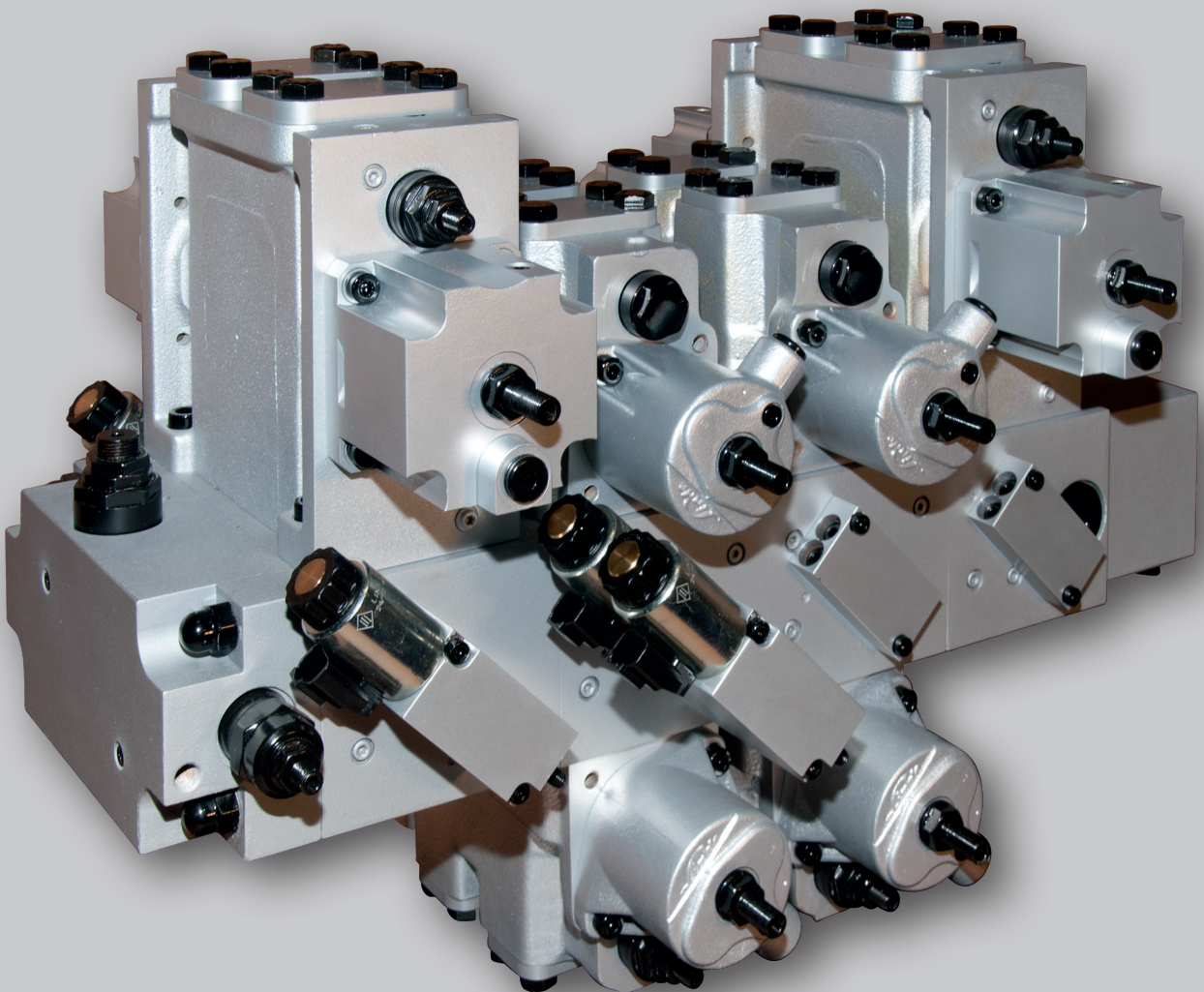
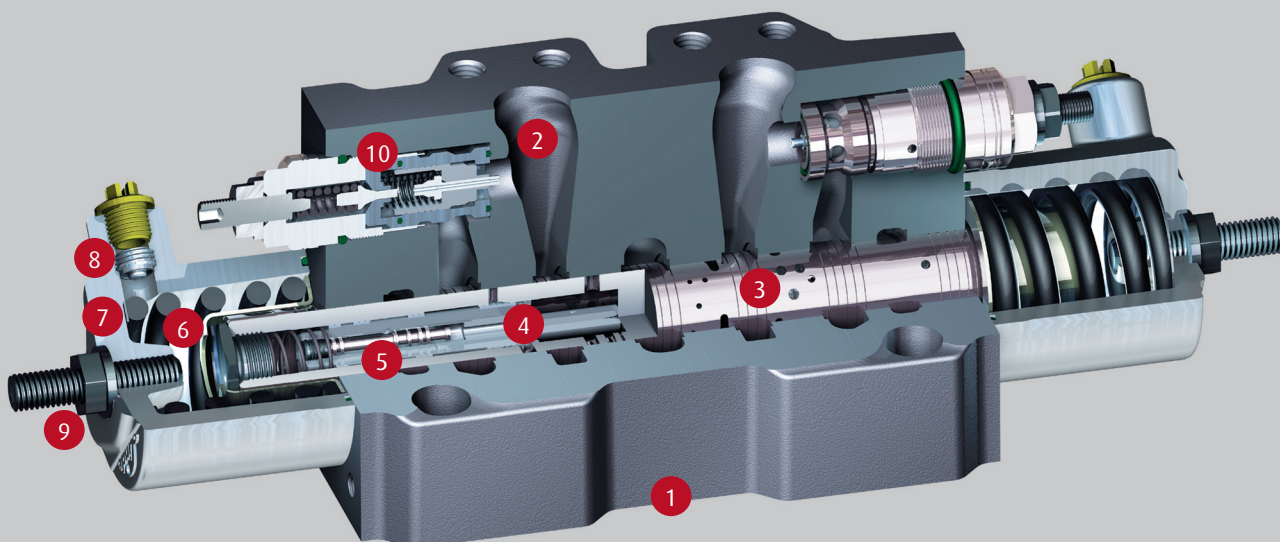


VT1 modular.  
Modular System for  
LSC Manifold Valve Plates.

Linde Hydraulics

*Linde*





- |  |   |
|--|---|
| <p><b>1</b> Load Sensing Directional Control Valve<br/>shown as sub mounted valve</p> <p><b>2</b> Work ports<br/>1" or 1 1/4", based on flow rating</p> <p><b>3</b> Valve control spool<br/>with integrated compensators and pressure copiers</p> <p><b>4</b> Compensator<br/>downstream, for compensation, one per side</p> <p><b>5</b> Pressure copier<br/>integrated in compensator, one per side</p> | <p><b>6</b> Centering spring<br/>with 6-19bar nominal control range</p> <p><b>7</b> Shim<br/>controls start of function on each side</p> <p><b>8</b> Throttle check valve<br/>controls spool dynamics</p> <p><b>9</b> Mechanical stroke limiter<br/>independent flow limitation on each side</p> <p><b>10</b> Pilot-operated pressure relief valves<br/>with flat flow-pressure characteristic, anti-cavitation<br/>function optional</p> |
|--|---|

## Design features

- >> Directional control valves as sub plate mounted valves
- >> Designed for the Linde Synchron Control (LSC) – Load Sensing System
- >> Nominal sizes 25 and 30
- >> Flow rates of up to 600 l/min (NG30)
- >> Downstream compensators (Post-Compensated LS system)
- >> Individual characteristics due to separate compensators and pressure copiers for A side and B side
- >> Proportional flow distribution during system saturation
- >> Modular design for the configuration of control plates for 1-7 functions
- >> Optionally with hydraulic or electric piloting

## Introduction. VT1 modular

### Product benefits

- >> Approved quality since the introduction of LSC in 1984
- >> Highest flow of all load sensing systems on the market
- >> Fast machine response & low hysteresis control
- >> Intuitive machine operation through compensation of load effects — also during multi-functioning
- >> Maintenance flow ratios even during system saturation (all functions remain active)
- >> High handling performance
- >> Low energy consumption
- >> High system efficiency
- >> Easily adaptable to applications
- >> Quick availability even for quantity 1

## Linde Hydraulics Product Range

Find the right products for your application.

### Product range

Product	Type	Application	Linde Terminology
Pump	Self-regulating	open circuit	HPR-02
	Variable displacement	closed circuit	HPV-02
Motor	Variable displacement	closed and open circuit	HMV-02
	Self-regulating	closed and open circuit	HMR-02
	Fixed displacement	closed and open circuit	HMF-02
		open circuit	HMF-02 P
	Adjustable fixed displacement	closed and open circuit	HMA-02
<b>Valve technology</b>	<b>Modular system VT1</b>	<b>open circuit</b>	<b>VT1 modular</b>
Elektronik	Control unit	closed and open circuit	LINC
	Peripheral equipment	closed and open circuit	-
	Software	diagnostics and parameterization	LinDiag®

The data on which this data sheet is based corresponds to the current state of development. Subject to technical changes. The specifications on the respective installation drawings are binding. The features listed in this data sheet may not be available in all combinations and nominal sizes. Our sales engineers will be happy to provide advice regarding the configuration of your hydraulic system and on product selection.

## VT1 modular. chapter

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2 General technical data	9
3 Operating parameters	9
4 System components	10
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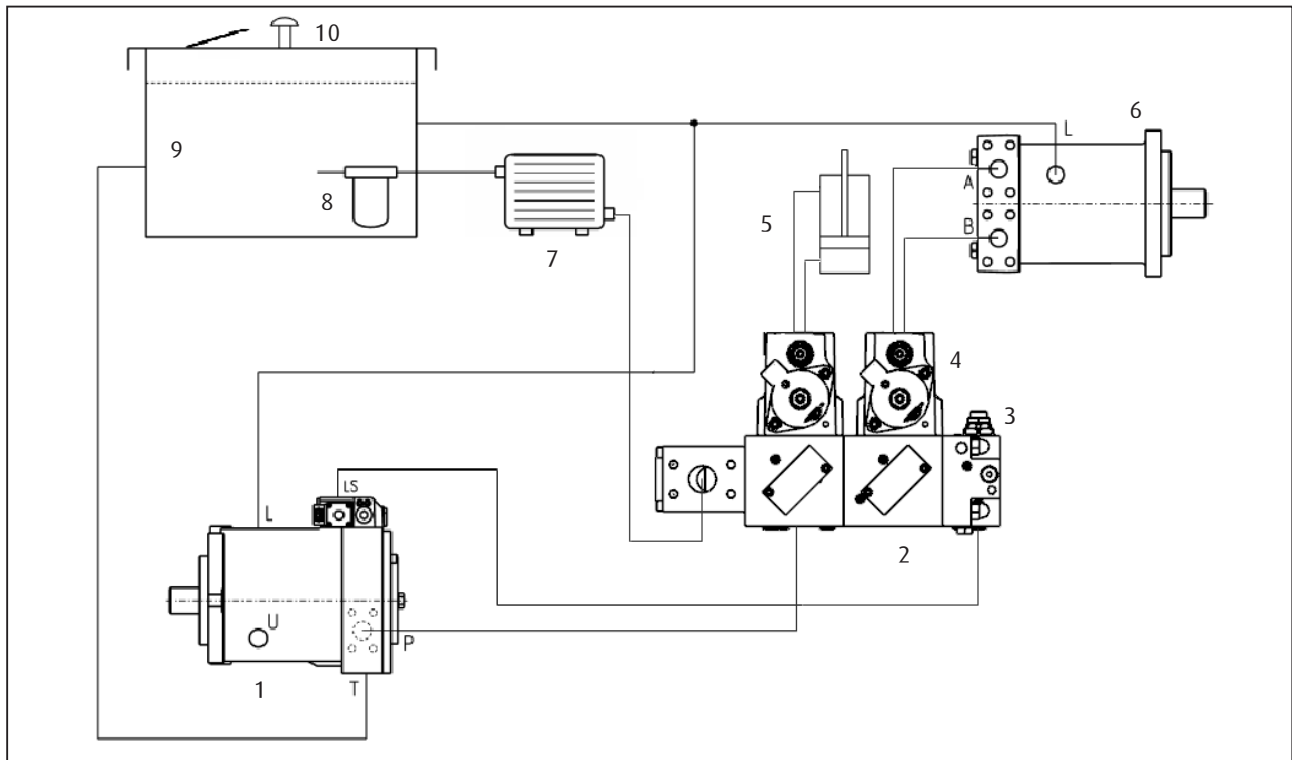
## VT1 modular. Contents

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## 1 | System remarks. The open circuit

### Function scheme (example)



- |   |                               |    |                        |
|---|-------------------------------|----|------------------------|
| 1 | Hydraulic pump HPR-02 E1L     | 6  | Hydraulic motor HMF-02 |
| 2 | Manifold plate VT1/2          | 7  | Cooler                 |
| 3 | Pressure relief function      | 8  | Filter                 |
| 4 | LSC-directional control valve | 9  | Tank                   |
| 5 | Hydraulic cylinder            | 10 | Breathing valve        |

### Explanation

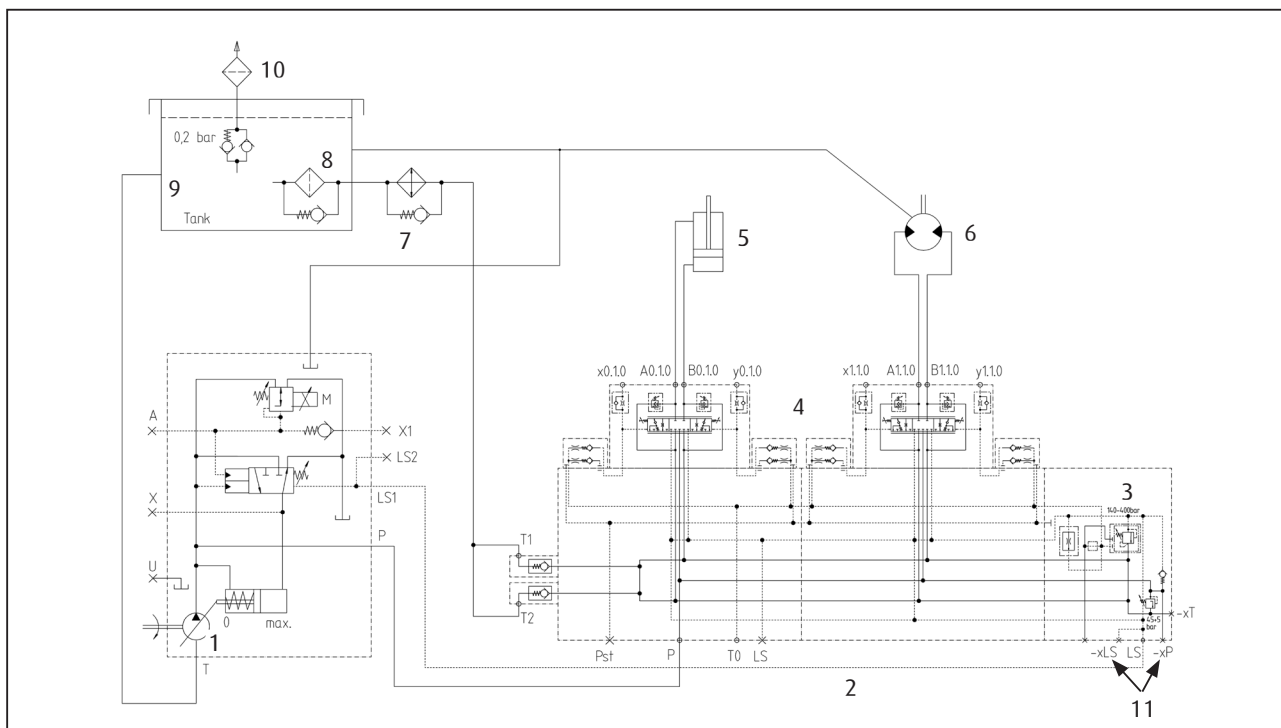
The hydraulic pump for use in an open circuit has two main ports: An intake port and a high-pressure port.

The intake port is connected to the hydraulic tank, and the high-pressure port is connected to a control block (directional control valve). When the hydraulic pump is being driven, it sucks hydraulic fluid from the tank. Fluid circulation always leads from the hydraulic pump to the control block and from there via pipes to the respective functions, such as the hydraulic cylinder and/or hydraulic motor. The pressure relief limits the pump pressure on the primary side (primary pressure relief).

The flow direction and speed of the oil determine the direction of movement and speed of the hydraulic cylinders and the speed and direction of rotation of the hydraulic motors. Hydraulic fluid then flows back to the control plate and, as a general rule, from there to the tank via a cooler and filter. In addition to the main ports, hydraulic pumps and motors also have filling, bleeding and leakage-oil ports. Any leakage oil occurring in the components is routed back to the hydraulic tank via separate pipes. If the hydraulic tank is not pressurized, a vent filter must be mounted on the hydraulic tank to prevent dirt from the air from getting into the tank.

# 1 | System remarks. The open circuit

## Circuit diagram (example)



- |   |                               |    |                                 |
|---|-------------------------------|----|---------------------------------|
| 1 | Hydraulic pump HPR-02 E1L     | 6  | Hydraulic motor HMF-02          |
| 2 | Manifold plate VT1/2          | 7  | Cooler                          |
| 3 | Pressure relief function      | 8  | Filter                          |
| 4 | LSC-directional control valve | 9  | Tank                            |
| 5 | Hydraulic cylinder            | 10 | Breathing valve                 |
|   |                               | 11 | Measuring point $\Delta p_{LS}$ |

Explanations	
Hydraulic pump HPR-02 E1L	
P	High-pressure port
T	Suction port
LS	Load Sensing port
L, U	Filling, bleeding and leakage-oil ports. Connection so that the interior is always filled with oil.
Hydraulic motor HMF-02	
A, B	High-pressure port
L, U	Filling, bleeding and leakage-oil ports. Connection so that the interior is always filled with oil.
Manifold plate VT1/2	
P	High-pressure port for pump line
T	Tank port
LS	Load Sensing port
A, B	High-pressure ports, functions

## 1 | System remarks. The LSC-System

The Linde Synchron Control (LSC) system is a Load Sensing (LS) valve system with downstream (post-compensated) compensators. The LSC system for the open hydraulic circuit allows for pump control according to the function-demand flows, based on Load Sensing technology (LS technology). An LSC system compensates the effect of varying loads, a varying number of functions as well as different load levels on different functions.

In principle, the LSC system works with a constant differential pressure ( $\Delta p_{LS}$ ) at the measuring orifices of the different directional control valves. Thus, the control quality, in particular during partial activation, is independent of the effective load pressure on the function, because the flow remains constant even during load changes. The LS control pump responds to the flow requirement of the valve and provides the flow automatically, regardless of the necessary load pressure.

“Load Sensing” means sensing the load, as the LS control pump “senses” the LS signal as the high pressure of the function, whose load pressure is currently highest.

The flow requirement is reported to the pump by the LS signal as the only required signal. The LS signal is confirmed at the speed of sound through a pressure line from the LSC valve block to the LS port of the pump. The LS pressure is generated by the pressure copiers in the directional control valve compensators, which also select the maximum LS pressure at the same time. The  $\Delta p_{LS}$  is the difference between the pump pressure and the LS pressure. The  $\Delta p_{LS}$  also changes briefly in the event of short-term changes in the load pressure (LS signal). The pump responds through brief changes in the delivery volume until the  $\Delta p_{LS}$  is constant again. Optimum operation of the LSC system is guaranteed in conjunction with Linde LS control pumps. The absolute pump pressure has no significant influence on the function. Drive-speed fluctuations are automatically compensated by the pump by means of an adapted delivery volume.

The downstream compensators enable the LSC valves to maintain controllability of several functions at the same time, even in the event of system saturation. System saturation occurs when the sum of all functions requires a greater flow than is available. In this operating situation, the flow distribution to the individual functions is kept in ratio. The  $\Delta p_{LS}$  drops accordingly, as a function of the flow shortage. All functions thus automatically maintain their full functionality within the scope of the system limits. This relieves the burden on the machine operator, as there is no need for continuous readjustment, as in other systems. With the LSC system, highly efficient hydraulic systems, strictly oriented on the machine function, can be achieved. Our application specialists will be pleased to help you with the individual lay out of your machine.

### Functionality

- >> Highly dynamic, demand-driven pump control
- >> Load holding at start of motion
- >> Excellent fine-control behavior without readjustment
- >> Exact reproducibility of machine movements through precise actuation of the functions
- >> Load-independent, simultaneous movements of several functions
- >> Ratio of oil distribution maintained even during saturation
- >> Automatic bleeding of the directional control valve caps
- >> Optimum continuity of movement even in the case of combined movements

### Additional optional functions

- >> High-pressure pressure relief, secondary side
- >> Regeneration function
- >> 2-stage pressure relief function

### Machine equipment

- >> Tailor-made system design for optimal implementation of customer requirements
- >> Optimum utilization of the installed power with simultaneous improvement of the energy balance
- >> High flexibility due to a modular control-plate system
- >> Compact, integrated solutions
- >> Modular design of valve sectors
- >> Optimized plumbing through omission of additional logic connections on the pilot side

### Benefit

- >> Perfect coordination of the individual work functions for customer-specific vehicle characteristics
- >> Efficient and dynamic machine for short work cycles
- >> Optimized energy balance for fuel economy and improved handling performance
- >> Easy and safe machine operation for fatigue-free and efficient working
- >> Unsurpassed reliability under the toughest conditions of use
- >> Shorter assembly times

## 1 | System remarks. The VT1 modular control plate system

The VT1 modular product platform is a consistently modular control-plate system for hydraulic and electro-hydraulic applications in an open-loop circuit, based on the proven LSC valve technology.

This VT1 modular system combines directional control valves for the control of hydraulic functions with up to 600 l/min flow and operating pressures of up to 400 bar with the base plate and provision for expansion modules.

The flow paths are generously dimensioned with one pump channel and two return channels with flow cross-sections of 32 mm diameter each. This guarantees the reduced routing losses when pump flows of up to 700 l/min and return flows of up to 1000 l/min.

The innovative fully modular system enables flexible grouping of control plate systems with up to 7 directional control valve functions — for all conceivable applications of valve technology in an open-loop circuit in the described power range. The standardized interfaces

>> IF32 (interface with nominal diameter 32)

>> CF25 (Common Footprint with nominal diameter 25)

enable the unrestricted positioning of the individual function modules of the control plate as well as simple expansion in already installed control plates based on VT1 modular.

## 2 | General technical data.

### System pressures

- >> Nominal pressure\* 420 bar
- >> Pilot pressure range 6-19 bar (Standard)

\*)Nominal pressure: Pressure for the designation or identification of a component. For the LSC components, at an effective pressure of 420 bar, a maximum total of 5% of the operating period is permitted (500 hours where Oh = 10,000).

### Nominal flows

- >> Pump (P) total 700 l/min
- >> Pump (P) per port 500 l/min
- >> Tank/Cooler (T/K) in total 1.000 l/min
- >> Functions (A, B) VW25 400 l/min\*
- >> Functions (A, B) VW30 600 l/min\*

\*) flows for  $\Delta p_{LS}=20$  bar

### Ports

The hydraulic ports of the system components are in accordance with ISO 6149 1, ISO 6162 1 and ISO 6162 2.

Port function	Name	Size	DN	Max. effect. pressure [bar]
Work ports NG25	A, B	SAE 1" ISO 6162-2	25	420
Work ports NG30	A, B	SAE 1 1/4" ISO 6162-2	32	420
Pump	P	SAE 1 1/2" ISO 6162-2	38	400
Load Sensing Signal	LS	M14x1.5 ISO 6149-1		380
Tank	T1, T2	SAE 1 1/2" ISO 6162-1	38	30
Leakage oil	T0	M14x1.5 ISO 6149-1		2
Pilot pressure	$p_{str}$ , $p_{st}$	M14x1.5 ISO 6149-1		32
Pump measuring port	-xP	M14x1.5 ISO 6149-1		400
Load Sensing measuring port	-xLS	M14x1.5 ISO 6149-1		380
Tank/flushing-oil measuring port	-xT	M27x2 ISO 6149-1		30
Leakage-oil measuring port	-xT0	M14x1.5 ISO 6149-1		2

## 3 | Operating parameters.

### Permitted pressure fluids

- >> HLP mineral oil as per DIN 51 524-2
- >> Biodegradable hydraulic oils as per ISO 15 380, on request
- >> Other pressure media on request.

### Recommendation for viscosity ranges

Pressure-fluid temperature range	[°C]	-20 to +105
Operating viscosity range	[mm <sup>2</sup> /s] = [cSt]	10 bis 80
Optimum operating viscosity range	[mm <sup>2</sup> /s] = [cSt]	15 bis 30
Maximum viscosity (briefly when moving off)	[mm <sup>2</sup> /s] = [cSt]	1000

### Recommendation for viscosity classes

Mean operating temperature [°C]	Viscosity class [mm <sup>2</sup> /s] = [cSt] at 40°C
30 bis 40	22
40 bis 60	32
60 bis 80	46 oder 68

### Filtering

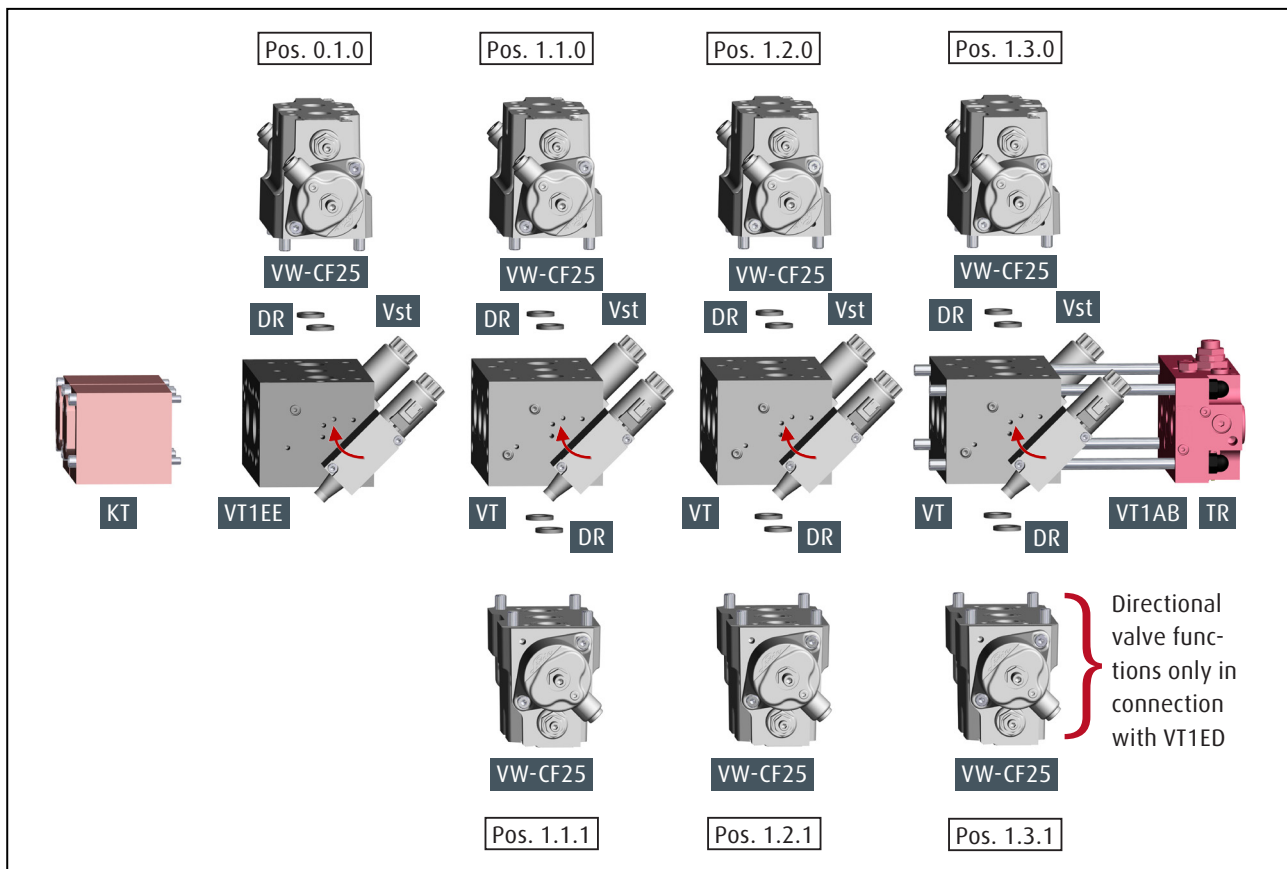
- >> For a high level of operational safety and a long service life: 18 / 16 / 13 according to ISO 4406 or better
- >> Minimum requirement: 20 / 18 / 15 according to ISO 4406. Maximum size of hard dirt particles: 200 µm



## 4 | System components. Overview

### Display and assignment of system components and modules to the positions

Since, during reconfiguration, it is assumed that all positions are occupied with a directional control valve function, the CF25B blanking plate has been omitted from this illustration.



