

**J R U**  
**ORIFICE PLATE ASSEMBLY**

**OPERATION & MAINTENANCE**  
**INSTRUCTION MANUAL**

**J R U CONTTROL PVT.LTD.**  
**5B, Ramamoorthy Street, Nehru Nagar**  
**Chromepet, Chennai - 600 044**

# **"J R U" ORIFICE PLATE ASSEMBLY**

## **INSTRUCTIONS FOR INSTALLATION, OPERATION AND MAINTENANCE**

### **PRELIMINARY STEPS**

1. Unpack carefully
2. Record the Serial Number and other details for future reference
3. Read the instructions before installation

### **INSTALLATION**

Fig (1) shows the typical installation of the Orifice Plate Assembly. Fig (2) is the exploded view of the same.

The inlet of the orifice plate is marked on the handle of the Orifice plate. Orifice Plate of size upto 4" are generally supplied in assembled condition. The larger size orifice plates should be assembled in the field as per fig (2). There should be straight pipe lengths both upstream and downstream depending on the type of fittings used. The orifice plate assembly should be properly welded to the pipe taking care to see that there is no projection to the inside of the pipe.

### **PRINCIPLE OF OPERATION**

The Orifice Plate is mounted in a pipe perpendicular to the fluid flow. The orifice plate is held in a position by bolting it with gaskets on either side between two flanges.

As fluid passes through the orifice there is a pressure across the orifice plate proportional to the rate of flow. The differential pressure is taken out through two pressure tappings. (High pressure tapping & low pressure tapping).

### **TYPE OF TAPPINGS:**

1. Flange Tapping
2. Corner tapping
3. Radius (or) D & D/2 tapping

### **FLANGE TAPPING (Ref Fig 3A)**

The high pressure tapping is upstream and 25 mm from the Inlet face of the orifice plate and the low pressure tapping is also 25 mm from the outlet face of the orifice plate. It is recommended type for general application in clean fluids, i.e. for gas, steam and liquids. The value of Beta ratio inside of orifice / inside dia of pipe should be less than or equal to 0.75 and should be equal to or greater than 0.2.

### **CORNER TAPPING (Ref fig. 3B)**

In this type of tapping the pressures are taken directly from the upstream and downstream of the orifice. The pressure tapping holes open into a recess in the flange face adjacent to the orifice plate as shown in fig. The value of the Beta ratio should be less than or equal to 0.8

### **RADIUS TAPPING (D & D/2 TAPPING) Ref fig. 3C:**

The upstream and downstream pressure tappings are placed at a distance of D & D/2 respectively, measured from the upstream and downstream face of the orifice plate

Orifice flanges are made as per standard ANSI B 16.5 or as per customers requirement. Orifice bore calculation is done by computer as per BS 1042 & ISO 5167.

### **MAINTENANCE:**

This is a very rugged instrument and does not require much of maintenance. However for fluids with particles or sludge the tappings should be cleaned periodically. In certain applications where sludge, sticky or precipitating fluids are handled it is advisable to take out and clean the orifice plate periodically.

