

# spirax sarco

## M410

TI-P176-02  
EMM Issue 6

## Orifice Plate Flowmeter and Carrier Assembly

### Description

The M410 orifice plate and carrier assembly is a primary flow element consisting of a tab handled square edged orifice plate and optional carrier. The orifice plate is designed and manufactured to meet the requirements of British Standard BS 1042 and International Standard Organisation ISO 5167 in all respects and is suitable for the measurement of the rate of flow for most liquids, gases and steam. The tab handled orifice plate can be used for either:

**a:** on its own fitted between flanges with pressure tapplings in the users pipework or flanges.

or

**b:** fitted into a carrier with integral flange tapplings designed to fit between customer flanges.

### Limiting conditions

The pressure and temperature limitations of both the tab handled plate and the carrier assembly are the same as the specified flange ratings.

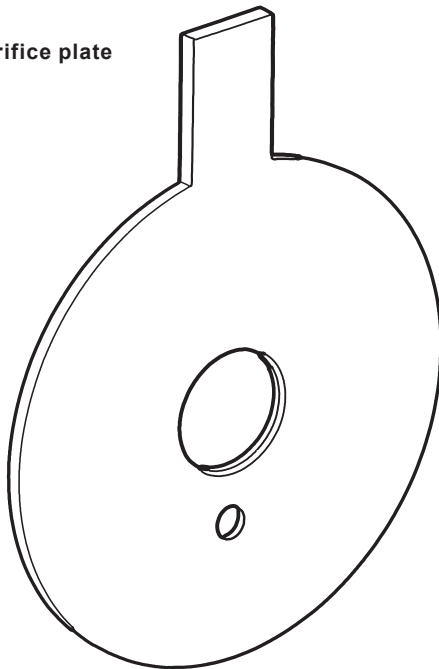
### Performance

To BS 1042 and ISO 5167.

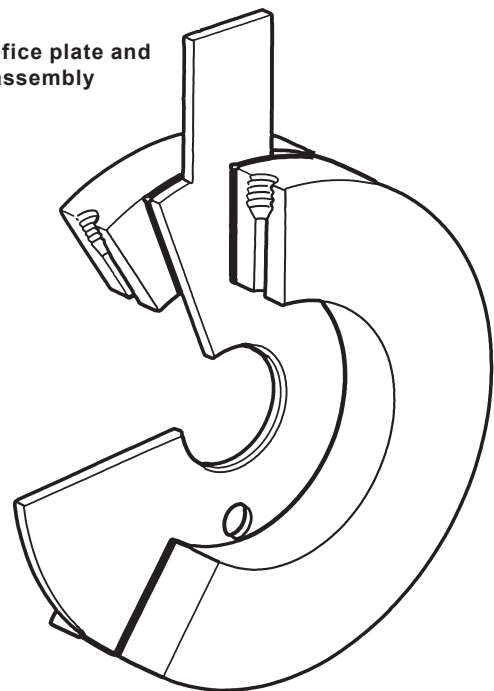
The performance of an orifice plate flowmetering system can be greatly influenced by installation variables, so the figures given below are for guidance only:

<b>Accuracy</b>	Typically $\pm 3\%$ of actual flow (equivalent to $\pm 1.5\%$ full scale deflection at 50% of rated maximum flow)
<b>Repeatability</b>	Typically $\pm 0.3\%$
<b>Turndown</b>	Typically 4:1

M410 orifice plate



M410 orifice plate and carrier assembly



## Pipe sizes available

Tab handled plates with or without carriers are available to suit the following pipe sizes:

DN25, DN40, DN50, DN65, DN80, DN100, DN125, DN150, DN200, DN250, DN300, DN350, DN400, DN450, DN500 and DN600.  
(1", 1½", 2", 2½", 3", 4", 5", 6", 8", 10", 12", 14", 16", 18", 20" and 24")

## Connections

Tab handled plates and carriers are available to suit the following flange specifications:

EN 1092 PN16, PN25 and PN40.

BS 10 Table H.

ASME B 16.5 Class 150, 300, 600.

