of the following: (1) Valve travel — vary air supply to the actuator to ascertain that actual travel corresponds with the nameplate indication. (2) Air lines to the actuator — check for leaks. (3) Control instruments/valve action — check to be sure that the combined actions (direct or reverse) of controller, positioner (if any), and valve will provide the desired direction of valve movement, and will

ensure the required valve position in the event of air failure.

Under actual operating conditions, pressure drop across the valve may differ from the calculated fig-

ure. Diaphragm actuators on single seated valves may require readjustment of the spring in order to provide full valve travel and shutoff. See Actuator Instructions Supplement for this procedure.

Maintenance

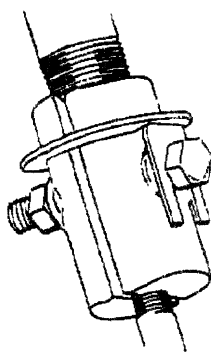
I. General

- A. Maintenance such as diaphragm, packing, or trim replacement can be done without removing the valve from the line.

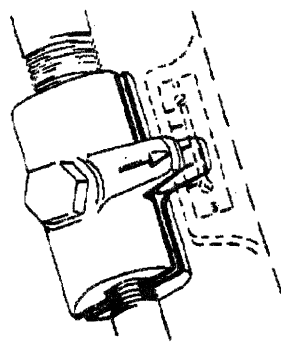
II. Removal of actuator from body assembly

Note: The valve plug must be off the seat ring while the stem connector is being separated — apply air to the actuator if necessary.

- A. Remove any existing checknut or other attachment from the end of the stem connector cap screw — actuator yoke will pass over the packing flange.
- B. Separating the stem connector (split-coupling)
1. Type I — with separate brass ring travel indicator
 - a. Unscrew the connector screw enough to release the slotted tongue of the travel indicator, then slide the indicator ring above the top of the connector.
 - b. Remove the connector capscrew to free the connector halves, then remove the connector halves and travel indicator.
 2. Type II — with integral travel indicator fingers
 - a. Unscrew the connector screw and remove the halves of the connector.
 - b. Remove the rubber dust boot from the end of the actuator packing box.



Type I — with brass travel indicator ring



Type II — with integral indicator fingers

Stem connectors

C. Dismounting the actuator

The actuator is removed from the body as a unit, without disturbing the packing box bolting. Clamp nut and actuator yoke will pass over the packing flange.

1. Disconnect the air supply and/or any electrical connections to the actuator.
2. Unscrew the hammer lug clamp nut (25) from the bonnet threads and lift the nut over the plug stem.
3. Lift or hoist the actuator unit off the valve, taking care to avoid damaging the plug stem, instruments, or tubing.

III. Disassembly of valve body

A. Removing packing

1. Unscrew the packing flange nuts (24), and remove packing flange (15) and packing follower (14).
2. Remove the bonnet/body stud nuts (10) and lift the bonnet (2), while holding the plug stem (8) (to prevent the plug from dropping out) carefully off the valve body. Discard the body gasket (4).

CAUTION: Spline plugs are seat guided, so that a straight upward pull is required until the plug clears the seat.

3. Withdraw the plug and stem (6 & 8) out of the bonnet through the guide (18).
 4. Using a narrow hook or bent wire, pull the packing rings and lantern ring (12 & 13) out of the packing box.
 5. Clean the packing box thoroughly before replacing packing as instructed on page 6.
- B. Complete disassembly

With the plug and stem removed from the bonnet as per paragraph A, and providing that one of these parts is to be replaced or machined, (contoured plug only), proceed as follows:

1. Drive out the plug stem pin (19) and unscrew the stem (8) from the plug (6).
2. Unscrew and remove the seat ring.

Note: The seat ring should be removed only for re-machining or replacement. It should not be removed for cleaning purposes. Special Hammel-Dahl wrenches are available for seat removal. A lathe or boring mill can be used for unscrewing seat rings. Heating the valve body or chilling the seat ring may be required to loosen an extremely tight seat.

