Series 651

with **extended** control range

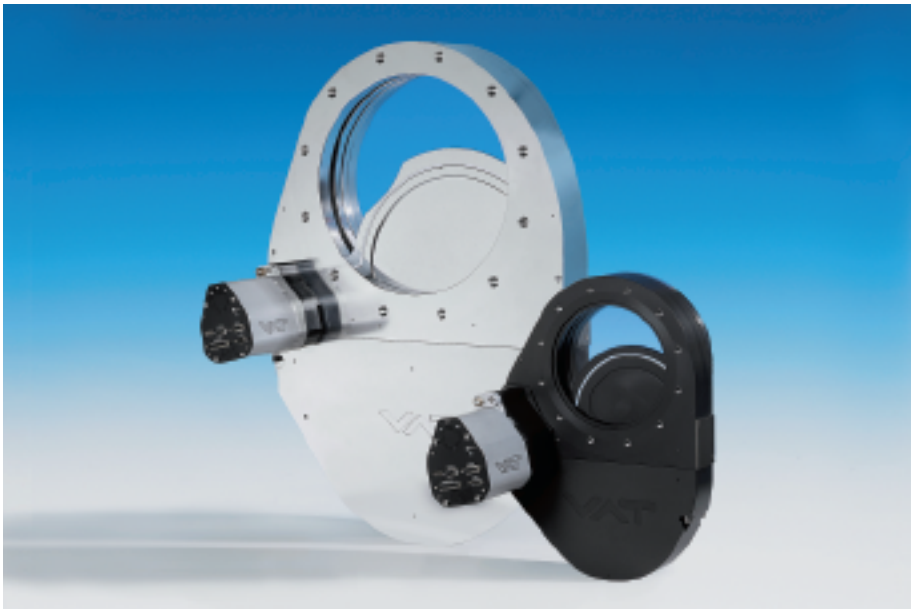
Downstream pressure control and isolation valve

Compact design

Fast, virtually particle-free and shock-free operation

High-performance, integrated controller

Low minimum controllable conductance



Body material

aluminum

Valve with integrated controller

DN		Ordering numbers			
		aluminum		aluminum hard anodized	
mm	inch	ISO-F	JIS	ISO-F	JIS
100	4	on request	on request	on request	on request
160	6	65144-PA x y	65144-JA x y	65144-PH x y	65144-JH x y
200	8	65146-PA x y	65146-JA x y	65146-PH x y	65146-JH x y
250	10	65148-PA x y	65148-JA x y	65148-PH x y	65148-JH x y
320	12	65150-PA x y	65150-JA x y	65150-PH x y	65150-JH x y
350	14	–	65151-JA x y	–	65151-JH x y
400	16	65152-PA x y	65152-JA x y	65152-PH x y	65152-JH x y

x

G = basic version
A = with SPS
H = with PFO
C = with SPS and PFO

y

Interface
G = RS232, 1 sensor
H = RS232, 2 sensors
C = Logic, 1 sensor
E = Logic, 2 sensors
P = DeviceNet®, 1 sensor
Q = DeviceNet®, 2 sensors

Ordering number example:

65140-PAGG

= aluminum valve with ISO-F DN 100 flanges, RS232 interface, for 1 sensor

optional controller configurations

SPS = ±15VDC Sensor Power Supply

PFO = Power Failure Option (valve closes or opens automatically at power failure)

Accessories

Designation	Ordering No.
'VAT Control View' package, consisting of software and service cable	600SP-99NN-000
'VAT Control Performance Analyzer' package, consisting of software and service cable	600SP-99NN-AAA
Connector kit for valves with RS232 or Logic interface, consisting of counter plugs for INTERFACE, SENSOR and POWER connections	242411
Connector kit for valves with DeviceNet®, consisting of counter plugs for SENSOR and POWER connections	242410
AC power supply unit (input: 100 - 240 VAC, output: 24 VDC)	249775
Separation unit for controller including 2 m cable	255544

