

## Sleeved Plug Valves

Installation,

Operation and

Maintenance



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## 0. Introduction

This manual is designed to explain the storage • installation • test • maintenance for all the Sleeved plug valve supplied by IDEX INDIA. You must comply with this manual to maintain and manage the Lined plug valve for a long time.

### 0-1. User Safety

All the person in charge must be fully aware of the contents covered, understand and practice exactly. The contents of this manual doesn't cover any unforeseen accident that can occur in Lined plug valve, related equipment and a variety of working process, so while acting by the contents of this manual, proper handling and precaution should be taken based on the common sense and experience of the relevant worker situationally. The procedures and orders of this manual is composed of maintenance of Lined plug valve to assist the user. Please read the notes below.

 CAUTION	 Warning	 Notice
do not attempt to repair the valves or components during under Pressure. It can lead to Serious injury or death.	Please read the instructions Before repairing the valves. If you do not follow the instructions of this manual, It can lead to serious Injury or sometimes death.	This instruction covers valves which are in current production. If you need to repair a discontinued valve, please contact with IDEX service center for correct service method and instructions.

### 0-2. Protective Clothing

IDEX products are often used in critical applications such as extremely high pressures, dangerous, toxic or corrosive mediums. When performing service, inspection or repair operations always ensure that the Valve and actuator are depressurized and that the valve has been cleaned and is free from harmful Substances. Proper PPE should be used while working under these conditions (Gloves, Glasses and mask).

### 0-3. Qualified Personnel

The persons should have proper training and knowledge of relevant standards and specifications. He/she should be well versed with accident prevention regulations and operating conditions. The persons should be authorized by the concerned safety officer of the plant.

# 1. Specification and Availability

1-1. IDEX Sleeved plug valve are designed under the following specifications as shown below:

Size	0.5"		0.75"		1"		1.5"		2"		3"		4"		6"		8"	
Rating	150	300	150	300	150	300	150	300	150	300	150	300	150	300	150	300	150	300
Temperature Range	-2 to + 200 Degree C																	
Connection	Flange,BW		Flange,BW		Flange,BW		Flange,BW		Flange,BW		Flange,BW		Flange,BW		Flange,BW		Flange,BW	
Design	ASME B16.34 , API 599																	
End to End	ASME B16.10																	
Dimension Flanges	ASME B16.5																	

PRESSURE TEMPERATURE DIAGRAM: ACCORDING TO ASME B16.42



## 2. Cross-Sectional View and list of MOC:

The list of components, its Material of Construction and range of operation is described in the table below:

Sr. No	Component	Material of Construction	Alternate Material Available
1	20717112-M6 X 15 Hex Bolt	A470	316, 316L, Alloy 20, Cd4MCuN, CZ100, Monel
2	80527051- Bonnet Machining	ASTM A 216 Gr.WCB	Alloy 20, Cd4MCuN, CZ100, Monel
3	81731177- Washer	SS 316 L	316, 316L, Alloy 20, Cd4MCuN, CZ100, Monel
4	82728190- Cup Spring	1.431	GFT, Modified PTFE
5	83421159- O-Ring	VITON	Monel
6	84931168- Pressure plate	SS 316	Epoxy coating available
7	80731132- Diaphragm Plate	SS 316 L	Monel
8	82123141 - Diaphragm	V.PTFE	-
9	84823150-Wedge Ring	V.PTFE	Monel
10	84741109- Plug Machining	ASTM A 216 Gr.WCB	Modified PTFE
11	80427033- Body Machining	ASTM A 216 Gr.WCB	Modified PTFE
12	81123123-Sleeve	PTFE	Modified PTFE
13	20717124-M12 Hex Nut	A470	-
14	20717118-M12x 50 Hex Bolt	A 470	-
15	4188_11_1060- Tag Plate	SS 316	-