Place holder	Symbol	Name
VT1EE		VT1 base plate without pilot control
VT		IF32 expansion modules without pilot control
VT1AB		IF32 expansion modules, pressure relief module / blanking plate
KT		Tank check modules KT3 / KT5
Vst		Pilot control modules for hydraulic / electro-hydraulic actuation
VW-CF25		Directional control valves VW25-CF25 / VW30-CF25
TR		Tie rod
DR		CF25 return throttle

## 4 | System components. Overview

Place holder	System component	Name	Page
VT1EE	VT1EE	VT1 base plate without pilot control	14
VT	VT1EA	IF32 expansion module, single without pilot	17
	VT1EP	IF32 expansion module, single without pilot, with P connection	19
	VT1ED	IF32 expansion module, double section without pilot	21
VT1AB	VT1B	IF32 expansion module, blanking plate	23
	VT1A	IF32 pressure relief module	24
KT	KT3, KT5	Tank check modules 3bar und 5bar	26
Vst	ABP	air bleed plates for hydraulic piloting	27
	DMV1/24 and DMV1/12	Pressure-reducing valve modules for e/h actuation, single 24V and 12V	28
	DMV2/24 and DMV2/12	Sandwich pressure-reducing valve modules for e/h actuation, 24V and 12V	29
	DMV2ABP/24 and DMV2ABP/12	Combination of ABP with DMV2/24 or DMV2/12	30
	DMV3/24 and DMV3/12	Combination of DMV1/24 or DMV1/12 with DMV2/24 or DMV2/12	31
VW-CF25	25ZY	Directional control valve VW25, cylinder, asymmetric	36
	25N	Directional control valve VW25, tilt, asymmetric	36
	30ZY	Directional control valve VW30, cylinder, asymmetric	36
	30A	Directional control valve VW30, cylinder, asymmetric	36
	25ZU	Directional control valve VW25, additional function, symmetric	38
	25D1	Directional control valve VW25, rotate 1, symmetric	38
	25D2	Directional control valve VW25, rotate 2, symmetric	38
	30ZU	Directional control valve VW30, additional function, symmetric	38
	25W1	Directional control valve VW25, hoist 1, symmetric	40
	25W2	Directional control valve VW25, hoist 2, symmetric	40
	30W	Directional control valve VW30, hoist, symmetric	40
	25F1	Directional control valve VW25, track-drive 1, symmetric	42
	25F2	Directional control valve VW25, track-drive 2, symmetric	42
	CF25B	CF25 blanking plate	44
TR	TR0	Tie rod without IF32 expansion module	45
	TR1	Tie rod for an IF32 expansion module	45
	TR2	Tie rod for two IF32 expansion modules	45
	TR3	Tie rod for three IF32 expansion modules	45
DR	DR10	CF25 return throttle, dia. 10	46
	DR15	CF25 return throttle, dia. 15	46
	Replacement parts	DBV380; NLV; MSP; DRV; seal kits	47-49

Combination	System component	Name	Page
VT1EE and Vst	VT1E/ABP	Combination VT1EE with ABP	54
	VT1E/DMV1/24 ; VT1E/DMV1/12	Combination VT1EE with DMV1/24; VT1EE with DMV1/12	56
VT and Vst	VT1EA/ABP	Combination VT1EA with ABP	58
	VT1EA/DMV1/24 ; VT1EA/DMV1/12	Combination VT1EA with DMV1/24; VT1EA with DMV1/12	61
	VT1EP/ABP	Combination VT1EP with ABP	58
	VT1EP/DMV1/24 ; VT1EP/DMV1/12	Combination VT1EP with DMV1/24; VT1EP with DMV1/12	61
	VT1ED/ABP	Combination VT1ED with ABP	64
	VT1ED/DMV1/24 ; VT1ED/DMV1/12	Combination VT1ED with DMV1/24; VT1ED with DMV1/12	66
	VT1ED/DMV2ABP/24 ; VT1ED/DMV2ABP/12	Combination VT1ED with DMV2ABP/24; VT1ED with DMV2ABP/12	68
	VT1ED/DMV3/24 ; VT1ED/DMV3/12	Combination VT1ED with DMV3/24; VT1ED with DMV3/12	70

## 4 | System components. Interface IF32

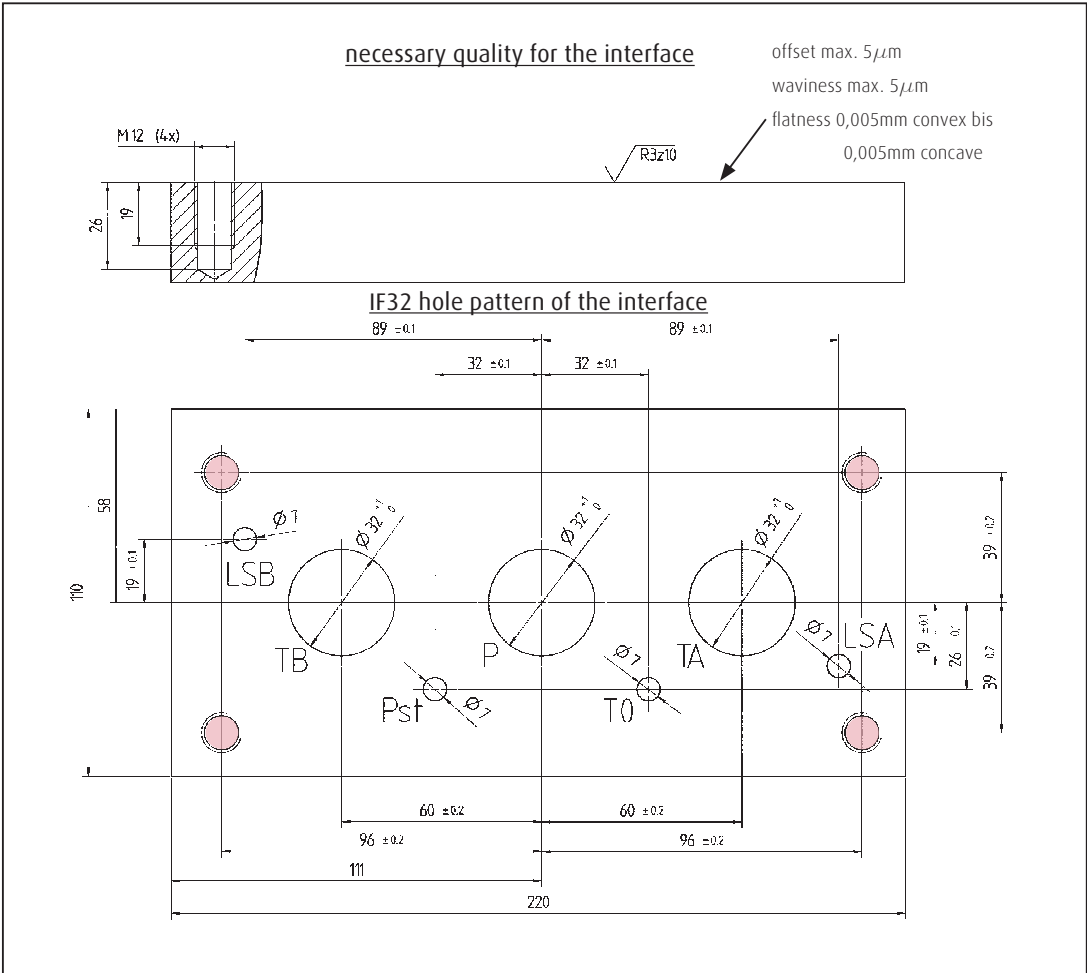
Modules VT1EE, VT1EA, VT1EP and VT1ED, the pressure relief module VT1A and the blanking plate VT1B are designed with an IF32-interface.

>> The **IF32 Interface** is the continuation of canals of VT1EE baseplate by expansion modules. These have CF25 interfaces. By this other way valves can be connected with CF25 interfaces. The expansion modules may contain other functions. The IF32 interface is designed for a pump feed rate of up to 700 l / min.

Function	Name
Pump	P
Tank	T
Leakage oil	T0
Load Sensing Signal	LSA, LSB
Pilot pressure	Pst

For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".

● M12



## 4 | System components. Interface CF25

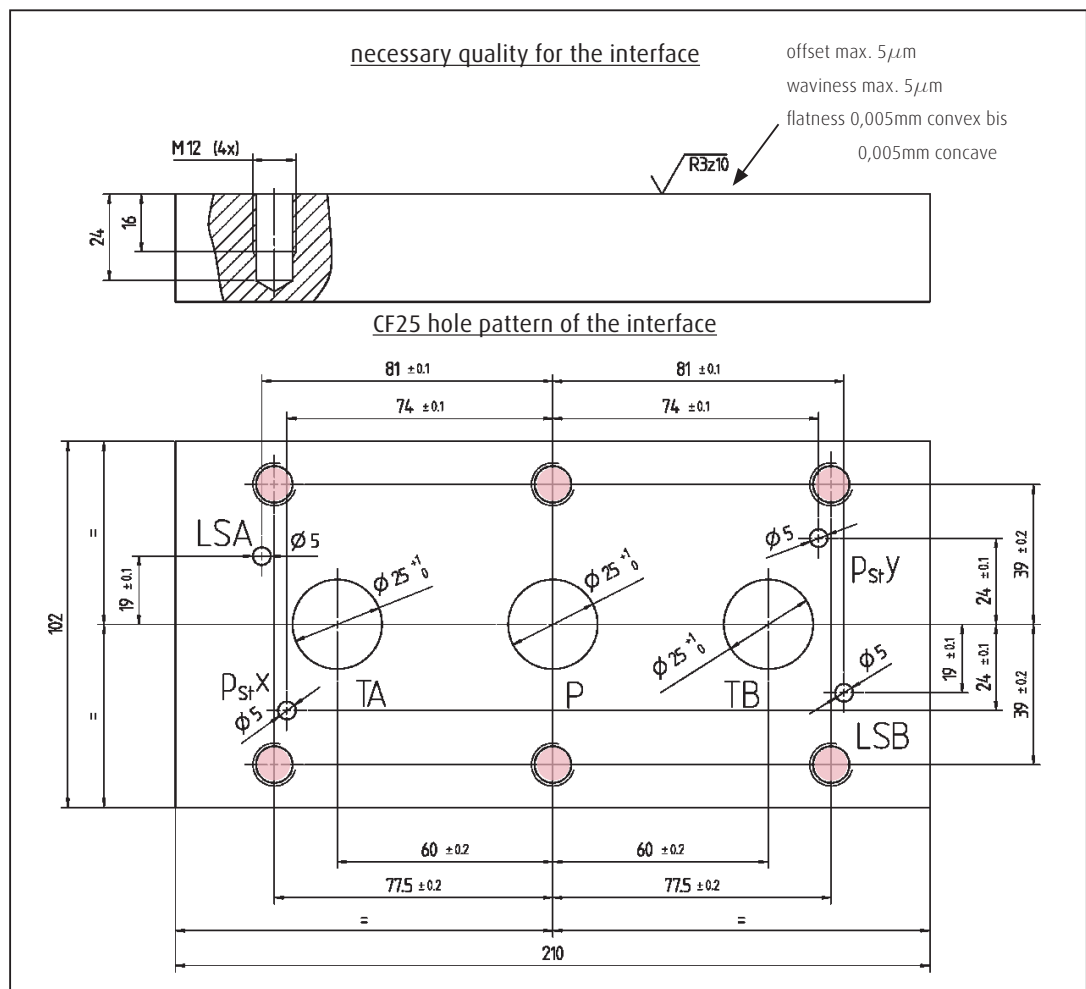
Modules VT1EE, VT1EA and VT1EP are designed with a CF25 interface and VT1ED is designed with two CF25 interfaces, to which directional control valves VW25 and VW30 are attached.

>> The CF25 interface is used for direct attachment of directional control valves. The CF25 interface has a parallel circuit design provided by the VT1 base plate. The CF25 interface is designed for a function supply flow of up to 600 l/min.

Function	Name
Pump	P
Tank	TA, TB
Load Sensing Signal	LSA, LSB
Pilot pressure	$P_{StX}$ , $P_{StY}$

For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".

● M12



## 4 | System components. VT1EE base plate

The VT1EE base plate is the basic element of the modular system. It provides the basis for the supply of the power and signal paths for all mounted directional control valves and base plate expansions. The base plate has various interfaces. Directional control valves and expansion modules can be attached to these.

The VT1EE base plate is equipped with a CF25 interface, an IF32 interface, an SAE 1 1/2" ISO 6162-2 pump port and two SAE 1 1/2" ISO 6162-1 tank ports. One or two tank check modules can be attached to the tank SAE ports: The VT1EE base plate is always located at position 0.1.0.

- >> 1 directional control valve directly at the CF25 interface
- >> 1 expansion module or blanking plate or pressure relief module at the IF32 interface of the VT1EE
- >> 1 or 2 tank check modules at the tank SAE ports of the VT1EE

For hydraulic actuation of the flanged directional control valve, the ABP air bleed plates are used for removing trapped air from the pilot lines. For electrical actuation of the flanged directional control valve, DMV1 modules with the round solenoids (Deutsch connector) are used. No further functions are integrated in the VT1EE base plate. Therefore, when putting together an independently working control plate on the VT1EE base, a VT1A pressure relief unit must always be provided at the IF32 interface.

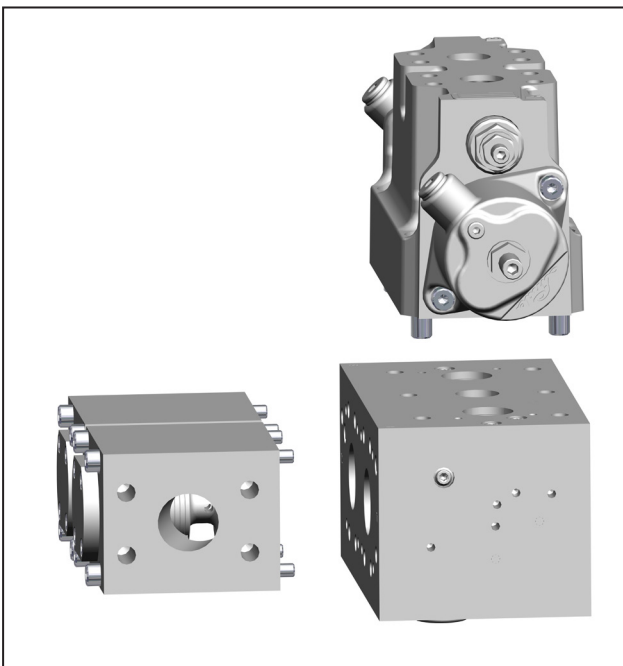
If another external pressure relief function can be used via external piping, the VT1A pressure relief module on the VT1EE is not required. In this case, the VT1B blanking plate must be used.

Function	Name
Pump	P
Tank	T1, T2
Leakage oil	T0
Control signal	Pst, p <sub>st</sub> x/y
Load Sensing signal	LS, LSA, LSB



### >> VT1EE

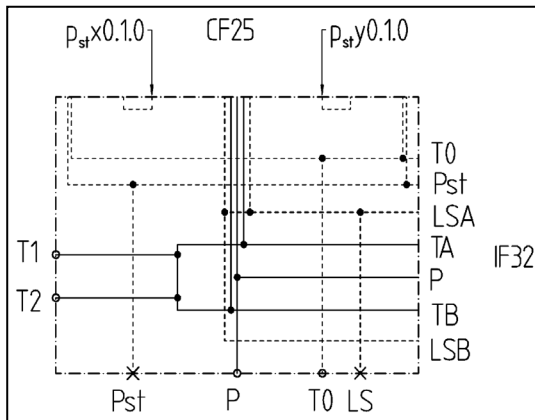
Example with VW25 and 2x tank check modules KT3/KT5



IF32 → possible expansion modules:  
VT1EA, VT1EP, VT1ED, VT1B, VT1A



## 4 | System components. VT1EE base plate

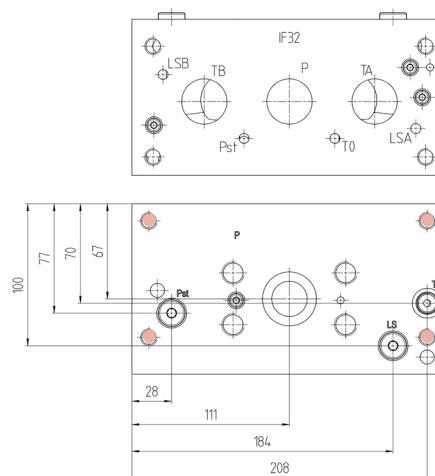
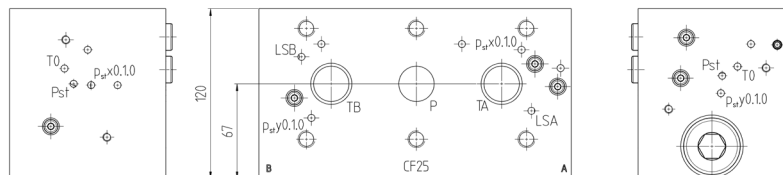
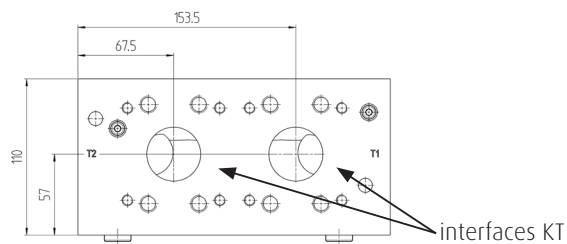


circuit diagram

Port function	Port size	DN	Max. permissible pressure
P - Pump	SAE 1 1/2" ISO 6162-2 4x M16 / 29 deep / $M_A = 295\text{Nm}$ 1)	38	400bar
T1, T2 - tank or cooler	SAE 1 1/2" ISO 6162-1 4x M12 / 21.5 deep / $M_A = 130\text{Nm}$ 1)	38	10bar
T0 - Tank T0	M14x1.5 ISO 6149-1 $M_A = 45\text{Nm}$		2bar
Pst - Pilot pressure	M14x1.5 ISO 6149-1 $M_A = 45\text{Nm}$		32bar
LS - LS-pressure	M14x1.5 ISO 6149-1 $M_A = 45\text{Nm}$		380bar
LSA, LSB - LS-pressure			380bar
$p_{st} \times 0.1.0$ , $p_{st} y 0.1.0$ -Pilot pressure			32bar

1) dependent on screwproperty class according to ISO

● M12/16 deep



VT1EE

For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".

Weight [kg] ca. 17,85  
Dimensions [BxHxT] 120 x 110 x 220 mm

## 4 | System components. VT1EA, VT1EP, VT1ED, VT1B, VT1A and IF32 expansion module

Expansion modules can be attached to the IF32 interface of the VT1EE base plate of the VT1 modular system, in order to supply additional directional control valves. Depending on their design, a maximum of three expansion modules can be mounted in series for each IF32 interface on the VT1EE base plate.

### The following IF32 expansion modules are available

**>> VT1EA - IF32 expansion module, single, without pilot for CF-25 directional control valve**

IF32 module with CF25 interface for attachment of a directional control valve

**>> VT1EP - IF32 expansion module, single, without pilot and with pump port for CF-25 directional control valve**

As above, with additional pump port in SAE 1 ½"

**>> VT1ED - IF32 expansion module, double section without pilot, for two CF-25 directional control valves**

IF32 module with two CF25 interfaces for mounting two directional control valves at the top and bottom

**>> VT1B - IF32 expansion module blanking plate**

Plate for closing the IF32 channels (with mounting threads for support in the application)

**>> VT1A - IF32 pressure relief module**

**The IF32 pressure relief module (with mounting threads for support in the application)**

contains basic functions for the protection of the hydraulic system:

- LS pressure relief (LS-DA)
- Unload valve (45 bar valve, opens from P to T when the directional control valve function is not actuated — idle pump protection)
- LS pressure relief (reduces the pressure in the LS line if no directional control valve is actuated)

If a control plate based on the VT1EE base plate is operated in an application without a connection to a protected system, the VT1A - IF32 pressure relief module must be used.

For characteristics of the pressure relief function, see diagram (p. 25).

Sealing kits are required to seal the individual interfaces.

They are included in the scope of delivery for the respective system components for the IF32 expansion modules.

During assembly or installation, proper handling of the O-rings must be ensured.

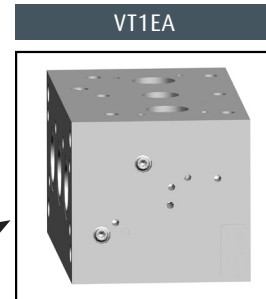
## 4 | System components. VT1EA expansion module single

### Expansion module for additional section

For expansion of the VT1EE base plate with an additional CF25 interface.

The VT1EA expansion module may be located at position 1.1.0, 1.2.0, 1.3.0, depending on the configuration.

Function	Name
Pump	P
Tank	TA, TB
Leakage oil	T0
Control signal	Pst, p <sub>st</sub> x1.X.0/y1.X.0
Load Sensing signal	LSA, LSB



4x O-Ring-9x2-V80  
3x O-Ring-38x3-V80

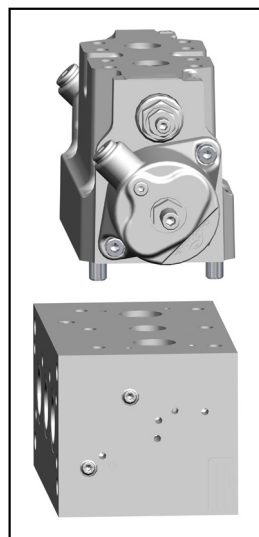
During assembly or installation, proper handling of the O-rings must be ensured.

#### >> VT1EA

Example with VW25

possible expansion modules:  
VT1EE, VT1EA, VT1EP, VT1ED

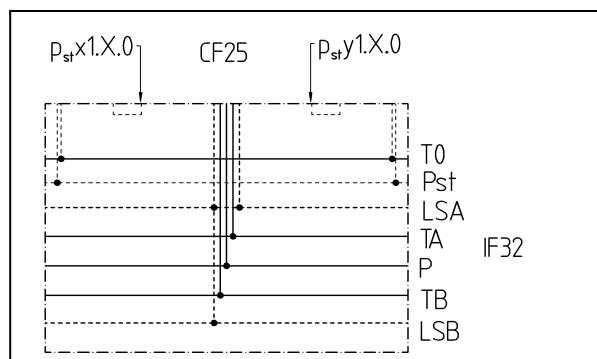
← IF32



IF32 →

possible expansion modules:  
VT1EA, VT1EP, VT1ED, VT1B, VT1A

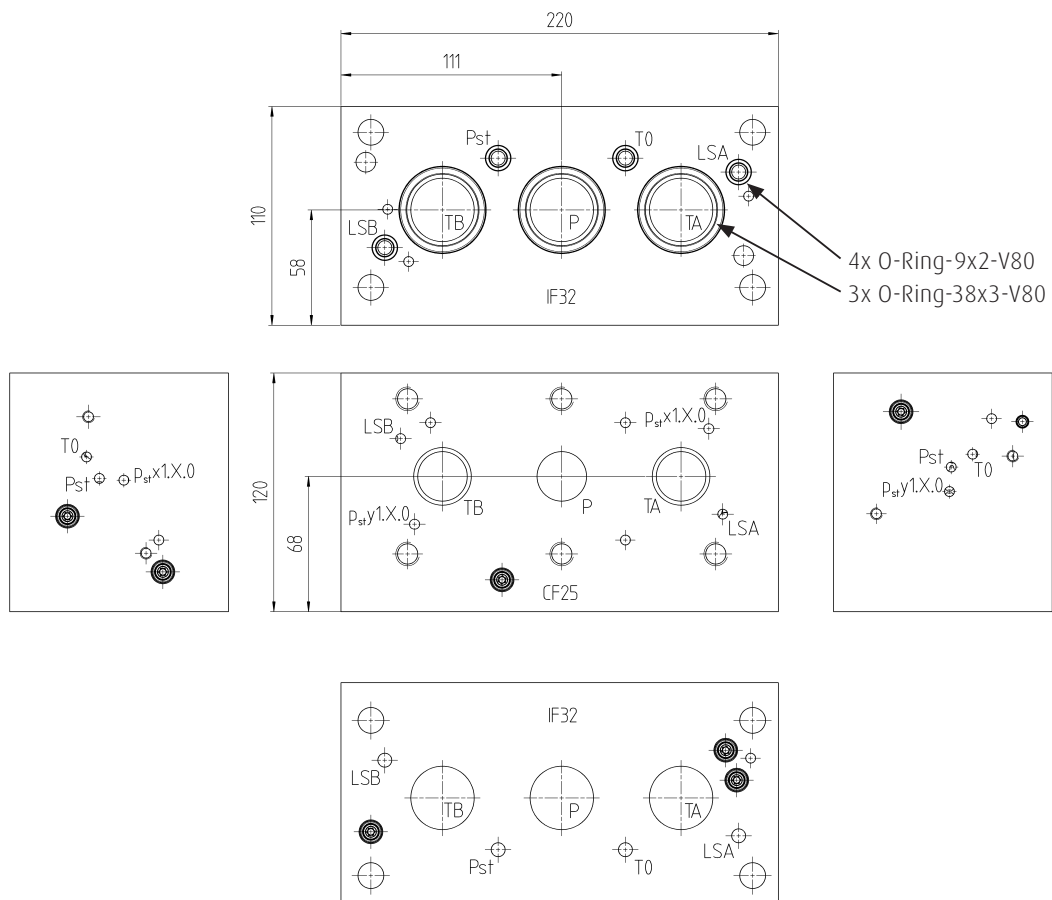
### circuit diagram



Weight[kg]	ca. 17,1
Dimensions [BxHxT]	120 x 110 x 220 mm

For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".

## 4 | System components. VT1EA expansion module single



VT1EA

## 4 | System components. VT1EP expansion module single

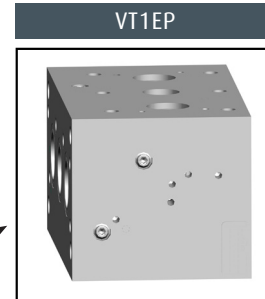
### Expansion module for additional section with pump port

For expansion of the VT1EE base plate with an additional CF25 interface and additional pump port.

The VT1EP expansion module may be located at position 1.1.0, 1.2.0, 1.3.0, depending on the configuration.

Function	Name
Pump	P
Tank	TA, TB
Leakage oil	T0
Control signal	P <sub>st</sub> , p <sub>st</sub> x1.X.0/y1.X.0
Load Sensing signal	LSA, LSB

4x O-Ring-9x2-V80  
3x O-Ring-38x3-V80



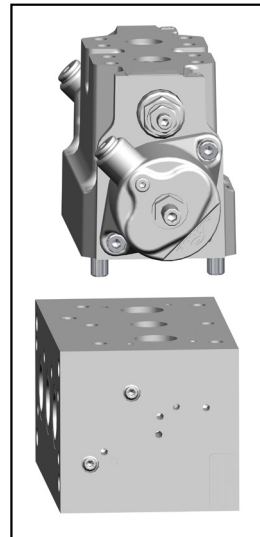
During assembly or installation, proper handling of the O-rings must be ensured.

