
**Hydraulic fluid power — Pressure-reducing
valves, sequence valves, unloading valves,
throttle valves and check valves —
Mounting surfaces**

*Transmissions hydrauliques — Réducteurs de pression, soupapes de
séquence, soupapes de décharge, soupapes d'étranglement et clapets de
non-retour — Plan de pose*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 5781 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 5, *Control products and components*.

This second edition cancels and replaces the first edition (ISO 5781), which has been technically revised.

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Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure circulating within an enclosed circuit. The most typical components found in such systems are hydraulic valves. They control flow direction, pressure or the flow rate of liquids in the enclosed circuit.

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Hydraulic fluid power — Pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves — Mounting surfaces

1 Scope

This International Standard specifies, in order to ensure interchangeability, the dimensions and other characteristics of surfaces on which hydraulic pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves are mounted.

It is applicable to mounting surfaces for hydraulic pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves, which represent current practice. They are generally used in industrial equipment.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 1101:—¹⁾, *Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out.*

ISO 1219-1:1991, *Fluid power systems and components — Graphic symbols and circuit diagrams — Part 1: Graphic symbols.*

ISO 1302:—²⁾, *Geometrical Product Specification (GPS) — Indication of surface texture in technical product documentation.*

ISO 4401:1994, *Hydraulic fluid power — Four-port directional control valves — Mounting surfaces.*

ISO 5598:1985, *Fluid power systems and components — Vocabulary.*

ISO 5783:1995, *Hydraulic fluid power — Code for identification of valve mounting surfaces and cartridge valve cavities.*

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 5598 apply.

1) To be published. (Revision of ISO 1101:1983)

2) To be published. (Revision of ISO 1302:1992)

4 Symbols

4.1 For the purposes of this International Standard, the following symbols apply:

- a) A, B, P, T, X and Y identify ports;
- b) F_1 , F_2 , F_3 , F_4 , F_5 and F_6 identify threaded holes for fixing screws;
- c) G identifies the location of pin holes;
- d) D identifies the fixing screw diameter;
- e) r_{\max} identifies the mounting surface edge radius.

4.2 The graphic symbols used in Figures 2, 3, 5, 6, 8, 9, 11, 12, 14 and 15 are in conformance with the graphical symbols in ISO 1219-1.

4.3 The code system used in this International Standard is defined in ISO 5783.

5 Tolerances

5.1 The following values shall be applied to the mounting surface, i.e. the area within the chain thick lines:

- surface roughness: $Ra \leq 0,8 \mu\text{m}$ (see ISO 1302);
- surface flatness: 0,01 mm over a distance of 100 mm (see ISO 1101);
- tolerance on diameters of locating pin holes: H12

5.2 With respect to the point of origin, along the x and y axes, the following tolerances shall be complied with:

- pin holes: $\pm 0,1 \text{ mm}$
- screw holes: $\pm 0,1 \text{ mm}$
- main ports: $\pm 0,2 \text{ mm}$

For the other dimensions, refer to the figures.

6 Dimensions

6.1 Mounting surface dimensions for hydraulic pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves shall be selected from the figures and tables specified in 6.2 to 6.6.

6.2 Mounting surface dimensions for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 4,5 mm maximum diameter (code: 5781-02-01-0-00) are given in Figure 1.

6.3 Mounting surface dimensions for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 7,5 mm maximum diameter (code: 5781-03-04-0-00) are given in Figure 4.

6.4 Mounting surface dimensions for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 14,7 mm maximum diameter (code: 5781-06-07-0-00) are given in Figure 7.

6.5 Mounting surface dimensions for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 23,4 mm maximum diameter (code: 5781-08-10-0-00) are given in Figure 10.

6.6 Mounting surface dimensions for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 32 mm maximum diameter (code: 5781-10-13-0-00) are given in Figure 13.

7 Port marking

7.1 The port symbols to be used for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves shall be selected from the figures specified in 7.2 to 7.11.

7.2 The symbols for directly-operated pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 4,5 mm maximum diameter (code: 5781-02-01-0-00) are given in Figure 2.

7.3 The symbols for pilot-operated pressure-reducing valves, sequence valves and unloading valves with main ports of 4,5 mm maximum diameter (code: 5781-02-01-0-00) are given in Figure 3.