Sealing materials

Plate: VITON

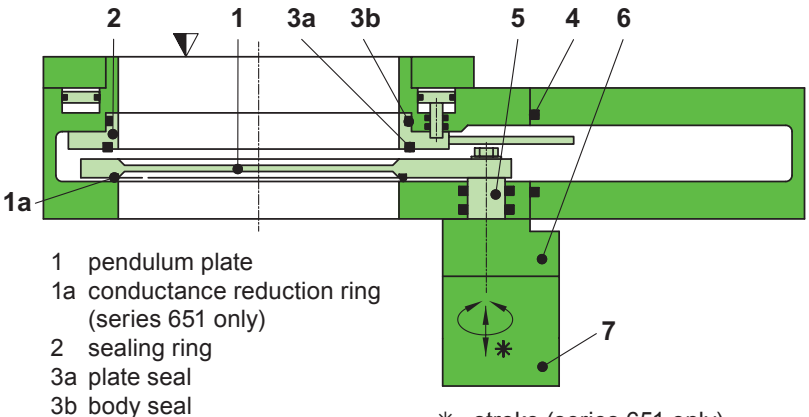
Body: VITON

Bonnet: VITON

Feedthrough

Rotary feedthrough (actuator) VITON

Shaft feedthrough (sealing ring) VITON



1 pendulum plate
1a conductance reduction ring (series 651 only)
2 sealing ring
3a plate seal
3b body seal
4 bonnet seal
5 actuator shaft
6 actuator
7 controller
▼ valve seat side

✳ stroke (series 651 only)

Features

Fast operation	Extremely short control response times
Position indication	Integrated controller (easy to remove)
Easy maintenance	Service port (computer connection)

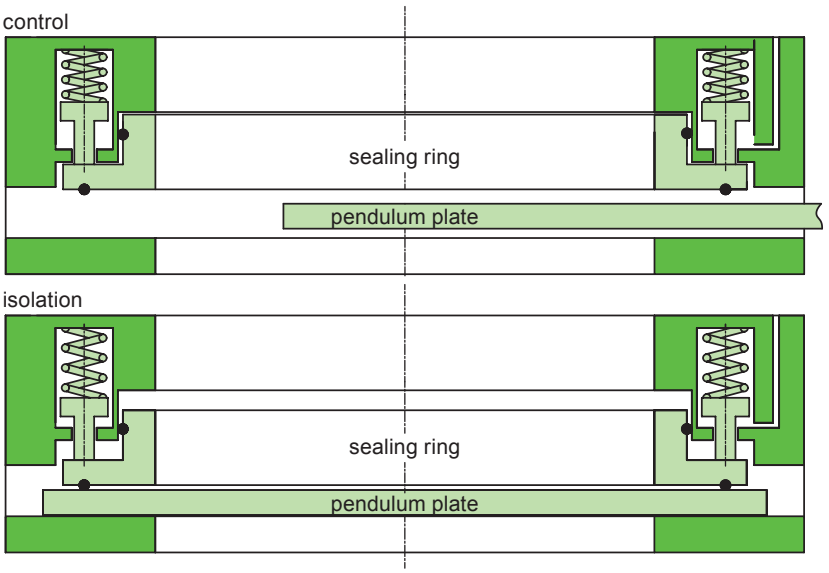
Function

The valve plate acts as a throttling element and varies the conductance of the valve opening. The integrated controller calculates the required plate position to achieve the setpoint pressure. See also principle drawing on page 199. Actuation is performed by a stepper motor. An encoder monitors the position. This principle ensures fast and accurate process pressure control.

Series 650 The plate performs a linear movement only .

Series 651 The plate first performs a linear movement and then also a stroke movement. In combination with the conductance reduction ring very small conductances are achieved.

For leaktight closing the sealing ring moves downwards. It is closed by a spring. For opening the sealing ring is lifted pneumatically.



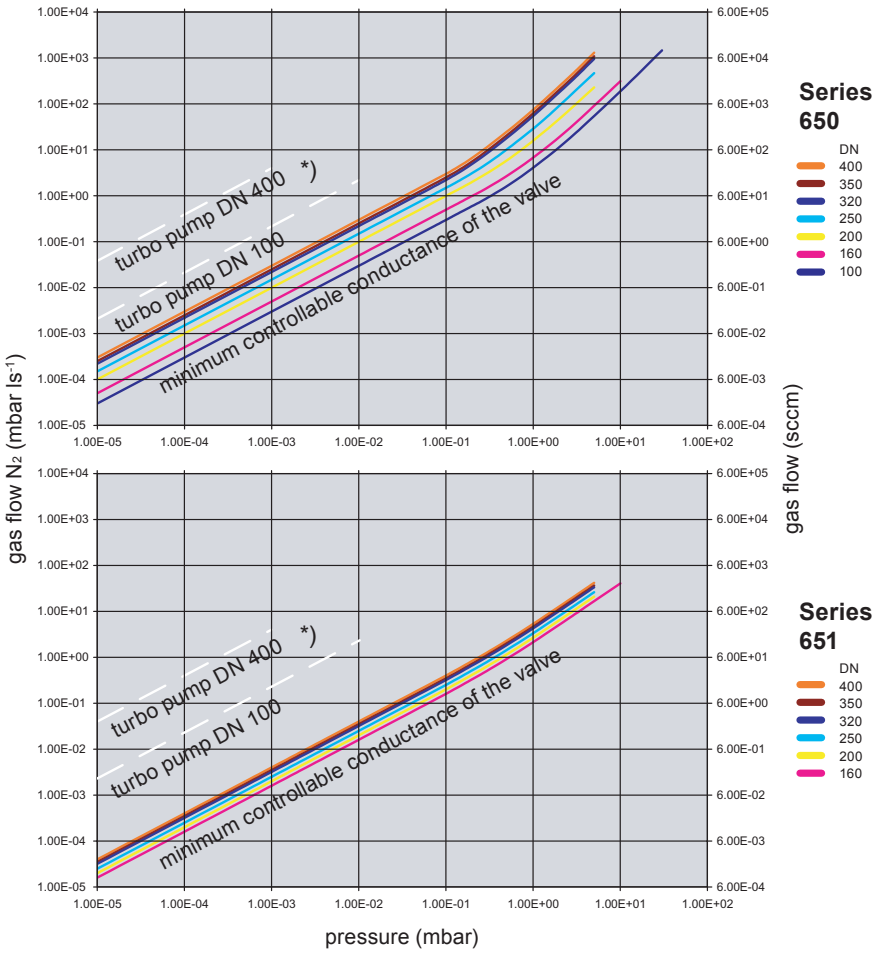
Comparison Series 650 / Series 651

	Series 650	Series 651
Control range	standard	extended
Minimum controllable conductance	standard	minimized
Pressure rise time (up to setpoint)	standard	reduced
Vibration	very low	very low

B

Control range

VAT has a software «Valve Evaluation Tool» to determine the most suitable product for a specific application. Please contact us to assist you when selecting a product.



*) approx. upper pressure limit (depending on pump size, pump type and customer system)

Technical data

Actuator unit with controller

Continued next page

Power consumption	+ 24 VDC (±10%) 50 W max. (controller + motor) 10 W max. for Power Failure Option 36 W max. for Sensor Power Supply
Sensor supply	24 VDC or ±15 VDC
Sensor input	
- Signal voltage	0 - 10 VDC linear with pressure
- Input resistance	Ri = 100kΩ
- Resolution	0.23 mV
- Sampling rate	10 ms
Control accuracy	0.1% of maximum sensor range
Ambient temperature	50°C max. (<35°C recommended)

Technical data

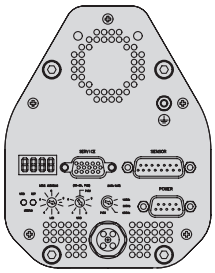
Valve unit

Pressure range at 20°C	
- blank	$1 \cdot 10^{-8}$ mbar to 1.2 bar (abs)
- hard anodized	$1 \cdot 10^{-6}$ mbar to 1.2 bar (abs)
Leak rate to the outside at 20°C	
- blank	$1 \cdot 10^{-9}$ mbar ls^{-1}
- hard anodized	$1 \cdot 10^{-5}$ mbar ls^{-1}
Leak rate at the seat at 20°C	
- blank	$1 \cdot 10^{-9}$ mbar ls^{-1}
- hard anodized	$1 \cdot 10^{-4}$ mbar ls^{-1}
Cycles until first service	
- Closing cycles (open - closed - open)	200 000 unheated and under clean conditions
- Throttling cycles (open - max. throttling - open)	1 million unheated and under clean conditions
Operating temperature [1]	10°C - 150°C
Mounting position	
- DN 100 - 250	any valve seat on chamber side recommended
- DN 320 - 400	horizontal **only** valve seat on chamber side recommended
Material in vacuum	
- Valve body	aluminum 3.2315 (AA6082)
- Pendulum plate Series 650	aluminum 3.2315 (AA6082)
- Pendulum plate Series 651	aluminum 3.2315 (AA6082), 1.4310 (301), PTFE
- Sealing ring	aluminum 3.2315 (AA6082), 1.4303 (304), 1.3541, 1.4568
- Other parts	1.4435 (316L), 1.4404 (316L), 1.4122, 1.4310 (301), 1.4571, stainless steel A2 (304)
- Seals	VITON