Figure 1: List of components details

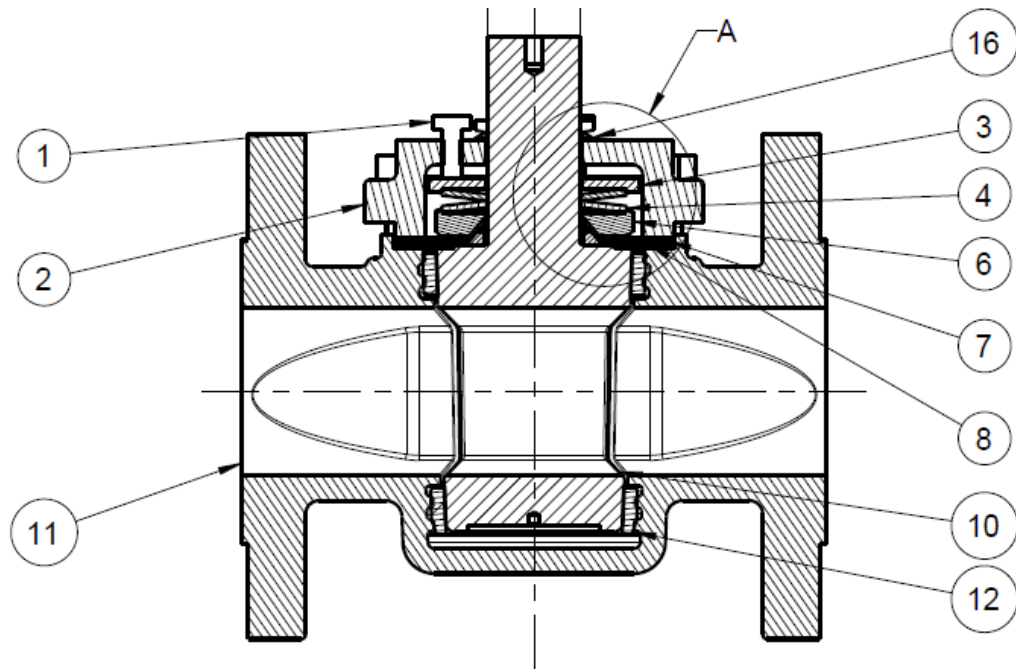
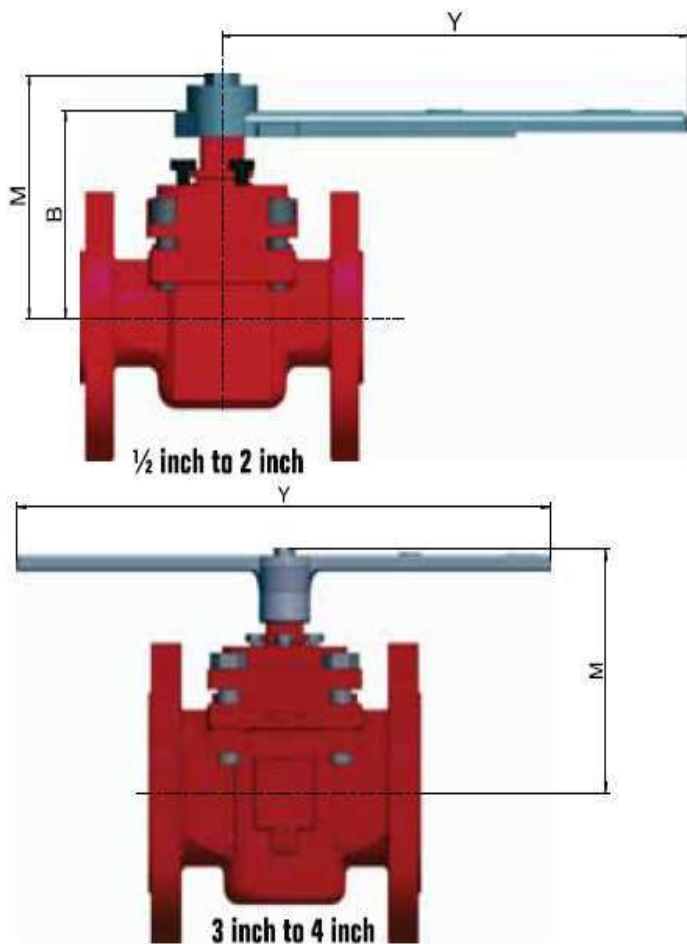