7.4 The symbols for directly-operated pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 7,5 mm maximum diameter (code: 5781-03-04-0-00) are given in Figure 5.

7.5 The symbols for pilot-operated pressure-reducing valves, sequence valves and unloading valves with main ports of 7,5 mm maximum diameter (code: 5781-03-04-0-00) are given in Figure 6.

7.6 The symbols for directly-operated pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 14,7 mm maximum diameter (code: 5781-06-07-0-00) are given in Figure 8.

7.7 The symbols for pilot-operated pressure-reducing valves, sequence valves and unloading valves with main ports of 14,7 mm maximum diameter (code: 5781-06-07-0-00) are given in Figure 9.

7.8 The symbols for directly-operated pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 23,4 mm maximum diameter (code: 5781-08-10-0-00) are given in Figure 11.

7.9 The symbols for pilot-operated pressure-reducing valves, sequence valves and unloading valves with main ports of 23,4 mm maximum diameter (code: 5781-08-10-0-00) are given in Figure 12.

7.10 The symbols for directly-operated pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 32 mm maximum diameter (code: 5781-10-13-0-00) are given in Figure 14.

7.11 The symbols for pilot-operated pressure-reducing valves, sequence valves and unloading valves with main ports of 32 mm maximum diameter (code: 5781-10-13-0-00) are given in Figure 15.

7.12 The direction A to B should not be used in new designs.

8 Modular stack valves

For modular stack valves, the mounting surfaces and port markings defined in ISO 4401 shall be used.

9 Rated pressure

For an indication of the maximum limit of the rated pressure, see paragraph 1 of Figures 1, 4, 7, 10 and 13.

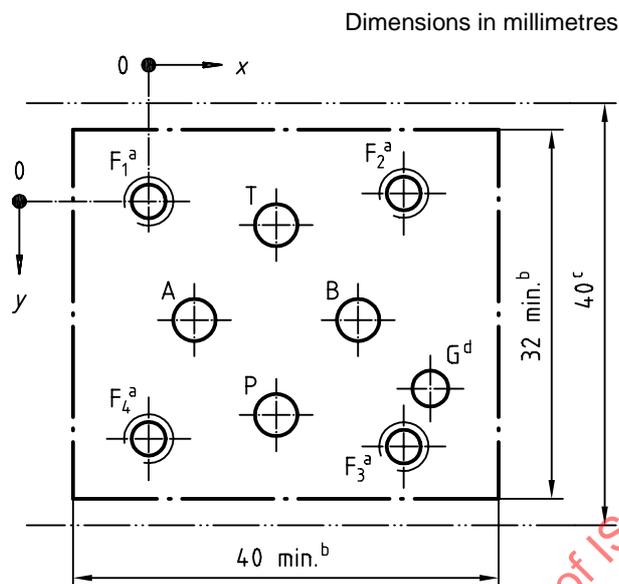
10 Identification statement (Reference to this International Standard)

It is strongly recommended to manufacturers who have chosen to conform to this International Standard that the following statement be used in test reports, catalogues and sales literature:

“Mounting surface dimensions of pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves conform to ISO 5781:2000, *Hydraulic fluid power — Pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves — Mounting surfaces.*”

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Code: 5781-02-01-0-00



The supplier shall establish the maximum rated pressure for subplates and manifold blocks.

^a The minimum thread depth is 1,5 times the screw diameter, D . The full thread depth recommended is $2D + 6$ mm, to facilitate interchangeability of valves and reduce the number of fixing screw lengths. The recommended engagement of fixing screw thread for ferrous mountings is $1,25D$.

^b The dimensions specifying the area within the chain thick lines are the minimum dimensions for the mounting surface. The corners of the rectangle may be radiused to a maximum radius, r_{\max} , equal to the thread diameter of the fixing screws.

^c This dimension gives the minimum space required for a valve with this mounting surface. The dimension is also the minimum distance from centreline to centreline of two identical mounting surfaces placed on a manifold block.

^d Blind hole in the mounting surface to accommodate the locating pin on the valves; the minimum depth is 4 mm.

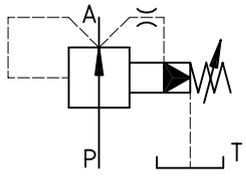
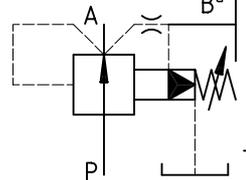
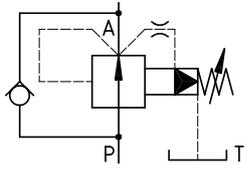
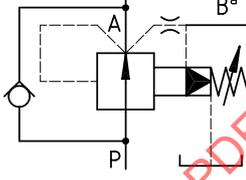
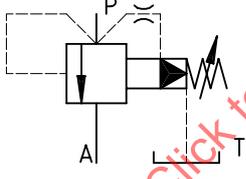
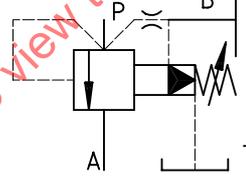
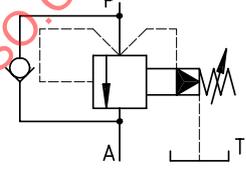
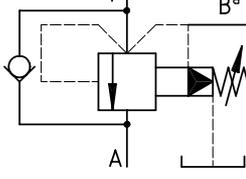
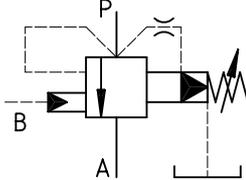
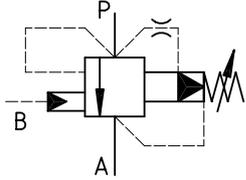
NOTE See Figures 2 and 3 for graphic symbols.

Axis	P	A	T	B	F ₁	F ₂	F ₃	F ₄	G
	∅ 4,5 max.	∅ 4,5 max.	∅ 4,5 max.	∅ 4,5 max.	M5	M5	M5	M5	∅ 3,4
x	12	4,3	12	19,7	0	24	24	0	26,5
y	20,25	11,25	2,25	11,25	0	-0,75	23,25	22,5	17,75

Figure 1 — Mounting surface for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 4,5 mm maximum diameter (size 02)

Option conforming to ISO 5783	0	1	2	3
Description	External drain		Internal drain	
	Internal pilot	External pilot	Internal pilot	External pilot
Pressure-reducing valves				
Pressure-reducing valves with by-pass check valve				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading valves				
Unloading valves with by-pass check valve				
Throttle valves				
Throttle valves with by-pass check valve				
Check valves				
Pilot-operated check valves				

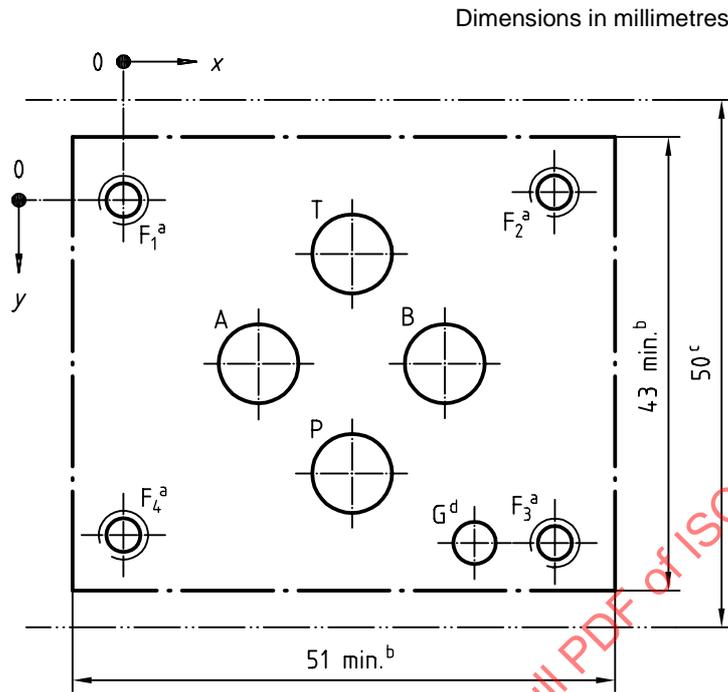
Figure 2 — Directly-operated pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 4,5 mm maximum diameter (code: 5781-02-01-0-00)

Option conforming to ISO 5783	0	1	2	3
Description	External drain		Internal drain	
	Internal pilot	External pilot	Internal pilot	External pilot
Pressure-reducing valves				
Pressure-reducing valves with by-pass check valve				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading valves				

^a Port for supplementary remote control; may be blocked if not used.

Figure 3 — Pilot-operated pressure-reducing valves, sequence valves and unloading valves with main ports of 4,5 mm maximum diameter (code: 5781-02-01-0-00)

Code: 5781-03-04-0-00



The supplier shall establish the maximum rated pressure for subplates and manifold blocks.

- a The minimum thread depth is 1,5 times the screw diameter D . The full thread depth recommended is $2D + 6$ mm, to facilitate interchangeability of valves and reduce the number of fixing screw lengths. The recommended engagement of fixing screw thread for ferrous mountings is $1,25D$.
- b The dimensions specifying the area within the chain thick lines are the minimum dimensions for the mounting surface. The corners of the rectangle may be radiused to a maximum radius, r_{max} , equal to the thread diameter of the fixing screws.
- c This dimension gives the minimum space required for a valve with this mounting surface. The dimension is also the minimum distance from centreline to centreline of two identical mounting surfaces placed on a manifold block.
- d Blind hole in the mounting surface to accommodate the locating pin on the valves; the minimum depth is 4 mm.

NOTE See Figures 5 and 6 for graphic symbols.

Axis	P	A	T	B	G	F ₁	F ₂	F ₃	F ₄
	∅ 7,5 max.	∅ 7,5 max.	∅ 7,5 max.	∅ 7,5 max.	∅ 4	M5	M5	M5	M5
x	21,5	12,7	21,5	30,2	33	0	40,5	40,5	0
y	25,9	15,5	5,1	15,5	31,75	0	-0,75	31,75	31

Figure 4 — Mounting surface for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 7,5 mm maximum diameter (size 03)

Option conforming to ISO 5783	0	1	2	3
Description	External drain		Internal drain	
	Internal pilot	External pilot	Internal pilot	External pilot
Pressure-reducing valves				
Pressure-reducing valves with by-pass check valve				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading valves				
Unloading valves with by-pass check valve				
Throttle valves				
Throttle valves with by-pass check valve				
Check valves				
Pilot-operated check valves				

Figure 5 — Directly-operated pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 7,5 mm maximum diameter (code: 5781-03-04-0-00)

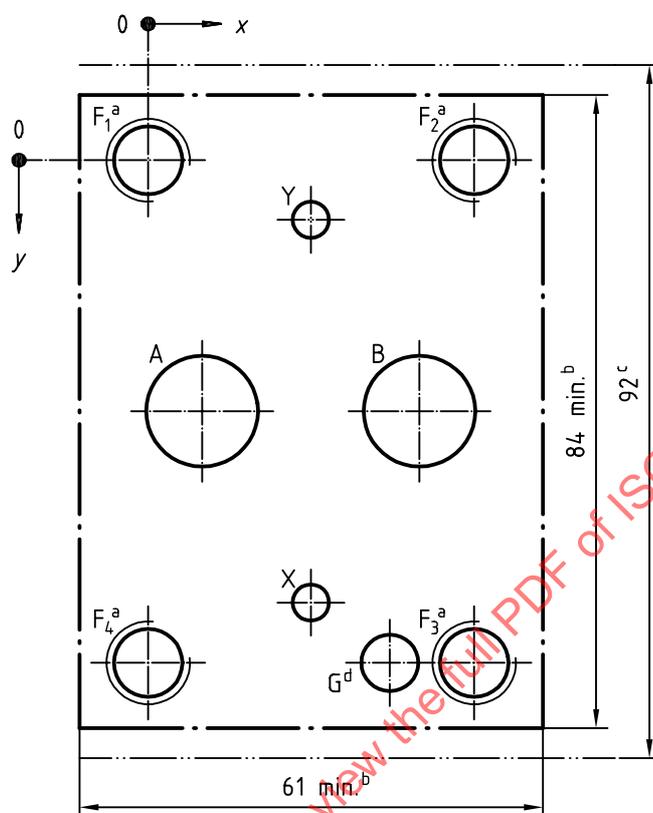
Option conforming to ISO 5783	0	1	2	3
Description	External drain		Internal drain	
	Internal pilot	External pilot	Internal pilot	External pilot
Pressure-reducing valves				
Pressure-reducing valves with by-pass check valve				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading valves				

^a Port for supplementary remote control; may be blocked if not used.

Figure 6 — Pilot-operated pressure-reducing valves, sequence valves and unloading valves with main ports of 7,5 mm maximum diameter (code: 5781-03-04-0-00)

Code: 5781-06-07-0-00

Dimensions in millimetres



The supplier shall establish the maximum rated pressure for subplates and manifold blocks.

- ^a The minimum thread depth is 1,5 times the screw diameter, D . The full thread depth recommended is $2D + 6$ mm, to facilitate interchangeability of valves and reduce the number of fixing screw lengths. The recommended engagement of fixing screw thread for ferrous mountings is $1,25D$.
- ^b The dimensions specifying the area within the chain thick lines are the minimum dimensions for the mounting surface. The corners of the rectangle may be radiused to a maximum radius, r_{\max} , equal to the thread diameter of the fixing screws.
- ^c This dimension gives the minimum space required for a valve with this mounting surface. The dimension is also the minimum distance from centreline to centreline of two identical mounting surfaces placed on a manifold block.
- ^d Blind hole in the mounting surface to accommodate the locating pin on the valves; the minimum depth is 4 mm.

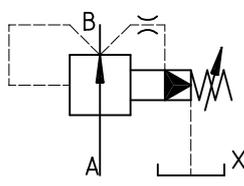
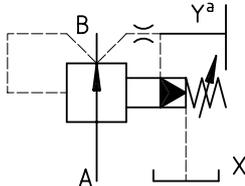
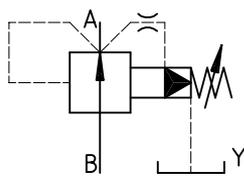
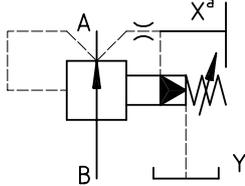
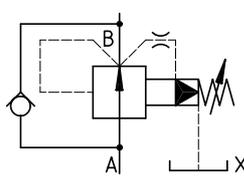
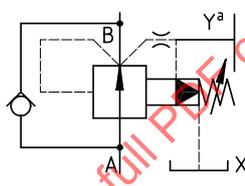
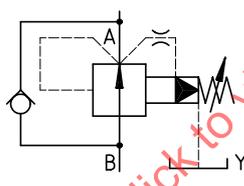
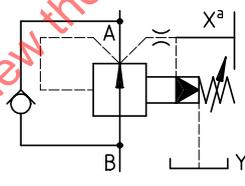
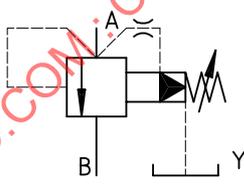
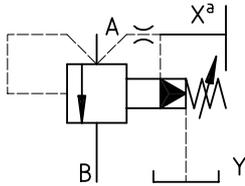
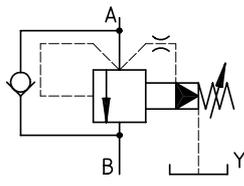
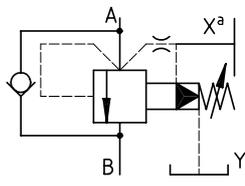
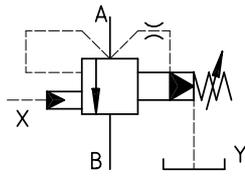
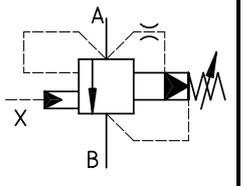
NOTE See Figures 8 and 9 for graphic symbols.

Axis	A	B	X	Y	G	F ₁	F ₂	F ₃	F ₄
	∅ 14,7 max.	∅ 14,7 max.	∅ 4,8	∅ 4,8	∅ 7,5	M10	M10	M10	M10
x	7,1	35,7	21,4	21,4	31,8	0	42,9	42,9	0
y	33,3	33,3	58,7	7,9	66,7	0	0	66,7	66,7

Figure 7 — Mounting surface for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 14,7 mm maximum diameter (size 06)

Option conforming to ISO 5783	0	1	2	3
Description	External drain		Internal drain	
	Internal pilot	External pilot	Internal pilot	External pilot
Pressure-reducing valves				
Pressure-reducing valves with by-pass check valve				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading valves				
Throttle valves				
Throttle valves with by-pass check valve				
Check valves				
Pilot-operated check valves				

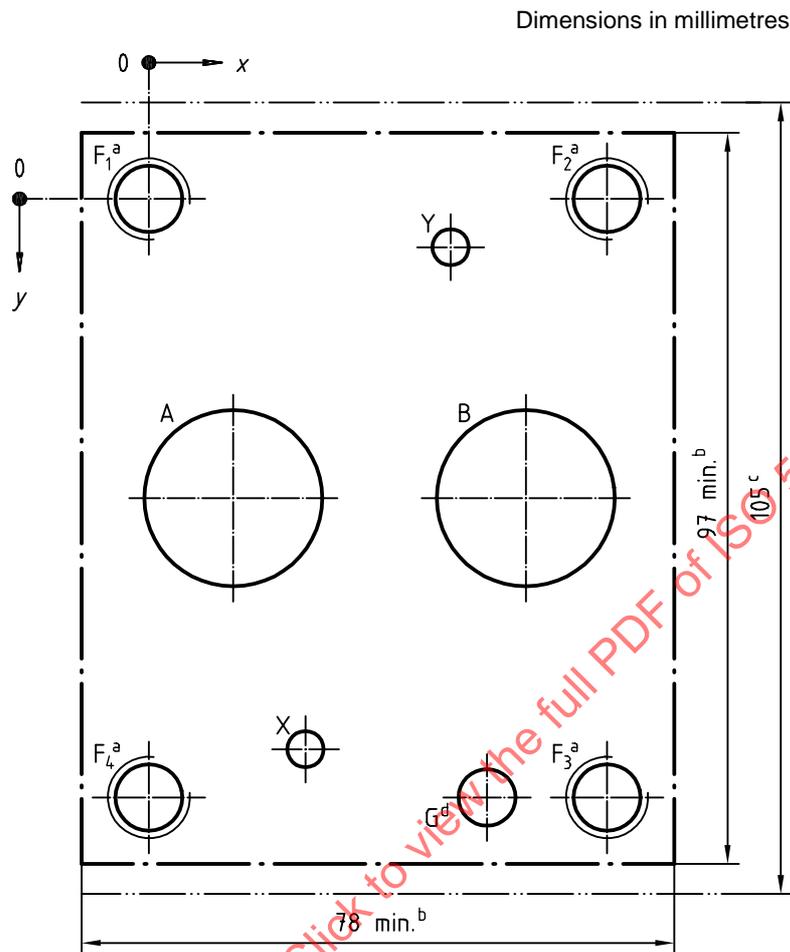
Figure 8 — Directly operated pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 14,7 mm maximum diameter (code: 5781-06-07-0-00)

Option conforming to ISO 5783	0	1	2	3
Description	External drain		Internal drain	
	Internal pilot	External pilot	Internal pilot	External pilot
Pressure-reducing valves				
				
Pressure-reducing valves with by-pass check valve				
				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading valves				

^a Port for supplementary remote control; may be blocked if not used.

Figure 9 — Pilot-operated pressure-reducing valves, sequence valves and unloading valves with main ports of 14,7 mm maximum diameter (code: 5781-06-07-0-00)

Code: 5781-08-10-0-00



The supplier shall establish the maximum rated pressure for subplates and manifold blocks.

^a The minimum thread depth is 1,5 times the screw diameter, D . The full thread depth recommended is $2D + 6$ mm, to facilitate interchangeability of valves and reduce the number of fixing screw lengths. The recommended engagement of fixing screw thread for ferrous mountings is $1,25D$.

^b The dimensions specifying the area within the chain thick lines are the minimum dimensions for the mounting surface. The corners of the rectangle may be radiused to a maximum radius, r_{max} , equal to the thread diameter of the fixing screws.

^c This dimension gives the minimum space required for a valve with this mounting surface. The dimension is also the minimum distance from centreline to centreline of two identical mounting surfaces placed on a manifold block.

^d Blind hole in the mounting surface to accommodate the locating pin on the valves; the minimum depth is 4 mm.

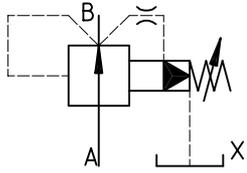
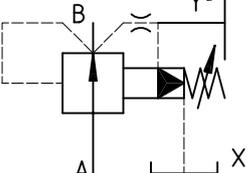
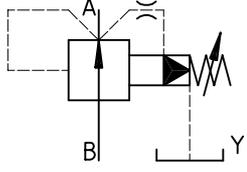
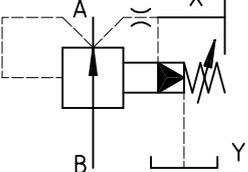
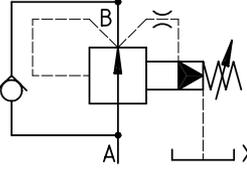
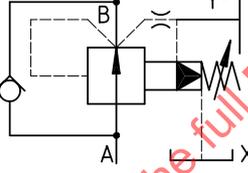
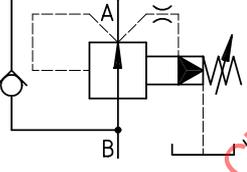
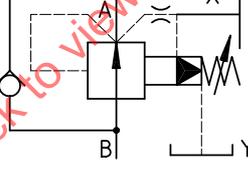
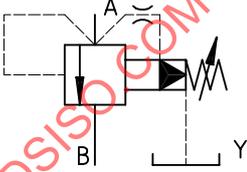
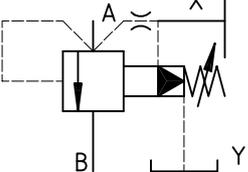
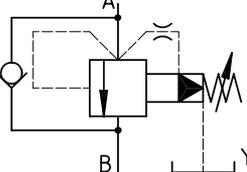
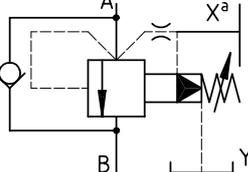
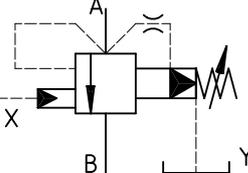
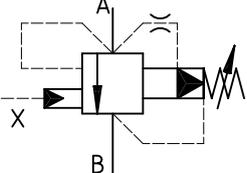
NOTE See Figures 11 and 12 for graphic symbols.

Axis	A	B	X	Y	G	F ₁	F ₂	F ₃	F ₄
	∅ 23,4 max.	∅ 23,4 max.	∅ 4,8	∅ 4,8	∅ 7,5	M10	M10	M10	M10
x	11,1	49,2	20,8	39,7	44,5	0	60,3	60,3	0
y	39,7	39,7	73	6,4	79,4	0	0	79,4	79,4

Figure 10 — Mounting surface for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 23,4 mm maximum diameter (size 08)

Option conforming to ISO 5783	0	1	2	3
Description	External drain		Internal drain	
	Internal pilot	External pilot	Internal pilot	External pilot
Pressure-reducing valves				
Pressure-reducing valves with by-pass check valve				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading valves				
Throttle valves				
Throttle valves with by-pass check valve				
Check valves				
Pilot-operated check valves				

Figure 11 — Directly-operated pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 23,4 mm maximum diameter (code: 5781-08-10-0-00)

Option conforming to ISO 5783	0	1	2	3
Description	External drain		Internal drain	
	Internal pilot	External pilot	Internal pilot	External pilot
Pressure-reducing valves				
				
Pressure-reducing valves with by-pass check valve				
				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading valves				

^a Port for supplementary remote control; may be blocked if not used.

Figure 12 — Pilot-operated pressure-reducing valves, sequence valves and unloading valves with main ports of 23,4 mm maximum diameter (code: 5781-08-10-0-00)