3. The pressed-in guide bushing (18) should be removed from the bonnet (2) only for replacement. A stud welded into the guide will serve as a jackscrew puller.

7. Assembly of valve body

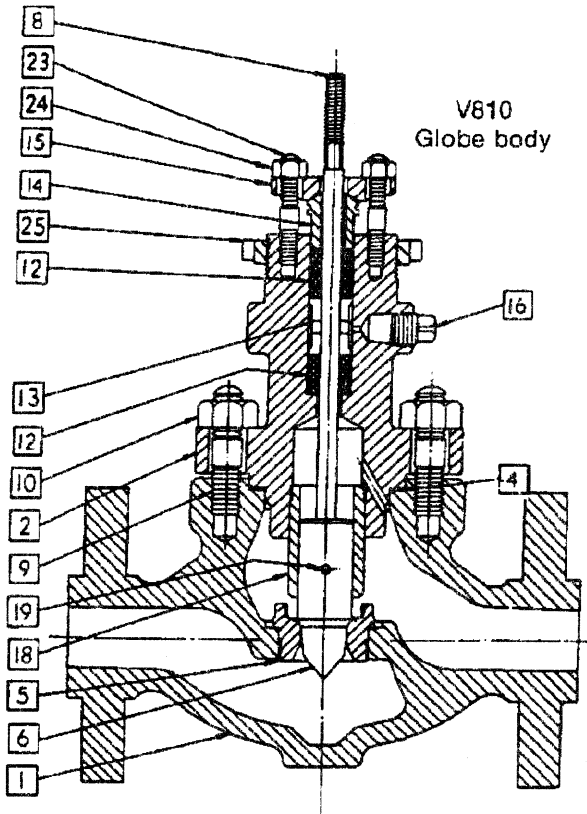
A. A new plug and stem are pinned together at the factory. If only one of these parts is to be replaced, the old plug stem pin (19) must be driven out and the stem unscrewed. After screwing together the new combination, drill through the plug and stem, countersink, insert

and peen the pin, then machine the pin flush with the plug shank surface. The pin diameter must not exceed $\frac{3}{8}$ of the plug stem diameter.

1. Apply pipe compound to the seat ring (5) threads, then install the set ring in the body.

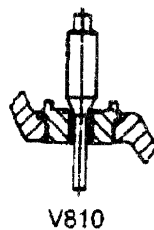
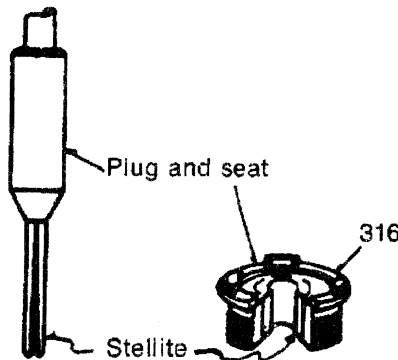
CAUTION: Each spline plug and seat is a matched set, precision ground to a selective fit. Never install a new seat or plug only. Extreme care should be taken with splines to avoid chipping or breakage.

2. Lower the plug and stem assembly (6 & 8) into the body. With spline plugs, be ex-



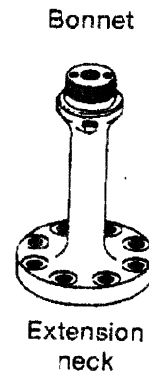
Parts List

- 1 Body
 - 2 Bonnet
 - *4 Bonnet gasket
 - *5 Seat ring
 - *6 Valve plug
 - *8 Plug stem
 - 9 Body stud
 - 10 Body stud nut
 - *12 Packing
 - 13 Lantern ring
 - 14 Packing follower
 - 15 Packing flange
 - 16 Lubricator plug
 - 18 Guide bushing
 - *19 Plug stem pin
 - 23 Packing stud
 - 24 Packing nut
 - 25 Clamp nut
- *Recommended spare parts



Spline Trim

Stellite spine trim



Spline Trim

Spline trim illustrated at left shows the "V" (spline) groove in the valve plug. As the plug is drawn out of the seat ring, more of the "V" is exposed to pass an increasingly greater flow. Section views below illustrate the seat ring as installed in the valve bridge and with the spline plug in the full down (closed) position.