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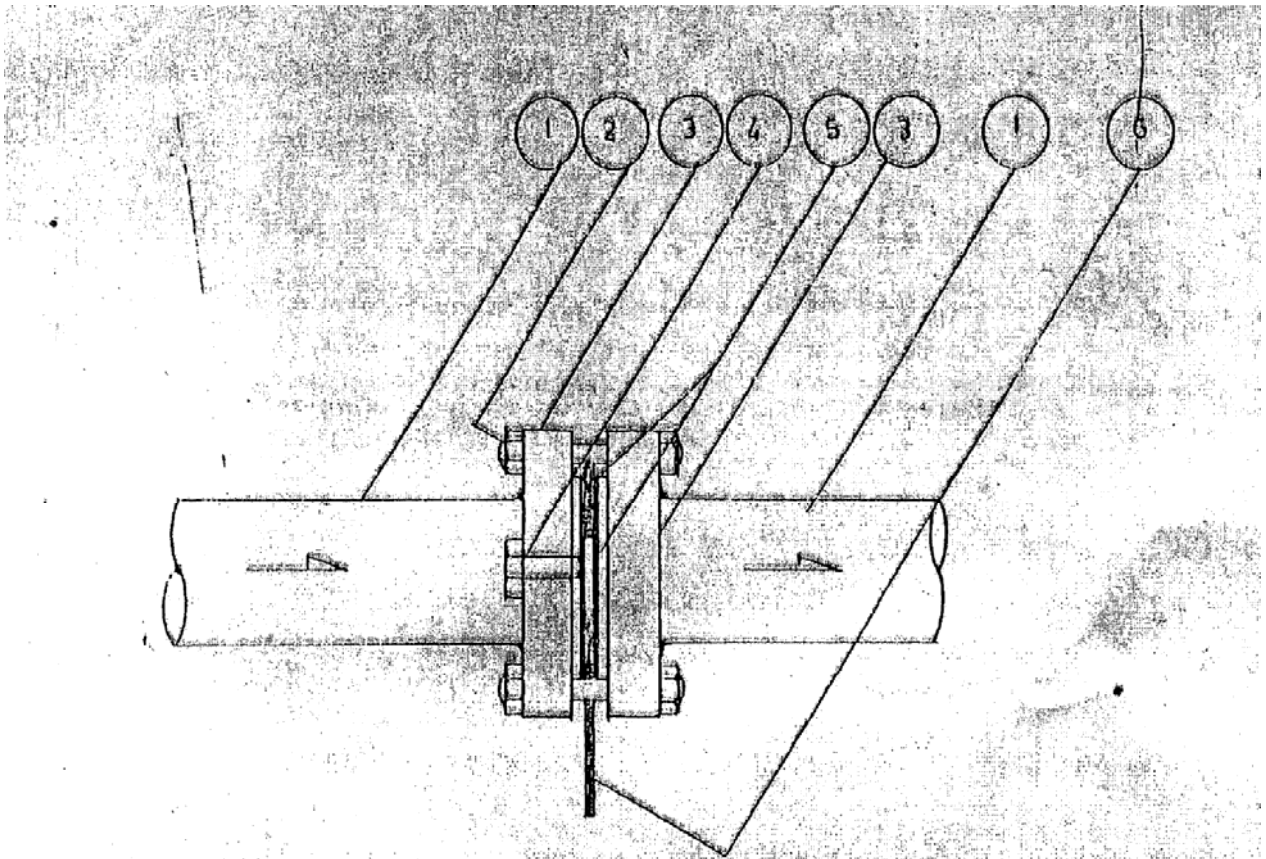


FIG NO : (1)