#### >> VT1EP

Example with VW25

possible expansion modules:  
VT1EE, VT1EA, VT1EP, VT1ED

← IF32

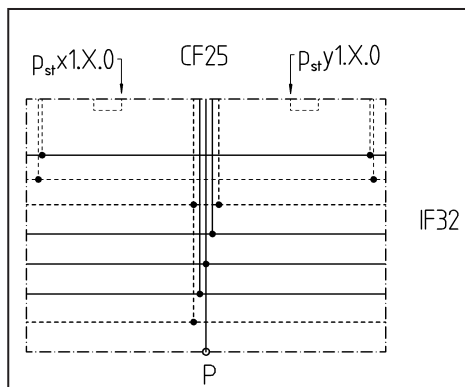


↑  
P

IF32 →

possible expansion modules:  
VT1EA, VT1EP, VT1ED, VT1B, VT1A

### circuit diagram



Port function	Port size	DN	Max. permissible pressure
P - Pump	SAE 1 1/2" ISO 6162-2 4x M16 / 29 deep / M <sub>A</sub> = 295Nm 1)	38	400bar

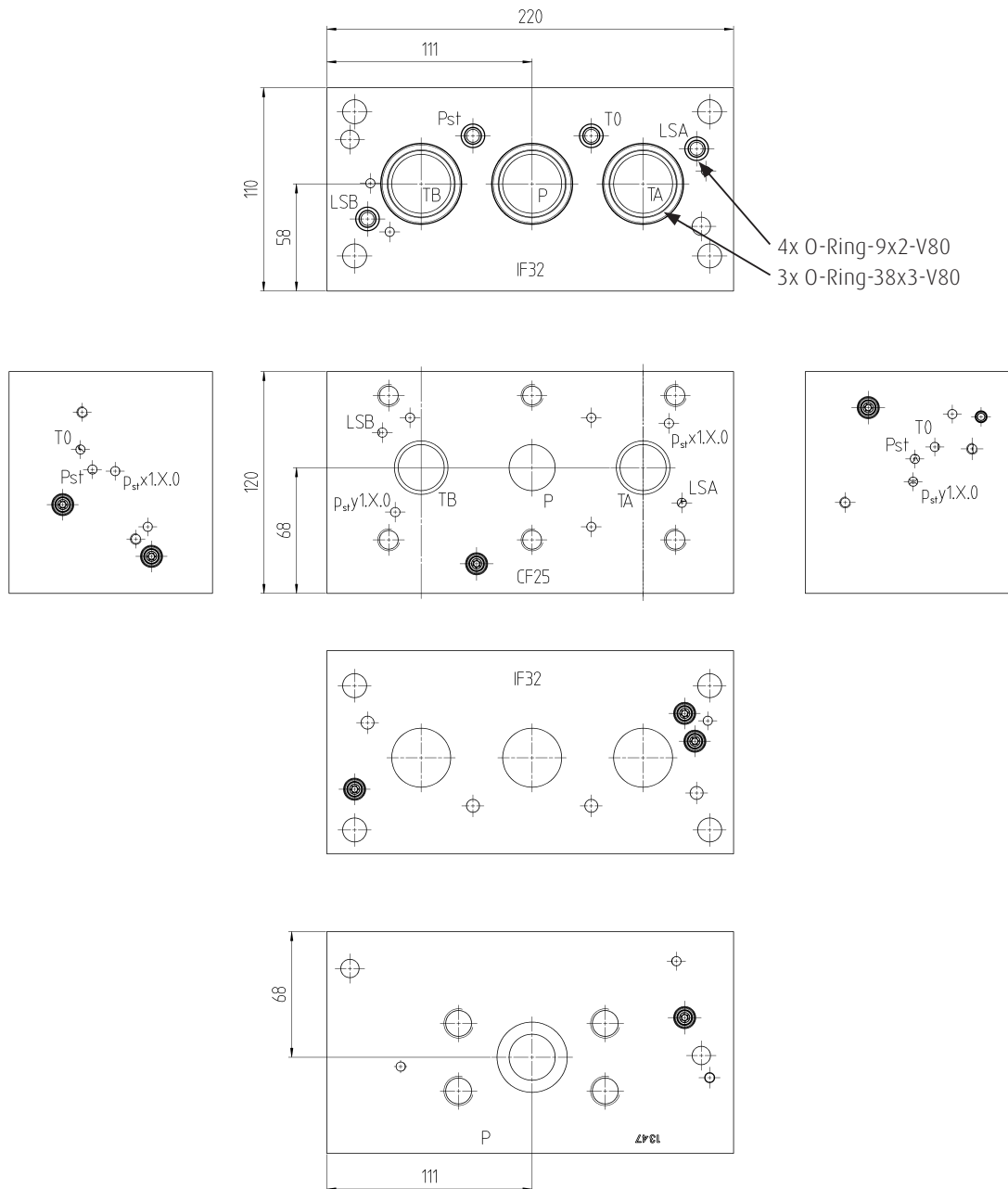
1) dependent on screwproperty class according to ISO

Weight [kg]	ca. 16,5
Dimensions [BxHxT]	120 x 110 x 220 mm

For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".



## 4 | System components. VT1EP expansion module single



VT1EP

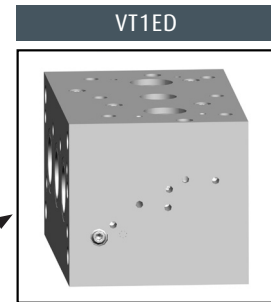
## 4 | System components. VT1ED expansion module double

### Expansion module for two additional sections

For expansion of the VT1EE base plate with two further CF25 interfaces for mounting two additional directional control valve modules at the top and bottom. The VT1ED expansion module may be located at position 1.1.0, 1.2.0, 1.3.0, depending on the configuration.

Function	Name
Pump	P
Tank	TA, TB
Leakage oil	T0
Control signal	Pst, p <sub>st</sub> x1.X.0/y1.X.0, p <sub>st</sub> x1.X.1/y1.X.1
Load Sensing signal	LSA, LSB

4x O-Ring-9x2-V80  
3x O-Ring-38x3-V80



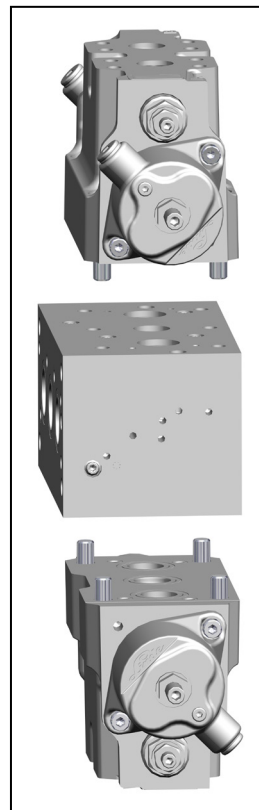
During assembly or installation, proper handling of the O-rings must be ensured.

#### >> VT1ED

Example with 2x VW25

possible expansion modules:  
VT1EE, VT1EA, VT1EP, VT1ED

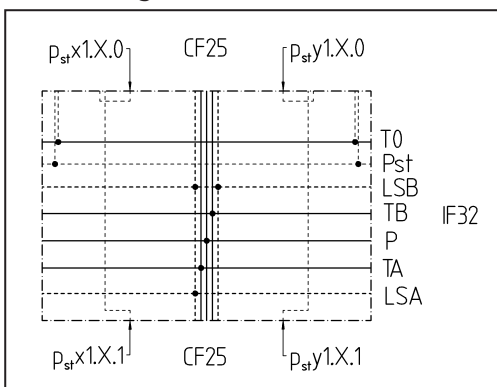
← IF32



IF32 →

possible expansion modules:  
VT1EA, VT1EP, VT1ED, VT1B, VT1A

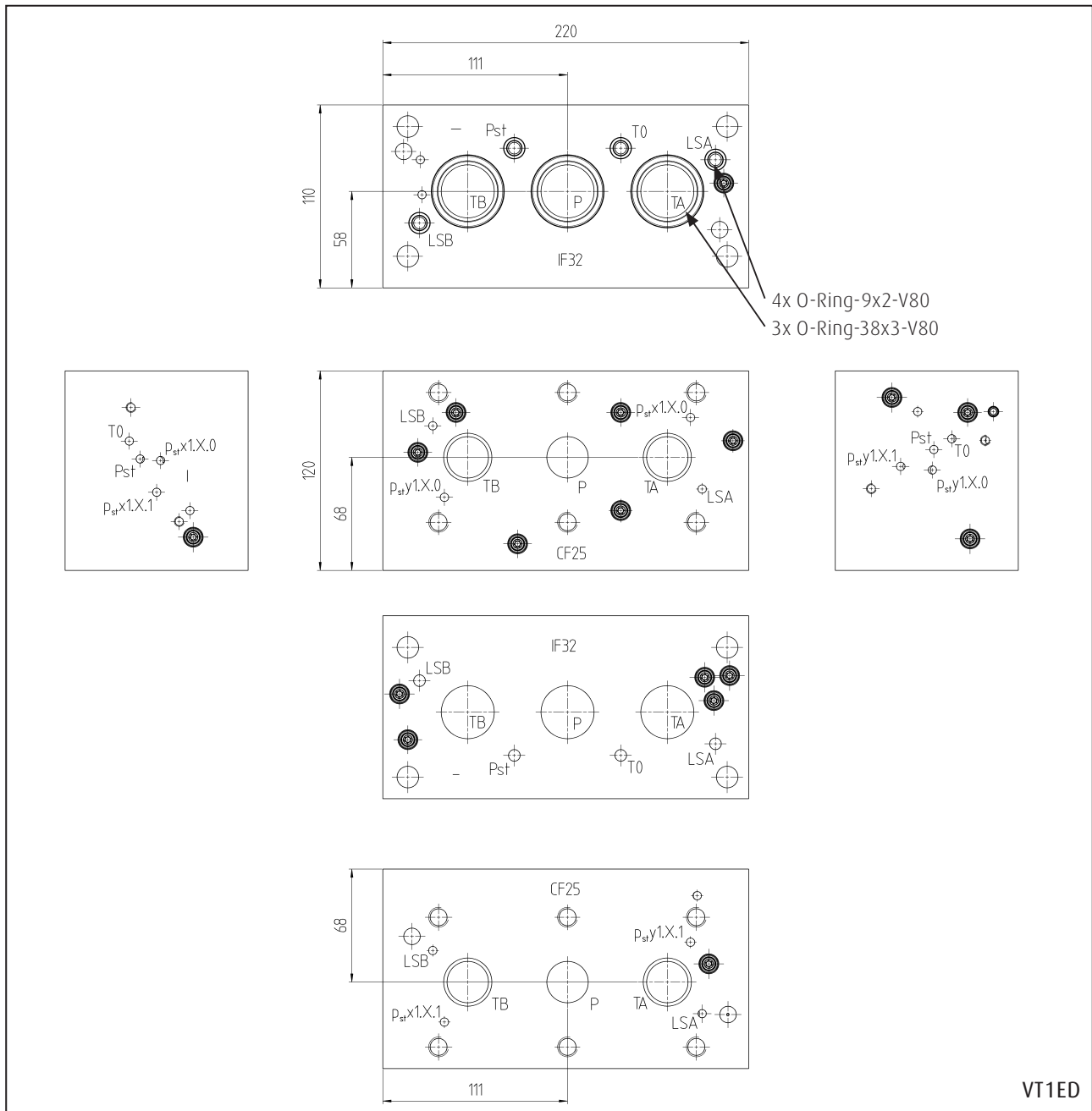
### circuit diagram



Weight [kg]	ca. 16,5
Dimensions [BxHxT]	120 x 110 x 220 mm

For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".

## 4 | System components. VT1ED expansion module double



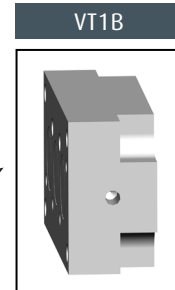
## 4 | System components. VT1B blanking plate

### Module blanking plate

The VT1B blanking plate can be used if a different external pressure relief function of the VT1 modular configuration is used via external piping. The blanking plate seals the configuration at the IF32 interface in a leak-free and pressure-tight manner. For mounting or support in the application, four M12 threads are provided. The VT1B blanking plate can be located at position 0.1.0, 1.1.0, 1.2.0, 1.3.0, depending on the configuration.

Function	Name
Pump	P
Tank	TA, TB, -xT
Leakage oil	T0
Control signal	Pst
Load Sensing signal	LSA, LSB

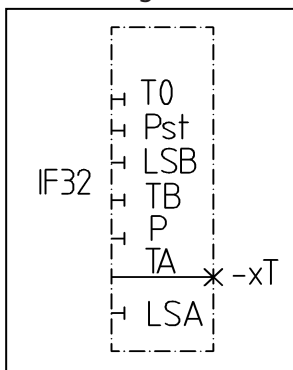
4x O-Ring-9x2-V80  
3x O-Ring-38x3-V80



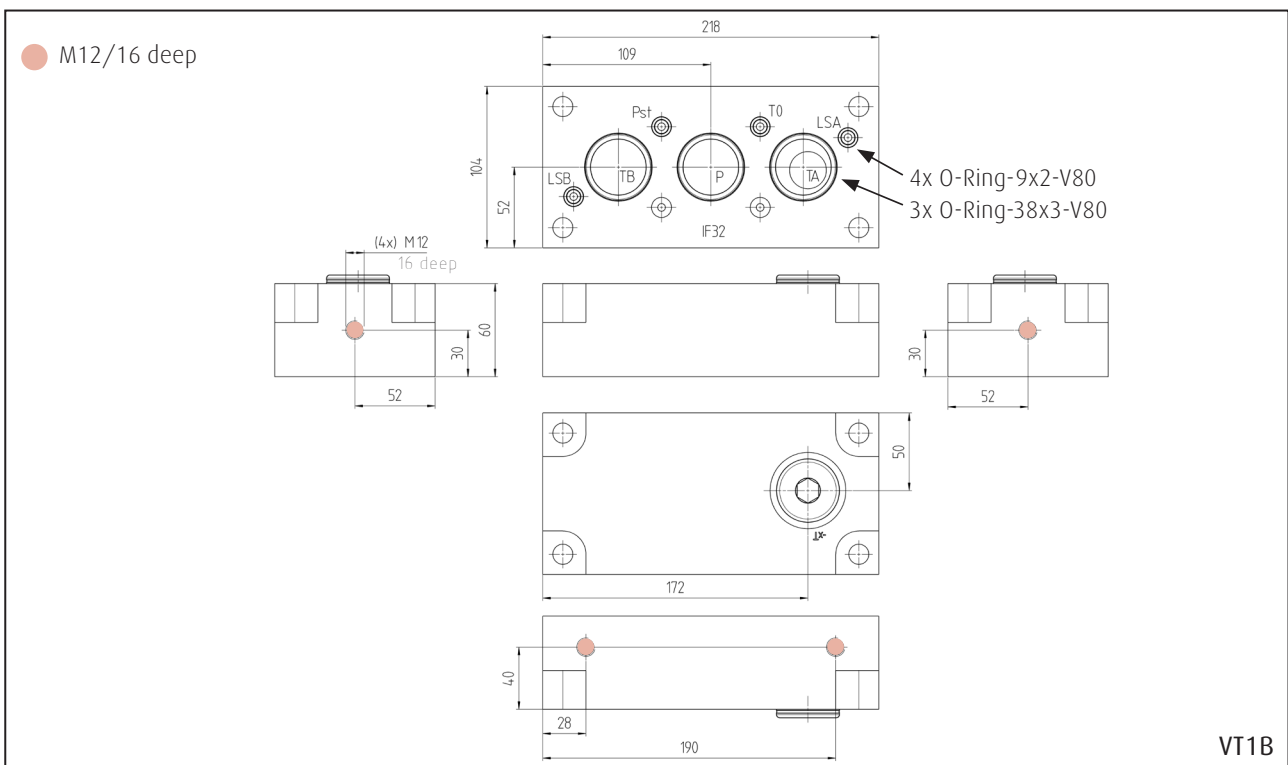
During assembly or installation, proper handling of the O-rings must be ensured.

>> VT1B

### circuit diagram



Port function	Port size	DN	Max. permissible pressure
-xT - Tank	M27x2 ISO 6149-1 $M_A = 100\text{Nm}$		10bar



VT1B

Weight [kg]	ca. 8,8
Dimensions [BxHxT]	60 x 104 x 218 mm

For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".

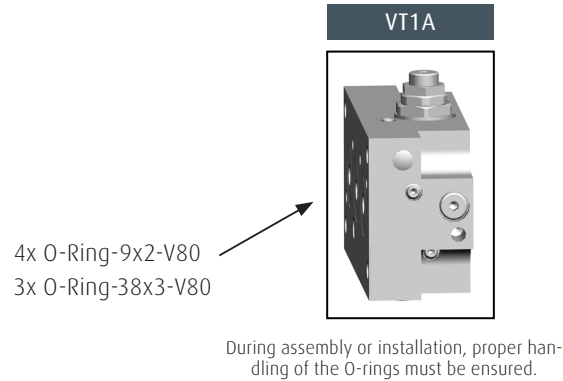
## 4 | System components. VT1A pressure relief module

### Pressure relief module

In addition to its pressure relief function, the VT1A pressure relief module is also used as an end plate. For mounting or support in the application, four M12 threads are provided.

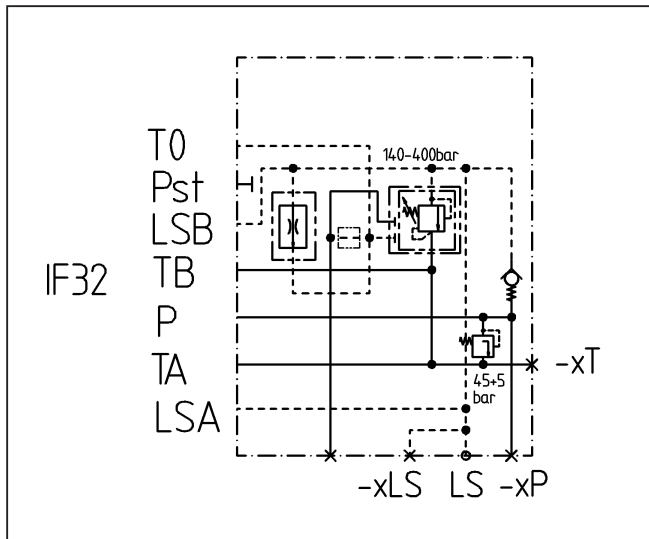
- >> LS pressure relief valve (LS-DA),
- >> Unload valve (45 bar valve that opens from P to T when the directional control valve function is not actuated — protection when pump is idling,
- >> LS unloading (reduces the pressure in the LS line if no directional control valve is actuated),
- >> Threads 4 x M12 for mounting

Function	Name
Pump	P
Tank	TA, TB, -xT
Leakage oil	T0
Control signal	Pst
Load Sensing signal	LS, LSA, LSB
Load Sensing measuring port	-xLS
Pump measuring port	-xP



>> VT1A

### circuit diagram

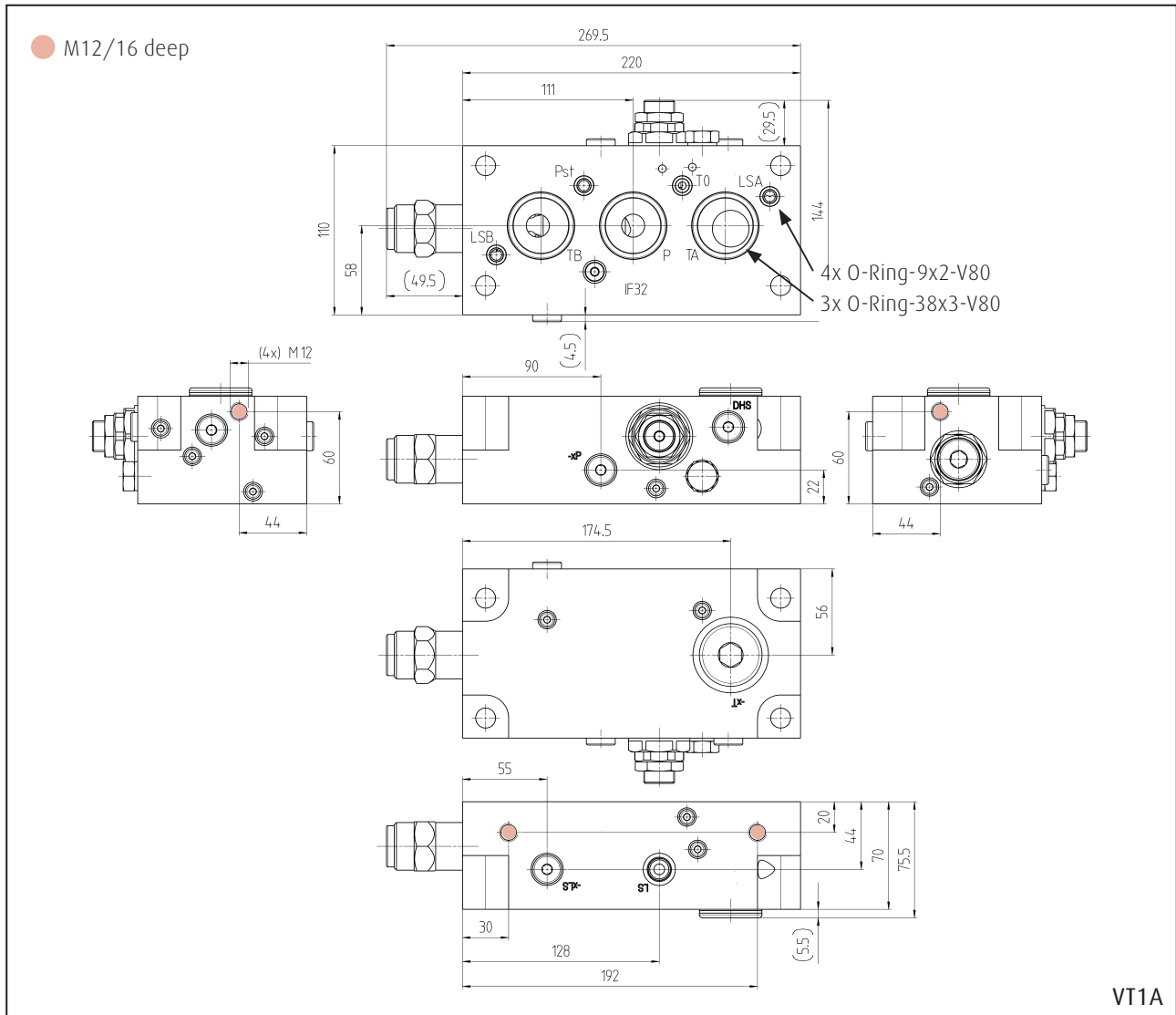


Port function	Port size	DN	Max. permissible pressure
-xT - Tank	M27x2 ISO 6149-1 $M_A = 100\text{Nm}$		10bar
-xP - Pump	M14x1.5 ISO 6149-1 $M_A = 45\text{Nm}$		400bar
LS, -xLS - LS-pressure	M14x1.5 ISO 6149-1 $M_A = 45\text{Nm}$		380bar

Weight [kg]	ca. 10,8
Dimensions [BxHxT]	70 x 144 x 288,5 mm

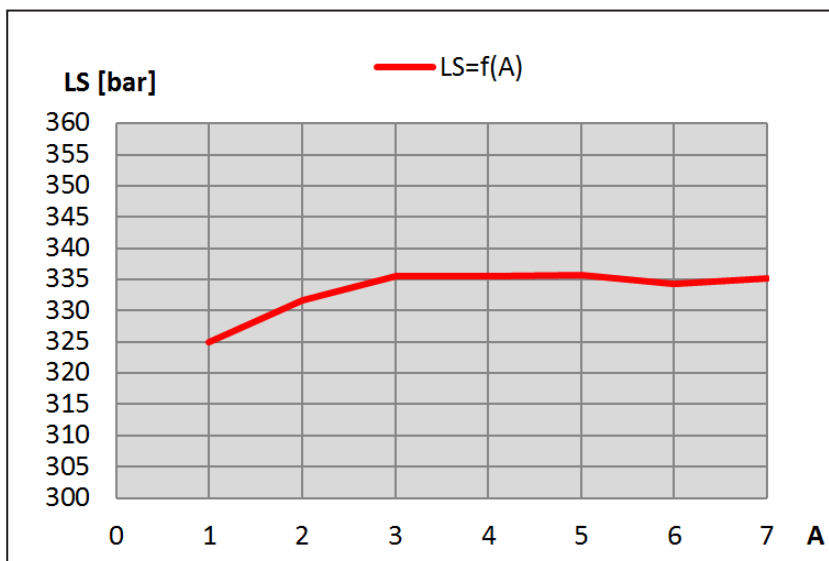
For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".

## 4 | Systemkomponenten. VT1A pressure relief module



### LS pressure relief valve

The LS pressure relief valve can be set between 140 and 400 bar:



A = Number of functions at LS-DA pressure.

## 4 | System components. KT tank check modules

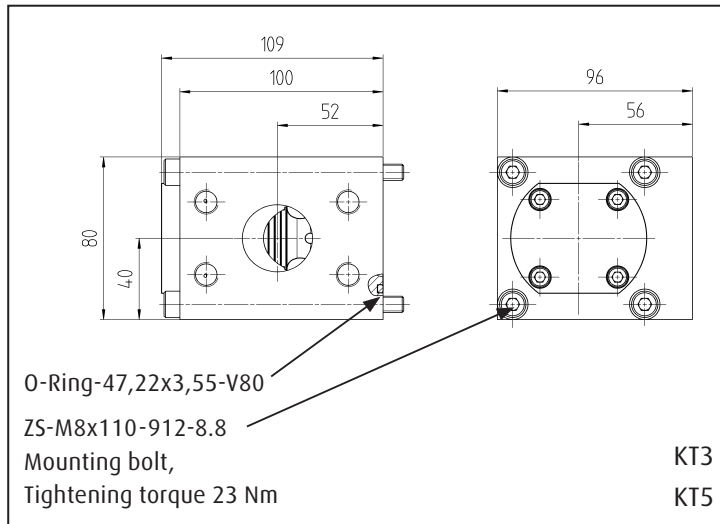
### KT3, KT5 tank check modules, 3 bar and 5 bar

The VT1EE base plates can optionally be equipped with a KT3 or KT5 tank check module at the external return ports T1 and T2. This module pressurizes the oil flow in the return channels to a defined pressure value of either 3 or 5 bar. This reinforces the anti-cavitation function of the secondary valves in the directional control valves.

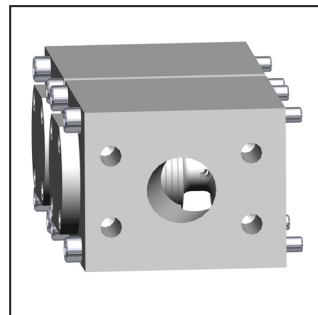
Mounting on the VT1EE can be offset by 90° in each case, so that the tank SAE ports can have a variable layout.

For illustration and options, see VT1EE assembly with KT3, KT5 tank check modules p. 50.

Function	Name
Tank	T1, T2



KT3, KT5 selective at T1, T2

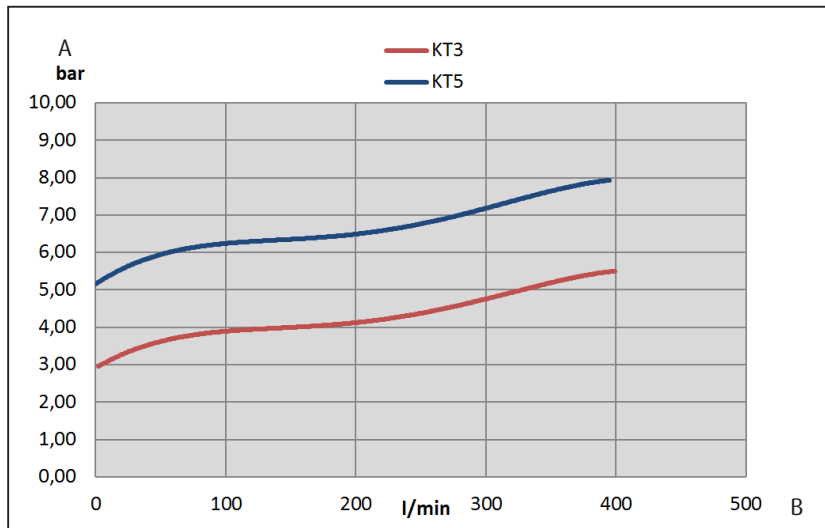


← O-Ring-  
47,22x3,55-V80

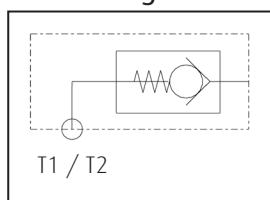
During assembly or installation, proper handling of the O-rings must be ensured.