Maintenance

tremely gentle when inserting the plug into the seat ring to avoid damaging the plug tip.

3. Place a new bonnet gasket (4) on the body, and lower the bonnet carefully over the plug stem and body studs to its place on the body.
 4. Install the stud nuts (10) and tighten them evenly.
- B. Install packing**
1. Slip three packing rings (12) over the stem (8) to the bottom of the packing box.
 2. Place the lantern ring (13) on top of the three rings, then place four rings on top of the lantern ring.

Note: Check to be sure that the channel in the lantern ring is opposite the lubricator hole in the valve bonnet.

3. Slip the packing follower (14) over the stem to rest on the packing and check to see that it enters the packing box at least $\frac{1}{8}$ ".
4. Place the packing flange (15) flat side up, over the stem and flange studs (8 & 23) to rest on the packing follower.
5. Screw the packing flange nuts (24) onto the studs and tighten them evenly to avoid cocking the flange (15). Finger tightening is sufficient.

V. Mounting the actuator

Assemble and adjust the actuator as instructed in the appropriate Actuator Instructions.

- A. Lower the actuator over the plug stem and packing flange to seat squarely on the bonnet shoulder.
- B. Rotate the actuator to a convenient position, then screw the hammer lug clamp nut (25) onto the valve bonnet threads and tighten it securely.
- C. Connecting actuator stem to valve plug stem.

The valve plug must be on its seat while the actuator stem is being connected; On pull-stem-to-open valves, the actuator stem must be at its lowest position of travel.

1. Type I stem connector — with separate brass ring travel indicator.
 - a. Place the brass travel indicator (tongue downward) on the actuator stem. Tape the indicator to the actuator stem temporarily while the stem connector is being applied.
 - b. Press the half of the stem connector which is threaded for the connector cap-screw against the actuator stem and valve plug so that:
 - (1) The ends of the stems are equidistant from the tapped connector screw hole, and

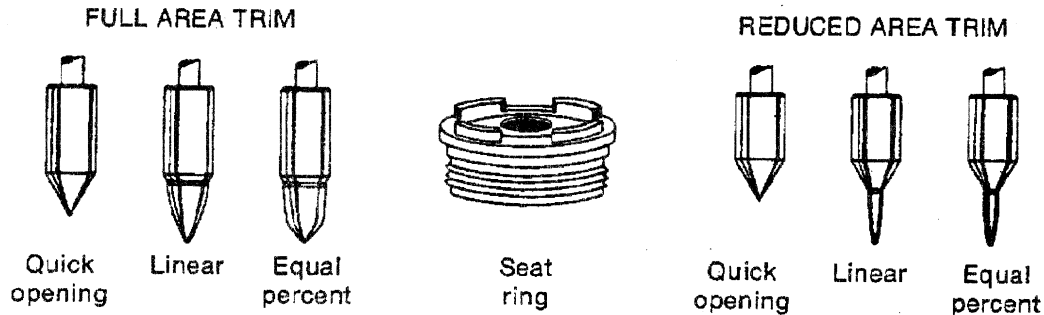
(2) The tapped connector screw hole is on the same side of the actuator as the positioner or other accessories which may require attachment to the connector screw.

Note: It may be necessary to move the valve plug off its seat a slight distance in order to mesh the valve plug stem threads with the lower connector threads.

