2. Introduction

Ordering code

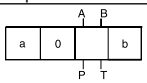
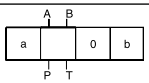
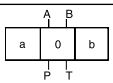
D		1	F	P							E	0	ED	
DC valve	Nominal size	Pilot NG06	Proportional control	VCD	Funktion	Volume flow (on request)	Spool position on power down [1]	Pilot oil	Seal	Command signal	Explosion proof IECEx	Valve option Standard	Protection type	Design series [3] (not required for ordering)

Code	Nominal size
4	NG16 / CETOP 07
8	NG25 / CETOP 08
9	NG25 / CETOP 08
11	NG32 / CETOP 10

Code	Protection
ED	Solenoid Ex II 2G Ex db IIC T5/T6 Gb
EEx-proof type, pilot valve D1FP**9***0ED** (operation manual HY11-5715-709) and position transducer PPT**ED* (operation manual HY11-5715-715)	

Function	
Code	Spool type
E01	
E52	
(Further spool types on reguest)	

Code	Signal	Function
B	+/- 10 V	0...+10 V -> P-B
E	+/- 20 mA	0...+20 mA -> P-B
N	EtherCAT	
S	4...20 mA	12...20 mA -> P-A

Code	Spool position on power down	
A [1]		
B [1]		
C [2]		

Code	Seal
N	NBR
V	FPM
H	for HFC fluid

Code	Supply	Drain
1	internal	external
2	external	external
4	internal	internal
5	external	internal

[1] Approx. 10 % opening, only zero lapped spools and underlap spools.
[2] Only for overlapped spools.
[3] Revision status

Ordering code

D		1	F	E							E	0	ED	
DC valve	Nominal size	Pilot NG06	Proportional control	VCD	Funktion	Volume flow (on request)	Spool position on power down [1]	Pilot oil	Seal	Command signal	Explosion proof IECEx	Valve option Standard	Protection type	Design series [2] (not required for ordering)

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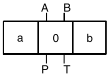

Function	
Code	Spool type
E01	
(Further spool types on reguest)	

Code	Supply	Drain
1	internal	external
2	external	external
4	internal	internal
5	external	internal

Code	Protection
ED	Solenoid Ex II 2G Ex db IIC T5/T6 Gb
EEx-proof type, pilot valve D1FP**9***0ED** (operation manual HY11-5715-709) and position transducer PPT**ED* (operation manual HY11-5715-715)	

Code	Signal	Function
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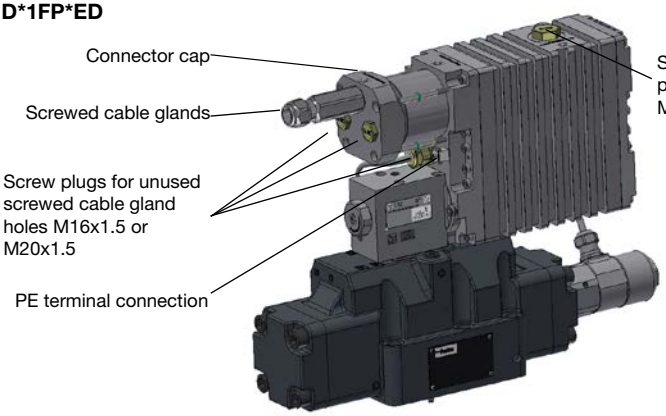
E	+/- 20 mA	0...+20 mA -> P-B
N	EtherCAT	
S	4...20 mA	12...20 mA -> P-A

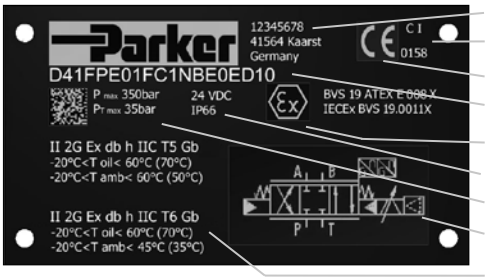
Code	Seal
N	NBR
V	FPM
H	for HFC fluid

[1] Only for overlapped spools.
[2] Revision status

D*1FP*ED



Name plate



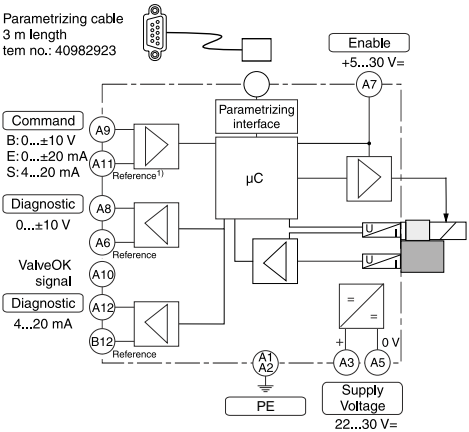
Manufacturer's logo and address
Code for year and month of manufacture
CE mark
Entire name
Ex protection symbol
Protection class, supply voltage
Hydraulic data
Hydraulic symbol
Explosion protection class of complete valve to European Directive 2014/34/EU