- >> KT3 inc. 2x M8x110-912-8.8 for VTEE base plate
- >> KT5 inc. 2x M8x110-912-8.8 for VTEE base plate

### Characteristic of the tank check function



### circuit diagram



Port function	Port size	DN	Max. permissible pressure
T1, T2 - Tank or Cooler	SAE 1 1/2" ISO 6162-1 4x M12 / 21.5 deep / M <sub>A</sub> = 130Nm 1)	38	10bar

1) dependent on screwproperty class according to ISO

Weight [kg]	ca. 5,2
Dimensions [BxHxT]	109 x 96 x 80 mm

For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".

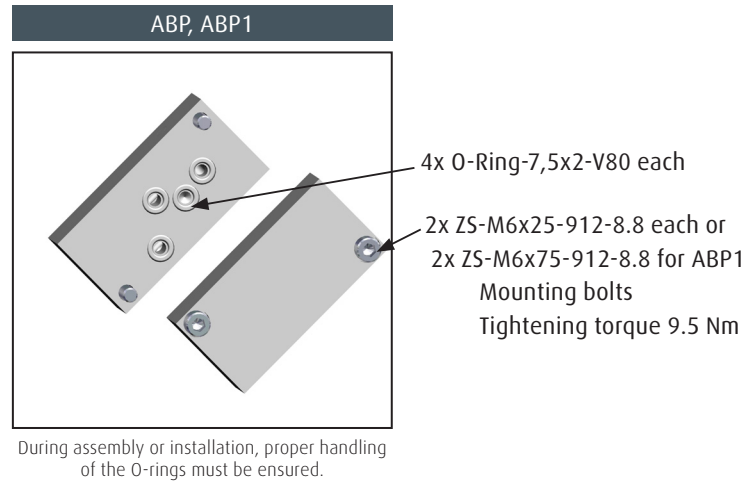
## 4 | System components. ABP pilot controls

### ABP, ABP1 air-bleed plates for hydraulic actuation at 21 bar

The modules bleed the pilot pressure caps of the directional control valves to tank T0 at 21 bar pilot pressure. In addition, they plug the interface for electro-hydraulic actuation.

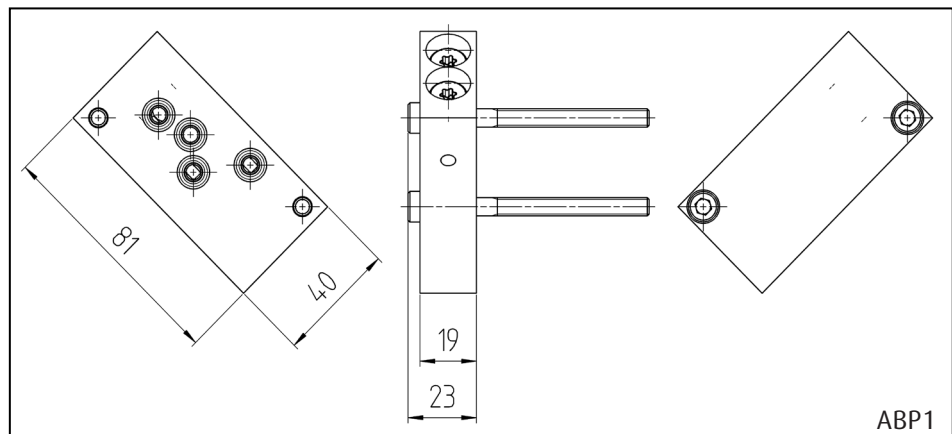
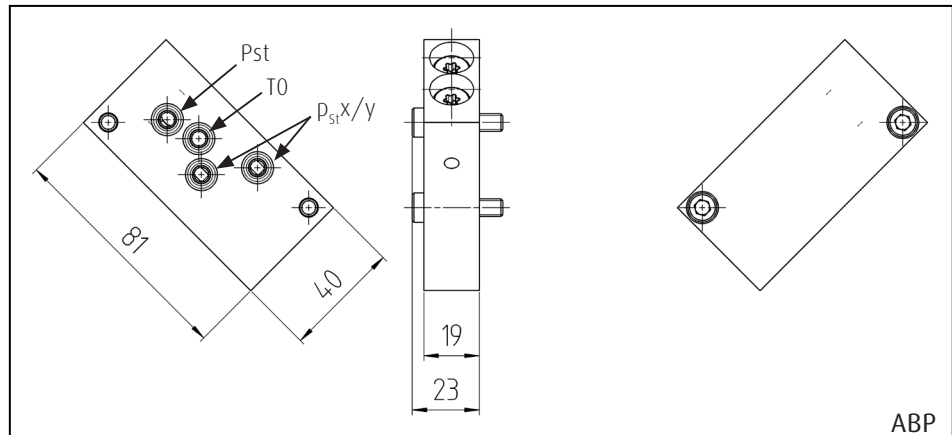
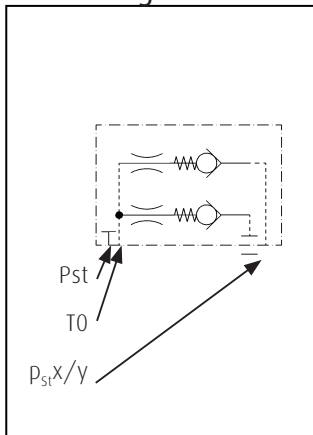
The ABP modules are used in pairs in order to enable hydraulic actuation of a directional control valve installed at position 1.X.0 on a VTEE base plate, a VT1EA expansion module as well as on a VT1EP expansion module.

The ABP1 modules are used in pairs in order to enable hydraulic actuation of a directional control valve installed at positions 1.X.0 and 1.X.1 on a VT1ED expansion module.



>> ABP	inc. 2x M6x25-912-8.8 for VTEE base plate, VT1EA expansion module and VT1EP expansion module
>> ABP1	inc. 2x M6x75-912-8.8 together with DMV2/24 or DMV2/12 for VT1ED expansion module

### circuit diagram



Weight[kg]	ca. 0,46
Dimensions [BxHxT]	81 x 40 x 23 mm

For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".

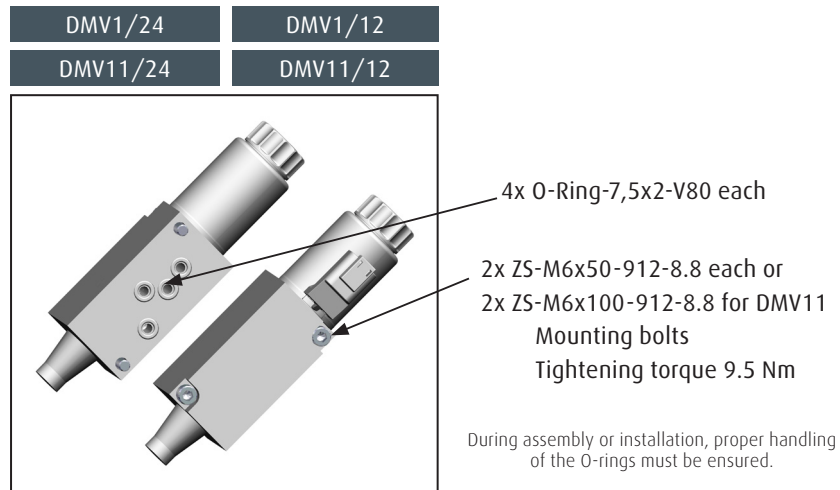


## 4 | System components. DMV1/24 und DMV1/12 pilot controls

### DMV1, DMV11 modules for electro-hydraulic actuation / Deutsch connector 24V and 12V

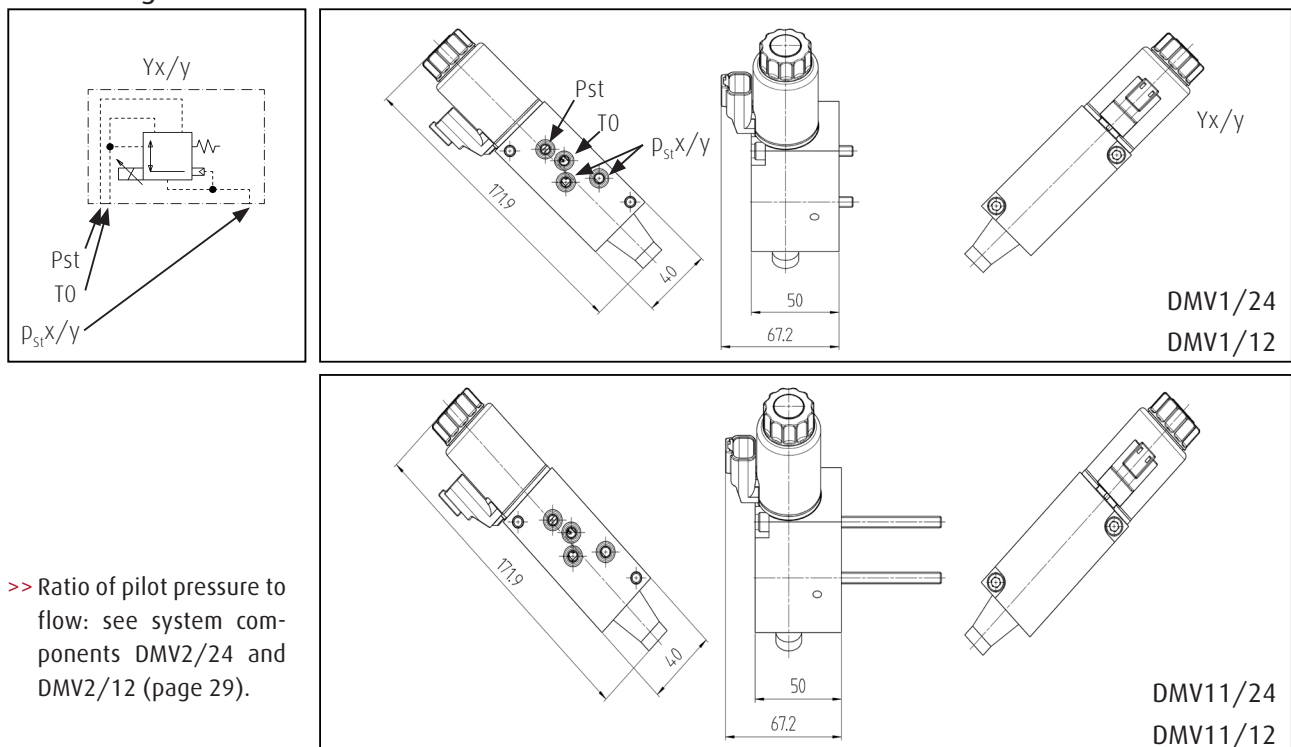
The DMV1/24 and DMV1/12 modules are used in pairs in order to enable electro-hydraulic actuation of a directional control valve installed at position 0.1.0 on a VT1EE base plate, at position 1.X.0 on a VT1EA expansion module as well as on a VT1EP expansion module. On a VT1ED, they enable simultaneous electro-hydraulic actuation of the directional control valves at pos.v 1.X.0 and 1.X.1. The DMV11/24 and DMV11/12 modules are used in pairs to enable electro-hydraulic actuation of a directional control valve installed at position 1.X.1 on a VT1ED expansion module.

>> Electro-hydraulic opening begins at approximately  $I = 430$  mA for DMV1/24 with 24V and at approx.  $I = 830$  mA for DMV1/12 with 12V. The pressure set is  $7.5 \pm 0.5$  bar. In combination with a standard directional control valve, a flow of approx. 1 l/min then flows from P to A/B. For optimal operation, electrical actuation via a dither signal at 100 Hz is recommended. The required pilot pressure (max. 32 bar) comes from the Pst port of the VT1EE.



>> DMV1/24	inc. 2x M6x50-912-8.8 with 24V for VTEE, VT1EA, VT1EP and VT1ED
>> DMV1/12	inc. 2x M6x50-912-8.8 with 12V for VTEE, VT1EA, VT1EP and VT1ED
>> DMV11/24	inc. 2x M6x100-912-8.8 with 24V for VT1ED
>> DMV11/12	inc. 2x M6x100-912-8.8 with 12V for VT1ED

### circuit diagram



>> Ratio of pilot pressure to flow: see system components DMV2/24 and DMV2/12 (page 29).

Weight [kg]	ca. 1,64
Dimensions [BxHxT]	172 x 40 x 67 mm

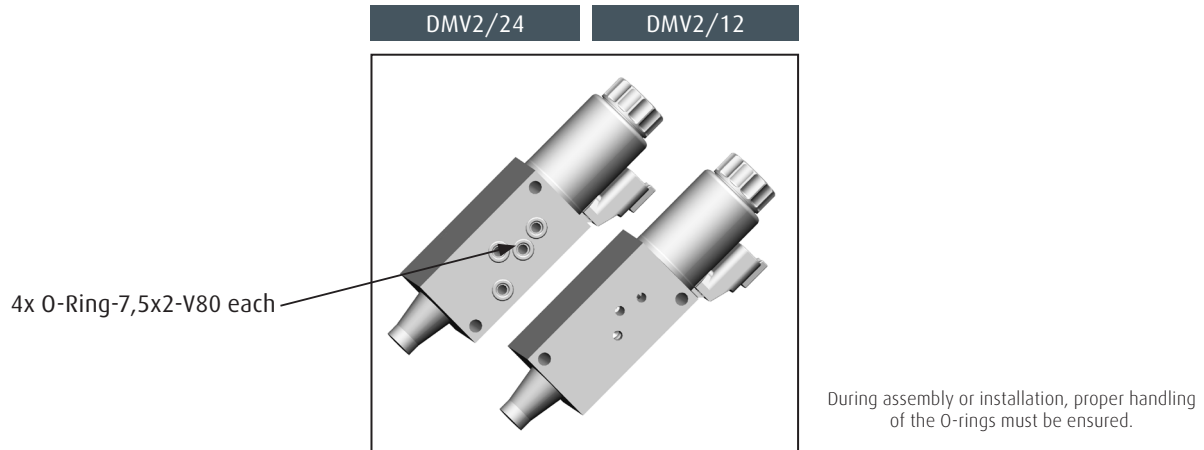
For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".

## 4 | System components. DMV2/24 und DMV2/12 pilot controls

### DMV2 sandwich modules for electro-hydraulic actuation / Deutsch connector 24V and 12V

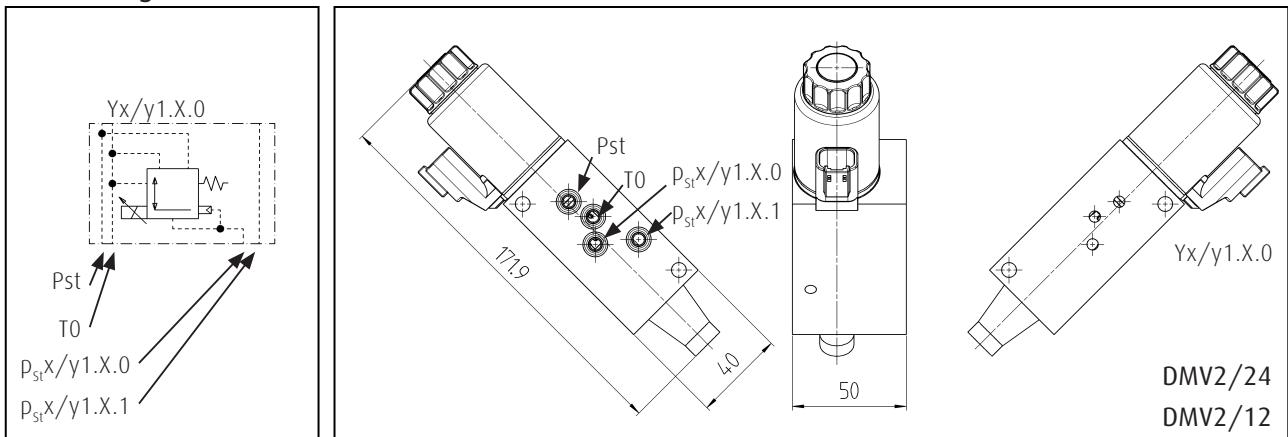
The DMV2/24 and DMV2/12 modules are used in pairs in order to enable electro-hydraulic actuation of a directional control valve installed at position 1.X.0 on a VT1ED expansion module.

>> Electro-hydraulic opening begins at approximately  $I = 430$  mA for DMV2/24 with 24V and at approx.  $I = 830$  mA for DMV2/12 with 12V. The pressure set is  $7.5 \pm 0.5$  bar. In combination with a standard directional control valve, a flow of approx. 1 l/min then flows from P to A/B. For optimal operation, electrical actuation via a dither signal at 100 Hz is recommended. The required pilot pressure (max. 32 bar) comes from the Pst port of the VT1EE.

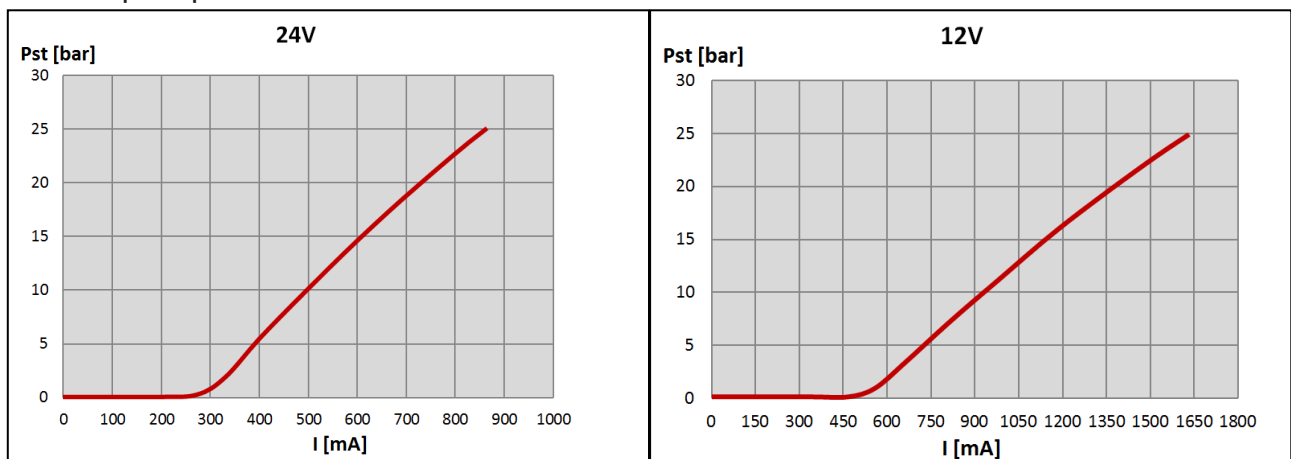


>> DMV2/24      with 24V for VT1ED  
>> DMV2/12      with 12V for VT1ED

### circuit diagram



### Ratio of pilot pressure to flow



Weight [kg]      ca. 1,61  
Dimensions [BxHxT]      172 x 40 x 50 mm

For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".

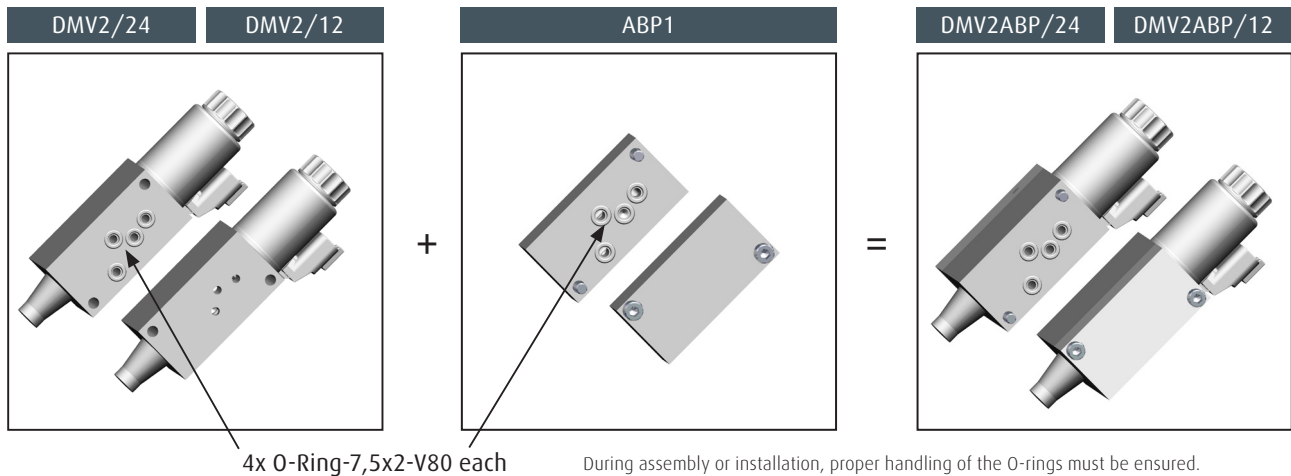
## 4 | System components. Combinations DMV2ABP/24 and DMV2ABP/12

### ABP1 air-bleed plates with hydraulic actuation

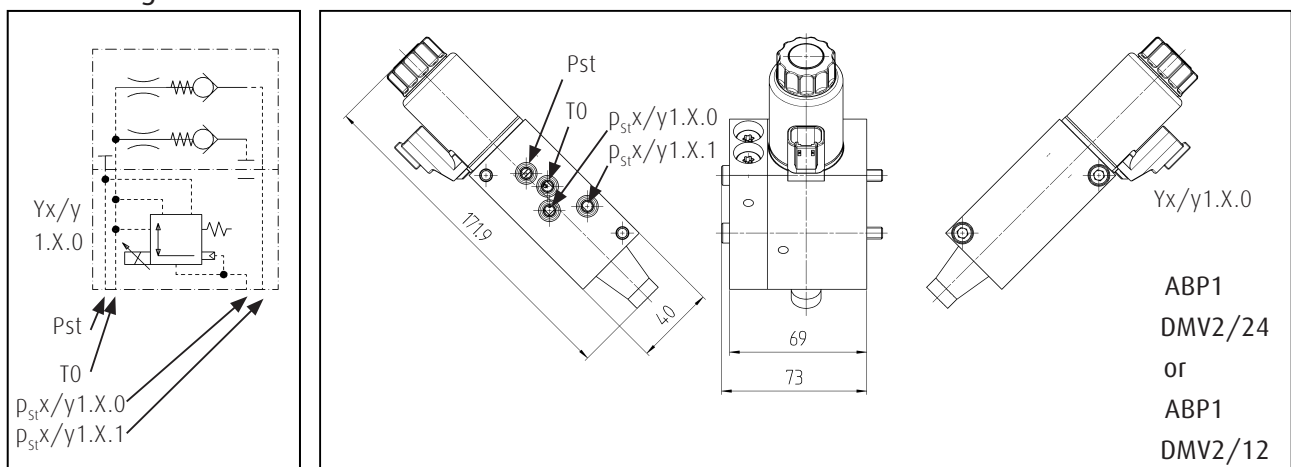
#### Electro-hydraulic actuation when combined with the DMV2/24 or DMV2/12 sandwich module

These combinations are used in pairs in order to enable electro-hydraulic actuation of a direction control valve installed at position 1.X.0 on a VT1ED expansion module, and hydraulic actuation of a directional control valve installed at position 1.X.1 of a VT1ED expansion module.

>> Electro-hydraulic opening begins at approx.  $I = 430$  mA for DMV2/24 with 24V and at approx.  $I = 830$  mA for DMV2/12 with 12V. The pressure set is  $7.5 \pm 0.5$  bar. In combination with a standard directional control valve, a flow of approx. 1 l/min then flows from P to A/B. For optimal operation, electrical actuation via a dither signal at 100 Hz is recommended. The required pilot pressure (max. 32 bar) comes from the Pst port of the VT1EE.



#### circuit diagram



>> Ratio of pilot pressure to flow: see system components DMV2/24 and DMV2/12 (page 29).

Weight [kg]	ca. 2,1
Dimensions [BxHxT]	172 x 40 x 73 mm

For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".

## 4 | System components. Combinations DMV3/24 und DMV3/12

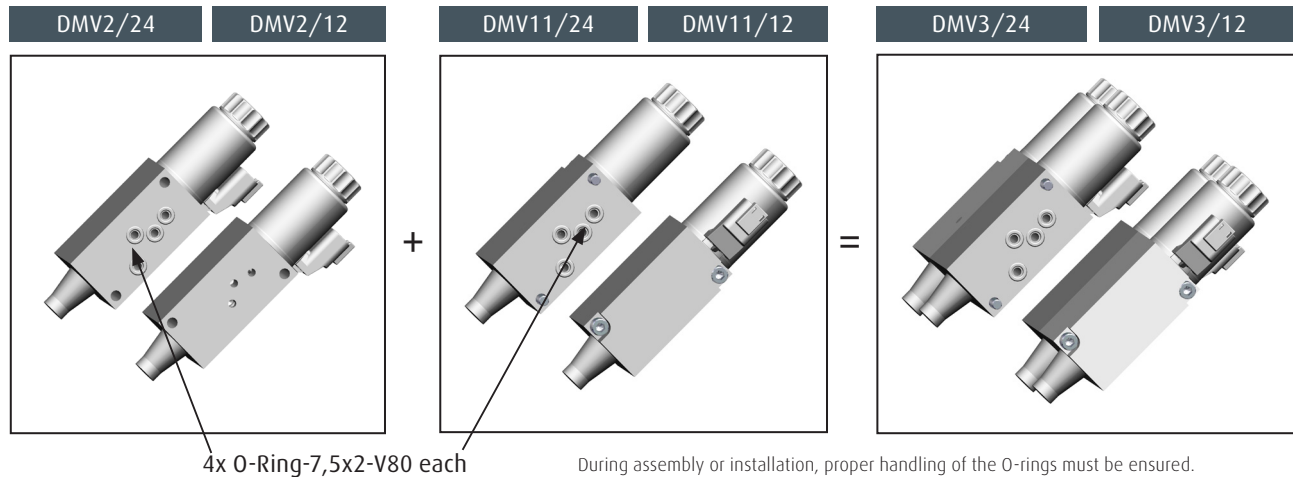
### DMV11/24 or DMV11/12 module, electro-hydraulic actuation

#### Electro-hydraulic actuation when combined with the DMV2/24 or DMV2/12 sandwich module

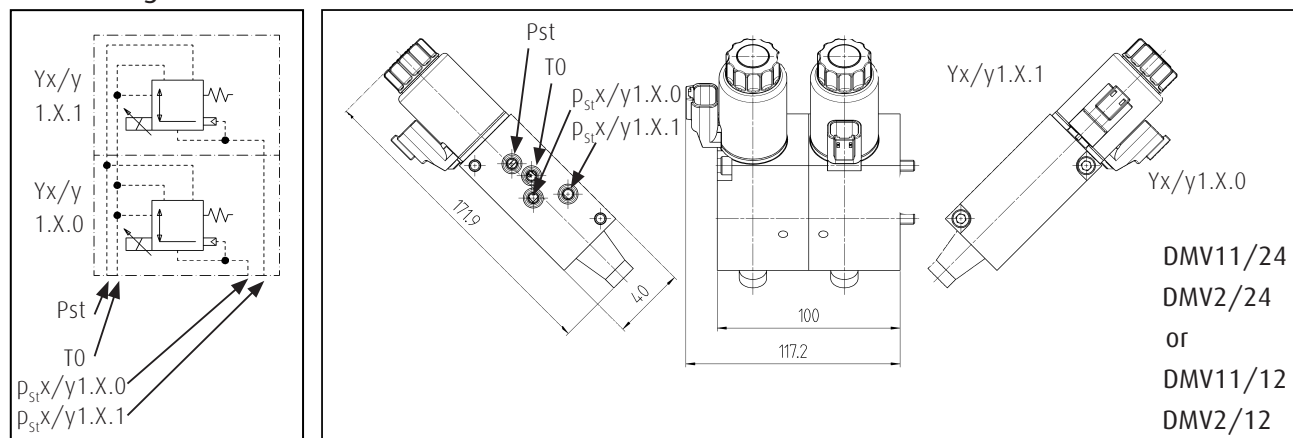
These combinations are used in pairs in order to enable electro-hydraulic actuation of a directional control valve installed at position 1.X.0 on a VT1ED expansion module, and

electro-hydraulic actuation of a directional control valve installed at position 1.X.1 on a VT1ED expansion module.

