spirax sarco

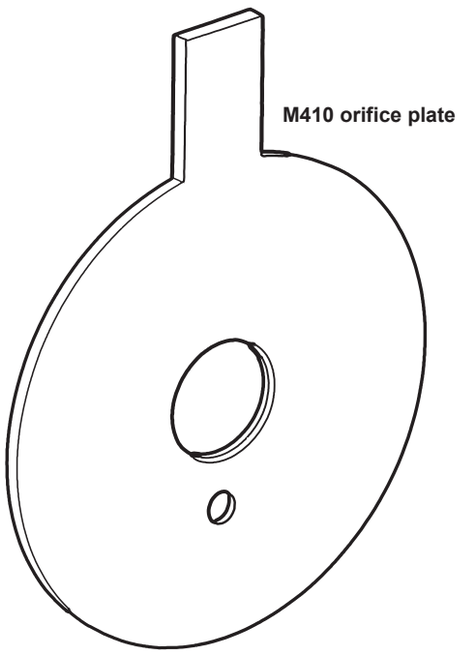
TI-P176-02
MI Issue 5

M410
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 tappings in the users pipework or flanges.
or
b: fitted into a carrier with integral flange tappings designed to fit between customer flanges.



M410 orifice plate

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:

Accuracy	Typically ±3% of actual flow (equivalent to ±1.5% full scale deflection at 50% of rated maximum flow)
Repeatability	Typically ±0.3%
Turndown	Typically 4:1

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.

Connections

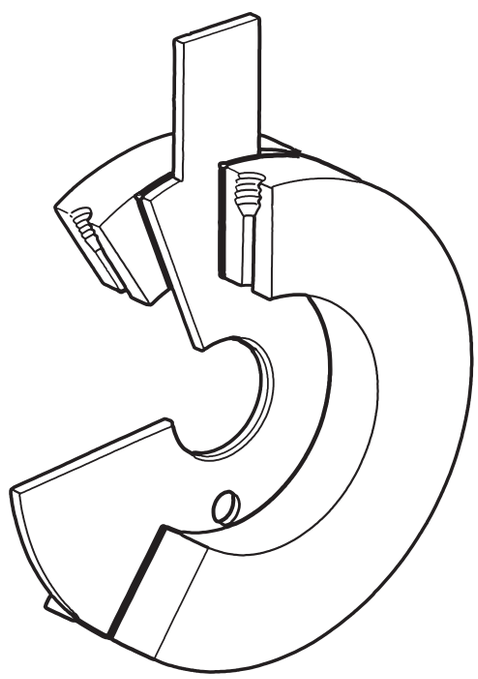
Tab handled plates and carriers are available to suit the following flange specifications:
EN 1092 PN16, PN25 and PN40.
BS 10 Table H.
ASME B 16.5 Class 150, 300, 600.
Japanese Industrial Standard JIS 20.
Korean Standard KS 20.

Materials

Tab handled orifice plate	BS 1449 S 316
Carrier	Passivated zinc plated carbon steel
Gaskets	Exfoliated graphite

Pressure tappings

When the tab handled orifice plates are used without the optional carrier, it is the responsibility of the user to provide appropriate presssure tappings 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 tappings threaded ½" NPT. These tappings are 25.4 mm either side of the orifice plate face in line with the requirements of BS 1042 / ISO 5167.



M410 orifice plate and carrier assembly

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

3.4
2

Notes:
1: Dimension **C** is 25.4 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.

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.

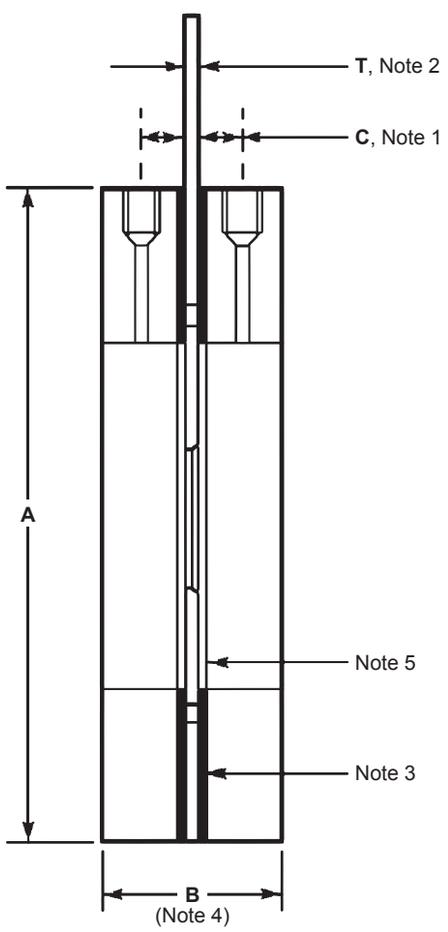
How to order

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.