Figure 2: Cross Section of Sleeved Plug Valve

*Details of 1 to 16 is given in below table*



Classes 150/300			
Size	B	Y	M
0.5"	63.5	210	77.7
0.75"	69.5	210	83.7
1"	77	300	91.2
1.5"	94	300	108.2
2"	107.5	300	123.1

Classes 150/300		
Size	Y	M
0.5"	400	156.6
0.75"	450	191

### Dimensions with Lever Operator

## 3. Storage (Prevention) and Unpacking

- During transport the valve must be protected from impact and collisions. Under no circumstances the valve should be dragged, dropped or thrown. It can cause damage.
- To prevent damage of sealing surface of the plug, the valve should be kept in open position, while transporting, storing and installing. (preservation)
- The valve shall be stored in a cool and dry place to protect from the climatic conditions such as Dust, moisture, or rain.
- The flange cover shall not be taken off until installation as it protects the inside ports from dust and other foreign particles. Failing to do so can cause damage to valve surface. (Preservation)

- Periodical checks to be carried out in the storage area to verify that the above-mentioned conditions are maintained.



**Avoid the flame, fire or hot/cold temperature, which could damage gasket or seal parts and happen to leakage.**



**Dry the valve body before painting of the valve because humidity may cause destruction of valve.**

- While unpacking, check the packing list against the materials received. Lists describing the valve and accessories are in each shipping container.
- Contact logistics immediately, if there is a shipping damage.
- In case of any other issues, call your IDEX representative.

## 4. Installation

- Before installation, examine the valve for in-transit damage, damaged valves shall not be installed. To carry the valves proper arrangement should be made which can sustain the load. The valve should be installed with firm groundwork.



**Pay attention to correct tightening torques as mentioned in figure**

- Flange ends type valves should be fitted parallel with counter flange and standard gasket. The bolts to fit should be tightened by diagonal axis successively.



**Poorly aligned pipe connections cause leakage, fissuring rupture while using under pressure.**

- Always follow guidance mentioned in the attached plates.



**Check material grade on name plate or body to verify compatibility of fluids with the valve.**

Size - NPS (DN)	Torque NM at $\Delta P=20$ bar for class 150	Torque NM at $\Delta P=50$ bar for class 300	Cv Values
1/2" (15)	12	12	10
3/4" (20)	12	12	10
1 " (25)	25	25	48
1.5"(40)	35	35	98
2"(50)	75	75	190
3" (80)	120	120	330
4"(100)	240	240	630
6"(150)	450	450	1200
8" (200)	785	785	1900

*Figure 4: Operating Torque & Cv Values*

Note : Safety factor to be added . Please consult factory for the same

## 5. Commissioning and Operation

- The valve should be operated under trained personal. Normally, the Plug valves have been tested for leaks with air or water. Prior to initial operation check body bolting. Unless otherwise agreed, there could be residual amounts of water in the flow section of the valve; this could result in a possible reaction with the medium. To prevent leaks, all connection screws must be checked and retightened if needed after the initial loading of the valve with operating pressure and operating temperature.  
For torque refer the above table 4.
- If the valve is equipped with a locking device, only the concerned operator or the supervisor should keep the key. In case the device wants repairs, it should be done straightaway.
- After installation, the valve shall be fully opened and should remain in this fully open position until lines are thoroughly cleaned and flushed. During operation, care shall be taken not to adjust the adjusting bolts and cover bolts except for operators.
- Don't' remove any device / attachment from the valve under any circumstances.
- The operation shall be stopped in case of defects observations. The application terms must be observed; for example, the pressure limitation and the application for material.



**Check the maximum working pressure on the Name plate.**



**Check marking of maximum operating temperature on the name plate.**



**Do not use v-notch stamps on the body this results in weakening of the body strength leading to leakage or serious injury especially under pressure applications.**

- In accordance with the manual, the inspection of the functions shall be carried out periodically always right before the operation of the valve.