>> Electro-hydraulic opening begins at approximately  $I = 430 \text{ mA}$  for DMV3/24 with 24V and at approx.  $I = 830 \text{ mA}$  for DMV3/12 with 12V. The pressure set is  $7.5 \pm 0.5 \text{ bar}$ . In combination with a standard directional control valve, a flow of approx.  $1 \text{ l/min}$  then flows from P to A/B. For optimal operation, electrical actuation via a dither signal at  $100 \text{ Hz}$  is recommended. The required pilot pressure (max.  $32 \text{ bar}$ ) comes from the Pst port of the VT1EE.



#### circuit diagram



>> Ratio of pilot pressure to flow: see system components DMV2/24 and DMV2/12 (page 29).

Weight [kg]	ca. 3,3
Dimensions [BxHxT]	172 x 40 x 118 mm

For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".

## 4 | System components. Directional control valves

The directional control valves are used for distribution and control of flow provided via the VT1EE base plate to the various functions and of the outlet flows from the functions. They are designed as LS valves, based on LSC technology, with a downstream compensator and a pressure copier on each function side. The compensators and pressure copiers are integrated in a control spool designed as a hollow spool.

With parallel operation of two functions, the compensators compensate the system pressure to the function load pressure and thus keep the flow of the respective function at a constant level regardless of a change in the overall system pressure. The compensators open the path between the pump and the function at the beginning of actuation of the control spool only if the pump pressure has reached the load-pressure level. This ensures that the pressure does not drop in the event of actuation of a function under load.

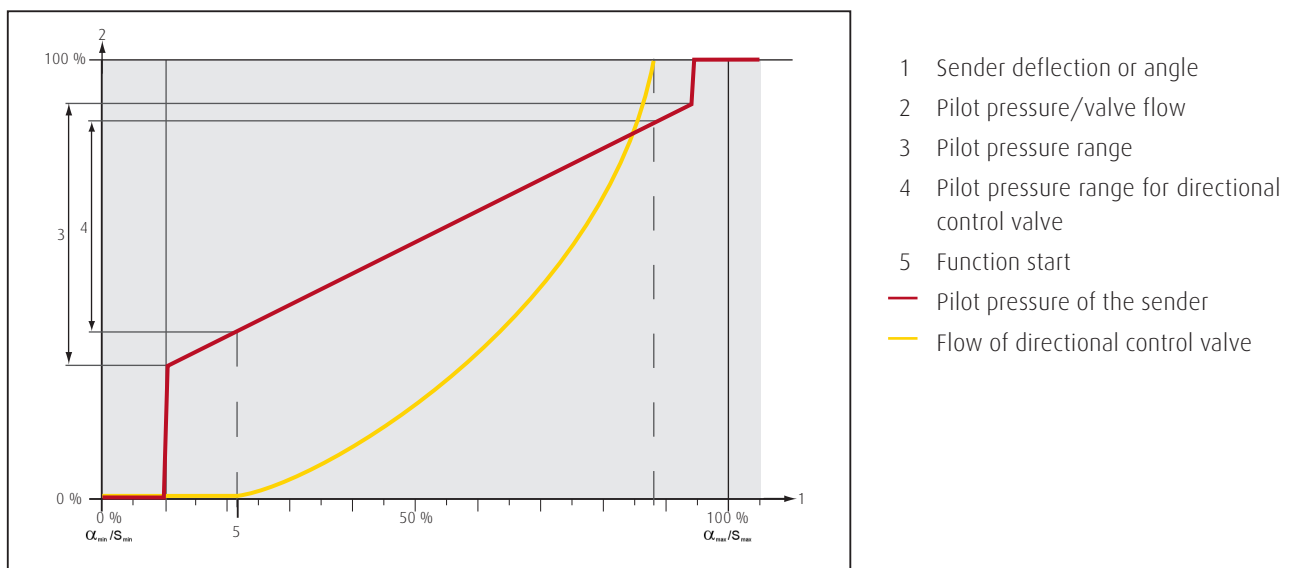
### Actuation

For all directional control valves, the control spool is held in its center position via centering springs on both sides. The centering springs are supported in the control caps through which the hydraulic control pressure signals are sent to the end faces of the control spool. When a hydraulic control pressure signal is applied, the control spool is moved from its center position, in accordance with the characteristics of the centering springs, causing one function side of the valve section to open to the pump path and the other function side to the return passage to be relieved.

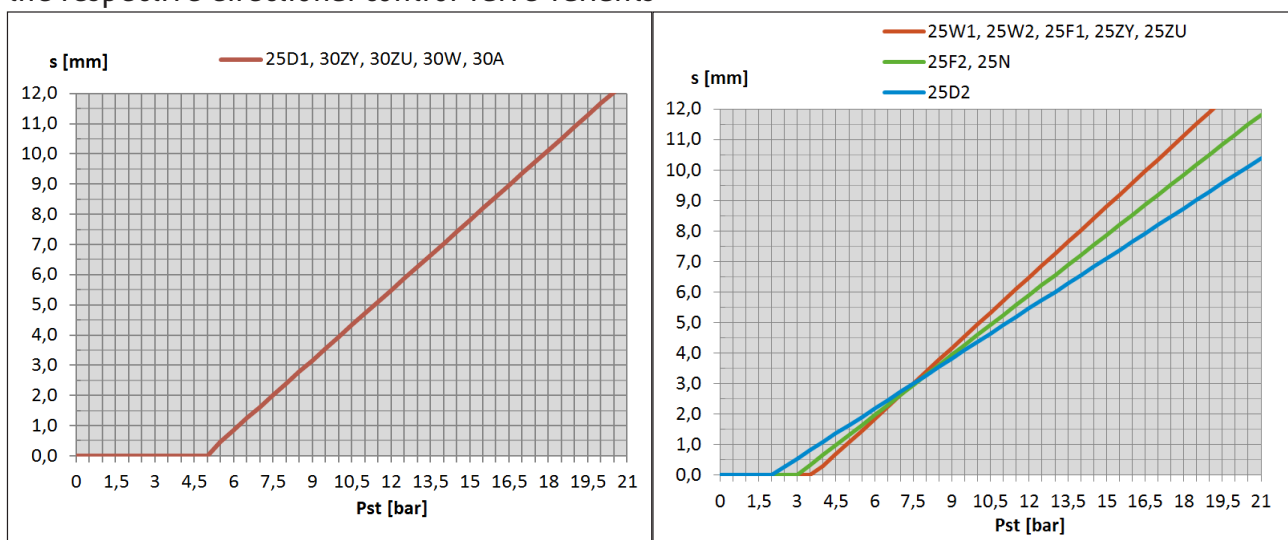
Depending on the pilot pressure sender, a control pressure range is available for the directional control valves:

>> Standard: 6 to 19 bar

### Sender characteristic curve



### Ratio of spool stroke "s" to pilot pressure "Pst" for the respective directional control valve variants



## 4 | System components. Directional control valves

The directional control valves to be added at the CF25 interfaces on the VT1EE base plate and at the IF32 expansion modules are designed in two nominal sizes with maximum possible flows (for  $\Delta p_{LS}=20$  bar):

>> VW25-CF25: 400 l/min

>> VW30-CF25: 600 l/min

The specified flows are independent of the position of the CF25 interfaces on the VT1EE base plate or the position of the IF32 expansion modules on the VT1EE base plate, since the available CF25 interfaces are arranged in parallel to the VT1EE base plate. The directional control valves have the following characteristics:

>> **Hydraulic piloting** is possible through the pilot pressure ports of the control caps.

>> **Electro-hydraulic piloting** is possible via the pilot pressure ports of the CF25 interface.

>> **Automatic bleeding** of the pilot pressure lines and pilot pressure caps via the CF25 interface (air-bleed valves in the ABP plates).

>> **Other responses:** see replacement parts.

	Directional control valves	
Nominal size	25	30
$Q^*_{\max}$ [l/min] P → A, B	400	600
$Q_{\max}$ [l/min] A → T	560	840
$Q_{\max}$ [l/min] B → T	400	600
A, B	1"	1 1/4"
$P_{st} X, P_{st} Y$		

\*) flows for  $\Delta p_{LS}=20$  bar

Port function	Port size	DN	Max. permissible pressure
A, B - Work ports NG25	SAE 1" ISO 6162-2 4x M12 / 21.5 deep / $M_A = 130Nm$ 1)	25	420bar
A, B - Work ports NG30	SAE 1 1/4" ISO 6162-2 4x M12 / 21.5 deep / $M_A = 130Nm$ 1)	32	420bar
$P_{st} X, P_{st} Y$ - Pilot pressure	M14x1.5 ISO 6149-1 $M_A = 35Nm$		32bar

1) dependent on screwproperty class according to ISO

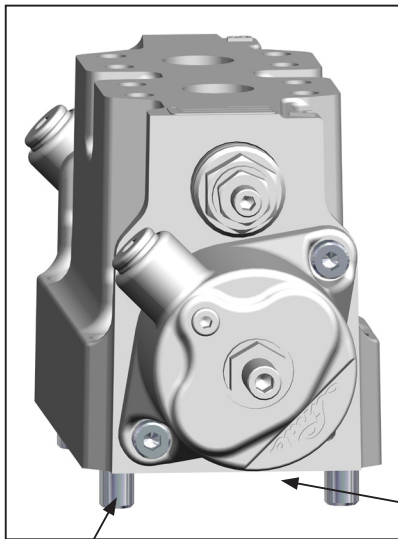
### Leakage behavior of the valves without additional measures

Boundary conditions		NG	Q [ml/min]	
Pressure	$p = 200$ bar		Without secondary valve	Mit DBV/NLV
Recommended viscosity	$\nu = 30$ cSt			
Standard spool clearance	$s = 13$ $\mu m$			
		25	110	120
		30	120	130

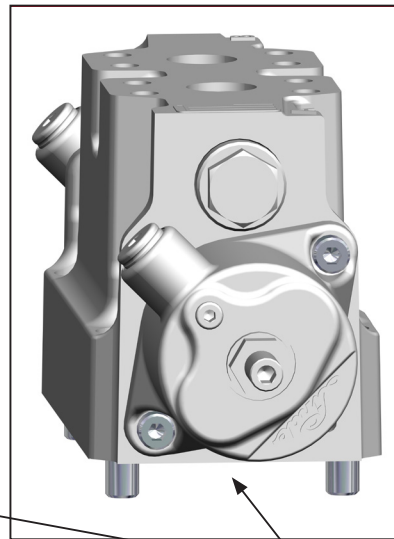
## 4 | System components. Directional control valves

VW25-  
CF25

VW25-CF25 with DBV/NLV



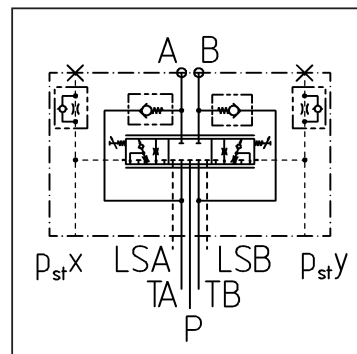
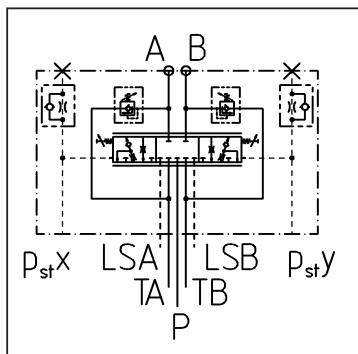
VW25-CF25 with NLV



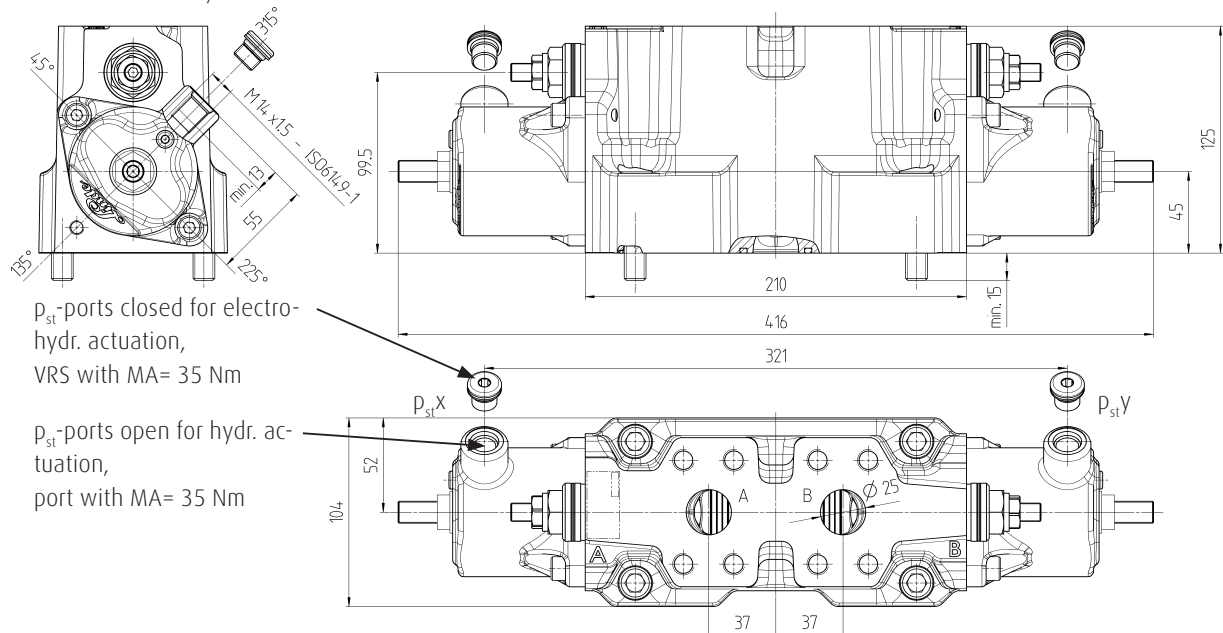
4x ZS-M12x30-912-8.8 each  
Mounting bolts, Tightening torque 80 Nm

During assembly or installation, proper handling  
of the O-rings must be ensured.

4x O-Ring-7,5x2-V80  
3x O-Ring-32,92x3,55-V80



Control cap position  
Standard A side 45° / B side 315°



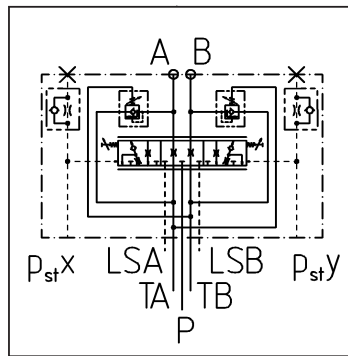
Weight [kg] ca. 18,2  
Dimensions [BxHxT] 104 x 125 x 416 mm

For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".

## 4 | System components. Directional control valves

VW30-  
CF25

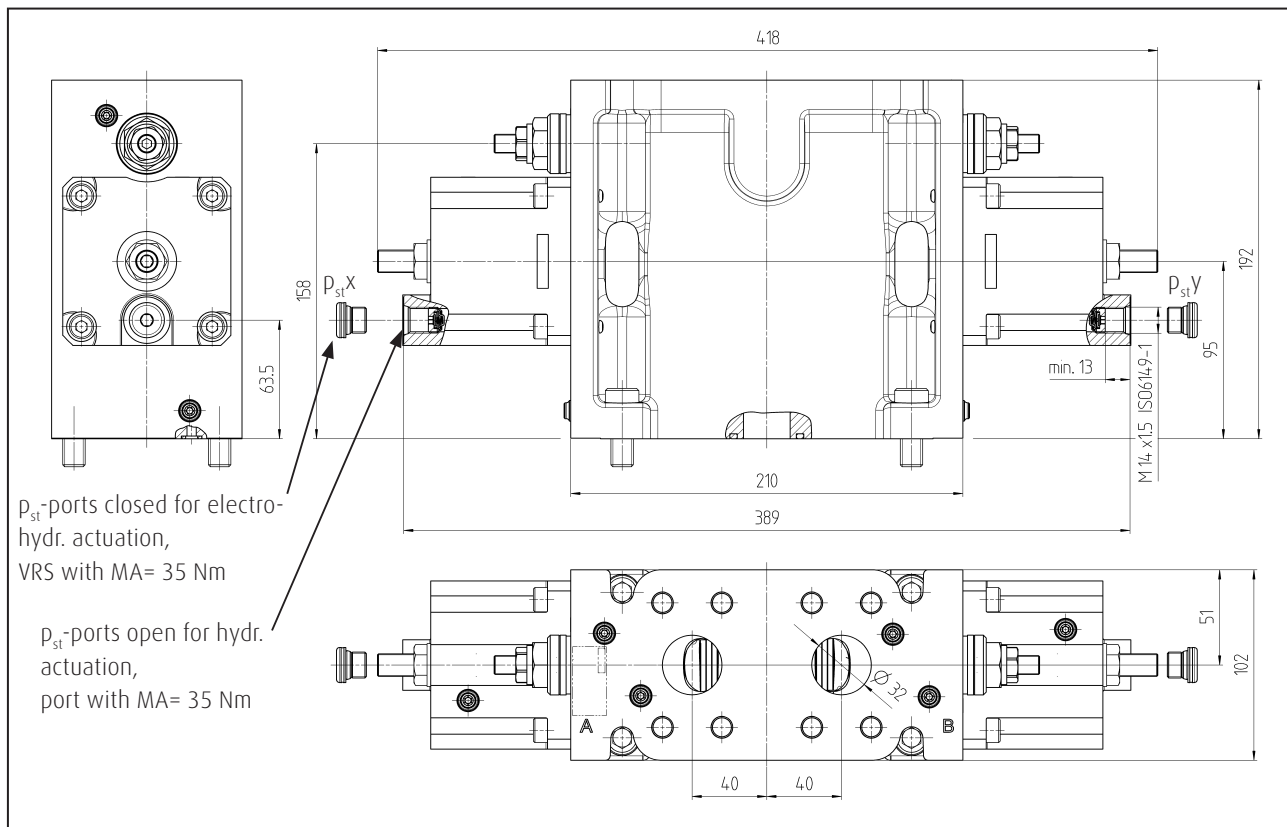
VW30-CF25 with DBV/NLV



4x ZS-M12x30-912-8.8 each  
Mounting bolts, Tightening torque 80 Nm

4x O-Ring-7,5x2-V80  
3x O-Ring-32,92x3,55-V80

During assembly or installation, proper handling  
of the O-rings must be ensured.



Weight [kg] ca. 27,2  
Dimensions [BxHxT] 102 x 192 x 428 mm

For more information on variables and permissible pressures, see section "Ports" in chapter "General technical data".



## 4 | System components. Directional control valves variants. Distinction

### Directional control valve with standard function type A — asymmetric function

#### Directional control valve types

The following directional control valves are available:

>> 25ZY	VW25-CF25	for NG25 functions with <b>cylinder function</b>
>> 25N	VW25-CF25	for NG25 functions with <b>tilt function</b>
>> 30ZY	VW30-CF25	for NG30 functions with <b>cylinder function</b>
>> 30A	VW30-CF25	for NG30 functions with <b>cylinder function</b>

These directional control valves are normally used for the actuation of cylinders with differential areas. They have an asymmetric flow distribution between ports A and B and a simple load holding function. In the zero position, all ports are blocked. In addition, in both function ports, there is a pressure relief valve with anti-cavitation function.

>> Hydraulic actuation (pilot pressure max. 32 bar) is realized with the ports provided on the covers of the VW directional control valves. Hydraulic opening begins at  $7.5 \pm 0.5$  bar (pump-to-function). \*

>> Electro-hydraulic actuation is realized with the electro-proportional pressure reducing valves. Electro-hydraulic opening begins at  $I = 430 \pm 10$  mA. \*

>> The necessary pilot pressure (max. 32 bar) comes from the Pst port on the VT1EE.

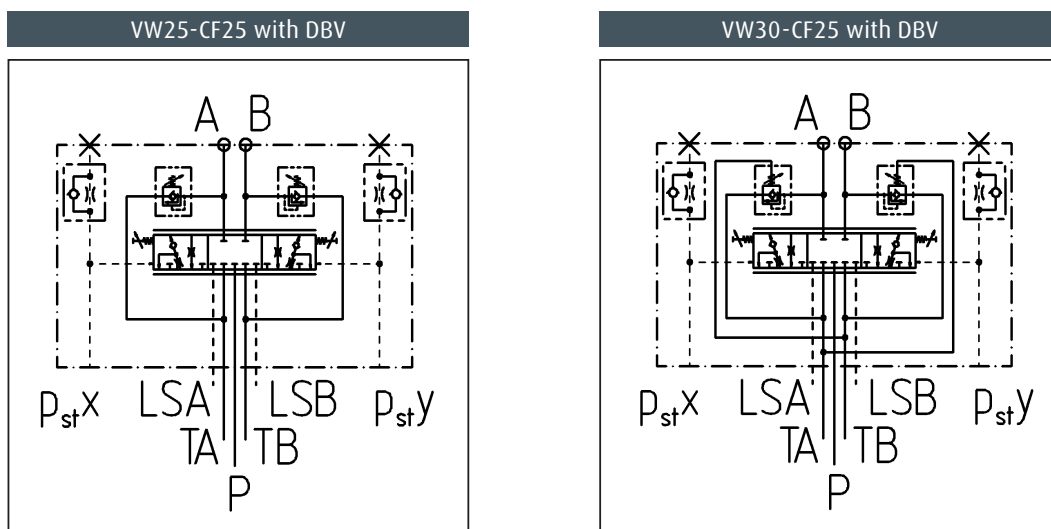
\* A volume of approx. 1 l/min flows from the pump to the function

Each directional control valve is configured with the following characteristics:

- >> Flow characteristic of the valve spool
- >> Other responses: see replacement parts.

Directional control valve	flow A / B at $D_{pLS}=20$ bar	DBV in bar	NLV
25ZY	420 / 330	380	-
25N	350 / 200	380	-
30ZY	620 / 320	380	-
30A	640 / 440	380	-

#### circuit diagram

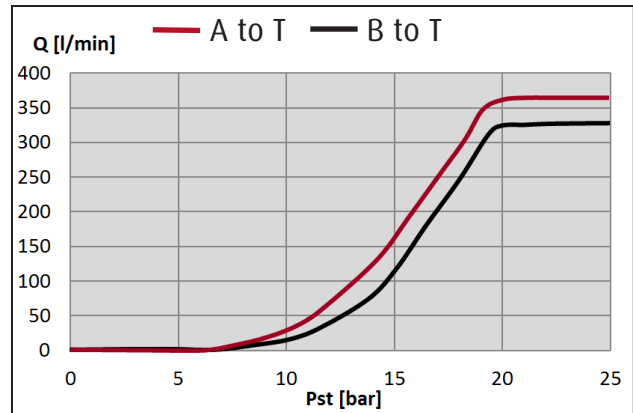
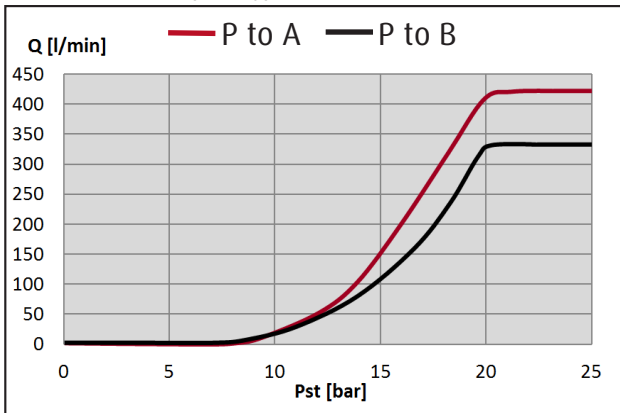


## 4 | System components. Directional control valves variants. Distinction

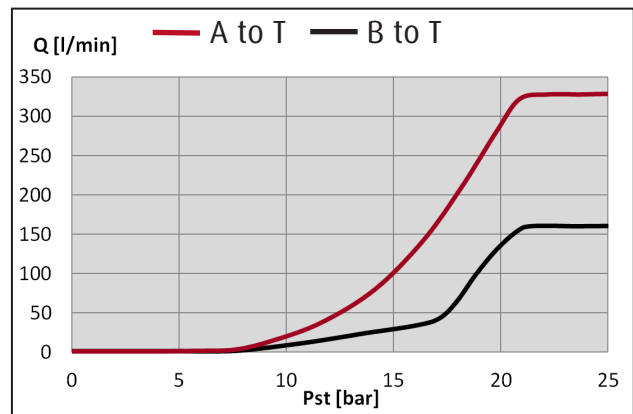
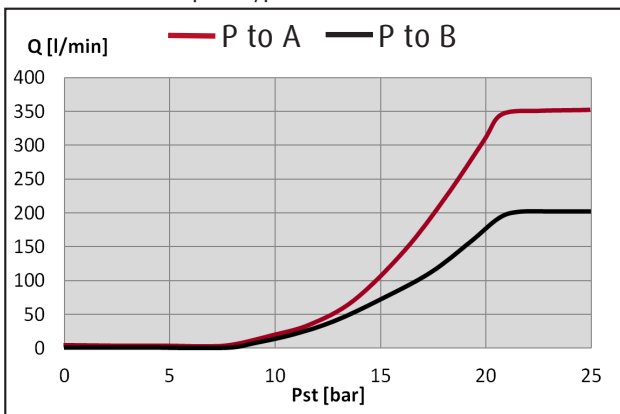
### Directional control valve with standard function type A — asymmetric function

Flow characteristics P to A, B (for a  $D_{pLS}=20$  bar) and A, B to T (for a  $D_p=20$  bar) of the valve spool on directional control valve VW CF25

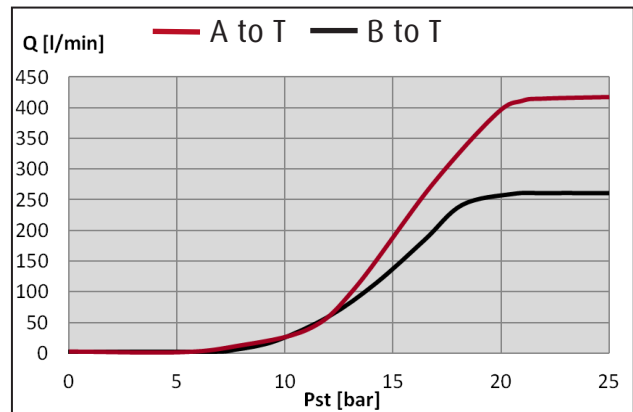
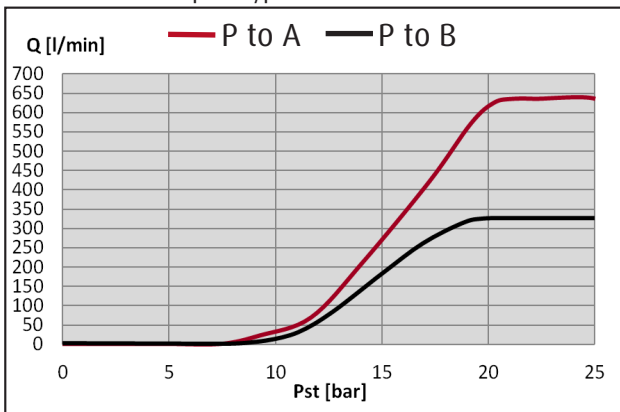
Characteristic for spool type A - Directional control valve 25ZY VW25-CF25



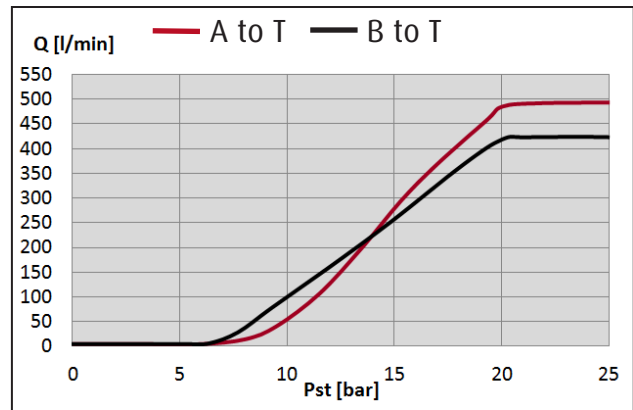
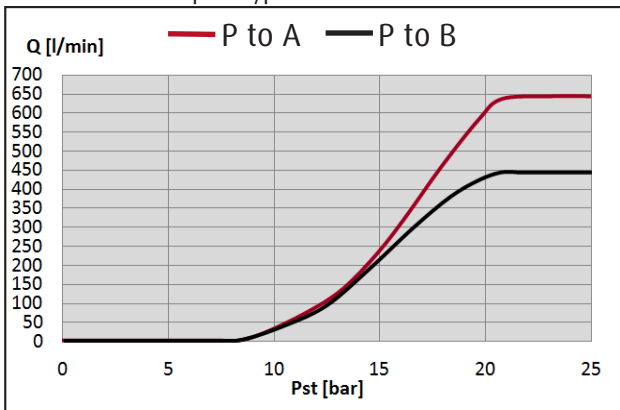
Characteristic for spool type A - Directional control valve 25N VW25-CF25



Characteristic for spool type A - Directional control valve 30ZY VW30-CF25



Characteristic for spool type A - Directional control valve 30A VW30-CF25



## 4 | System components. Directional control valves variants. Distinction

### Directional control valve with standard function type B — symmetrical function

#### Directional control valve types

The following directional control valves are available:

>> 25ZU	VW25-CF25	for NG25 functions with <b>additional function</b>
>> 25D1	VW25-CF25	for NG25 functions with <b>swing function</b>
>> 25D2	VW25-CF25	for NG25 functions with <b>swing function</b>
>> 30ZU	VW30-CF25	for NG30 functions with <b>additional function</b>

These directional control valves are universal valves and are usually used for mobile vehicles without a brake valve or in slewing gear directional valves without a brake valve. They have a symmetrical flow distribution between ports A and B and a simple load holding function. In the zero position, all ports are blocked. There are directional control valves in NG25 with anti-cavitation valves (NLV) and with pressure relief valves with a anti-cavitation function (DBV) at both work ports. In NG30, the directional control valves are equipped with pressure relief valves with a anti-cavitation function (DBV) at both work ports.