Characteristics of valve driver

The integral electronic driver combines all functions for optimal operation of the valve. Thanks to its excellent dynamics, the valve is deployable within closed loop control applications. The most important features are:

- high dynamic actuator with specially designed electronic driver
- closed loop controlled spool position
- constant current actuator control with overcurrent shutoff
- excellent properties for response sensitivity and temperature drift
- differential input stage with various command signal options
- diagnostic output for spool stroke / overcurrent state
- meets relevant European EMC-standards

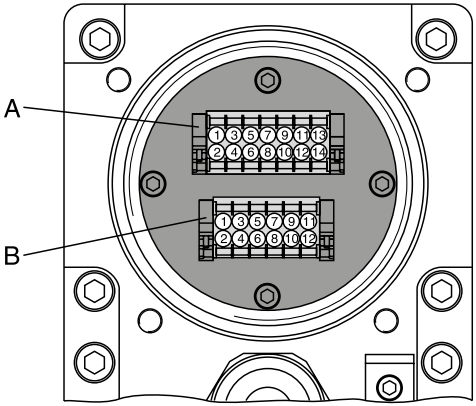
Block diagram of onboard electronics



1) Do not connect with supply voltage zero.

MSG11-5715-718 D_1FP IECEX UK.indd 19.12.19

Position of the terminal strips



Terminal strip	Function	Terminal	Signal in/out
14 pin	Power supply	A1	PE
		A3	+Supply (22...30 V)
		A5	0 V Supply voltage
		A7	Enable (5...30 V) [2]
	Command signal	A9	Command signal
		A11	Command reference
	Diagnostic signal [3]	A8	Diagnostic (voltage ±10 V)
		A10	Valve OK output signal [4]
		A12	Diagnostic (current 4...20 mA)
	Sensor supply	A2	PE
		A4	+Sensor supply [7]
		A6	0 V Sensor supply voltage / reference [5]
	Not used	A13	n. c.
		A14	n. c.

Terminal strip	Function	Terminal	Signal in/out
12 pin	Axis control	B9	Feedback IN (4...20 mA) [7]
		B11	Feedback reference IN (4...20 mA)[6] [7]
		B10	Feedback IN (±10 V) [7]
		B12	Feedback reference IN (±10 V) / Diagnostic reference [3]
	BUS interface	B2	BUS 1
		B4	BUS 2
		B6	BUS 3
		B8	BUS 4
		B1	BUS 5
		B3	BUS 6
		B5	BUS 7
		B7	BUS 8

Supplement for valves with EtherCAT interface please refer to bulletin HY11-5715-708/UK.

1) Do not connect with supply voltage zero.
2) Can be connected to power supply, if no separate enable signal is required.
3) Reference B12 for diagnostic signal A12.
4) Provides 24 V signal when no error is detected by the valve electronics, provides 0 V when an error is detected.
5) Reference for diagnostic A8.
6) Reference B11 for command signal A9.
7) Special functions are not shown in the block diagram.