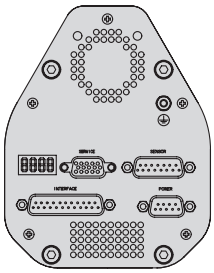
[1] Maximum values: depending on operating conditions and sealing materials

DN (nominal I. D.)		conductance in open position (molecular flow)	minimum controllable conductance (molecular flow)	max. differential pressure in closed position	max. pressure during operation	compressed air pressure min. - max. (overpressure)		typical closing / opening time: throttling only	typical closing / opening time: throttling and closing	weight (approx.)	
mm	inch	ls^{-1}	ls^{-1}	mbar	mbar	bar	psi	s	s	kg	lbs
Series 650											
100	4	1700	3	1200	30	4 - 7	55 - 100	0.7	3 / 4	12	26.5
160	6	5000	5	1200	10	4 - 7	55 - 100	0.8	3 / 4	18	40
200	8	12000	10	1200	5	4 - 7	55 - 100	0.9	3 / 4	22	48.5
250	10	22000	15	1200	5	4 - 7	55 - 100	0.9	3 / 4	29	64
320	12	30000	22	1200	5	4 - 7	55 - 100	1.1	5 / 6	48	106
350	14	43000	25	1200	5	4 - 7	55 - 100	1.3	5 / 6	59	130
400	16	61000	30	1200	5	4 - 7	55 - 100	1.5	5 / 6	68	150
Series 651											
100	4	on request									
160	6	5000	1.6	1200	10	4 - 7	55 - 100	0.8	4 / 4	18	40
200	8	12000	2	1200	5	4 - 7	55 - 100	0.9	4 / 4	22	48.5
250	10	22000	2.5	1200	5	4 - 7	55 - 100	0.9	4 / 4	29	64
320	12	30000	3.2	1200	5	4 - 7	55 - 100	1.1	6 / 6	48	106
350	14	43000	3.5	1200	5	4 - 7	55 - 100	1.3	6 / 6	59	130
400	16	61000	4	1200	5	4 - 7	55 - 100	1.5	6 / 6	68	150

Pressure controller



DeviceNet®



RS232, Logic

Features

- Fast and accurate pressure control
- Automatic learning of system parameters
- Hold function for plasma ignition
- Valve position control
- Remote control
- Information display
- Inputs for 1 or 2 linear pressure sensors (capacitance manometers)
- Closing or opening of the valve at power failure (option)

Pressure control

The controller ensures fast and accurate pressure control. By operating the LEARN function — needs to be done only once at start-up — the system parameters are automatically determined.

Due to the adaptive algorithm the controller continuously adapts to the process conditions (species of gas, gas flow) and thus ensures optimum pressure control.

Valve position control

In position control mode the valve plate can be moved to any position.

Display

Status and position are displayed by means of 4 bright digits.

Remote control

The valve can be controlled by a host computer via RS232, Logic or DeviceNet® interface.

The RS232 interface also has digital inputs to close and open the valve.

Control via Logic interface performs via digital and analog inputs and outputs.

Service port

The valve has a service port (RS232) for connecting a computer. VAT can provide the following two versions of software:

Basic version **'VAT Control View'**:
Available as freeware (see www.vatvalve.com). Independent of the host computer, it enables setup, operation, monitoring and diagnosis.

Extended version **'VAT Control Performance Analyzer'**:
Available on order. This sophisticated tool offers a much wider range of possibilities than the basic version. For instance, it is possible to graphically display the pressure behaviour or to program and record sequences. Also several possibilities for data analysis and process optimization are available.

For connecting the valve both versions require a special cable from VAT.

Power Failure Option (PFO)

This function is available as an option. It closes or opens the valve automatically at power failure.

Sensor Power Supply (SPS)

Optionally, the valve can be provided with a ±15 V DC power supply unit for the sensor(s).