Japanese Industrial Standard JIS 20.

Korean Standard KS 20.

## Materials

Tab handled orifice plate	BS 1449 S 316 (Stainless Steel Grade 316)
Carrier	Passivated zinc plated carbon steel
Gaskets	Exfoliated graphite

## Pressure tapplings

When the tab handled orifice plates are used without the optional carrier, it is the responsibility of the user to provide appropriate pressure tapplings in either his flanges or upstream and downstream pipework in line with BS 1042/ISO 5167.

The optional carrier assembly incorporates upstream and downstream pressure tapplings threaded ½" NPT. These tapplings are 25.4 mm either side of the orifice plate face in line with the requirements of BS 1042 /ISO 5167.

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions supplied with the product.

### Installation note:

It is important that all details of the installation conform to BS 1042 /ISO 5167. Of special note, is the long, straight lengths of pipe that must be present upstream of the orifice plate. As an approximate guide, 20 to 30 pipe diameters upstream and 5 downstream should be adequate but it is recommended that reference is made to the relevant standard (BS 1042 / ISO 5167). A summary of the basic requirements is included with the M410 equipment.

### Maintenance note:

A visual inspection of the orifice plate should be made at regular intervals to check for dirt build-up, damage or a loss of sharpness of the upstream edge of the plate. Replacement orifice plates and gaskets are available from Spirax Sarco.

### How to specify

Orifice plate primary element with/without optional carrier assembly conforming to BS 1042 / ISO 5167.

## Associated equipment

Item	Description
EL2211	Temperature sensor/transmitter
EL2230	Temperature sensor/transmitter
EL2600	Pressure transmitter
EL2810	Temperature sensor/transmitter
F50C	Isolation valve
M610	Transmitter assembly
M750	Display unit
M850	Steam flow computer

For a general description of Spirax Sarco orifice plate flowmetering systems, see TI-P176-03 (density compensated system) and TI-P176-01 (non density compensated system).

## Dimensions/weights (approximate) in mm and kg

Size	EN 1092 PN16 A	EN 1092 PN25 A	EN 1092 PN40 A	BS 10: Table H A	ASME 150 A	ASME 300 A	ASME 600 A	JIS 20 A	KS 20 A	Maximum weight kg
DN25	73	73	73	71.4	66.7	73.0	73.0	74	74	2.36
DN40	94	94	94	88.9	85.7	95.3	95.3	89	89	3.72
DN50	109	109	109	111.1	104.7	111.1	111.1	104	104	4.91
DN65	129	129	129	130.1	123.8	130.2	130.2	124	124	6.21
DN80	144	144	144	149.2	136.5	149.3	149.3	140	140	7.91
DN100	164	170	170	174.6	174.6	181.0	193.7	165	165	13.75
DN125	194	196	196	215.9	196.9	216.0	241.3	203	203	20.98
DN150	220	226	226	241.3	222.3	250.9	266.7	238	238	23.51
DN200	275	286	293	304.9	279.4	308.0	320.6	383	383	31.25
DN250	331	343	355	358.8	339.7	361.9	400.0	356	356	47.95
DN300	386	403	420	415.9	409.6	422.2	457.1	406	400	58.74
DN350	446	460	477	469.9	450.8	485.7	492.1	450	450	60.20
DN400	498	517	549	527.0	574.3	539.7	565.1	570	570	85.99
DN450	559	567	574	581.0	549.2	596.8	612.7	575	575	94.38
DN500	620	627	631	644.5	606.4	654.0	682.6	630	630	117.69
DN600	737	734	750	749.3	717.5	774.7	790.6	734	734	146.37