Technical data

General				
Model		Proportional directional control valve, pilot operated		
Drive		VCD® -actuator		
Nominal size		NG16 (CETOP 07)	NG25 (CETOP 08)	NG32 CETOP 10)
Installation position		unrestricted		
Sensitivity	[%]	< 0,05		
Hysteresis	[%]	< 0,1		
Temp. drift of center postion	[%/K]	< 0,025		
Ambient temperature	[°C]	T5: -20…+60 at max. 60 fluid temperature T5: -20…+50 at max. 70 fluid temperature T6: -20…+45 at max. 60 fluid temperature T6: -20…+35 at max. 70 fluid temperature		
$MTTF_D$ value	[Jahre]	75		
Vibration resistance	[g]	10 Sinus 5...2000 Hz acc. IEC 68-2-6 10 (RMS) Random noise 20...2000 Hz acc. IEC 68-2-36 15 Shock acc. IEC 68-2-27		
Hydraulic				
Fluid		Hydraulic oil according to DIN 51524 ... 535, other on request		
Fluid temperature	[°C]	T5: -20…+60 at max. 60 ambient temperature T5: -20…+70 at max. 50 ambient temperature T6: -20…+60 at max. 45 ambient temperature T6: -20…+70 at max. 35 ambient temperature		
Viscosity				
permitted	[cSt]/ [mm²/s]	20...400		
recommended	[cSt]/ [mm²/s]	30...80		
Filtration		ISO 4406; 18/16/13		
Max. operating pressure	[bar]	Internal pilot drain P, A, B, X 350; T, Y 35 External pilot drain P, A, B, T, X 350; Y 35		
Electrical				
Duty ratio	[%]	100		
Protection class		CE Ex II 2G Ex db h IIC T5/ T6 Gb IECEx, IP66 and ATEX		
Supply voltage / ripple	[V]	22...30, electric shut-off < 19, ripple < 5 % eff., surge free		
Current consumption max.	[A]	3.5		
Pre-fusing	[A]	4.0 A medium lag		
Input signal				
Code B voltage	[V]	+10...0...-10, ripple < 0,01% eff., surge free, 0...+10 V P–>B		
Impedance	[kOhm]	100		
Code E current	[mA]	+20...0...-20, ripple < 0.01 % eff., surge free, 0...+20 mA P–>B		
Impedance	[Ohm]	< 250		
Code S current	[mA]	4...12...20, ripple < 0.01 % eff., surge free, 12...20 mA P–>A < 3,6 mA = enable off, > 3,8 mA = enable on according to NAMUR NE43		
Impedance	[Ohm]	< 250		
Differential input voltage max.	[V]	30 for terminal A9 and A11 against PE (terminal A1/A2) 11 for terminal A9 and A11 against 0 V (terminal A5)		
Enable signal	[V]	5...30, Ri = > 8 kOhm		
Diagnostic signal	[V]	+10...0...-10 / +12,5 V error detection, rated max. 5 mA		
EMC		EN 61000-6-2, EN 61000-6-4		
Electrical connection				
Code B, E, S		Terminal block 12-/14-polie		
Code N		EtherCAT		
Wiring min.	[mm²]	8 x 1.0 (AWG16) overall braid shield		
Wiring length max.	[m]	50		
Material				
Electronic housing		EN AW 6082 / AlSi1MgMn		
Valve body		EN-GJS-400 / 11SMnPb30+C / 16MnCrS5 / 1.7139/ ESP65		

3. Safety Instructions

Read the operating instructions thoroughly before installation, commissioning, maintenance, repair and storage, and observe them. Failure to observe the operating instructions may result in damage to the valve or the parts of the system connected to it.

In particular, in the case of explosive atmospheres, any failure to observe the operating instructions may result in an explosion.

The system operator must make these operating instructions visible and easily accessible to operating and maintenance personnel.

Compliance with applicable standards/legal requirements must be enforced. This particularly applies to plant safety and environmental protection.

A list of such standards, etc. appears in the annex by way of example.

Before starting installation, maintenance and repair work, the hydraulic system must be depressurized and power must be disconnected from the electrical installation.

In addition, the electrical installation must be secured so that power cannot be restored unexpectedly.

The valve may become hot during operation. To avoid risk of burns, do not touch the valve surface.

The system operator must monitor both the ambient temperature as well as the fluid temperature and cool the oil if necessary in order to the keep within the maximum temperatures set out in these operating instructions (see technical data). In this connection, observe the relevant directions in the operating instructions of the supplier (solenoid system).

Any leaks occurring at the valve must be rectified immediately.

Symbols

This manual uses symbols which have to be followed accordingly:

Instructions with regard to the warranty

Instructions with regard to possible damaging of the valve or linked system components

Notes relating to potential hazards

Helpful additional instructions

Marking, name plates

Information attached directly to the valve such as circuit plans and name plates must be observed and kept in a legible state.

Work on the valve

Work relating to the installation and commissioning of the valve may only be carried out by qualified persons. Qualified persons are defined as persons who, on the basis of education, experience and instruction, have sufficient knowledge of applicable requirements and accepted rules of the technology.

Throughout any installation, commissioning, maintenance and repair work, it is the responsibility of the operator to ensure that there is no risk of explosion.

Before starting such work, the operator has to ensure that tools and equipment are only used if they do not damage the valve and they do not leave behind residues that are inflammable.

In addition, clean the valve before starting such work, in particular removing dust, liquids and other deposits. Cleaning should be done using a lint-free cloth.