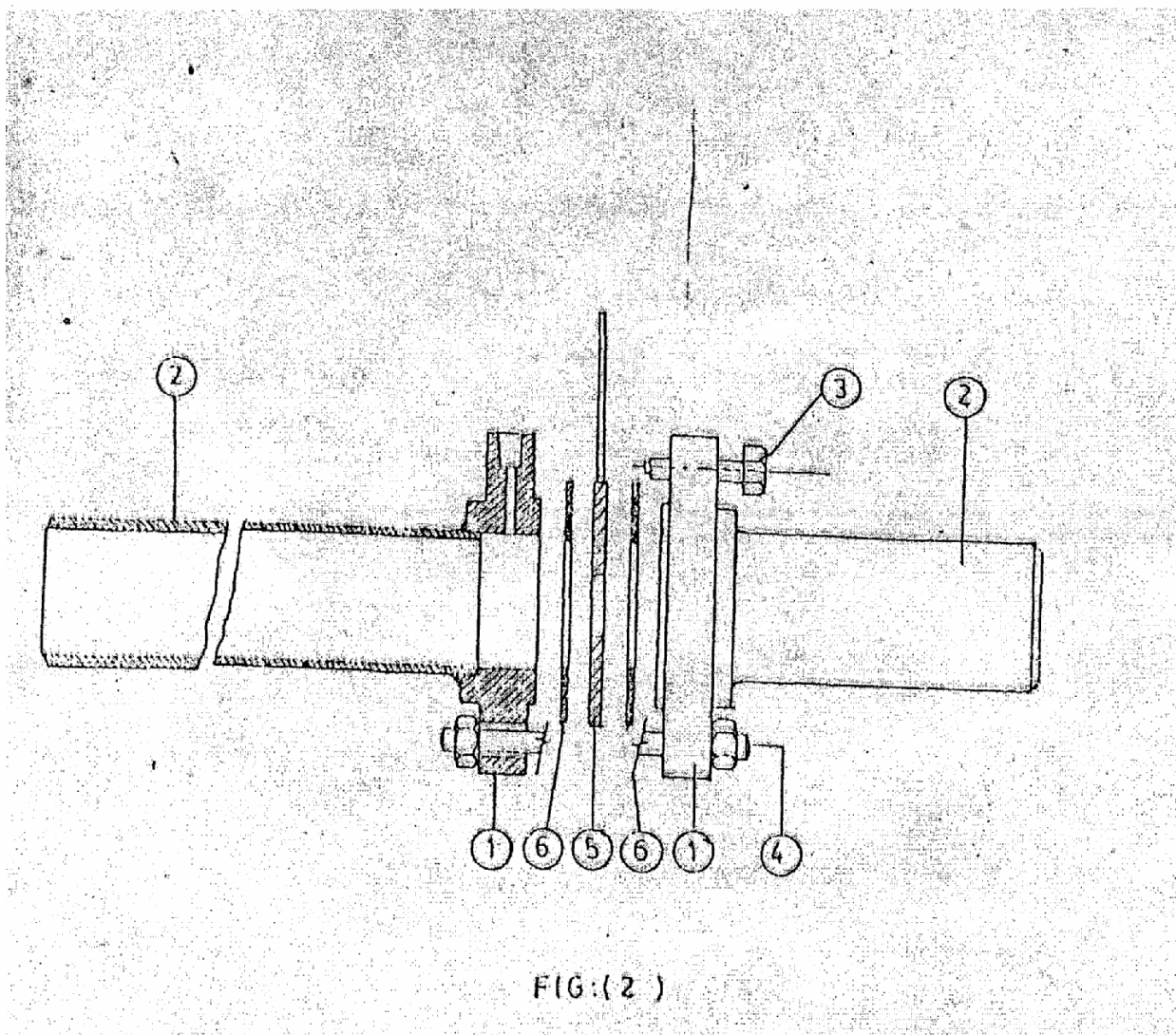
1. MAIN LINE
2. FIXING BOLT
3. FLANGE
4. JACK SCREW
5. GASKET
6. ORIFICE PLATE

DRN	<i>K. Babu</i>	16/8/93	ORIFICE PLATE ASSEMBLY
TRD			
SCALE	NTS	1	
CHKD			
APPD		1	

M/S JRU CONTROL PVT LTD

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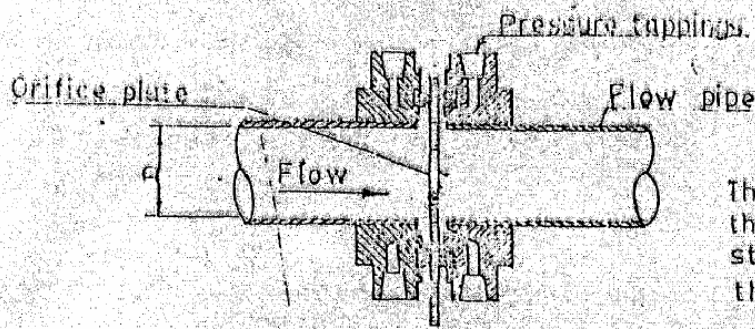
1. Orifice Flange Set
2. Line Pipe
3. Jack Screw
4. Stud Bolt with Nut
5. Orifice Plate
6. Gasket