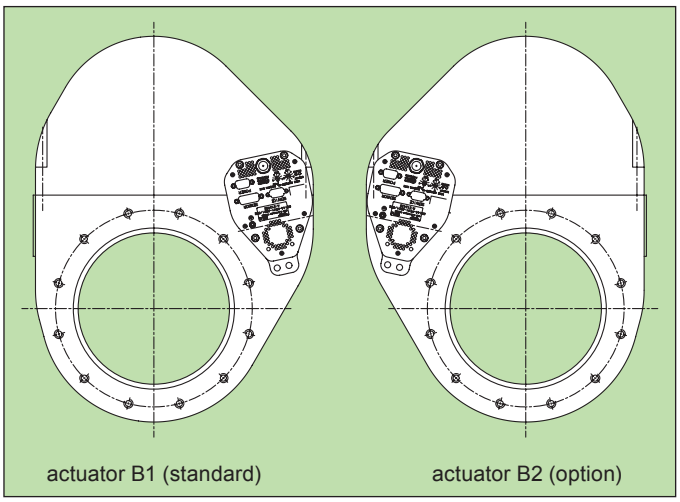
Easy maintenance

- Valve need not be removed from the system for maintenance
- Fast removal and reinstallation of pendulum plate and sealing ring for cleaning
- Only 2 standard tools are necessary for maintenance

Options

Certain options are not available for some nominal diameters or cannot be combined. Moreover, options can affect the general technical data.

Picture 1



Picture 2

Actuator / controller:

- Actuator B2 (picture 1)
- Controller with configurable PI parameters
- RS232 interface with 2 analog outputs
- Ethernet interface

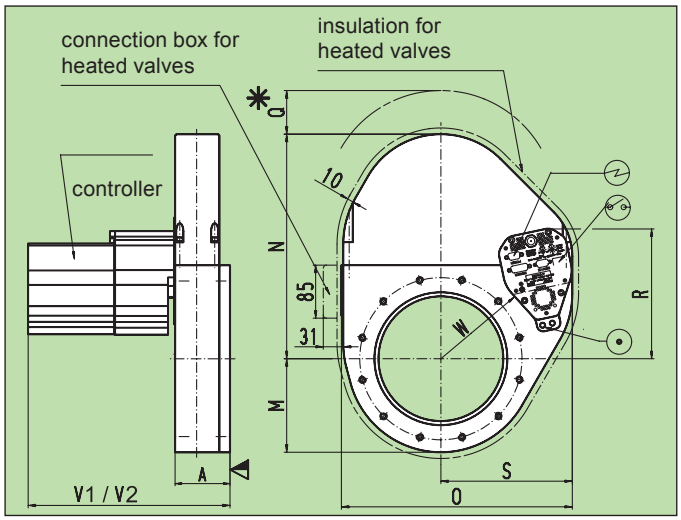
Valve:

- Other sizes (e. g. DN 80)
- Other flange types (e. g. ASA-LP)
- Customer specified flanges
  (e. g. rectangular flange for direct mounting to chamber)
- Other sealing materials
- Other surface processings (e. g. nickel-plating)
- KF ports on the body
- Heater (picture 2) with insulation for valve temperatures 80°C, 100°C, 120°C
- Controllers for operating several valves synchronously
- Control valve only (no leaktight closing)
- Wedge-shaped pendulum plate for smaller controllable conductances (series 650 only)

DN	320	350	400
standard	22 l/s	25 l/s	30 l/s
wedge-shaped	16 l/s	19 l/s	22 l/s

Ordering information for options:
Ordering No. of valve-X (e. g. 65046-PAGH-X,
X = valve with heater for 80°C)

Main dimensions



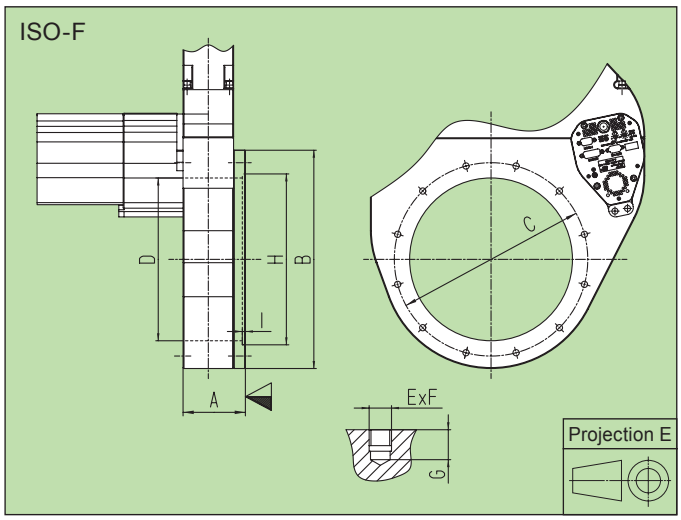
Connection		Type
POWER	Power input	DB-9 male
SENSOR	Sensor input / Sensor power supply	DB-15 female
INTER-FACE	RS232 or Logic	DB-25 female
	DeviceNet®	Micro-style male