>> Hydraulic actuation (pilot pressure max. 32 bar) is realized with the ports provided on the covers of the VW directional control valves. Hydraulic opening begins at  $7.5 \pm 0.5$  bar (pump-to-function). \*

>> Electro-hydraulic actuation is realized with the electro-proportional pressure reducing valves. Electro-hydraulic opening begins at  $I = 430 \pm 10$  mA. \*

>> The necessary pilot pressure (max. 32 bar) comes from the Pst port on the VT1EE.

\* A volume of approx. 1 l/min flows from the pump to the function

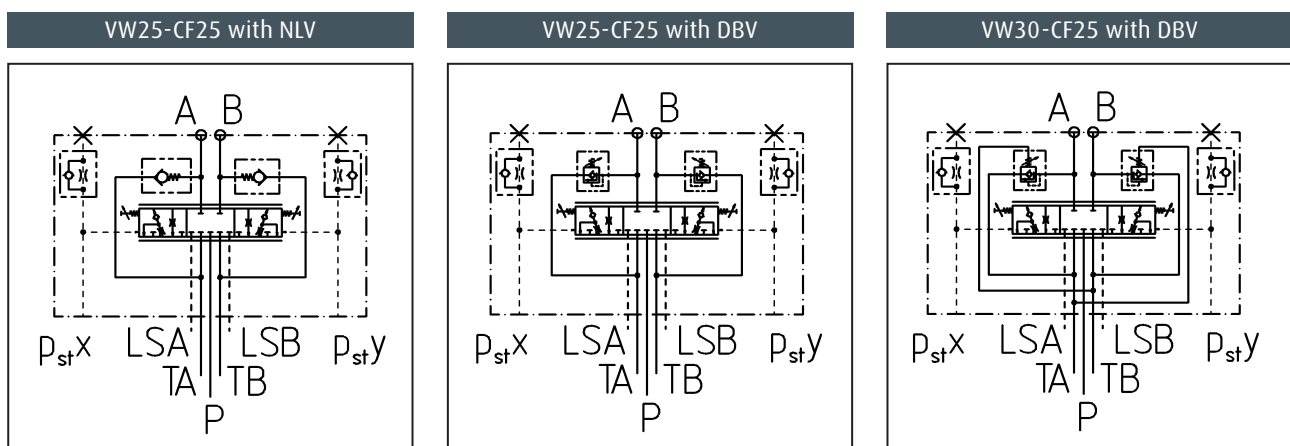
Each VW directional control valve is configured with the following characteristics:

>> Flow characteristic of the valve spool

>> Other responses: see replacement parts.

Directional control valve	flow A / B at $D_{pLS}=20$ bar	DBV in bar	NLV
25ZU	350 / 350	No	Yes
25D1	360 / 360	No	Yes
25D2	115 / 115	380	No
30ZU	590 / 590	380	No

#### circuit diagram

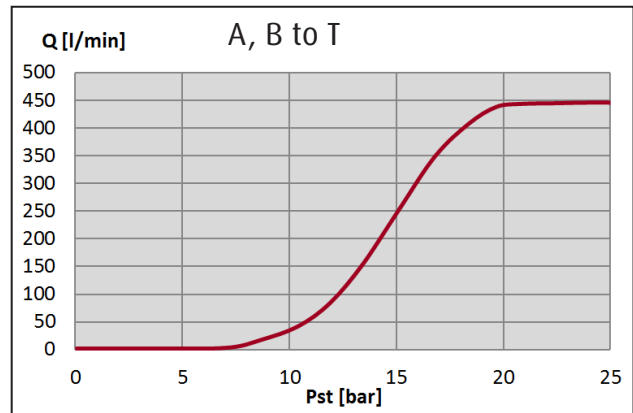
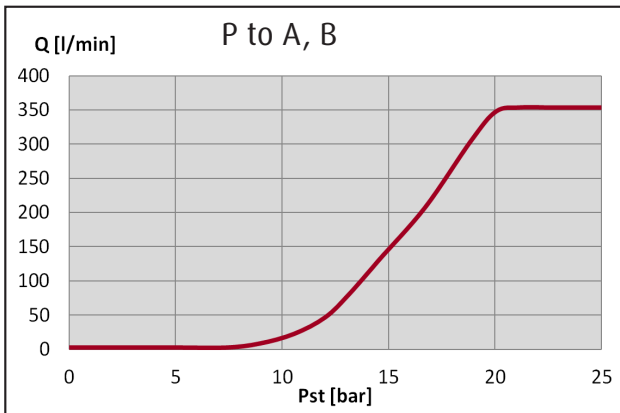


## 4 | System components. Directional control valves variants. Distinction

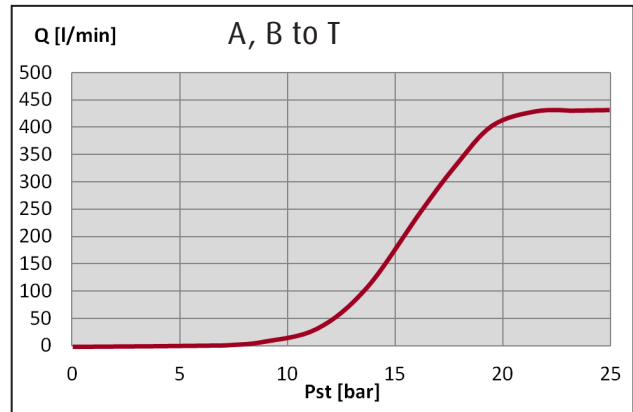
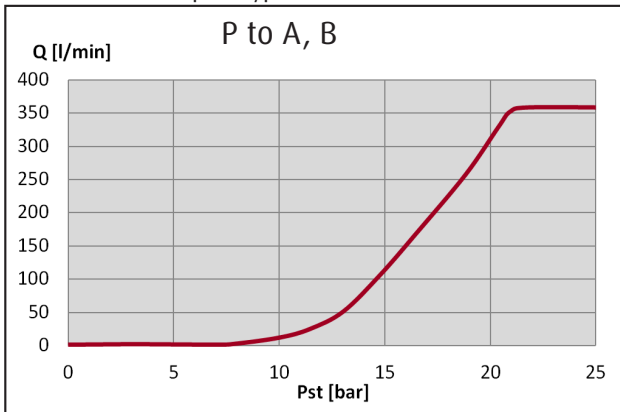
### Directional control valve with standard function type B — symmetrical function

Flow characteristics P to A, B (for a  $D_{pLS}=20$  bar) and A, B to T (for a  $D_p=20$  bar) of the valve spool on directional control valve VW CF25

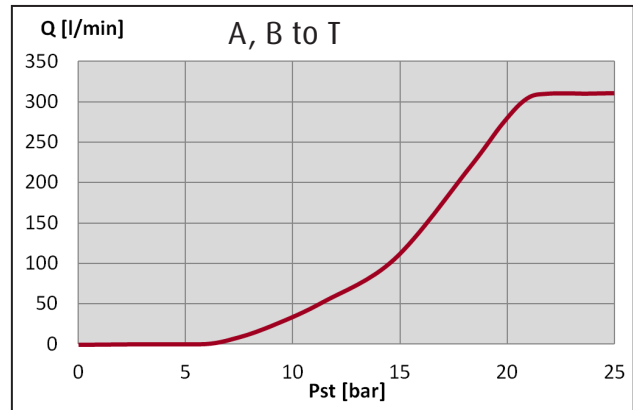
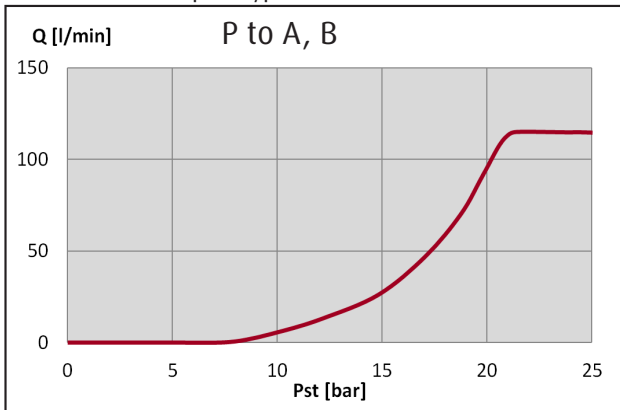
Characteristic for spool type B - Directional control valve 25ZU VW25-CF25



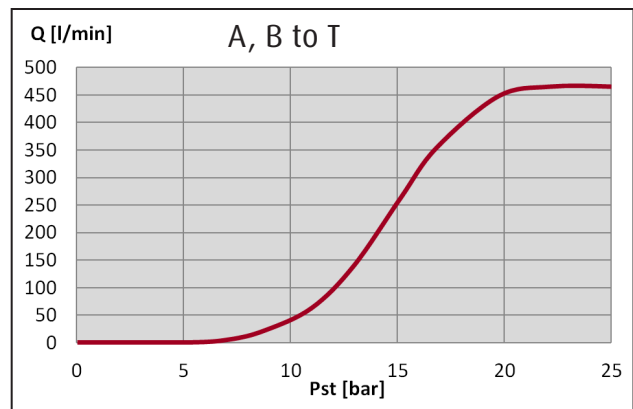
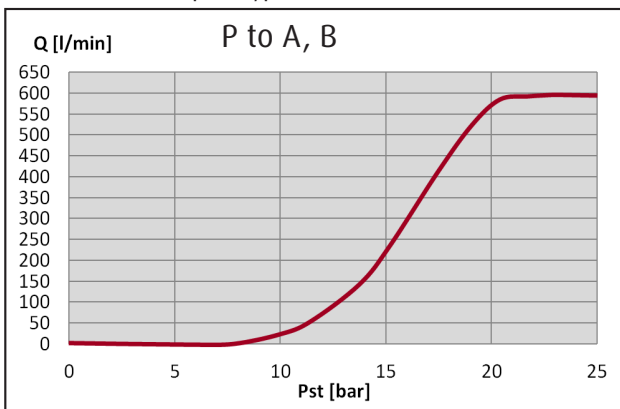
Characteristic for spool type B - Directional control valve 25D1 VW25-CF25



Characteristic for spool type B - Directional control valve 25D2 VW25-CF25



Characteristic for spool type B - Directional control valve 30ZU VW30-CF25



## 4 | System components. Directional control valves variants. Distinction

### Directional control valve with standard function type C — symmetrical function with A-B-tank connection, direction control valve types

The following directional control valves are available:

>> 25W1	VW25-CF25	for NG25 functions with <b>hoist function</b>
>> 25W2	VW25-CF25	for NG25 functions with <b>hoist function</b>
>> 30W	VW30-CF25	for NG30 functions with <b>hoist function</b>

These directional control valves are usually used for slewing gear or hoist directional control valves or for mobile vehicles with an external brake valve. They have symmetrical flow distribution between ports A and B. In the zero position, ports A and B are open to the tank. In addition, in both function ports, there is a pressure relief valve with anti-cavitation function.

- >> Hydraulic actuation (pilot pressure max. 32 bar) is realized with the ports provided on the covers of the VW directional control valves. Hydraulic opening begins at  $7.5 \pm 0.5$  bar (pump-to-function). \*
- >> Electro-hydraulic actuation is realized with the electro-proportional pressure reducing valves. Electro-hydraulic opening begins at  $I = 430 \pm 10$  mA. \*
- >> The necessary pilot pressure (max. 32 bar) comes from the Pst port on the VT1EE.

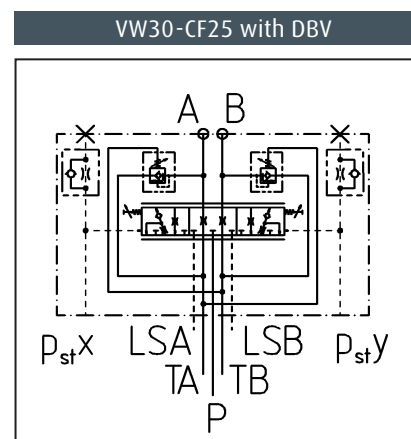
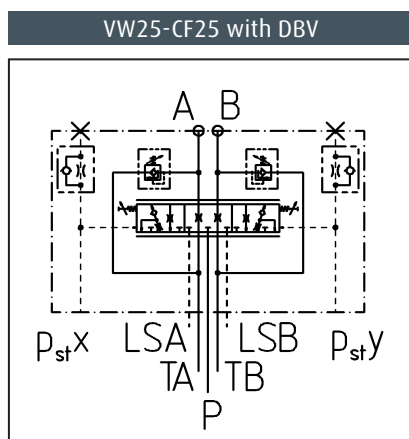
\* A volume of approx. 1 l/min flows from the pump to the function

Each VW directional control valve is configured with the following characteristics:

- >> Flow characteristic of the valve spool
- >> Other responses: see replacement parts.

Directional control valve	flow A / B at $D_{pLS}=20$ bar	DBV in bar	NLV
25W1	360 / 360	380	No
25W2	240 / 240	380	No
30W	560 / 560	380	No

### circuit diagram

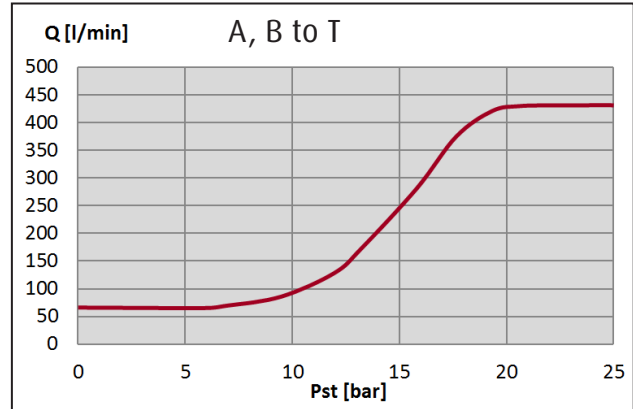
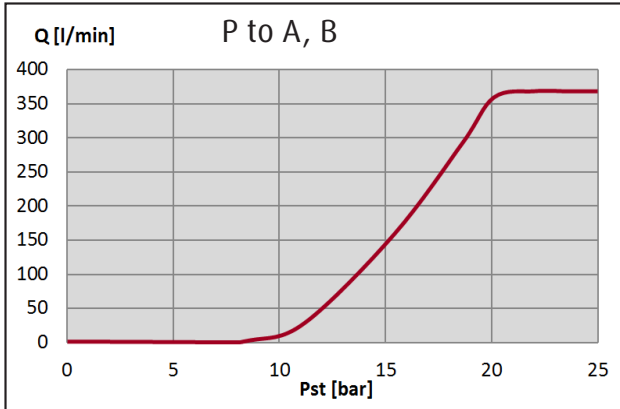


## 4 | System components. Directional control valves variants. Distinction

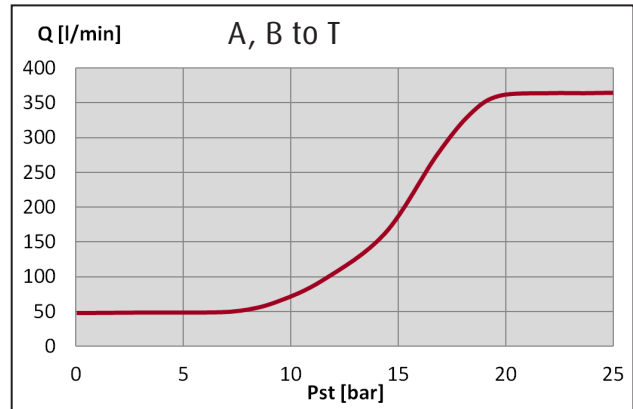
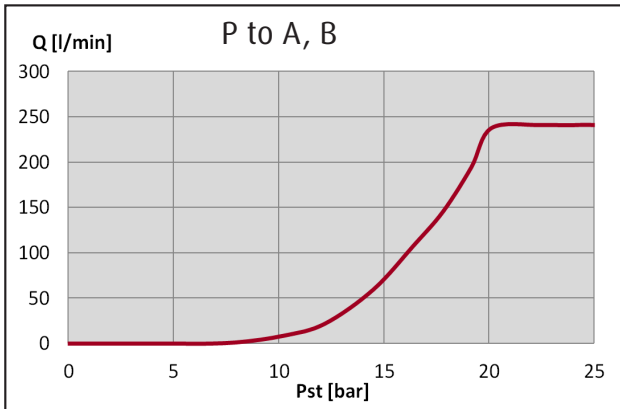
### Directional control valve with standard function type C — symmetrical function with A-B-tank connection

Flow characteristics P to A, B (for a  $D_{pLS}=20$  bar) and A, B to T (for a  $D_p=20$  bar) of the valve spool on directional control valve VW CF25

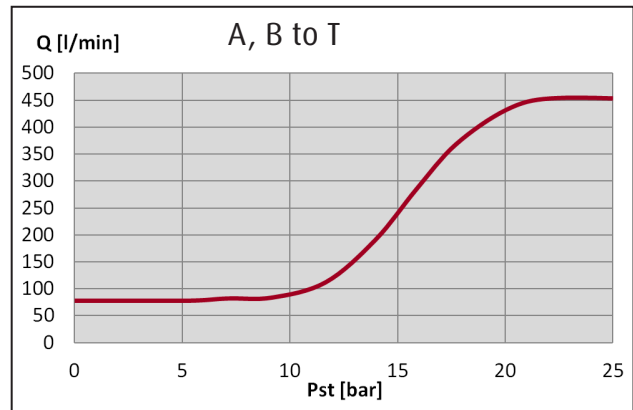
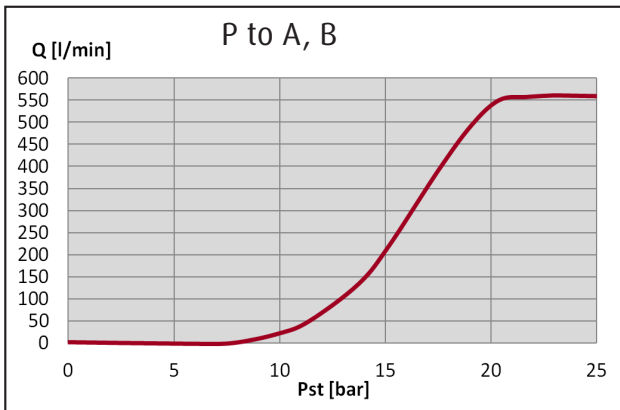
Characteristic for spool type C - Directional control valve 25W1 VW25-CF25



Characteristic for spool type C - Directional control valve 25W2 VW25-CF25



Characteristic for spool type C - Directional control valve 30W VW30-CF25



## 4 | System components. Directional control valves variants. Distinction

Directional control valve with standard function type D — symmetrical function with A-B-tank connection as a leakage discharge

### Directional control valve types

The following directional control valves are available:

>> 25F1	VW25-CF25	for NG25 functions with track-drive function
>> 25F2	VW25-CF25	for NG25 functions with track-drive function

These directional control valves are usually used for tracked vehicles with an open circuit and external brake valve. They have symmetrical flow distribution between ports A and B. In the zero position, ports A and B are open to the tank with a leakage discharge. The directional control valves also have an additional feature, which offers high-performance synchronization control. This is offered only in the NG25.

- >> Hydraulic actuation (pilot pressure max. 32 bar) is realized with the ports provided on the covers of the VW directional control valves. Hydraulic opening begins at  $7.5 \pm 0.5$  bar (pump-to-function). \*
- >> Electro-hydraulic actuation is realized with the electro-proportional pressure reducing valves. Electro-hydraulic opening begins at  $I = 430 \pm 10\text{mA}$ .\*
- >> The necessary pilot pressure (max. 32 bar) comes from the Pst port on the VT1EE.

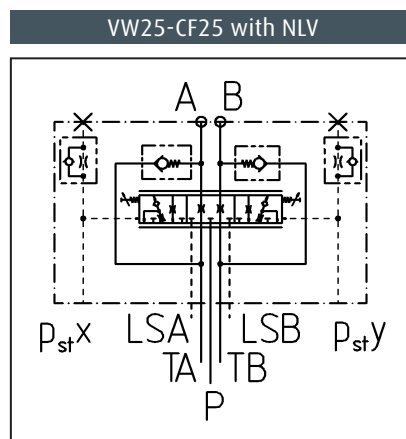
\* A volume of approx. 1 l/min flows from the pump to the function

Each VW directional control valve is configured with the following characteristics:

- >> Flow characteristic of the valve spool
- >> Other responses: see replacement parts.

Directional control valve	flow A / B at $D_{pLS}=20$ bar	DBV in bar	NLV
25F1	320 / 320	No	Yes
25F2	290 / 290	No	Yes

### circuit diagram

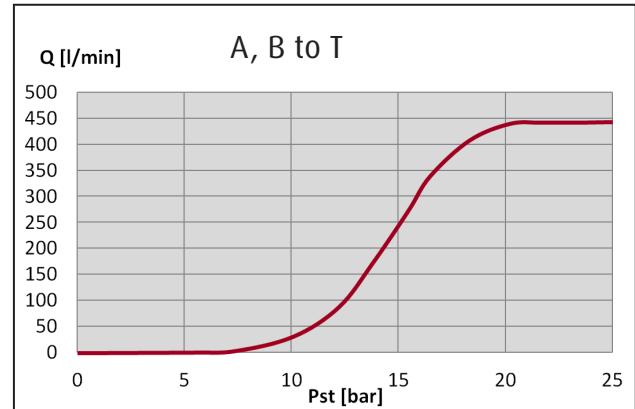
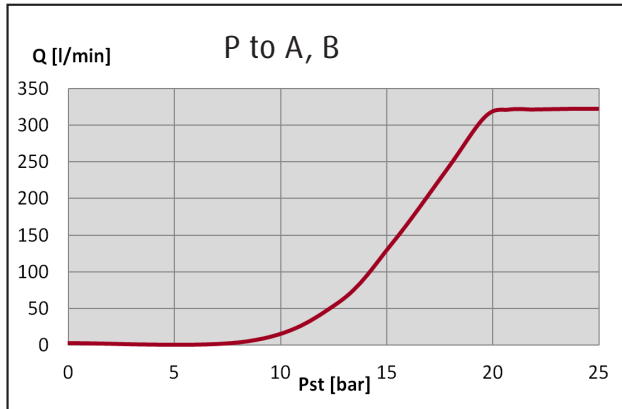


## 4 | System components. Directional control valves variants. Distinction

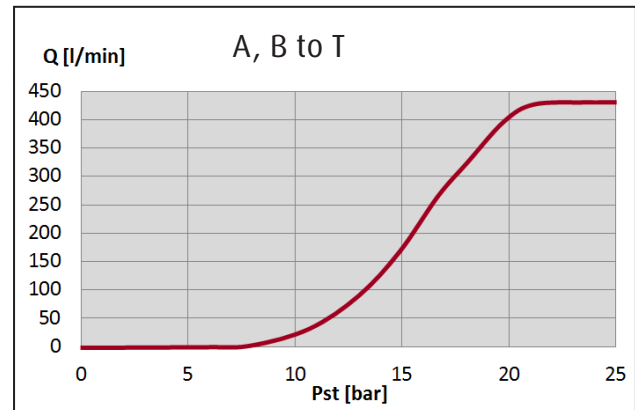
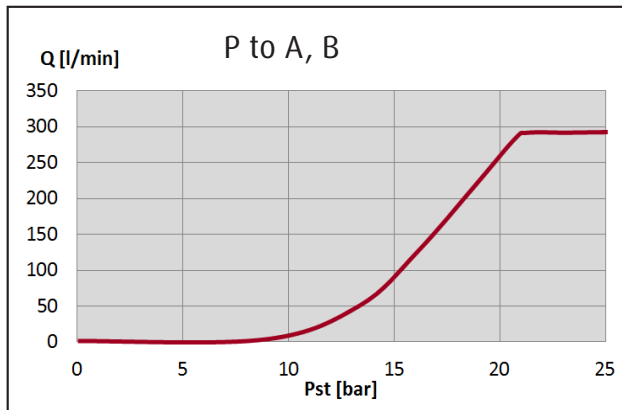
### Directional control valve with standard function type D — symmetrical function with A-B-tank connection

Flow characteristics P to A, B (for a  $\Delta p_{LS}=20$  bar) and A, B to T (for a  $\Delta p=20$  bar) of the valve spool on directional control valve VW CF2

Characteristic for spool type D - Directional control valve 25F1 VW25-CF25



Characteristic for spool type D - Directional control valve 25F2 VW25-CF25





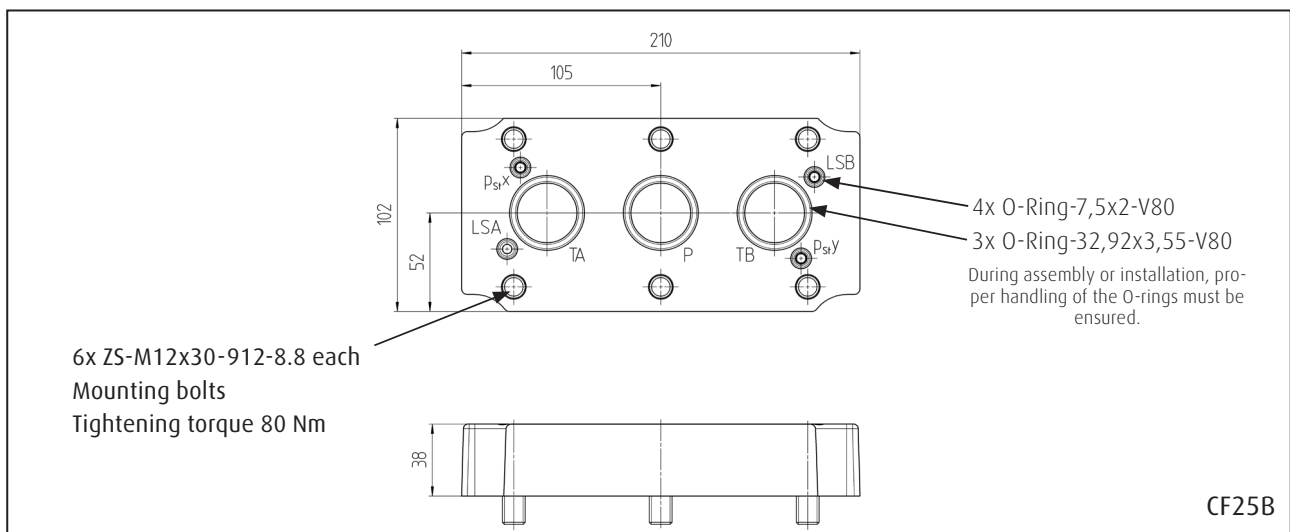
## 4 | System components. CF25B blanking plate

### CF25B blanking plate

Unused CF25 interfaces must each be sealed in a leak-free and pressure-tight manner with a CF25B blanking plate.