Tools may not be used if they might cause a static charge on use.

Throughout any installation, commissioning, maintenance and repair work, it is the responsibility of the operator to ensure that there is no risk of explosion.

Before removing the valve the hydraulic system must be depressurized and power must be disconnected from the electrical installation.

4. Important Details

Intended usage

⚠ These operating instructions apply to proportional DC valves of series D*1FP*ED and D*1FE*ED.
Compliance with the operating instructions must be ensured.

It is the responsibility of the operator to ensure that the information in the technical data is followed.

Any different or modified use is not classed as correct use.

In case of non-intended use of the product the manufacturer is not liable.

Common instructions

We reserve the right to make technical changes as a result of further development of the product described in these operating instructions. Figures and drawings in these instructions are simplified depictions. As a result of further development, improvements and changes to the product, it is possible that the figures are not fully consistent with the described valve.
The technical details and dimensions are non-binding. They may not form the basis of any claims.

Liability

The manufacturer cannot accept liability for loss or damage resulting from the following faults:

- incorrect installation
- unqualified operation
- inadequate maintenance
- use beyond specification

⚠ Do not dismantle the valve. In case of suspicion for a defect please contact Parker.

⚠ Maintenance works carried out by the user on exprotection valves are prohibited by Parker.

Storage

If the valve needs to be temporarily stored, it must be protected from dirt, the weather, and mechanical damage. Each valve is tested with hydraulic oil in the factory, so that the internal components are protected from corrosion. However, this protection can only be guaranteed under the following conditions:

Storage period	Storage requirements
12 months	constant humidity < 60 % as well as constant temperature < 25 °C
6 months	varying humidity as well as varying temperature < 35 °C

⚠ Storage outside or in maritime or tropical climates leads to corrosion and may make the valve unusable.

5. Mounting / Installation

Scope of supply

As soon as you receive the valve you should check if the package has the specified contents. In particular, check whether the type of protection indicated on the valve is as described in these operating instructions.
The scope of delivery includes:

- Valve
- Connector cap with IECEx certified screwed cable glands and/or screw plugs
- Operating instructions (including operating instructions of the valve and the declarations of conformity of the manufactures)

☞ As soon as you receive the shipment, please check for any obvious signs of damage caused by careless transport. Document the transport damage and immediately notify the carrier, the insurance company and the supplier.

Mounting

- Compare valve type (located on the name plate) with bill of materials respectively circuit diagram.
- The valve may be mounted fix or movable in any direction.

☞ Check mounting surface for the valve. Uneveness of 0.01 mm/100 mm, surface finish of 6.3 µm are tolerable values. Keep valve mounting surface and work environment clean!

- Unrestricted mounting position.
- Check the proper position of the valve ports and the O-rings
- Use mounting bolts according to property class ISO 4762-12.9 and tighten the bolts crisscross.

Insufficient condition of the valve mounting surface might create malfunction! Incorrect mounting resp. bolt torque may result in abrupt leakage of pressure fluid on the valve ports. The valve must be connected to the equipotential bonding system of the hydraulic system.

Size	Ordering code	Bolt kit	Torque values
D41F*	BK320	2 pcs. M6x55 / 4 pcs. M10x60	13.2 / 63 Nm
D81/91F*	BK360	6 pcs. M12x75	108 Nm
D111F*	BK386	6 pcs. M20x90	517 Nm

Connector cap

The electrical connection may only be carried out by qualified personnel. For this purpose, first the four fixing screws of the connector cap have to be loosened. These are screws DIN EN ISO 4762 M6x80-12.9.

Only fixing screws with the specified dimensions and quality grade may be used.

Tighten the bolts crisscross with the following torque value: 9.9 Nm

Fasteners of the minimum quality 12.9 have to be used for the closing of the flameproof enclosure.

	SW [mm]
M16x1.5	24
M20x1.5	30

Only screwed cable glands with a corresponding certification may be used.

Attention! For cable selection, the specified clamping area must be observed.

Torque according to manufacturer‘s data see A2. cable glands.

Only use screwed cable glands according to EN 60079-0, EN 60079-1 and EN 60079-14!

Base attachment as well as the clamping nut of the screwed cable glands are tightened to the specified torque.

Unused screwed cable gland holes are closed with IECEx certified screw plug M16x1.5 or M20x1.5.

Only use original IECEx certified screw plug according to EN 60079-1.

Torque M16: 16 Nm, M20: 16 Nm.