**Keep filtration of the fluid, internal wearing under the effect of an abrasive cause leakage Issuing rupture during use under pressure.**

- The maximum force required at the hand wheel or wrench to apply the breakaway torque shall Not exceed 360N



**Any tool or other device to operate valves may cause serious problem like leak or malfunction**

## 6. Maintenance

- All repair work is to be performed by qualified personnel using the appropriate tools. Generally recognized practice in mechanical engineering is to be observed.
- For the arrangement, designation and item numbers of all parts of the valve refer figure.
- Spare parts are to be ordered with all the details in acc. with the valve identification.
- Only original spare parts may be installed. To prevent leaks, a regular check of the connection's crews should be made in line with the operating requirements. For torque values refer torque table

### 6.1 Trouble shooting

- Packing is leaking: Retighten 3- bonnet screw according to the details in table 6.
- Plug valve does not operate: Check for following points

Is the actuator being supplied with power?

Is any directional control valve connected correctly?

Is there any foreign matter in the valve?

- The Plug no longer closes completely: Check for following points

Is the stem deformed?

Is the coupling worn?

- With a worm gear or actuator, check whether the end stops can be re-adjusted. The operating manuals of the gear and actuator manufacturers contain accurate instructions.

- Never apply force to the lever or use an extension.
- Try to get the plug valve working again by moving the lever to and fro.
- Remove the lever stop and try to switch against the normal direction of rotation.
- If actuation is not possible with the max. admissible breakaway torque as per **table 3**, dismantle plug valve and inspect individual components.

Note: For dismantling procedure check section 6.2

## 6.2 Dismantling Plug Valve

### 6.2.1 Plug Valve with Lever

- Remove the mounting plate now take out the lever.
- First open screw-12 of bonnet-3 with respective torque wrench.
- Next, Open the top four screws of bonnet-3 with the help of designated size torque wrench. And now remove the bonnet.
- Now remove the parts sequentially as shown in cross section 1 view starting with thrust plate-4, then cup spring-5, pressure plate-6, O-ring-7, diaphragm plate-8, diaphragm-9, wedge Ring-10 and V-ring-11.
- Check that Diaphragm (*Refer 9 of cross section*) is not teared or scratched in inner diameter where it fits plug stem,
- O-ring (*Refer S. No: 7 of cross section*) has deformed shape or not,
- Cup spring (*Refer S. No: 5 of cross section*) are not in deformed shape.
- Now remove the Plug Slowly (*Refer S. No:2*) with the help jacking arrangement.
- Check Plug surface for scratches

- Check that PTFE is scratch free and dust free.
- Now clean the parts properly with the help of cleaner.



figure: PTFE Sleeve

### 6.2.2 Plug Valve with Actuator

- Remove Actuator and coupling
- Loosen the bolts and remove the brackets.

Further dismantling will be performed as mentioned in 6.1.1

### 6.2.3 Plug Valve with Gearbox

- Remove Gearbox and coupling.
- Loosen the bracket bolts and remove the brackets.

Further dismantling will be performed as mentioned in 6.1.1

## 7.Assembling Plug Valve

- Prior to assembly, make sure that all parts and components are properly cleaned and there is no sign of damage on the PTFE parts. Refer picture above for references.
- Now, insert the plug-2 into the body-1 and make sure the plug port and body port are inline. And the Plug is free from scratches and burrs.
- Once this is done, press the plug-2 inside the body-1 with the help of hydraulic press, this will help in the proper settling of plug inside the body. The check point is both the Plug port and body port will match each other. The pressure to be applied is shown Table 6. For details refer the assembly procedure pictorial (Figure 8)
- Now clean the top surface of the plug and start putting the various parts starting from V-ring-11, Wedge ring-10, Diaphragm-9, diaphragm plate-8, O-ring-7, Pressure plate-6 and Cup spring-5. The sequence of assembling all the parts should match with the description given in the cross-section 1.
- Place the bonnet-3 and tighten the screws with the help of torque wrench. Torque should be applied as per below mentioned values.
- Now, place the top three screws-12 and tighten it to ensure zero stem leakage. For Tightening torque refer picture 1 below.

**TABLE 6**

Plug installation Pressure	
Valve Size	Pressure (Kg/CM2)
0.5"	0.3
0.75	4
1"	5
1.5"	4.7
2"	10
3"	10
4"	15
6"	30
8"	40

## 7.1.1 Assembling with the lever

Place the lever in alignment with the plug direction and put the mounting bracket.  
After assembly with lever check for the valve functioning.