DRN	<i>[Signature]</i>	ORIFICE PLATE ASSEMBLY.
DATE	22-10-92	
SCALE	N.T.S.	
CKD	J. Agastin	
APPD		
DRG NO: POPAC/015/92		

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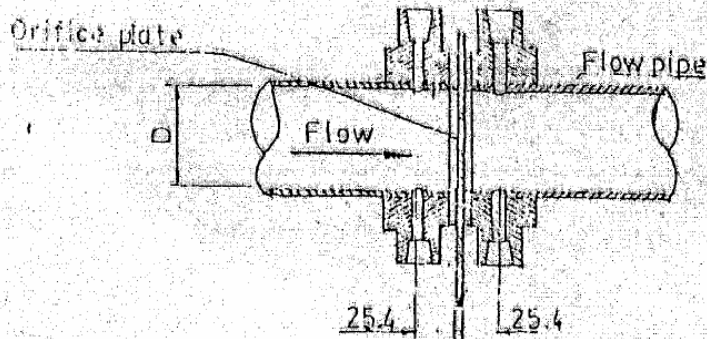
FIG (3)



The pressure tapping take the pressure directly up-stream & down stream of the orifice plate.

A

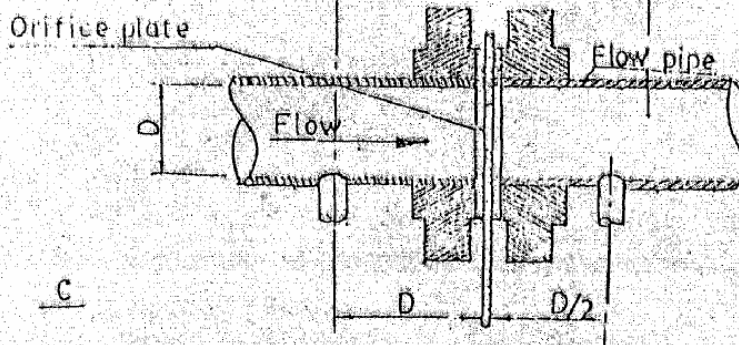
ORIFICE FLOW METER PRIMARY WITH CORNER TAPPINGS.



Take the pressure 25.4 mm from the nearest face of the orifice plate. Hence, in practice the tapping goes straight through the flanges which clamp the orifice plate.

B

ORIFICE FLOW METER PRIMARY WITH FLANGE TAPPING



The upstream and down stream pressure tapping are placed at distances D and D/2 respectively, measured from the up-stream face of the orifice plate.

C

ORIFICE FLOW METER PRIMARY WITH RADIUS TAPPING

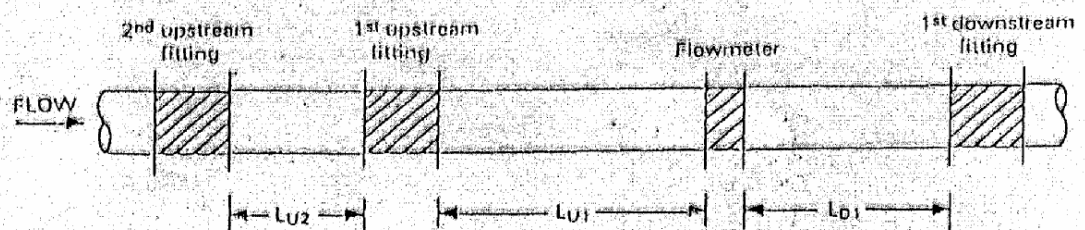
DRN	11/10/92	TYPES OF TAPPINGS.
DATE	13-10-92	
SCALE	N. T. S.	
CKD	T. A. Sushin	
APPD		
DRG NO	ROFAC/011/92	

## STRAIGHT LENGTH REQUIREMENTS

### General

The minimum straight length requirements  $L_{U1}$ ,  $L_{U2}$  and  $L_{D1}$  between various fittings located upstream or downstream of the primary device are given in Table 11.4.2 for the orifice plates and nozzles and in Table 11.4.3 for Venturi flow meters.