Before commissioning the tightening torque and tightness must be checked.

Attention! The screw-in depth is part of the certification criteria.

Screw plug parameterizing interface

In order to gain access to the parameterizing interface of the valve electronics, first the screw plug of the electronics box has to be removed.

M20x1.5 mm

Only use original IECEx certified screw plug according to EN 60079-1.

Torque 16 Nm.

Before commissioning the tightening torque and tightness must be checked.

Limits of use

The valve may be operated within the determined limits only. Please refer to the “technical data“ section.

Follow the environmental conditions! Unallowable temperatures, shock load, aggresive chemicals exposure, radiation exposure, illegal electromagnetic emissions may result in operating trouble and may lead to failure! Follow the operating limits listed in the “technical data“ section.

Impermissibly high temperatures may lead to an overheating of the drive and thus cause an explosion hazard.

Additional painting of the valve surface may cause electrostatic charging and cause an explosion hazard. The main stage is already provided with a coating thickness of 0.02-0.05 mm, additional coatings are limited to a maximum of 0.15 mm, so that the total coating thickness must not exceed 0.2 mm. The flameproof joints of the pilot valve and the position sensor must not be painted. The requirements according to EN 60079-0: Explosive atmospheres - part 0: General requirements and TRGS 727 have to be observed.

The lengths of the flameproof joints are in parts longer and the gaps of the flameproof joints are in parts smaller than the values of table 2 and 3 of IEC 60079-1:2014.

Electrical connection

The valve is connected electrically by the corresponding supply cable using the intended cable gland.

Earth connection

Connection of the valve to the equipotential bonding system via the PE terminal connection.

Electrical interfacing
Supply voltage

The supply voltage for the valve has to cover the range of 22...30 V. Valve is de-energized below 19 V. The residual ripple may not exceed 5 % eff.

The applied power supply (not included in the delivery) must comply to the relevant regulations (DIN EN 61558) and must carry a CE-mark. The operating voltage for the valve must be free of inductive surges. Do not exceed the max. value of 30 V! Higher voltage can lead to failure of the valve.

Make sure that the power supply runs outside the Ex area or inside an electrical cabinet certified for use in the Ex zone.

The increased inrush current of the valve should be considered when selecting the power supply.

A stabilized power supply with overcurrent limiting feature should not be used. Due to the inrush current of the valve the current limit circuit may respond prematurely and create problems during energizing of the supply voltage.

The operation of the valve is blocked if the supply voltage polarity is interchanged.

Each valve requires a separate pre-fuse of 4 Amp semi time-lag. Failure to observe this instruction may create irreparable damage of valve respectively incorporated system parts.

Pressure fluids

The following rules applies for the operation with various pressure fluids:

This information serves for orientation and does not substitute user tests among the particular operating conditions. Particularly no liabiliy for media compatibility may be derived out of it.

Mineral oil: usable without restriction.

HFC: choose the right seal option.

For operation with the following pressure fluids

HFA	oil-in-water emulsion
HFB	water-in-oil emulsion
HFD	unhydrous fluids (Phosphor-Ester)

please consult Parker:

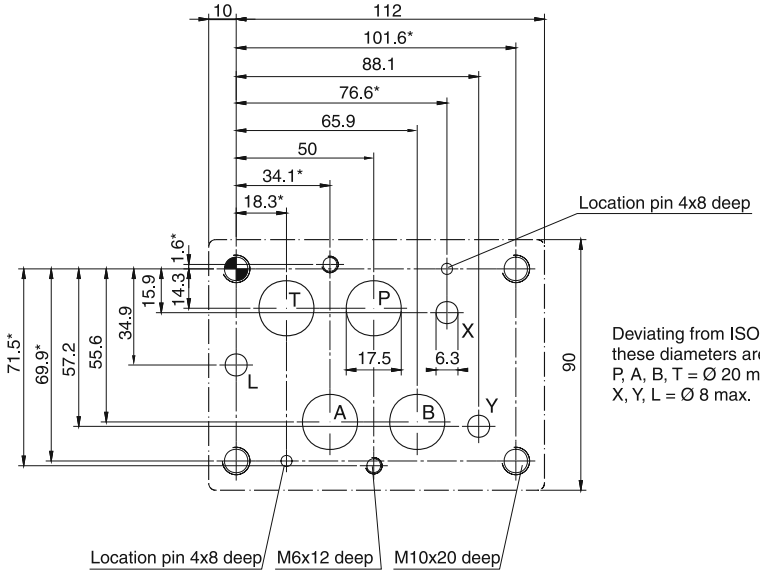
For detailed information concerning pressure fluids note VDMA-document 24317 as well as DIN 51524 & 51502.