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).



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TI-P176-04
MI Issue 7

Orifice Plate Flowmeters
Customer Data Sheet

This customer data sheet is intended to gather together all relevant information necessary to size and specify a Spirax Sarco orifice plate flowmetering system. All equipment will be supplied to the customer based on the information received.

Company name	
Address	
Contact	
Project reference	
Notes	

Please complete all sections and supply drawings, sketches etc. where appropriate.

Section A: Working fluid details

Type of fluid (e.g., steam, air, water etc)	

	Min. value	Normal value	Max. value	Units
Operating pressure				
Operating temperature				
Estimated rate of flow				

Notes: The pressure drop at specified maximum rate of flow will be 24.9 kPa (100 inches water gauge) unless otherwise stated. Below 25% of specified maximum rate of flow, system accuracy cannot be guaranteed due to turndown limitations of orifice plates. (BS 1042 / ISO 5167).

Section B: Pipeline details

	Value	Units
Nominal line size		
Line inside diameter		
Line schedule (if known)		N/A
Flange specification		N/A
Number of straight pipe diameters available upstream		N/A
Number of straight pipe diameters available downstream		N/A
Pipe material		N/A

Please provide a sketch showing all details of pipework including any valves, bends, fittings etc. in the area where the M410 orifice plate is to be fitted. This is important as the performance of all orifice plates can be affected greatly by installation factors. Using the information from sections A and B, Spirax Sarco will size the correct orifice plate in line with the parameters laid down in BS 1042 / ISO 5167.

Section C: Options available

The Spirax Sarco oriface plate flowmetering system is available in a number of options, at least one of which will suit the needs of a customer. Options 1 to 4 are for simple systems where automatic density compensation is **not** required. These are shown at the top of the next column...simply tick the option that meets your needs.

Options for use with flowcomputers that DO NOT include density compensation:

Option	List of equipment in each package option	
1	M410 orifice plate and gaskets	
2	M410 orifice plate and gaskets, M610 DP transmitter	
3	M410 orifice plate and gaskets with carrier ring, F50C isolation valves	
4	M410 orifice plate and gaskets with carrier ring, F50C isolation valves, M610 DP transmitter assembly	
Option product code		

Options 5 to 10 include equipment that allows automatic density compensation for maximum accuracy. These are shown below...simply tick the option that meets your needs.

Options for use with flowcomputers that DO include density compensation:

Option	List of equipment in each package option	
5	M410 orifice plate and gaskets, M610 DP transmitter assembly, EL2600 pressure transmitter	
6	M410 orifice plate and gaskets, M610 DP transmitter assembly, EL2271 temperature transmitter	
7	M410 orifice plate and gaskets, M610 DP transmitter assembly, EL2600 pressure transmitter, EL2271 temperature transmitter	
8	M410 orifice plate and gaskets with carrier ring, F50C isolation valves, M610 DP transmitter assembly, EL2600 pressure transmitter	
9	M410 orifice plate and gaskets with carrier ring, F50C isolation valves, M610 DP transmitter assembly, EL2271 temperature transmitter	
10	M410 orifice plate and gaskets with carrier ring, F50C isolation valves, M610 DP transmitter assembly, EL2600 pressure transmitter, EL2271 temperature transmitter	
Option product code		

Note: For **all** options, please state if a vent or drain hole is required in the M410 orifice plate.

Section D: Associated equipment required

The M850 steam flow computer will provide automatic density compensation for all steam flowmetering applications over the range 100°C @ 0 bar g to 500°C @ 42 bar g.

	Wall mounted version	Panel mounted version
M750 local display	N/A	99/264 Vac
M850 flow computer	24 Vdc	99/264 Vac

Sketch showing details of installation: