BS ISO 5781:2016

BSI Standards Publication

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

bsi.

National foreword

This British Standard is the UK implementation of ISO 5781:2016. It supersedes BS ISO 5781:2000 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MCE/18/-/5, Control components.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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BS ISO 5781:2016

INTERNATIONAL STANDARD

ISO 5781

Third edition
2016-08-01

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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Contents

Page

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 131, *Fluid power systems*, Subcommittee SC 5, *Control products and components*.

This third edition cancels and replaces the second edition (ISO 5781:2000), which has been technically revised.

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.

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

1 Scope

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

It applies to mounting surfaces for hydraulic pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves, which represent current practice; they are generally applicable to industrial equipment.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1219-1, *Fluid power systems and components — Graphical symbols and circuit diagrams — Part 1: Graphical symbols for conventional use and data-processing applications*

ISO 3601-2:2008, *Fluid power systems — O-rings —Part 2: Housing dimensions for general applications*

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

ISO 5598, *Fluid power systems and components — Vocabulary*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598 and the graphical symbols given in ISO 1219-1 apply.

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 Tables 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 dashed double-dotted lines:

— surface roughness: ISO 3601-2:2008, 5.1.4 and 5.2.3;

— surface flatness: 0,01 mm over a distance of 100 mm (see ISO 3601-2:2008, 5.1.4);

— tolerance on diameters of locating pin holes: H12.

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

— pin holes: ±0,1 mm;

— screw holes: ±0,1 mm;

— main ports: ±0,2 mm.

For the other dimensions, see 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: 5781-02-01-0-16) are given in Figure 1 and Table 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: 5781-03-04-0-16) are given in Figure 2 and Table 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: 5781-06-07-0-16) are given in Figure 3 and Table 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: 5781-08-10-0-16) are given in Figure 4 and Table 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: 5781-10-13-0-16) are given in Figure 5 and Table 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: 5781-02-01-0-16) are given in Table 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: 5781-02-01-0-16) are given in Table 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: 5781-03-04-0-16) are given in Table 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: 5781-03-04-0-16) are given in Table 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: 5781-06-07-0-16) are given in Table 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: 5781-06-07-0-16) are given in Table 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: 5781-08-10-0-16) are given in Table 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: 5781-08-10-0-16) are given in Table 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: 5781-10-13-0-16) are given in Table 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: 5781-10-13-0-16) are given in Table 15.

7.12 The direction A to B should not be used in new designs. This variant will be removed when this International Standard is next revised.

8 Modular stack valves

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

9 Rated pressure

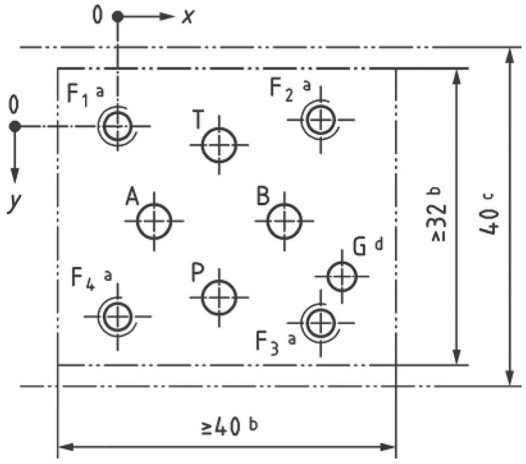
For indication of the maximum limit of the working pressure, see Note 1 in the Figures 1, 2, 3, 4 and 5.

10 Identification statement (reference to this International Standard)

Use the following statement in test reports, catalogues and sales literature when electing to comply with this International Standard:

"Mounting surface dimensions conform to ISO 5781:2016, *Hydraulic fluid power — Pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves — Mounting surfaces*."

Dimensions in millimetres



Key

a The minimum thread depth is 1,5 times the screw diameter, *D*. The full thread depth recommended is 2 *D* + 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 1,25 *D*.

b The dimensions specifying the area within the dashed double-dotted 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 1 The supplier shall stipulate the maximum working pressure for subplates and manifold blocks.

NOTE 2 See Tables 2 and 3 for graphical symbols.

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 (code: 5781-02-01-0-16)

Table 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 (code: 5781-02-01-0-16)

Axis	P	A	T	B	F1	F2	F3	F4	G
	ø 4,5 max.	ø 4,5 max.	ø 4,5 max.	ø 4,5 max.	M5	M5	M5	M5	ø 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

Table 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: 5781-02-01-0-16)

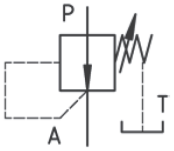
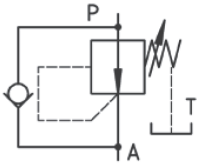
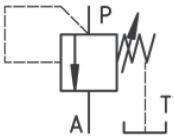
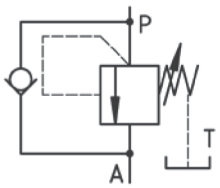
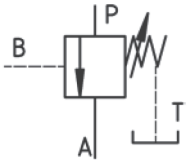
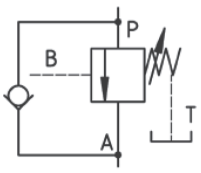
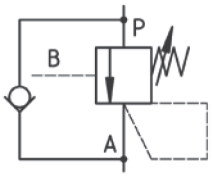
Option conforming to ISO 5783	0	1	2	3
Description	External drain		Internal drain	
	Internal pilot	External pilot	Internal pilot	External pilot
Pressure-reducing valves				
Pressure-reducing valves with by-pass check valve				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading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

Table 2 *(continued)*

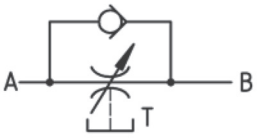
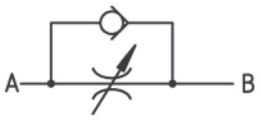
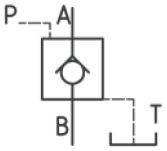
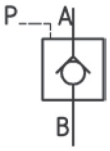
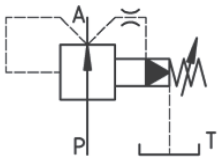
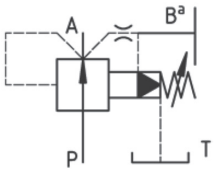
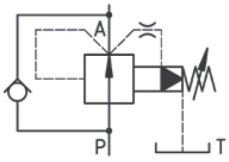
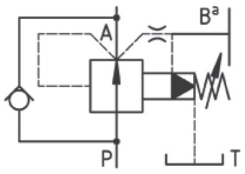
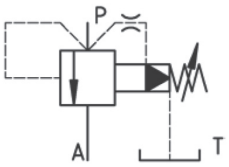
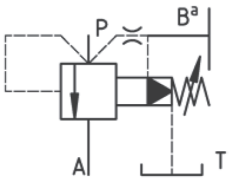
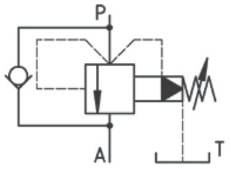
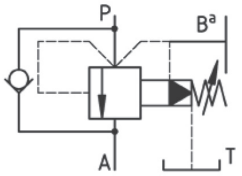
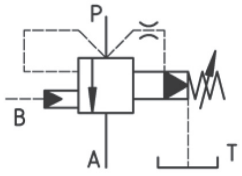
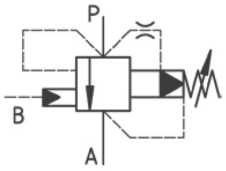
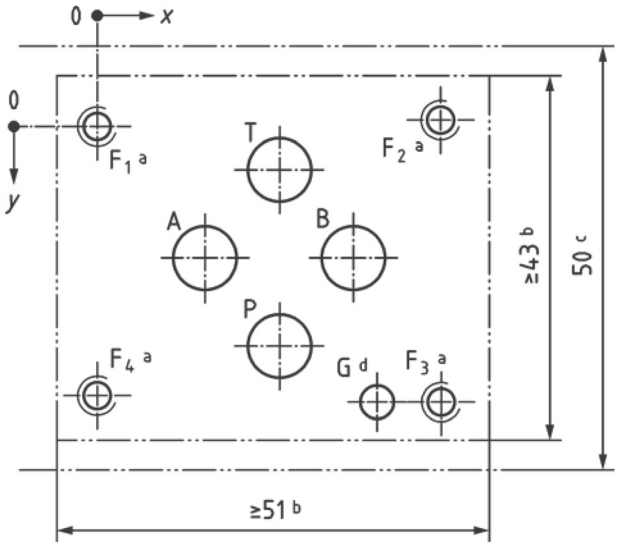
Option conforming to ISO 5783	0	1	2	3
Description	External drain		Internal drain	
	Internal pilot	External pilot	Internal pilot	External pilot
Throttle valves with by-pass check valve				
Check valves				
Pilot-operated check valves				

Table 3 — Pilot-operated pressure-reducing valves, sequence valves and unloading valves with main ports of 4,5 mm maximum diameter (code: 5781-02-01-0-16)

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.

Dimensions in millimetres



Key

a The minimum thread depth is 1,5 times the screw diameter, *D*. The full thread depth recommended is 2 *D* + 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 1,25 *D*.

b The dimensions specifying the area within the dashed double-dotted 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 1 The supplier shall stipulate the maximum working pressure for subplates and manifold blocks.

NOTE 2 See Tables 5 and 6 for graphical symbols.

Figure 2 — Mounting surface for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 7,5 mm maximum diameter (code: 5781-03-04-0-16)

Table 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 (code: 5781-03-04-0-16)

Axis	P	A	T	B	G	F_1	F_2	F_3	F_4
	ø 7,5 max.	ø 7,5 max.	ø 7,5 max.	ø 7,5 max.	ø 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

Table 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: 5781-03-04-0-16)

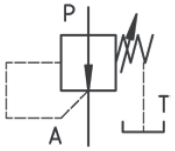
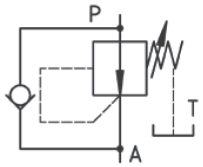
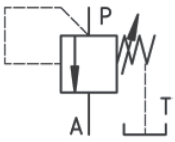
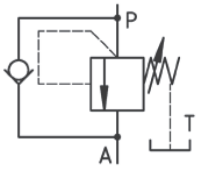
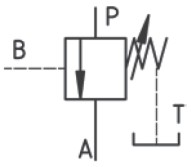
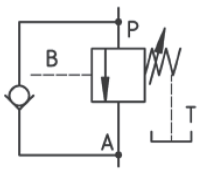
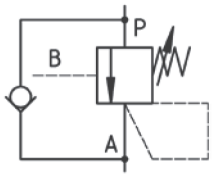
Option conforming to ISO 5783	0	1	2	3
Description	External drain		Internal drain	
	Internal pilot	External pilot	Internal pilot	External pilot
Pressure-reducing valves				
Pressure-reducing valves with by-pass check valve				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading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

Table 5 *(continued)*

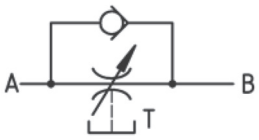
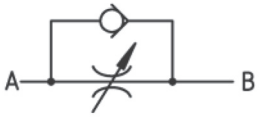
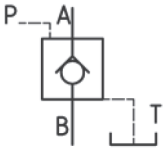
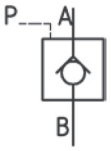
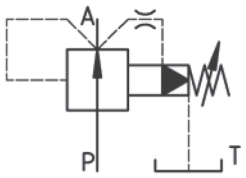
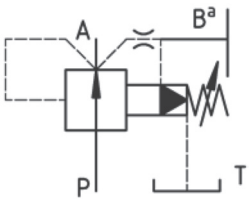
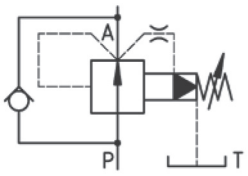
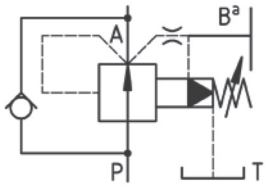
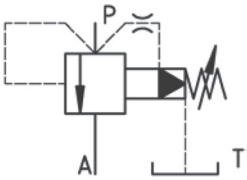
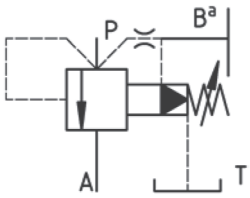
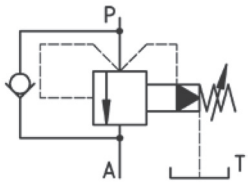
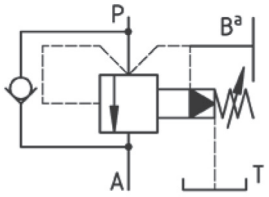
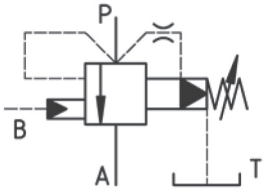
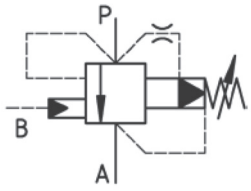
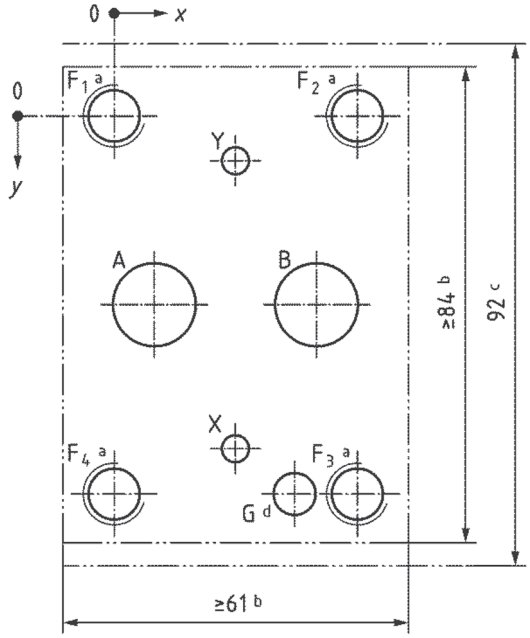
Option conforming to ISO 5783	**0**	**1**	**2**	**3**
Description	**External drain**		**Internal drain**	
	Internal pilot	**External pilot**	**Internal pilot**	**External pilot**
Throttle valves with by-pass check valve				
Check valves				
Pilot-operated check valves				

Table 6 — Pilot-operated pressure-reducing valves, sequence valves and unloading valves with main ports of 7,5 mm maximum diameter (code: 5781-03-04-0-16)

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.

Dimensions in millimetres



Key

a The minimum thread depth is 1,5 times the screw diameter, *D*. The full thread depth recommended is 2 *D* + 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 1,25 *D*.

b The dimensions specifying the area within the dashed double-dotted 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 1 The supplier shall stipulate the maximum working pressure for subplates and manifold blocks.

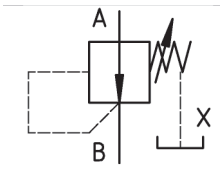
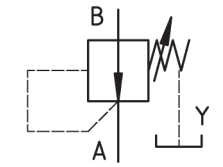
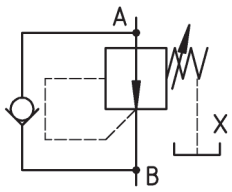
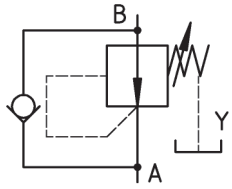
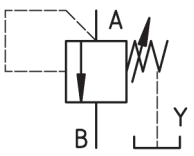
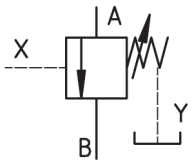
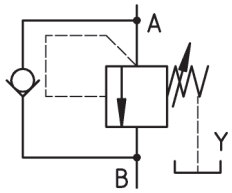
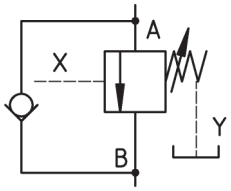
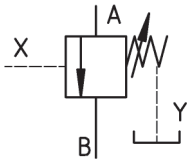
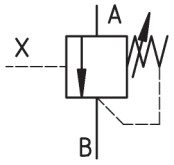
NOTE 2 See Tables 8 and 9 for graphical symbols.

Figure 3 — Mounting surface for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 14,7 mm maximum diameter (code: 5781-06-07-0-16)

Table 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 (code: 5781-06-07-0-16)

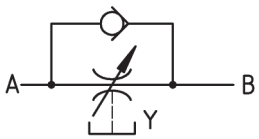
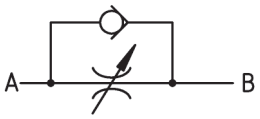
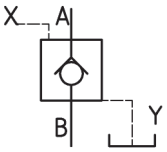
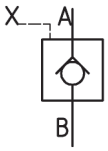
Axis	A	B	X	Y	G	F_1	F_2	F_3	F_4
	ø 14,7 max.	ø 14,7 max.	ø 4,8	ø 4,8	ø 7,5	M10	M10	M10	M10
x	7,1	35,7	21,4	21,4	31,8	0	42,9	42,9	0
y	33,3	33,3	58,7	7,9	66,7	0	0	66,7	66,7

Table 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: 5781-06-07-0-16)

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[a]				
				
Pressure-reducing valves with by-pass check valve[a]				
				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading valves				
Throttle valves				