Special gaskets may be available depending on the utilized fluid.
In case of insecurity please consult Parker.

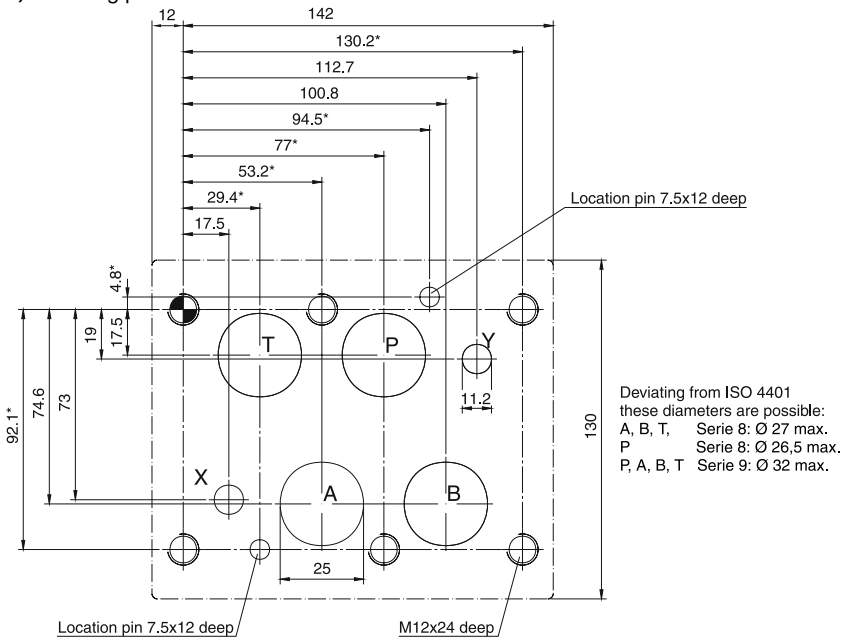
The pressure fluid must have an ignition temperature of at least 50 K above the maximum surface temperature of the valve (see ISO 80079-37 and ISO/IEC 80079-20-1).

Mounting pattern

Size 16, mounting pattern ISO 4401-07-07-0-05

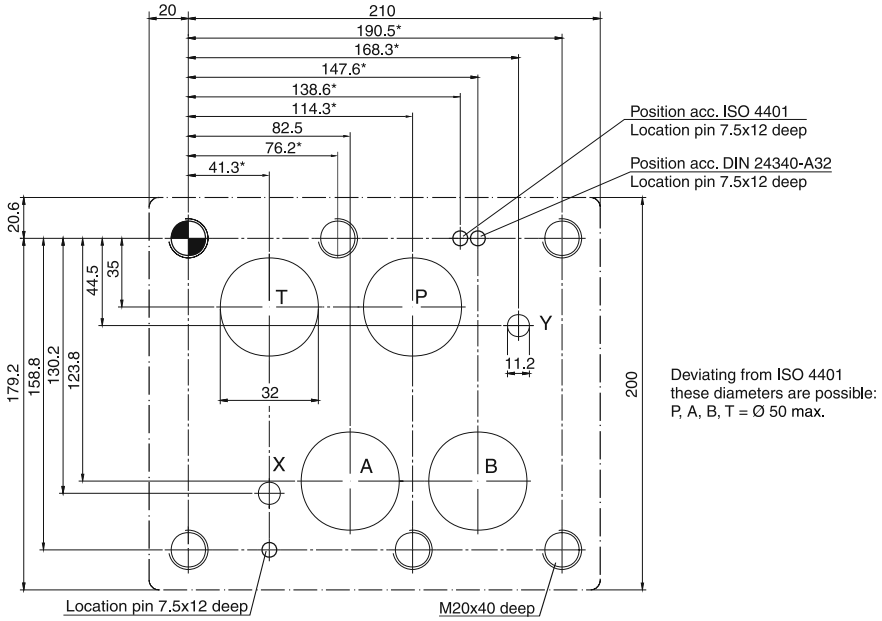


Size 25, mounting pattern ISO 4401-08-08-0-05



With * marked dimensions ±0,1 mm. All other dimensions ±0,2 mm.

Size 32, mounting pattern ISO 4401-10-09-0-05



With * marked dimensions ±0,1 mm. All other dimensions ±0,2 mm.