## 7.1.2 Assembling with the Actuator

Mount bracket with the opening at right angle to the direction of flow. See sectional drawing in Mount coupling and actuator. Observe the actuator position in accordance with the actuator operating manual. Observe the Plug position in accordance with the position of the actuator.

Alignment: If the actuator is fail open; valve will be in open position and actuator will be closed. If the actuator is fail closed; then both valve and actuator will be in closed position.

Attention.

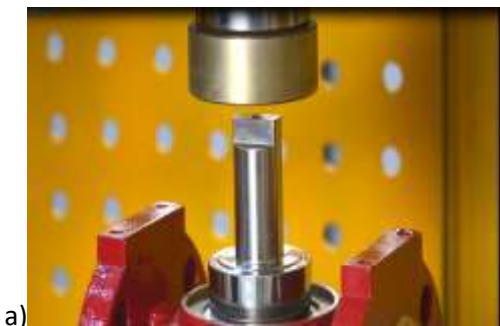
**Torque Values for Bonnet Bolts**

Valve Size	Bolt Size	Torque Value
1"	M10 X 25	35 NM
2"	M12 X 50	55 NM
4"	M16 X 55	70 NM
6"	M20 X 70	100 NM
8"	M22 X 90	200 NM
0.5" &	M6 X 12	15 NM

Attention

**Torque Values for Stem Bolts**

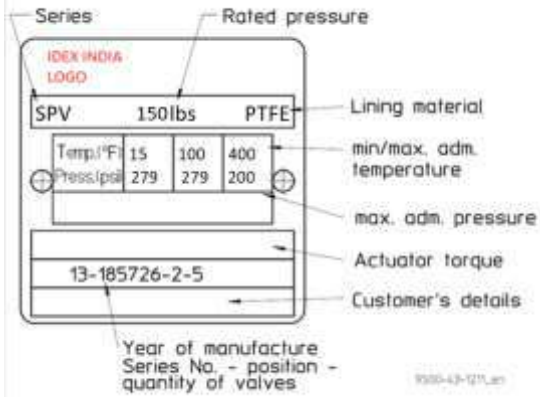
Valve Size	Bolt Size	Torque Value
0.5",0.75",1"	M6 X 12	7 NM
2",3" & 4"	M6 X 20	15 NM
6" & 8"	M12 X 20	25 NM