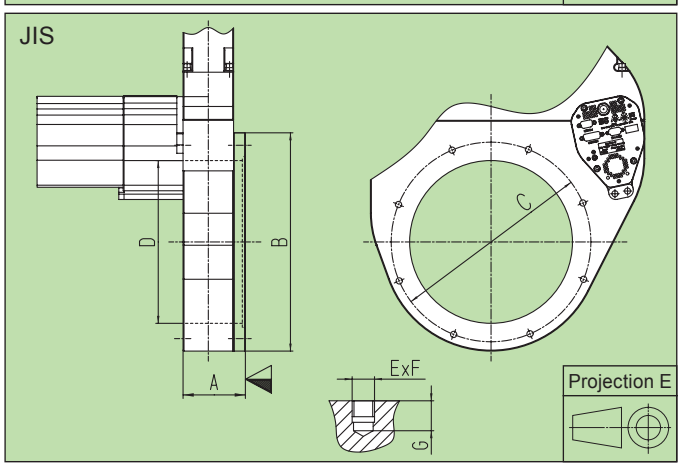
DN	mm / inch	100	160	200	250	320	350	400
		4	6	8	10	12	14	16
A	mm	70	88	88	100	120	126	128
	inch	2.76	3.46	3.46	3.94	4.72	4.96	5.04
M	mm	95	121.5	150	175	214	235	260
	inch	3.74	4.78	5.91	6.89	8.43	9.25	10.24
N	mm	200	302	360	438	538	590	655
	inch	7.87	11.88	14.17	17.24	21.18	23.23	25.79
O	mm	260.9	321	370.15	442.7	536.4	582	633
	inch	10.27	12.64	14.57	17.43	21.12	22.91	24.92
Q	mm	50	50	50	50	50	50	50
	inch	1.97	1.97	1.97	1.97	1.97	1.97	1.97
R	mm	176	192	208.5	233.5	277	290	313
	inch	6.93	7.56	8.21	9.19	10.91	11.42	12.32
S	mm	162.9	184.7	210.8	246.4	274.5	300	320
	inch	6.41	7.27	8.3	9.7	10.81	11.81	12.6
V1*)	mm	308	326	326	331	351	358	360
	inch	12.13	12.83	12.83	13.03	13.82	14.09	14.17
V2*)	mm	–	332	332	337	357	364	366
	inch	–	13.07	13.07	13.27	14.06	14.73	14.41
W	mm	94	121	151	194	236	257	292
	inch	3.7	4.76	5.94	7.64	9.29	10.12	11.5

*) V1 = Series 650 V2 = Series 651

✳ required for dismantling ⊙ compr. air connection ▼ valve seat side
⊖ electrical connection ⊘ position indicator

Flange dimensions





DN	mm / inch	100	160	200	250	320	-	400
		4	6	8	10	12		16
A	mm	70	88	88	100	120	-	128
	inch	2.76	3.46	3.46	3.94	4.72		5.04
B	mm	190	243	300	350	425	-	520
	inch	7.48	9.57	11.81	13.78	16.73		20.47
C	mm	145	200	260	310	395	-	480
	inch	5.71	7.87	10.24	12.2	15.55		18.9
D	mm	100	150	200	261	318	-	400
	inch	3.94	5.91	7.87	10.28	12.52		15.75
E x F		8 x M8	8 x M10	12xM10	12xM10	12xM12	-	16xM12
G	mm	12	14	15	16	18	-	20
	inch	0.47	0.55	0.59	0.63	0.71		0.79
H	mm	-	153	213.2	-	-	-	-
	inch		6.02	8.39				
I	mm	-	5	5	-	-	-	-
	inch		0.2	0.2				

DN	mm / inch	100	150	200	250	300	350	400
		4	6	8	10	12	14	16
A	mm	70	88	88	100	120	126	128
	inch	2.76	3.46	3.46	3.94	4.72	4.96	5.04
B	mm	190	243	300	350	425	470	520
	inch	7.48	9.57	11.81	13.78	16.73	18.5	20.47
C	mm	160	210	270	320	370	420	480
	inch	6.3	8.27	10.63	12.6	14.57	16.54	18.9
D	mm	100	150	200	261	318	350	400
	inch	3.94	5.91	7.87	10.28	12.52	13.78	15.75
E x F		8 x M10	8 x M10	8 x M12	12xM12	12xM12	12xM12	12xM16
G	mm	12	14	15	16	18	18	25
	inch	0.47	0.55	0.59	0.63	0.71	0.71	0.98