- c. Apply the other half of the connector, carefully engaging threads, then insert the connector cap screw and tighten it by hand.
 - d. Slide the travel indicator ring over the connector, and back off the connector cap screw enough to permit the slotted tongue of the indicator to slide behind the cap screw head. Position the indicator approximately opposite the "Shut" marking on the travel indicator scale, then retighten the connector cap screw by hand.
2. Type II stem connector — with integral travel indicator fingers.
 - a. Push the dust boot upward on the actuator stem while applying the connector.
 - b. Follow steps (b) and (c) above, for the Type I connector, but note that the indicator fingers of the Type II connector must straddle the indicator scale boss.
- D. Establishing valve travel and plug seating tension**
1. Pull-stem-to-open valves
 - a. Maintain the actuator stem at its lowest position of travel.
 - b. In case the plug was moved off the seat during the stem connection procedure: Prevent the stem connector from rotating, then unscrew the valve plug stem from the connector until the plug is firmly seated.
 - c. Move the plug off the seat, then unscrew the valve plug stem an additional one-half turn out of the connector to ensure positive seating.
 - d. Tighten the connector capscrew securely.
 - e. Seat the valve plug firmly by means of the actuator.
 - f. Adjust the travel indicator scale so that the "Shut" mark is opposite the travel indicator ring (Type I connector), or finger arrows (Type II connector).
 - g. Disconnect the airline used for assembly procedure, then apply the check nut or attachments (if any) to the connector cap screw.

Contoured Trim Identification

Spline Trim illustrated on page 3. Never lap Spline Trim



Contoured Trim Lapping Instructions

(1" Valve Only)

I. General

- A. Assembly of the valve for lapping (as outlined below) establishes the exact areas of plug and seat surface which will make contact when the valve is closed. The lapping operation then ensures minimum leakage by creating an extremely smooth, uniform contact between these seating surface areas.

CAUTION: Never lap a spline plug and seat ring.

- B. Lapping can correct shallow scratches or slight roughness only. Excessive lapping produces a groove in the plug, therefore plugs or seats having relatively deep scratches must be remachined.

CAUTION: Never lap a spline plug and seat ring.

II. Machining of trim

- A. Plugs or seats having a hard facing such as Stellite can be remachined before being lapped, but care should be taken to leave sufficient hard facing material intact.

III. Lapping

A. General

1. Grinding compound should be grade "A" or finer.
2. Apply grinding compound to the seating surface of the seat ring only. Compound on the characterized portion of the plug could increase the clearance between plug and seat, thus changing the flow characteristic and rangeability of the valve.
3. A film of light machine oil on the valve plug stem will facilitate stem movement during the lapping procedure.
4. Thoroughly clean the seat ring and the plug before and after lapping.

B. Fabricating the lapping tool

1. A "T" handle for the valve plug stem can be made by welding a nut (with threading to match the plug stem threads) to the center of a rod.

C. Assembling the valve for lapping

1. Assemble seat ring, cage, and gaskets into body as described in Maintenance, Section IV, paragraph A.
2. Carefully insert the valve plug and stem assembly (6 & 8) into the bonnet (2) from the bottom. Avoid damaging the stem threads or the walls of the guide bushing (18).
3. Position the bonnet and the plug assembly on the body and install and tighten two or three body stud nuts (10) to secure the bonnet during lapping.
4. Install temporary packing so that the valve plug stem will be aligned during the lapping operation. Any rope packing may be used for this purpose.
5. Screw a lock nut onto the valve plug stem, then screw the lapping tool onto the stem and lock it in position:

D. Lapping procedure

1. Lap with short, oscillating strokes. The weight of the plug, stem, and lapping tool provides ample pressure for lapping — do not bear down.
2. Raise the plug occasionally, lower it to another position and resume the oscillating strokes. This ensures an even lap over the entire seating surfaces of plug and seat.
3. Approximately 5 to 10 minutes lapping time, with grade A compound, is usually required to obtain a satisfactory fit between a new plug and seat.
4. Clean the plug and seat, then, holding the plug on the seat by hand, apply compressed air to the inlet side of the valve to check the tightness of the lapped parts. Repeat the lapping procedure if necessary.
5. Disassemble the valve and clean all parts thoroughly. Remove all traces of grinding compound. Remove the temporary packing and clean the packing box.

Note: Do not loosen or remove the seat ring for cleaning purposes.

Packing Instructions

Before proceeding with the appropriate packing operation below, clean the valve packing box thoroughly and assemble the valve body as per Maintenance Section IV. Teflon or Mica packings normally do not require periodic lubrication.