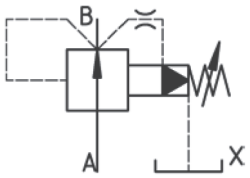
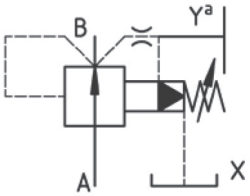
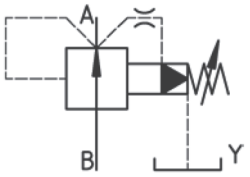
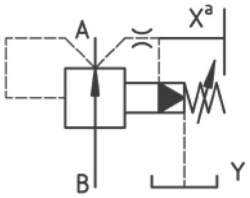
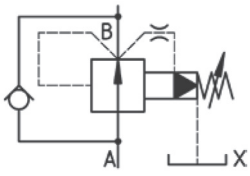
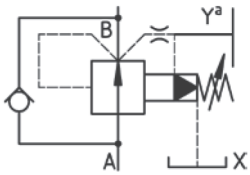
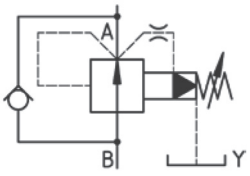
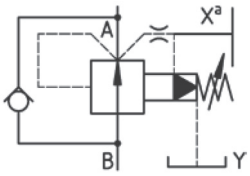
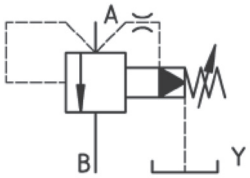
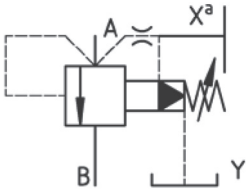
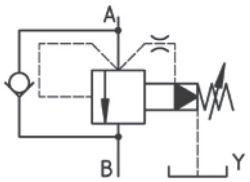
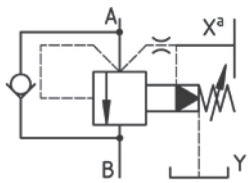
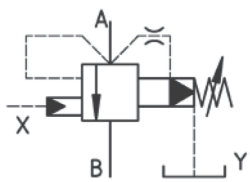
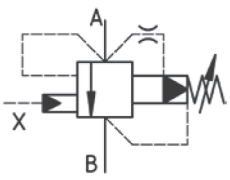
[a] See 7.12.

Table 8 *(continued)*

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

[a] See 7.12.

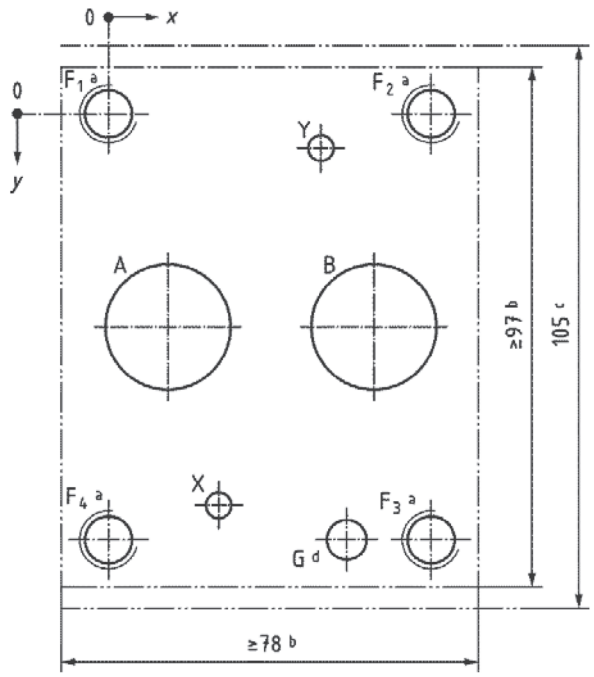
Table 9 — Pilot-operated pressure-reducing valves, sequence valves and unloading valves with main ports of 14,7 mm maximum diameter (code: 5781-06-07-0-16)

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[b]				
				
Pressure-reducing valves with by-pass check valve[b]				
				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading valves				

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

[b] See 7.12.

Dimensions in millimetres



a The minimum thread depth is 1,5 times the screw diameter, *D*. The full thread depth recommended is 2 *D* + 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 1,25 *D*.

b The dimensions specifying the area within the dashed double-dotted lines are the minimum dimensions for the mounting surface. The corners of the rectangle may be radiused to a maximum radius, rmax, 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 1 The supplier shall stipulate the maximum working pressure for subplates and manifold blocks.