>> CF25B



### circuit diagram

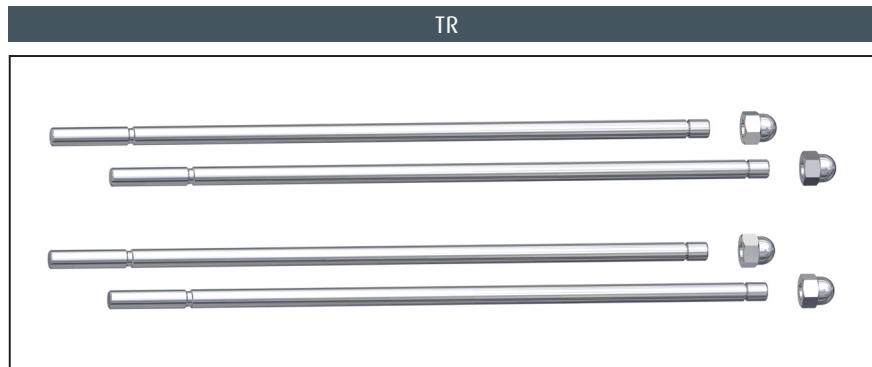


Weight [kg]	ca. 6,0
Dimensions [BxHxT]	102 x 38 x 210 mm

## 4 | System components. Tie rods and cap nuts

### Tie rods and cap nuts

In order to connect all selected IF32 modules with to the VT1EE, tie rods with the correct length must be selected. The length depends on the number of IF32 expansion modules. Four different lengths are available: For each configuration, 4 tie rods, incl. 4 cap nuts are required.



- >> **TR0** 4 pcs. each (inc. HM-M12-SW19-10)
- >> **TR1** 4 pcs. each (inc. HM-M12-SW19-10)
- >> **TR2** 4 pcs. each (inc. HM-M12-SW19-10)
- >> **TR3** 4 pcs. each (inc. HM-M12-SW19-10)

Name	Number of IF32 expansion modules	Name
TR0	-	Pin bolt M12x50-10.9
TR1	1	Pin bolt M12x170-10.9
TR2	2	Pin bolt M12x290-10.9
TR3	3	Pin bolt M12x410-10.9

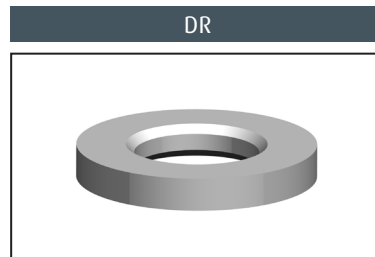
## 4 | System components. CF25 return throttle

### CF25 return throttle (side-selective/optional)

The two tank channels of the CF25 interface in the VT1EE base plate and IF32 expansion modules have a counterbore for the insertion of reducing orifice plates. These raise the return pressure and control large return quantities. When there is a negative load, cavitation on the infeed side is prevented.

Return throttles DR10 with a diameter of 10 mm and DR15 with a diameter of 15 mm are available.

Refer to the diagram for selection of the appropriate return throttle:

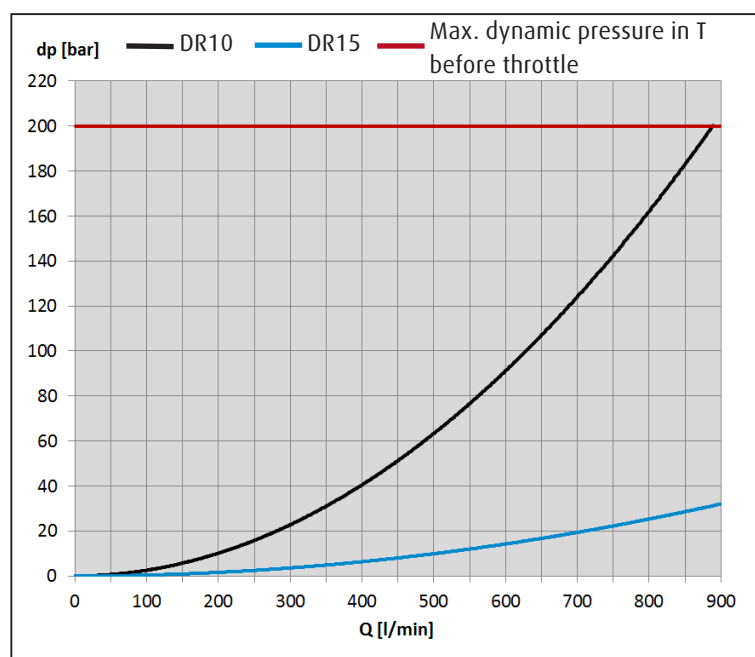
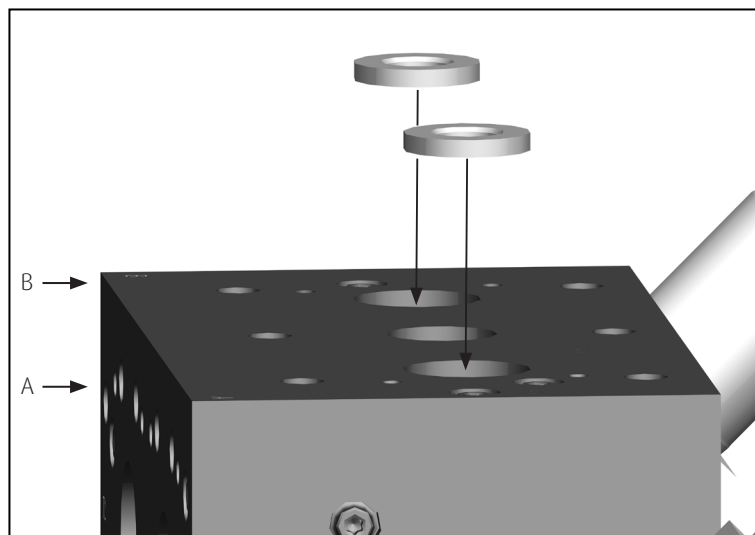


Return throttles are inserted under the VW-CF25 at TA and/or TB on the VT1EE and the VT

>> The sides of the VT1EE and the VT as well as the allocated sides of the VW-CF25 must be observed

>> DR10

>> DR15



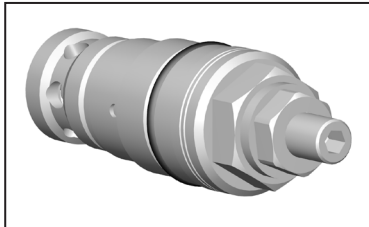
## 4 | System components. replacement parts

Replacement parts are components that determine the response behavior of the directional control valves or guarantee general operating safety.

The following components are available:

### Secondary pressure relief valve DBV/NLV 380bar

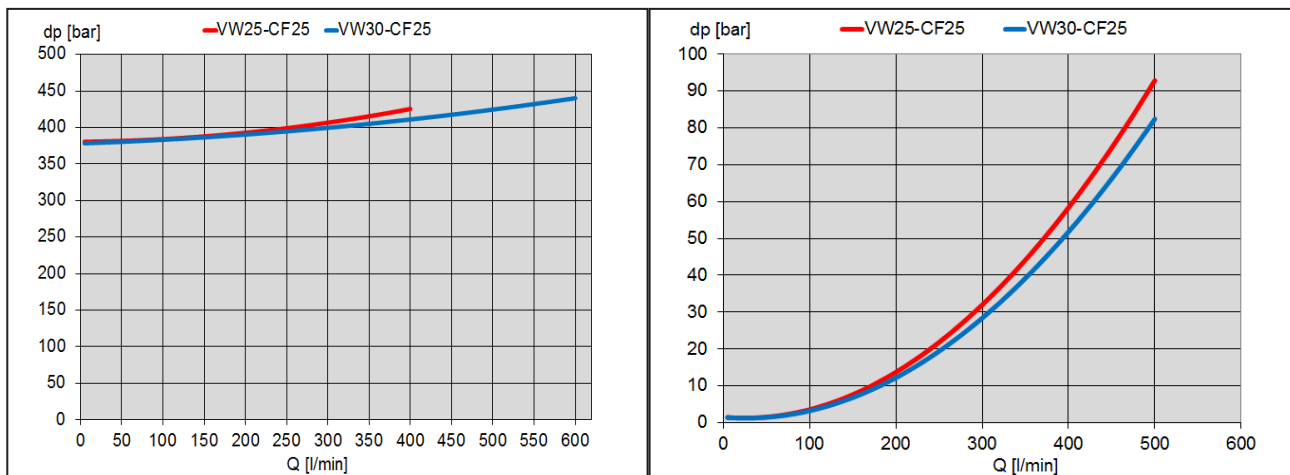
DBV380



>> DBV380

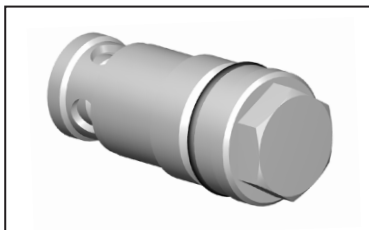
#### Characteristic for secondary DBV/NLV 380bar

The characteristic has been calculated for a valve with 380 bar nominal pressure and a 20 l/min flow.



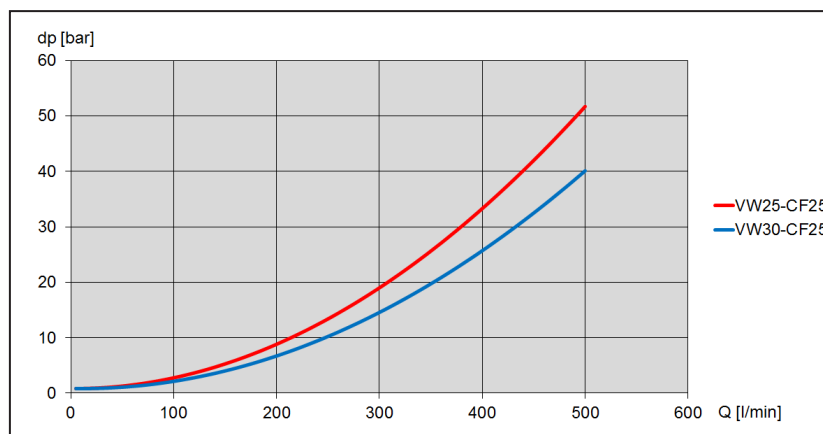
### Anti-cavitation valve NLV

NLV



>> NLV

#### Characteristic for anti-cavitation valve NLV



## 4 | System components. replacement parts

### Solenoid MSP24 und MSP12 with Deutsch connector

By means of a replacement, pilot controls DMV1 and DMV2 can each be converted from 24V to 12V or vice versa.

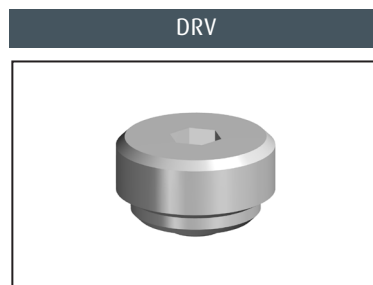


>> MSP24

>> MSP12

### Throttle check valves DRV

The directional control valves may be equipped with throttle check valves DRV to influence the stroking speed of the control spool. They are screwed into the pilot pressure ports of the control caps with a tightening torque of 9 Nm.



>> DRV1.0

>> DRV1.15

>> DRV1.35

Pilot range	Time	Tolerances [ms]	t <sub>open</sub> [ms]/ DRV	t <sub>closed</sub> [ms]/ DRV
6-19 bar	Medium (300-400 ms)	±30	290/ DRV1.15	380/ DRV1.15
	Slow (400-700 ms)	±40	350/ DRV1.0	460/ DRV1.0

For Directional control valves VW25-CF25

Pilot range	Time	Tolerances [ms]	t <sub>open</sub> [ms]/ DRV	t <sub>closed</sub> [ms]/ DRV
6-19 bar	Medium (300-400 ms)	±30	290/ DRV1.35	440/ DRV1.35
	Slow (400-700 ms)	±40	430/ DRV1.15	650/ DRV1.15

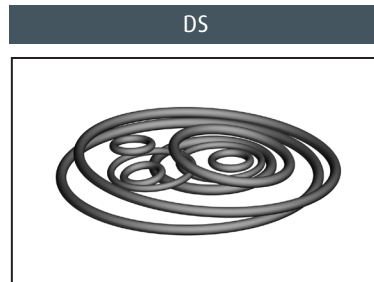
For Directional control valves VW30-CF25

Hydraulic advanced control times measured at 60 °C - 27 cStv

## 4 | System components. replacement parts

### Seal kits

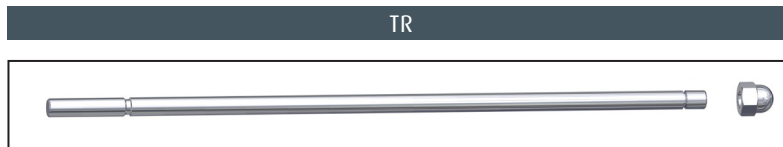
O-rings as seal kits enable general operating safety and guarantee fast replacement of lost or destroyed seal kits of the original system components.



>> DS/VT	inc. 4x O-Ring-9x2-V80, 3x O-Ring-38x3-V80, 5x VRS-CM8x1-ISO6149
>> DS/Vst	inc. 4x O-Ring-7,5x2-V80
>> DS/VW	inc. 4x O-Ring-7,5x2-V80, 3x O-Ring-32,92x3,55-V80, 2x O-Ring-61,5x2,65-V80
>> DS/KT	inc. 1x O-Ring-47,22x3,55-V80

### Tie rods and cap nuts

In order to connect all selected IF32 modules with to the VT1EE, tie rods with the correct length must be selected. The length depends on the number of IF32 expansion modules. Four different lengths are available:  
As replacement parts, 1 tie rod incl. 1 cap nut are available in each case.



>> TR01	1 pc. (inc. HM-M12-SW19-10)
>> TR11	1 pc. (inc. HM-M12-SW19-10)
>> TR21	1 pc. (inc. HM-M12-SW19-10)
>> TR31	1 pc. (inc. HM-M12-SW19-10)

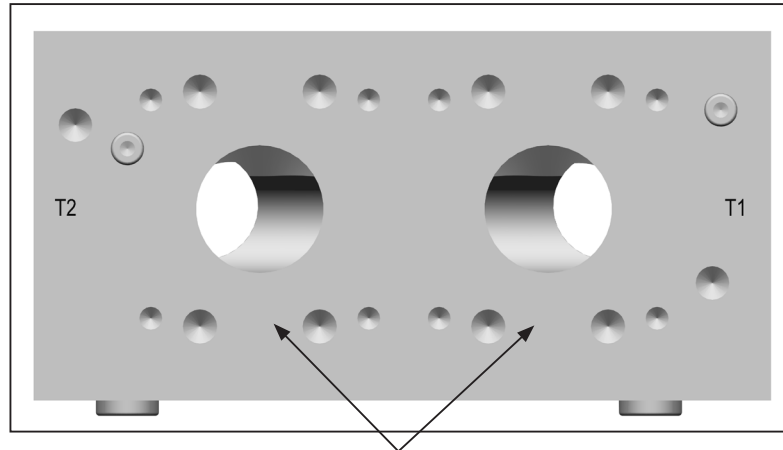
Name	Number of IF32 expansion modules	Name
TR01	-	Pin bolt M12x50-10.9
TR11	1	Pin bolt M12x170-10.9
TR21	2	Pin bolt M12x290-10.9
TR31	3	Pin bolt M12x410-10.9

## 5 | Assembly of System components. VT1EE with KT3, KT5 check modules

### VT1EE with or without tank check

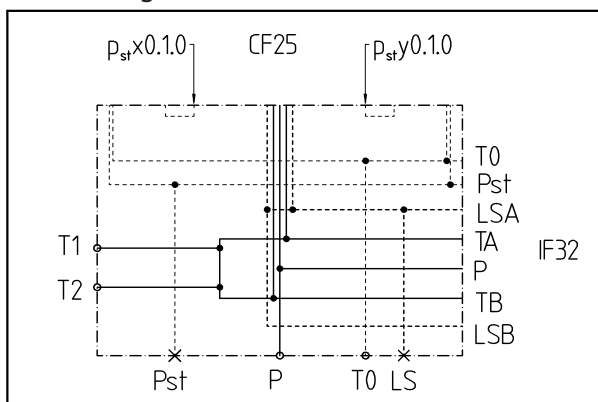
#### T1EE without tank check

On the VT1EE, there are two tank ports T1 and T2, each designed as SAE 1 1/2", ISO 6162-1. If no additional tank check function is desired, a simple tank port can be provided there.



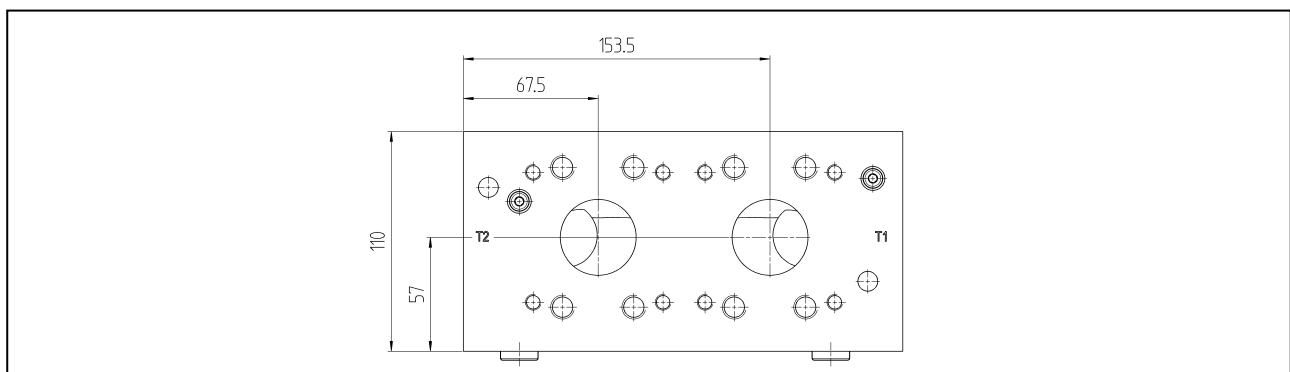
You can also choose to seal the unused tank port T1 or T2 with an SAE 1 1/2" closing flange (with O-ring 47.22x3.55-V80 and 4x Z5-M12x45-912-8.8, tightening torque 86 Nm)

### circuit diagram



Port function	Port size	DN	Max. permissible pressure
T1, T2 - Tank	SAE 1 1/2" ISO 6162-1 4x M12 / 21.5 deep / $M_A = 130\text{Nm}$ 1)	38	10bar

1) dependent on screwproperty class according to ISO



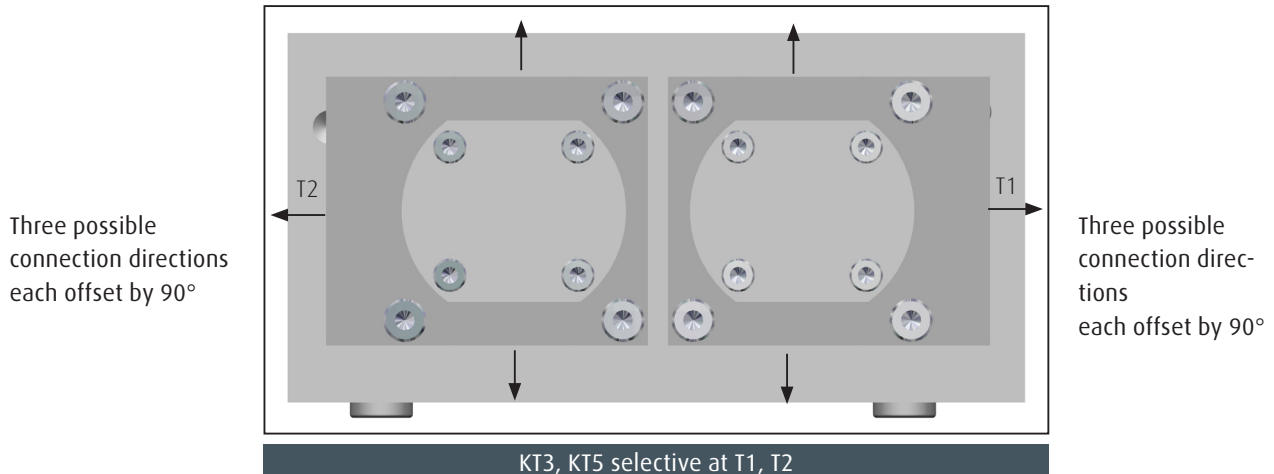
During assembly or installation, proper handling of the O-rings must be ensured.

## 5 | Assembly of System components. VT1EE with KT3, KT5 check modules

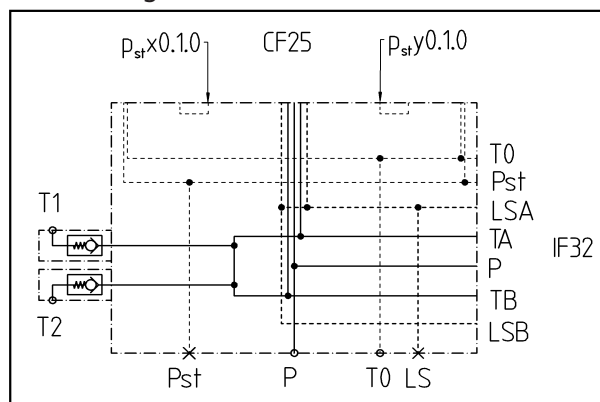
### VT1EE with or without tank check

#### VT1EE with tank check

For a tank check function at tank ports T1 and T2, the desired KT3 and KT5 modules must be attached in each case. There are three possible connection directions.

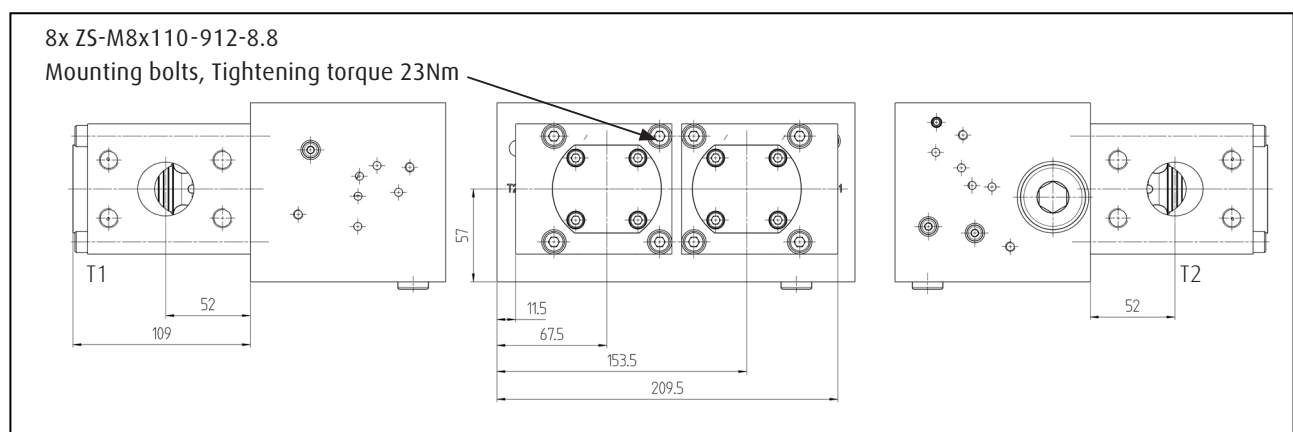


### circuit diagram



Port function	Port size	DN	Max. permissible pressure
T1, T2 - Tank	SAE 1 1/2" ISO 6162-1 4x M12 / 21.5 deep / M <sub>A</sub> = 130Nm 1)	38	10bar

1) dependent on screwproperty class according to ISO



During assembly or installation, proper handling of the O-rings must be ensured.

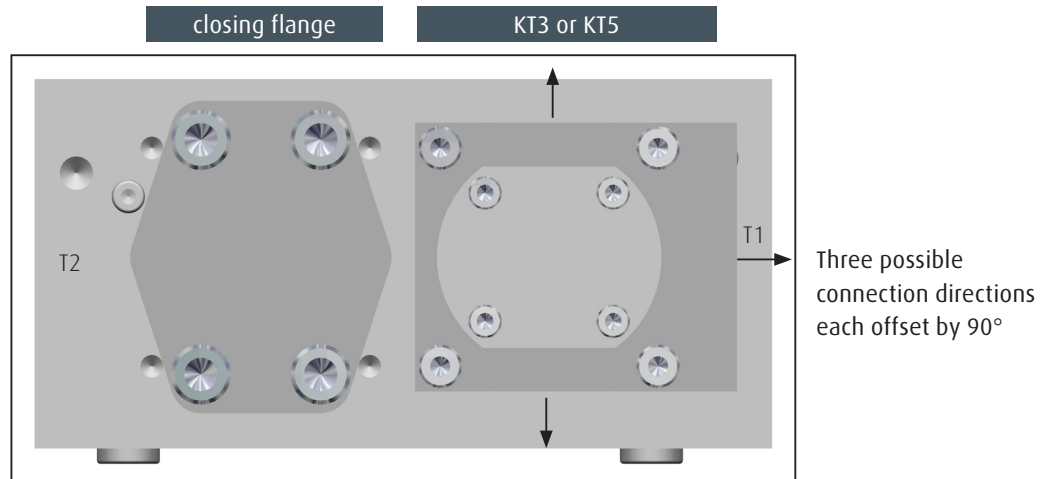


## 5 | Assembly of System components. VT1EE with KT3, KT5 check modules

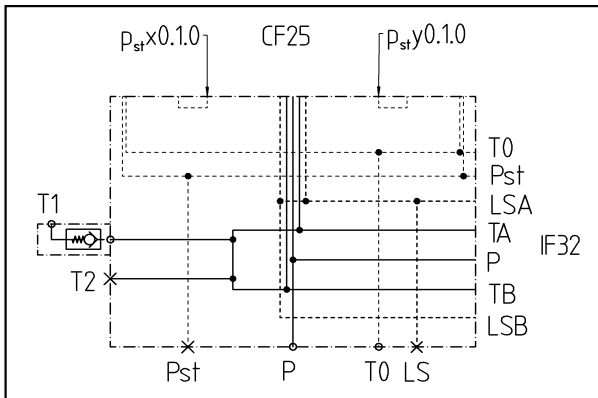
### VT1EE with or without tank check

#### VT1EE with tank check at T1

At tank port T1 of the VT1EE, a KT3 or KT5 tank check module can be mounted in three different directions. Tank port T2 must be sealed with an SAE 1 1/2" closing flange.