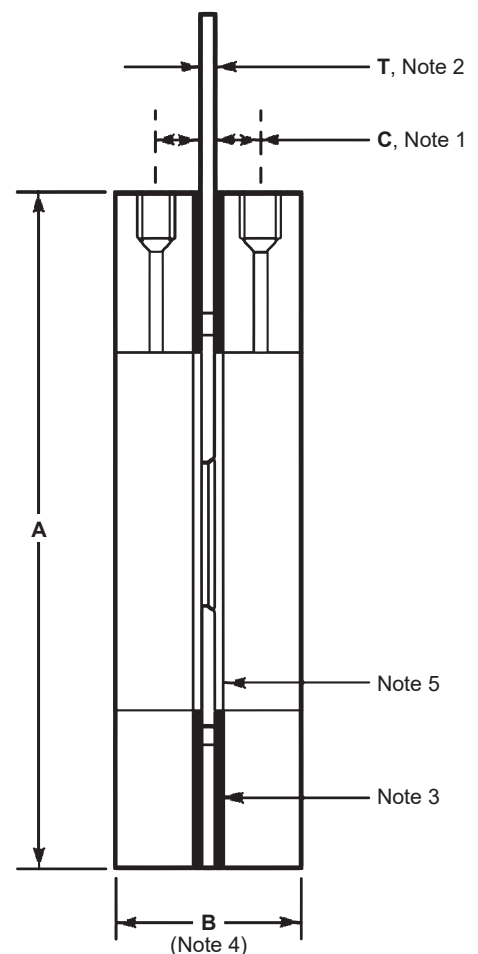
### Notes:

1. Dimension **C** is 2.54 mm for all sizes in line with BS 1042/ISO 5167.
2. For line sizes DN25 to DN350, orifice plate thickness **T** is 3 mm, above DN350, **T** is 6 mm.
3. Gaskets are 1.6 mm thick.
4. For line sizes up to DN350, carrier assembly thickness **B** is 82 mm, above DN 350, **B** is 85 mm.
5. An optional drain hole that meets BS 1042 can be incorporated if required.
6. Maximum weights shown above are based on ASME 600 flanges.

### How to order

Example: 1 off Spirax Sarco M410 orifice plate and carrier assembly.

**Important note:** In order that a correctly sized orifice plate can be supplied, it is essential that full details of the installation and estimated flowrates are supplied to Spirax Sarco. This is best done using a customer orifice plate datasheet available from Spirax Sarco.



For imperial dimensions/weights, see next page

## Dimensions/weights (approximate) in inches and lbs

Size	EN 1092 PN16 A	EN 1092 PN25 A	EN 1092 PN40 A	BS 10: Table H A	ASME 150 A	ASME 300 A	ASME 600 A	JIS 20 A	KS 20 A	Maximum weight lbs
1					2.63	2.87	2.87			5.20
1½					3.37	3.75	3.75			8.20
2					4.12	4.37	4.37			10.82
2½					4.87	5.13	5.13			13.69
3					5.37	5.88	5.88			17.44
4					6.87	7.13	7.63			30.31
5					7.75	8.50	9.50			46.25
6					8.75	9.88	10.50			51.83
8					11.00	12.13	12.62			68.89
10					13.37	14.25	15.75			105.71
12					16.13	16.62	18.00			129.50
14					17.75	19.12	19.37			132.72
16					22.61	21.25	22.25			189.58
18					21.62	23.50	24.12			208.07
20					23.87	25.75	26.87			259.46
24					27.25	30.5	31.13			322.69

### Notes:

1. Dimension **C** is 1" for all sizes in line with BS 1042/ISO 5167.
2. For line sizes DN25 to DN350, orifice plate thickness **T** is  $\frac{7}{64}$ ", above DN350, **T** is  $\frac{19}{64}$ ".
3. Gaskets are  $\frac{1}{16}$ " thick.
4. For line sizes up to DN350, carrier assembly thickness **B** is  $8\frac{37}{32}$ ", above DN 350, **B** is  $3\frac{1}{32}$ ".
5. An optional drain hole that meets BS 1042 can be incorporated if required.
6. Maximum weights shown above are based on ASME 600 flanges.

### How to order

Example: 1 off Spirax Sarco M410 orifice plate and carrier assembly.

**Important note:** In order that a correctly sized orifice plate can be supplied, it is essential that full details of the installation and estimated flowrates are supplied to Spirax Sarco. This is best done using a customer orifice plate datasheet available from Spirax Sarco.