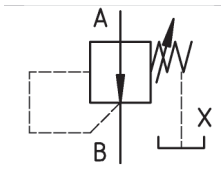
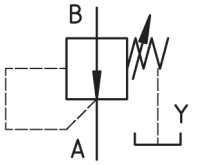
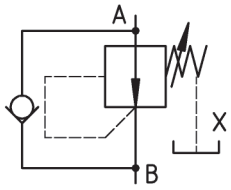
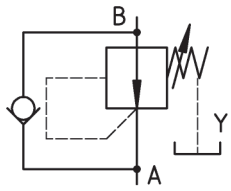
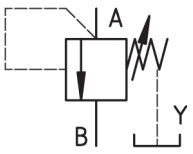
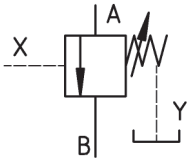
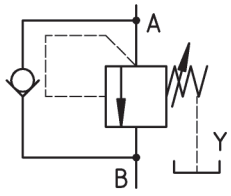
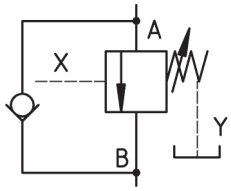
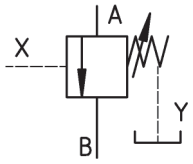
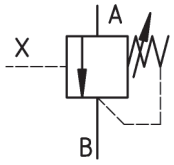
NOTE 2 See Tables 11 and 12 for graphical symbols.

Figure 4 — Mounting surface for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 23,4 mm maximum diameter (code: 5781-08-10-0-16)

Table 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 (code: 5781-08-10-0-16)

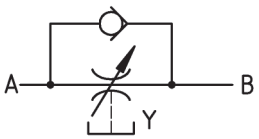
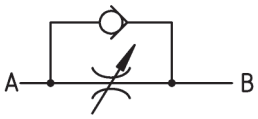
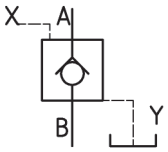
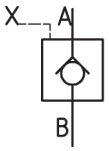
Axis	A	B	X	Y	G	F_1	F_2	F_3	F_4
	ø 23,4 max.	**ø 23,4 max.**	**ø 4,8**	**ø 4,8**	**ø 7,5**	**M10**	**M10**	**M10**	**M10**
x	11,1	49,2	20,8	39,7	44,5	0	60,3	60,3	0
y	39,7	39,7	73	6,4	79,4	0	0	79,4	79,4

Table 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: 5781-08-10-0-16)

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[a]				
				
Pressure-reducing valves with by-pass check valve[a]				
				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading valves				
Throttle valves				

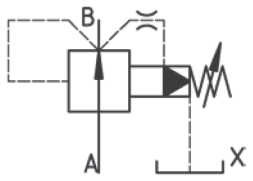
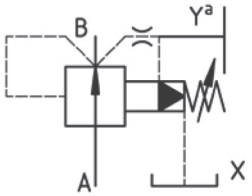
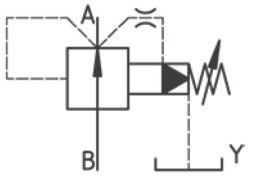
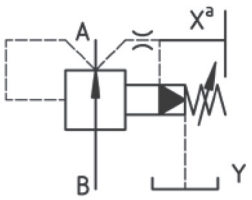
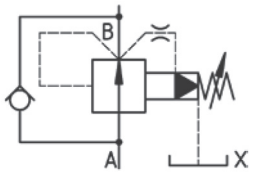
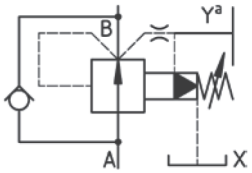
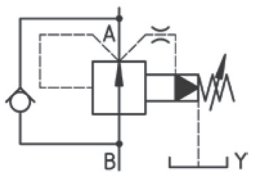
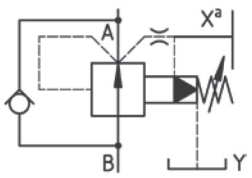
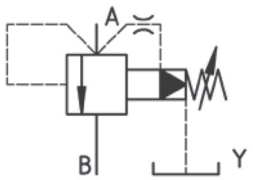
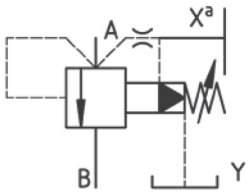
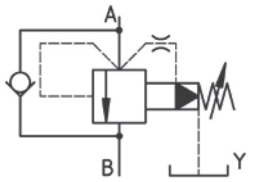
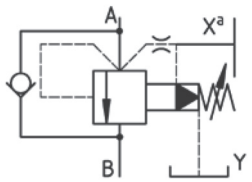
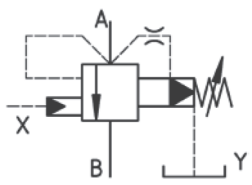
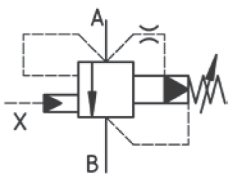
[a] See 7.12.

Table 11 *(continued)*

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

[a] See 7.12.

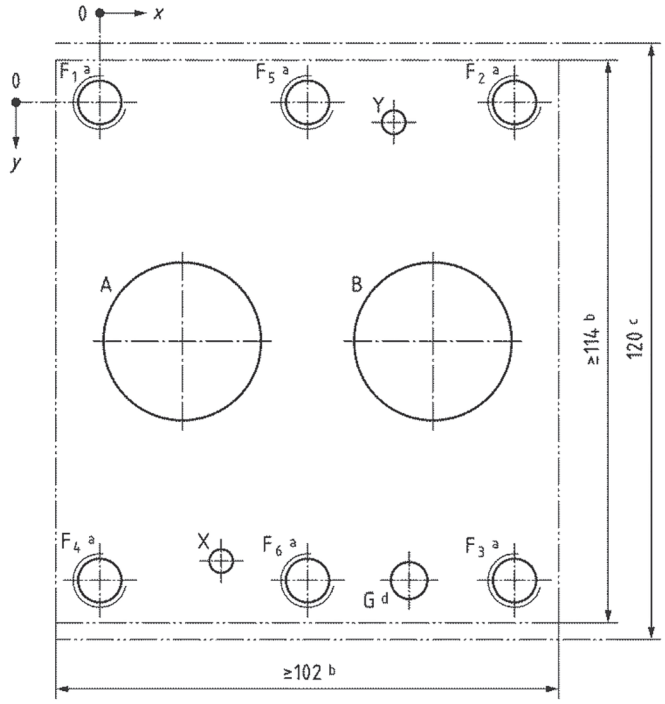
Table 12 — Pilot-operated pressure-reducing valves, sequence valves and unloading valves with main ports of 23,4 mm maximum diameter (code: 5781-08-10-0-16)

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[b]				
				
Pressure-reducing valves with by-pass check valve[b]				
				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading valves				

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

[b] See 7.12.

Dimensions in millimetres



a The minimum thread depth is 1,5 times the screw diameter, *D*. The full thread depth recommended is 2 *D* + 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 1,25 *D*.

b The dimensions specifying the area within the dashed double-dotted 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 1 The supplier shall stipulate the maximum working pressure for subplates and manifold blocks.

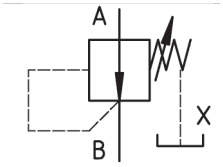
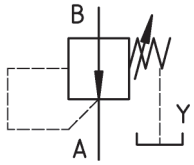
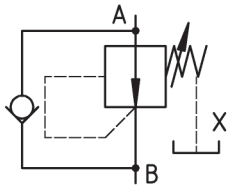
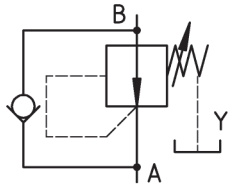
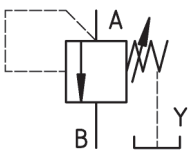
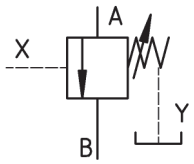
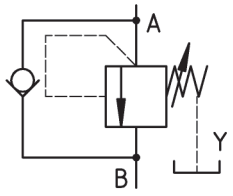
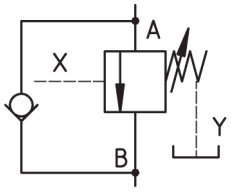
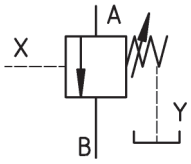
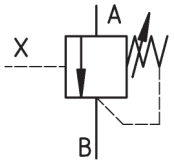
NOTE 2 See Tables 14 and 15 for graphical symbols.

Figure 5 — Mounting surface for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 32 mm maximum diameter (code: 5781-09-13-0-16)

Table 13 — Mounting surface for pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 32 mm maximum diameter (code: 5781-09-13-0-16)

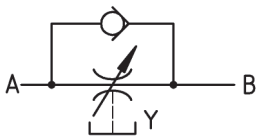
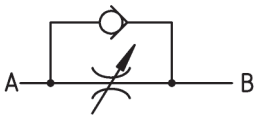
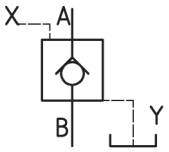
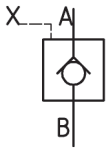
Axis	A	B	X	Y	G	F_1	F_2	F_3	F_4	F_5	F_6
	ø 32 max.	ø 32 max.	ø 4,8	ø 4,8	ø 7,5	M10	M10	M10	M10	M10	M10
x	16,7	67,5	24,6	59,6	62,7	0	84,1	84,1	0	42,1	42,1
y	48,4	48,4	92,9	4	96,8	0	0	96,8	96,8	0	96,8

Table 14 — Directly-operated pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves with main ports of 32 mm maximum diameter (code: 5781-09-13-0-16)

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[a]				
				
Pressure-reducing valves with a by-pass check valve[a]				
				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading valves				
Throttle valves				

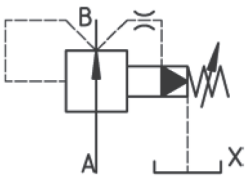
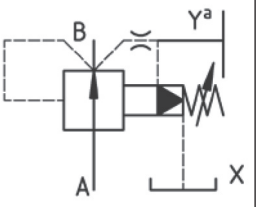
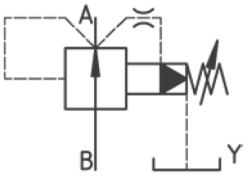
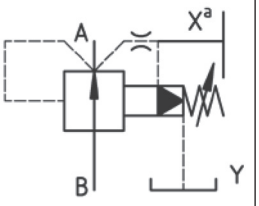
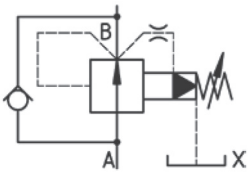
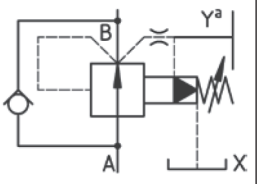
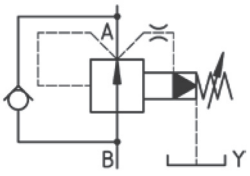
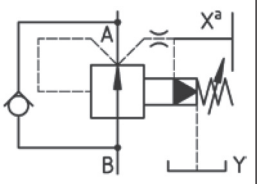
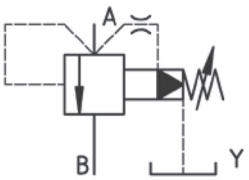
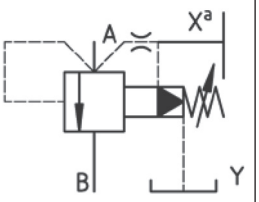
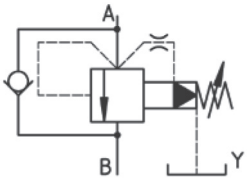
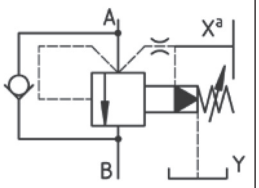
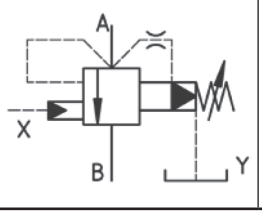
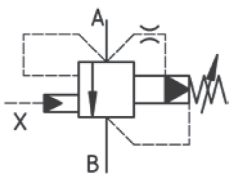
[a] See 7.12.

Table 14 *(continued)*

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

[a] See 7.12.

Table 15 — Pilot-operated pressure-reducing valves, sequence valves and unloading valves with main ports of 32 mm maximum diameter (code: 5781-09-13-0-16)

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[b]				
				
Pressure-reducing valves with by-pass check valve[b]				
				
Sequence valves				
Sequence valves with by-pass check valve				
Unloading valves				

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

[b] See 7.12.

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[1] ISO 129, *Technical drawings — Dimensioning — General principles, definitions, methods of execution and special indications*

[2] ISO 286-1, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 1: Basis of tolerances, deviations and fits*

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