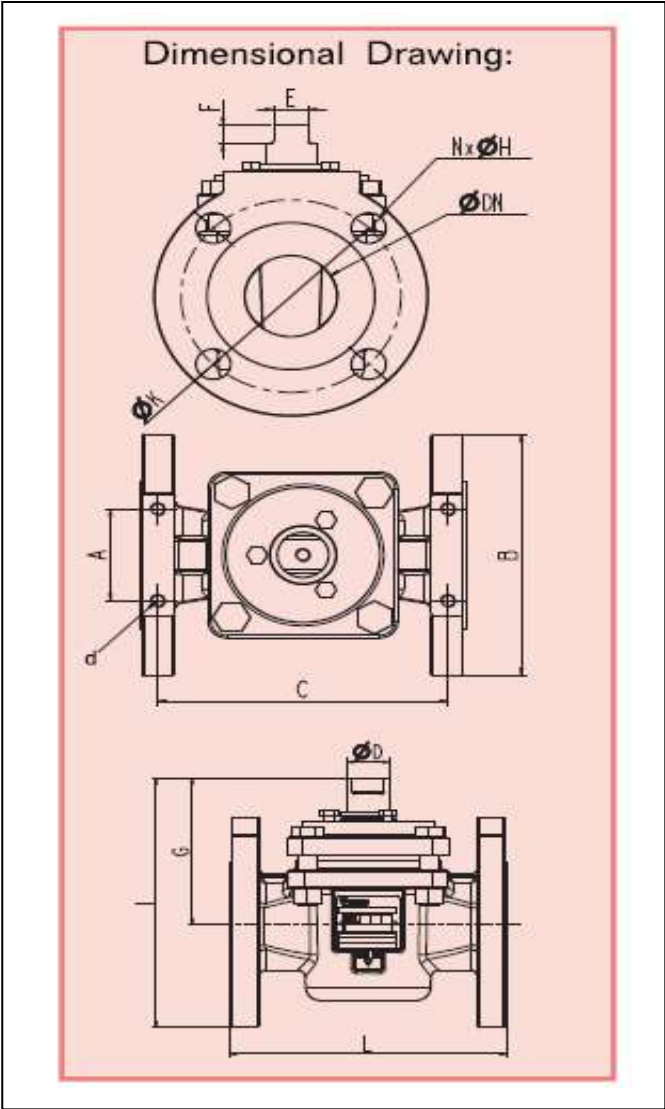
## 8. Name plate

The stainless-steel name plate is undetachable riveted to the body. If the operator attaches his identification, it must be ensured that the valve matches the application in question.

### Example of name plate:



# 9. Dimensions



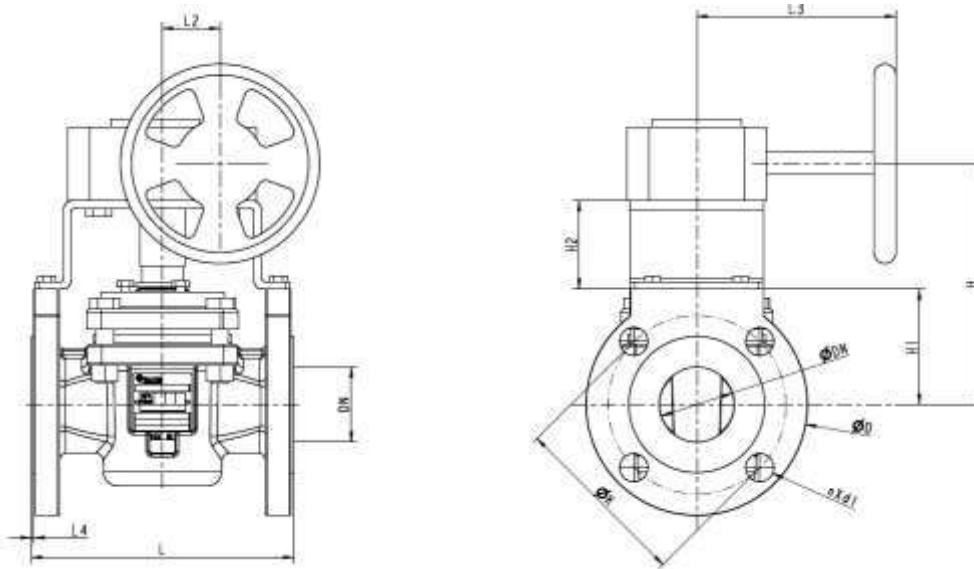
### Plug Valve Class 150

Size- NPS(DN)	A	B	C	D	E	F	G	H	I	K	L	n	d	Wt. (KG)
1/2"(15)	42	90	94	15.2	10	9	63.5	16	121.5	60.5	108	4	M8	2.5
3/4"(20)	42	100	102	15.2	10	9	69.5	16	124.5	70	117	4	M8	3.5
1"(25)	50	110	110	20	14	10	77	16	125	79.5	127	4	M8	4
1/5"(40)	50	125	144	21.7	14	12	94	16	158	98.5	165	4	M8	7
2"(50)	60	150	158	28	19	12	107.5	19	185	120.5	178	4	M8	10
3"(80)	80	190	177	28	19	16	127	19	222	152.5	203	4	M10	18
4"(100)	100	230	204	38.5	26	18	155	19	274.5	190.5	229	8	M12	29
6"(150)	120	280	240	48	32	20	193	22.2	345.5	241.3	267	8	M12	50
8"(200)	170	345	260	55	36	20	219.5	22.2	392	298.5	292	8	M12	72