These straight length requirements are in accordance with ISO 5167.



- $L_{U1}$  = distance between flow meter and first upstream fitting
- $L_{U2}$  = distance between first upstream fitting and second upstream fitting
- $L_{D1}$  = distance between flow meter and first downstream fitting

All straight lengths are expressed as multiples of the diameter  $D$ . They shall be measured from the upstream face of the primary device.

The unbracketed values are "zero additional uncertainty" values.

The bracketed values are " $\pm 0.5\%$  additional uncertainty" values.

The performance of orifice flow meters is greatly affected when not presented with a fully developed flow pattern specifically in the high  $\beta$  ratios.

It is strongly recommended to apply the figures corresponding to a  $\beta$  ratio of 0.7 thus obtaining the maximum flexibility in changing the orifice size at any time without affecting the zero additional uncertainty.

Minimum length required for the orifice or nozzle flow meter.

Nature of first upstream fitting	L <sub>U1</sub>														L <sub>U</sub>
	$\beta$ ratio of the orifice or nozzle flow meter														For $\beta$ ratio
	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8		
Single 90° bend or tee flow from only one branch	10 (6)	10 (6)	10 (6)	12 (6)	14 (7)	14 (7)	14 (7)	16 (8)	18 (9)	22 (11)	28 (14)	36 (18)	46 (23)	14	
Two or more close 90° bends (radius of curvature D) in the same plane	14 (7)	14 (7)	16 (8)	16 (8)	18 (9)	18 (9)	20 (10)	22 (11)	26 (13)	32 (16)	36 (18)	42 (21)	50 (25)	18	
Two or more close 90° bends (radius of curvature D) in different planes	34 (17)	34 (17)	34 (17)	36 (18)	36 (18)	38 (19)	40 (20)	44 (22)	48 (24)	54 (27)	62 (31)	70 (35)	80 (40)	31	
Reducer 2D to D over a length of 3D	5	5	5	5	5	5	6 (5)	8 (5)	9 (5)	11 (6)	14 (7)	22 (11)	30 (15)	7	
Expander 0.5D to D over a length of 1.5D	16 (8)	16 (8)	16 (8)	16 (8)	16 (8)	17 (8)	18 (9)	20 (10)	22 (11)	25 (13)	30 (15)	38 (19)	54 (27)	15	
Globe valve (completely open)	18 (9)	18 (9)	18 (9)	18 (9)	20 (10)	20 (10)	22 (11)	24 (12)	26 (13)	28 (14)	32 (16)	36 (18)	44 (22)	16	
Gate valve (completely open)	12 (6)	12 (6)	12 (6)	12 (6)	12 (6)	12 (6)	12 (6)	14 (7)	14 (7)	16 (8)	20 (10)	24 (12)	30 (15)	10	
Abrupt symmetrical reduction from 2D to D	30 (15)	30 (15)	30 (15)	30 (15)	30 (15)	30 (15)	30 (15)	30 (15)	30 (15)	30 (15)	30 (15)	30 (15)	30 (15)	15	
Thermometer pocket dia. 0.3D	5 (3)	5 (3)	5 (3)	5 (3)	5 (3)	5 (3)	5 (3)	5 (3)	5 (3)	5 (3)	5 (3)	5 (3)	5 (3)	3	
Thermometer pocket dia. 0.03D to 0.13D	20 (10)	20 (10)	20 (10)	20 (10)	20 (10)	20 (10)	20 (10)	20 (10)	20 (10)	20 (10)	20 (10)	20 (10)	20 (10)	10	
Open space or large vessel, e.g. tank	30	30	30	30	30	30	30	30	30	30	30	30	30	30-L <sub>U</sub>	
L <sub>DI</sub>															
For all above-mentioned fittings	4 (2)	4 (2)	5 (2.5)	5 (2.5)	6 (3)	6 (3)	6 (3)	6 (3)	7 (3.5)	7 (3.5)	7 (3.5)	8 (4)	8 (4)		

All straight lengths are expressed in multiples of the diameter D.