CAUTION: All packings without spring loading —

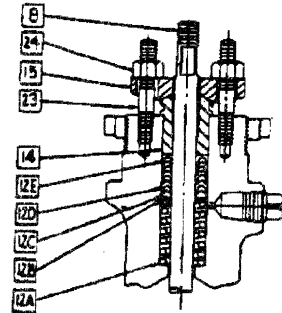
Finger tightening of the packing flange nuts (24) should provide ample sealing pressure to the packing rings. When the valve is placed in service this adjustment should be checked, and the nuts tightened just enough to prevent any leakage. Excessive tightening will bind the valve stem and prevent sensitive response.

Spring-loaded Chevron Teflon

1. Lubricate the five teflon rings lightly with silicone lubricant for ease in assembly (one male adapter, one female adapter, and three chevron rings).
2. Slide the compression spring (12A) over the valve plug stem to the bottom of the packing box.
3. Drop the packing washer (12B) over the stem to rest on the packing spring.
4. Place the teflon male adapter (12C) flat side down, against the packing washer (12B), then fit the three chevron rings (12D) into the packing box, with grooved sides down. Seat the female adapter (12E), flat side up, on the topmost chevron ring.

Note: Avoid damage to the teflon rings when slipping them over the stem threads, and be sure each ring is pushed firmly into the packing box.

5. Slide the packing follower (14) over the stem to rest on the female adapter.
6. Place the packing flange (15), flat side up, over the stem and flange studs (8 & 23) to rest on the



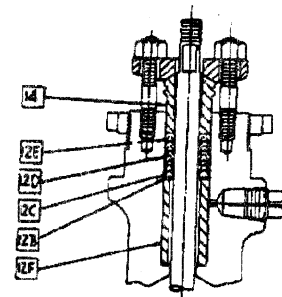
7. Screw the packing flange nuts (24) onto the studs and tighten them evenly until the packing follower shoulder contacts the top of the bonnet. No further packing adjustment is required because packing spring compression maintains the proper sealing pressure on the chevron rings.

Chevron Teflon

1. Lubricate the five teflon rings lightly with silicone lubricant for ease in assembly (one male adapter, one female adapter, and three chevron rings).
2. Slide the packing spacer (12F) over the valve plug stem to the bottom of the packing box.
3. Drop the packing washer (12B) over the stem to rest on the spacer.
4. Place the teflon male adapter (12C) flat side down, against the packing washer (12B), then fit the three chevron rings (12D) into the packing box, with grooved sides down. Seat the female adapter (12E), flat side up, on the topmost chevron ring.

Note: Avoid damage to the teflon rings when slipping them over the stem threads, and be sure each ring is pushed firmly into the packing box.

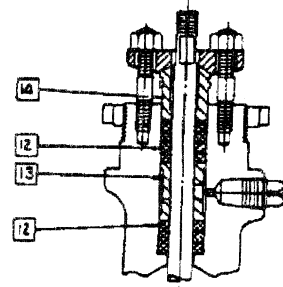
5. Slide the packing follower (14) over the stem to



- rest on the female adapter.
6. Place the packing flange (15), flat side up, over the stem and flange studs (8 & 23) to rest on the packing follower.
7. Screw the packing flange nuts (24) onto the studs and tighten them evenly to avoid cocking the flange (15). Finger tightening is sufficient.

Teflon or Mica Impregnated Asbestos

1. For the purpose of assembly only, lubricate the seven packing rings (12) lightly with silicone lubricant.
2. Slide three packing rings over the valve plug stem to the bottom of the packing box.
3. Place the lantern ring (13) on top of the packing. Check to be sure that the channel in the lantern ring is opposite the lubricator hole in the valve bonnet.
4. Insert the remaining four packing rings above lantern ring (13).
5. Slide the packing follower (14) over the stem and guide it into the packing box at least $\frac{1}{8}$ ".
6. Place the packing flange (15), flat side up, over the stem and flange studs (8 & 23) to rest on the



- packing follower.
7. Screw the packing flange nuts (24) onto the studs and tighten them evenly to avoid cocking the flange (15). Finger tightening is sufficient.

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