### Plug Valve Class 300

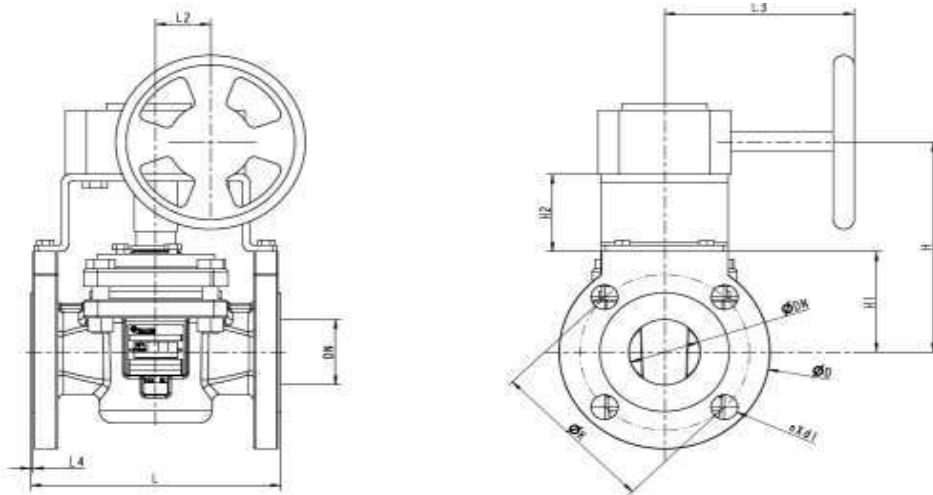
Size- NPS(DN)	A	B	C	D	E	F	G	H	I	K	L	n	d	Wt. (KG)
1/2"(15)	42	95	123.3	15.2	10	9	63.5	15.9	111	66.7	140	4	M8	3
3/4"(20)	42	115	133	15.2	10	9	69.5	19	127	82.6	152	4	M8	4.5
1"(25)	50	125	146	20	14	10	77	19	140	88.9	165	4	M8	6
1/5"(40)	65	155	167	21.7	14	12	94	22.3	171.5	114.3	190	4	M8	11
2"(50)	70	165	192	28	19	12	107.5	19	190	127	216	8	M8	13
3"(80)	85	210	254	28	19	16	127	22.2	232	168.3	285	8	M10	24
4"(100)	110	255	272	39.5	26	18	155	22.3	382.5	200	305	8	M12	40
6"(150)	140	320	362	48	32	20	193	22.2	353	269.9	403	12	M16	80
8"(200)	190	380	378	55	36	20	219.5	22.5	409.5	330.2	419	12	M16	110

## 9.1 PIUG VALVE CLASS 150 WITH GEAR BOX ARRANGEMENT



Size (NPS)	DN	A	D	d1	K	L	n	H1	H	H2	L2	L3	L4
1/2"	15	42	90	16	60.5	108	4	41	-	60	-	-	3
3/4"	20	42	100	16	70	117	4	47	-	60	-	-	3
1"	25.4	50	110	16	79.5	127	4	48	-	60	-	-	3
1.5"	38	50	127	16	98.5	165	4	60	-	60	-	-	3
2"	50.8	60	153	19	120.5	178	4	78	-	80	-	-	3
3"	76.2	80	191	19	152.5	203	4	95	-	80	-	-	3
4"	101.6	100	230	19	190.5	229	8	122	-	100	-	-	3
6"	152.4	120	280	22.2	242.5	275	8	140	-	100	-	-	3

## 9.2 PIUG VALVE CLASS 300 WITH GEAR BOX ARRANGEMENT



Size (NPS)	DN	A	D	d1	K	L	n	H1	H	H2	L2	L3	L4
1/2"	15	42	90	16	60.5	108	4	49	-	60	-	-	3
3/4"	20	42	100	16	70	117	4	59	-	60	-	-	3
1"	25.4	50	110	16	79.5	127	4	64	-	60	-	-	3
1.5"	38	50	127	16	98.5	165	4	84	-	60	-	-	3
2"	50.8	60	153	19	120.5	178	4	84	-	80	-	-	3
3"	76.2	80	191	22.2	152.5	203	8	108	-	80	-	-	3
4"	101.6	100	230	22.2	190.5	229	8	132	-	100	-	-	3
6"	152.4	120	280	22.2	242.5	275	8	178	-	100	-	-	3