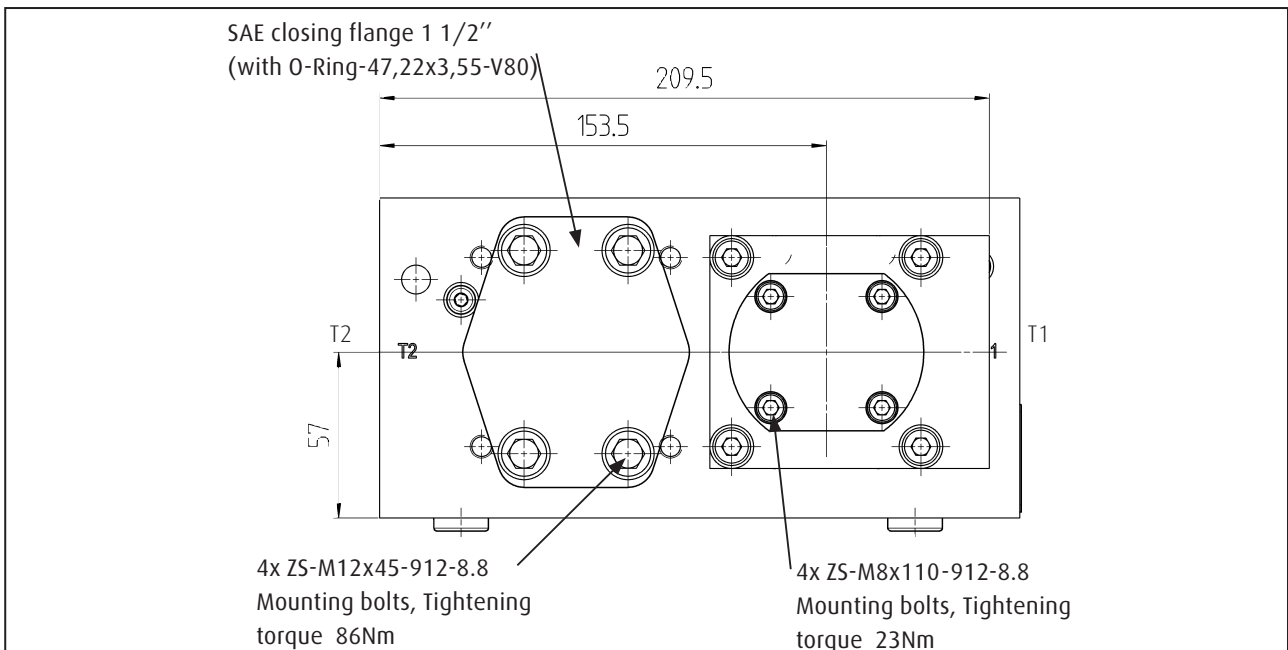


### circuit diagram



Port function	Port size	DN	Max. permissible pressure
T1 - Tank	SAE 1 1/2" ISO 6162-1 4x M12 / 21.5 deep / $M_A = 130Nm$ 1)	38	10bar

1) dependent on screwproperty class according to ISO



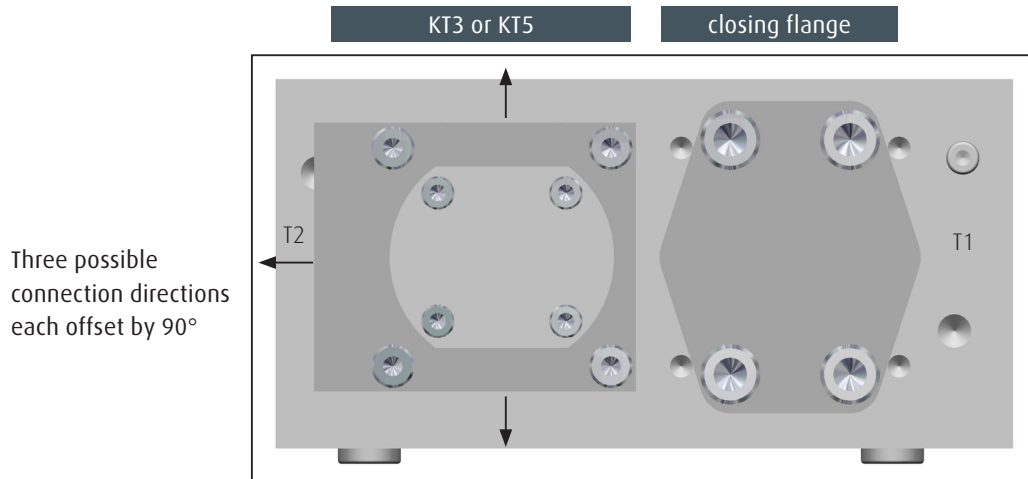
During assembly or installation, proper handling of the O-rings must be ensured.

## 5 | Assembly of System components. VT1EE with KT3, KT5 check modules

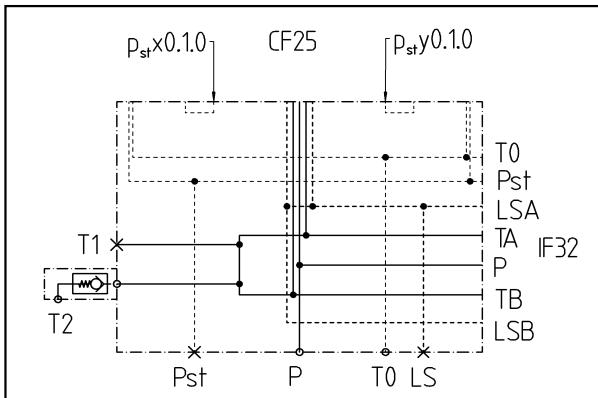
### VT1EE with or without tank check

#### VT1EE with tank check at T2

At tank port T2 of the VT1EE, a KT3 or KT5 tank check module can be mounted in three different directions. Tank port T1 must be sealed with an SAE 1 1/2" closing flange.

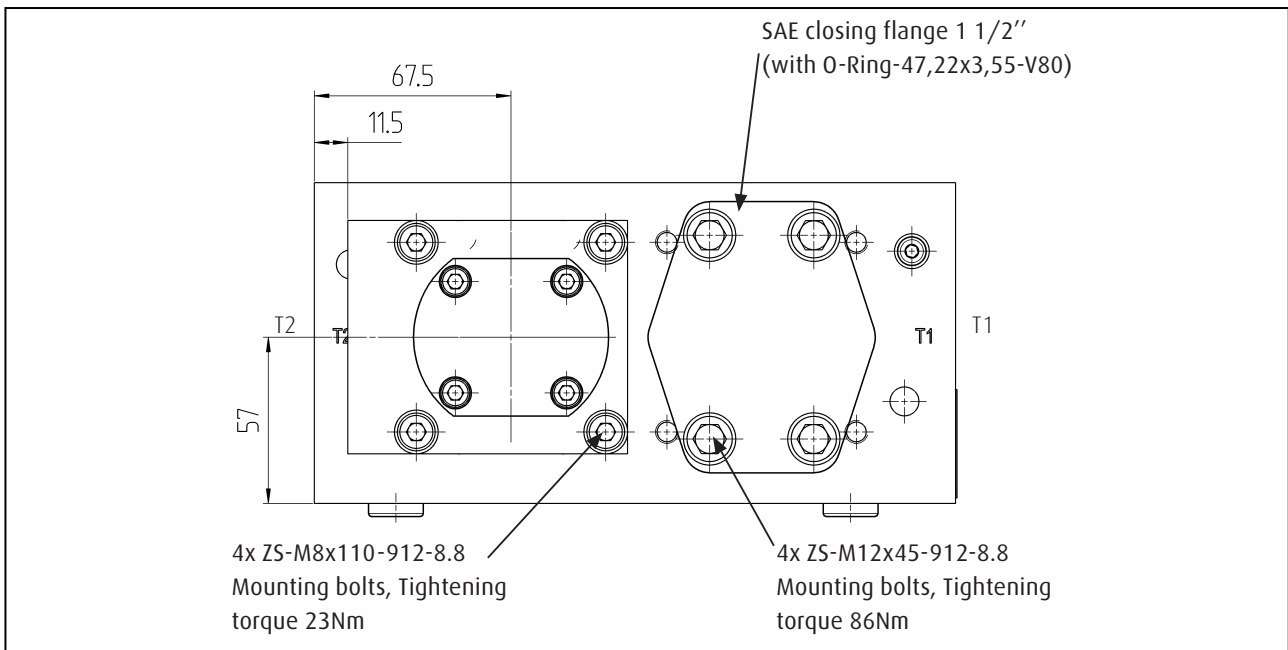


### circuit diagram



Port function	Port size	DN	Max. permissible pressure
T2 - Tank	SAE 1 1/2" ISO 6162-1 4x M12 / 21.5 deep / $M_A = 130Nm$ 1)	38	10bar

1) dependent on screw property class according to ISO



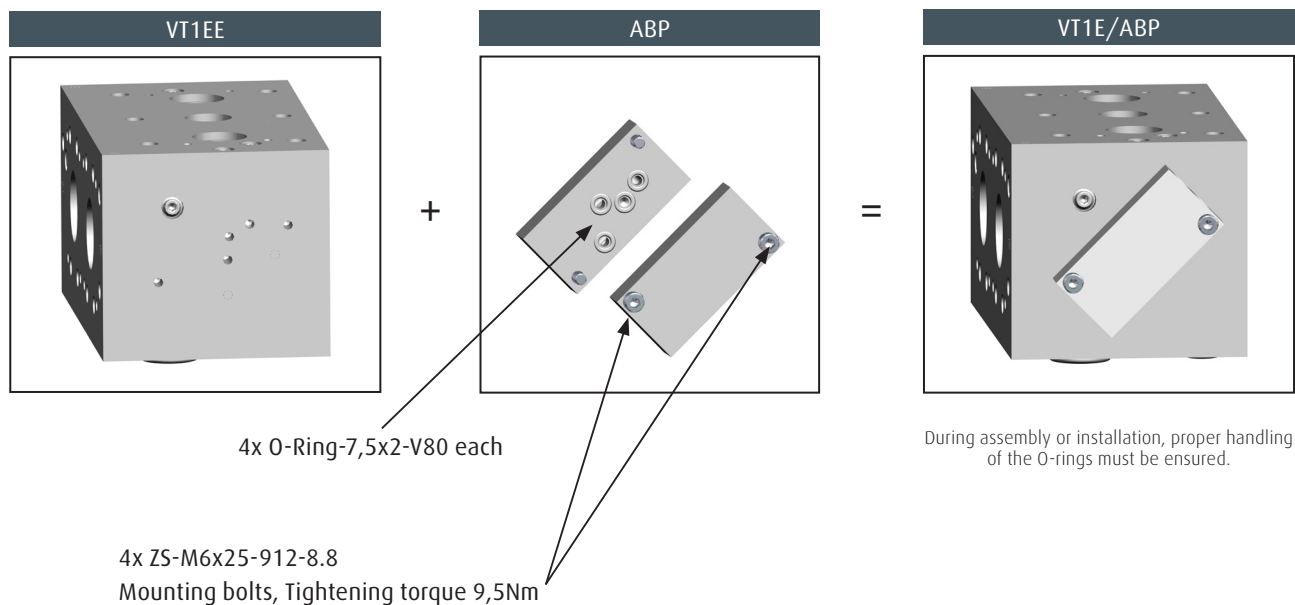
During assembly or installation, proper handling of the O-rings must be ensured.

## 5 | Assembly of System components. VT1EE with pilot control

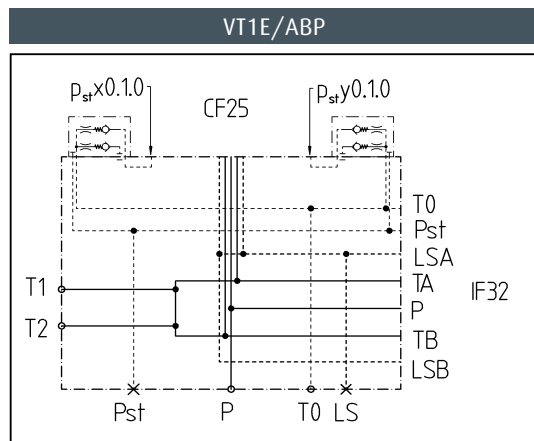
### VT1EE and selected pilot control

#### VT1EE with ABP air-bleed plates for hydraulic actuation

This combination is used for hydraulic actuation of a directional control valve fitted on a VT1EE base plate. The ports to be used for this are located on top of the directional control valves. The ABP modules are bolted onto the front of the VT1EE in pairs. You must ensure that the O-rings of the ABP modules with the associated  $P_{st}$ , T0 and  $p_{st}$  x/y holes fit on top of each other.



### circuit diagram



Port function	Port size	DN	Max. permissible pressure
P - Pump	SAE 1 1/2" ISO 6162-2 4x M16 / 29 deep / $M_A = 295Nm$ 1)	38	400bar
T1, T2 - Tank or Cooler	SAE 1 1/2" ISO 6162-1 4x M12 / 21.5 deep / $M_A = 130Nm$ 1)	38	10bar
T0 - Tank T0	M14x1.5 ISO 6149-1 $M_A = 45Nm$		2bar
Pst - Pilot pressure	M14x1.5 ISO 6149-1 $M_A = 45Nm$		32bar
LS - LS-pressure	M14x1.5 ISO 6149-1 $M_A = 45Nm$		380bar
LSA, LSB - LS-pressure			380bar
$p_{st} \times 0.1.0$ , $p_{st} y 0.1.0$ -Pilot pressure			32bar

1) dependent on screwproperty class according to ISO

Weight [kg]	ca. 18,77
Dimensions [BxHxT]	120 x 110 x 266 mm

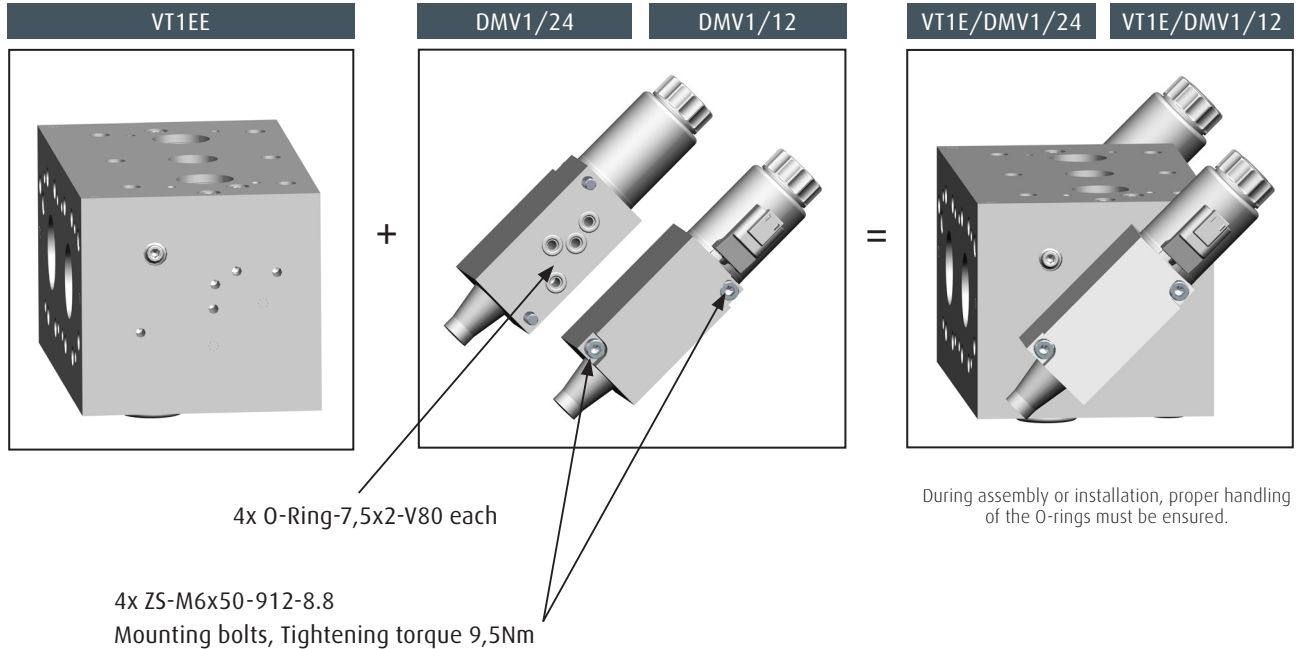
### VT1EE with ABP air-bleed plates for hydraulic actuation



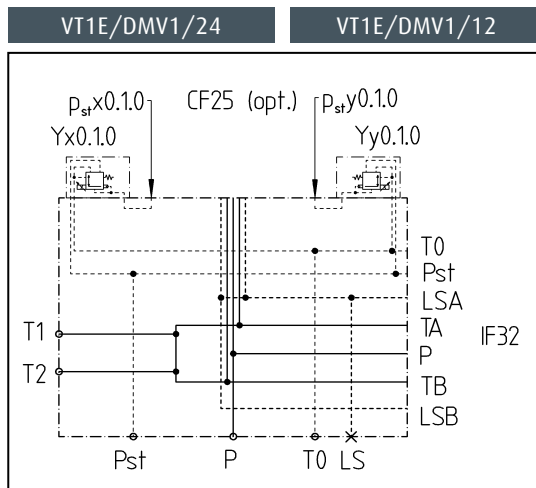
## 5 | Assembly of System components. VT1EE with pilot control

### VT1EE with DMV1/24 or DMV1/12 modules for electro-hydraulic actuation.

This combination is used for electro-hydraulic actuation of a directional control valve fitted on a VT1EE base plate. The DMV1 modules are bolted onto the front of the VT1EE in pairs. You must ensure that the O-rings of the DMV1 modules with the associated Pst, T0 and pst x/y holes fit on top of each other.



### circuit diagram



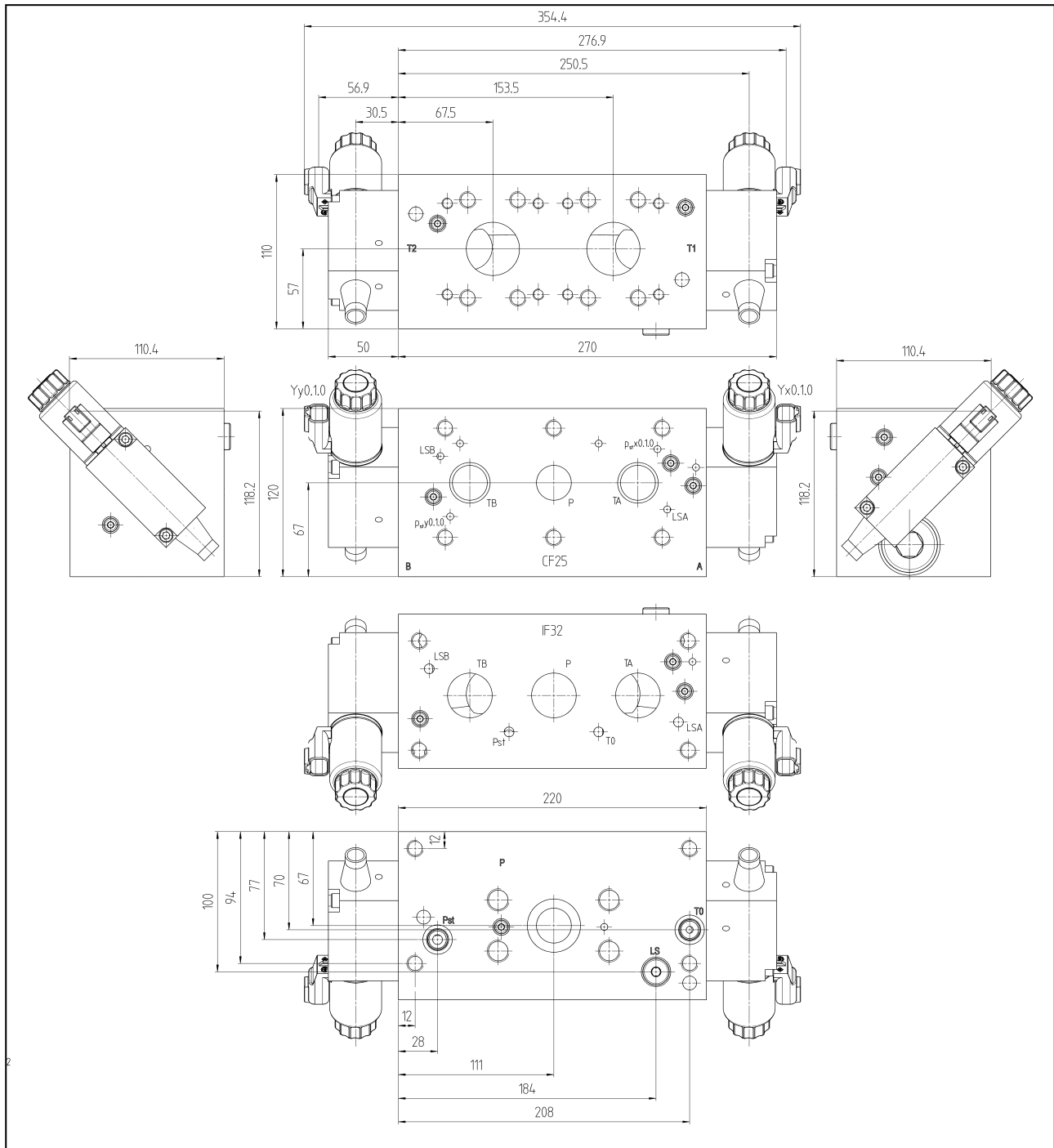
Port function	Port size	DN	Max. permissible pressure
P - Pump	SAE 1 1/2" ISO 6162-2 4x M16 / 29 deep / M <sub>A</sub> = 295Nm 1)	38	400bar
T1, T2 - Tank or Cooler	SAE 1 1/2" ISO 6162-1 4x M12 / 21.5 deep / M <sub>A</sub> = 130Nm 1)	38	10bar
T0 - Tank T0	M14x1.5 ISO 6149-1 M <sub>A</sub> = 45Nm		2bar
Pst - Pilot pressure	M14x1.5 ISO 6149-1 M <sub>A</sub> = 45Nm		32bar
LS - LS-Druck	M14x1.5 ISO 6149-1 M <sub>A</sub> = 45Nm		380bar
LSA, LSB - LS-pressure			380bar
p <sub>st</sub> x0.1.0, p <sub>st</sub> y0.1.0 - Pilot pressure			32bar
Yx0.1.0, Yy0.1.0	24V/26W/100%ED/IPX9K/IPX7 Deutsch connector		
Yx0.1.0, Yy0.1.0	12V/26W/100%ED/IPX9K/IPX7 Deutsch connector		

1) dependent on screw property class according to ISO

Weight [kg]	ca. 21,1
Dimensions [BxHxT]	120 x 110 x 354 mm

## 5 | Assembly of System components. VT1EE with pilot control

VT1EE with DMV1/24 or DMV1/12 modules for electro-hydraulic actuation.



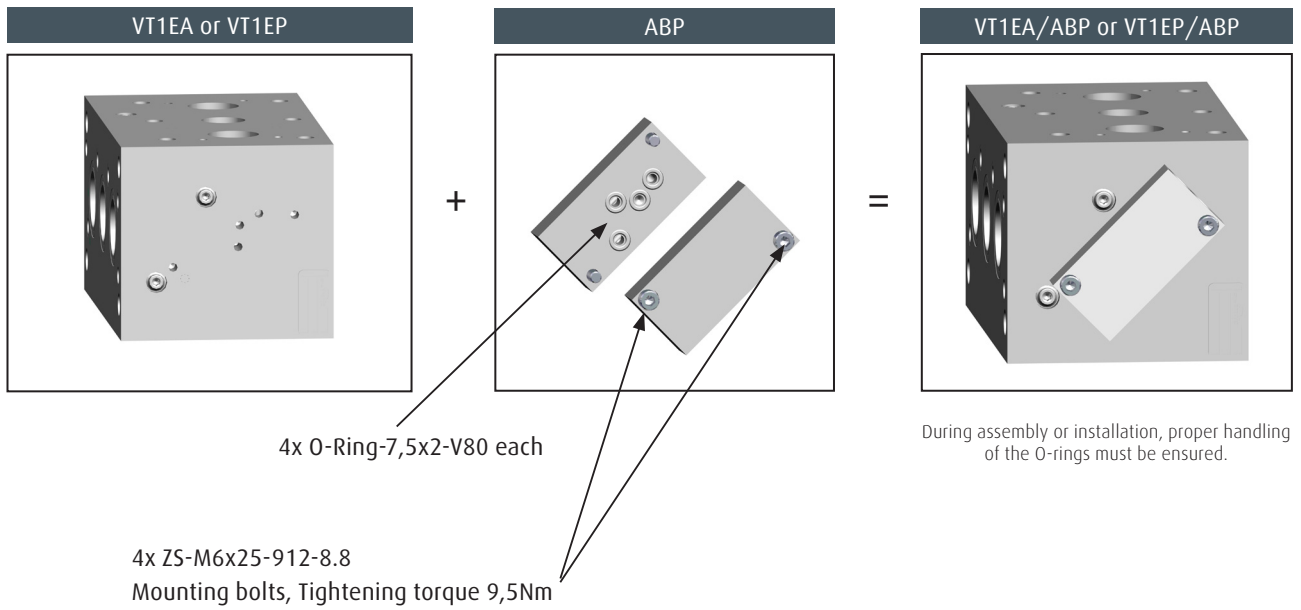
## 5 | Assembly of System components. VT1EA/VT1EP with pilot control

### VT1EA / VT1EP and selected pilot control

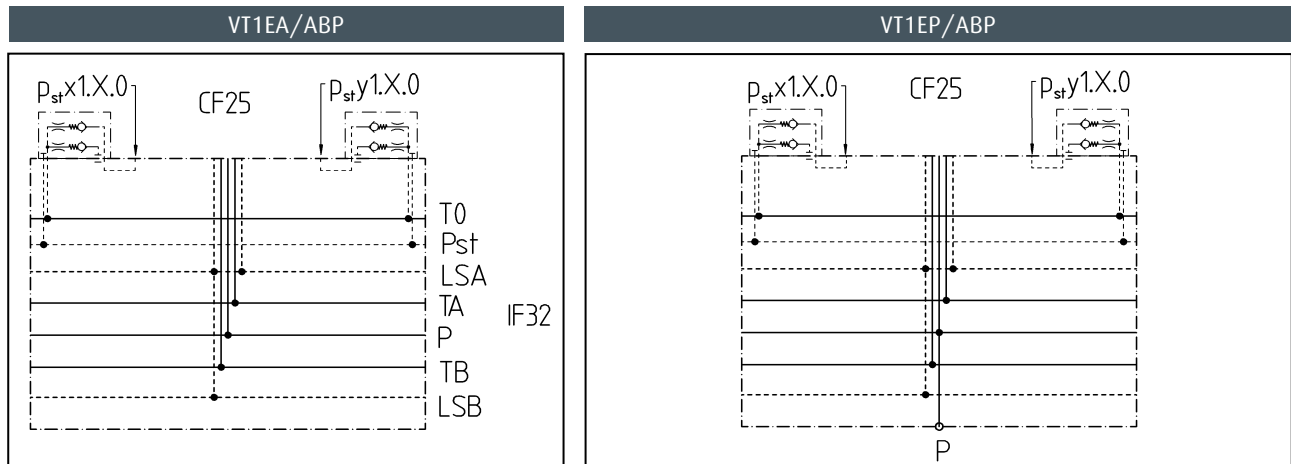
The assembly of the VT1EA and the VT1EP module is identical at this point.

### VT1EA / VT1EP with ABP air-bleed plates for hydraulic actuation

This combination is used for hydraulic actuation of a directional control valve fitted on a VT1EA or VT1EP expansion module. The ports to be used for this are located on top of the directional control valves. The ABP modules are bolted onto the fronts of the VT1EA or VT1EP in pairs. You must ensure that the O-rings of the ABP modules with the associated  $P_{st}$ , T0 and  $p_{st}$  x/y holes fit on top of each other.



### circuit diagram



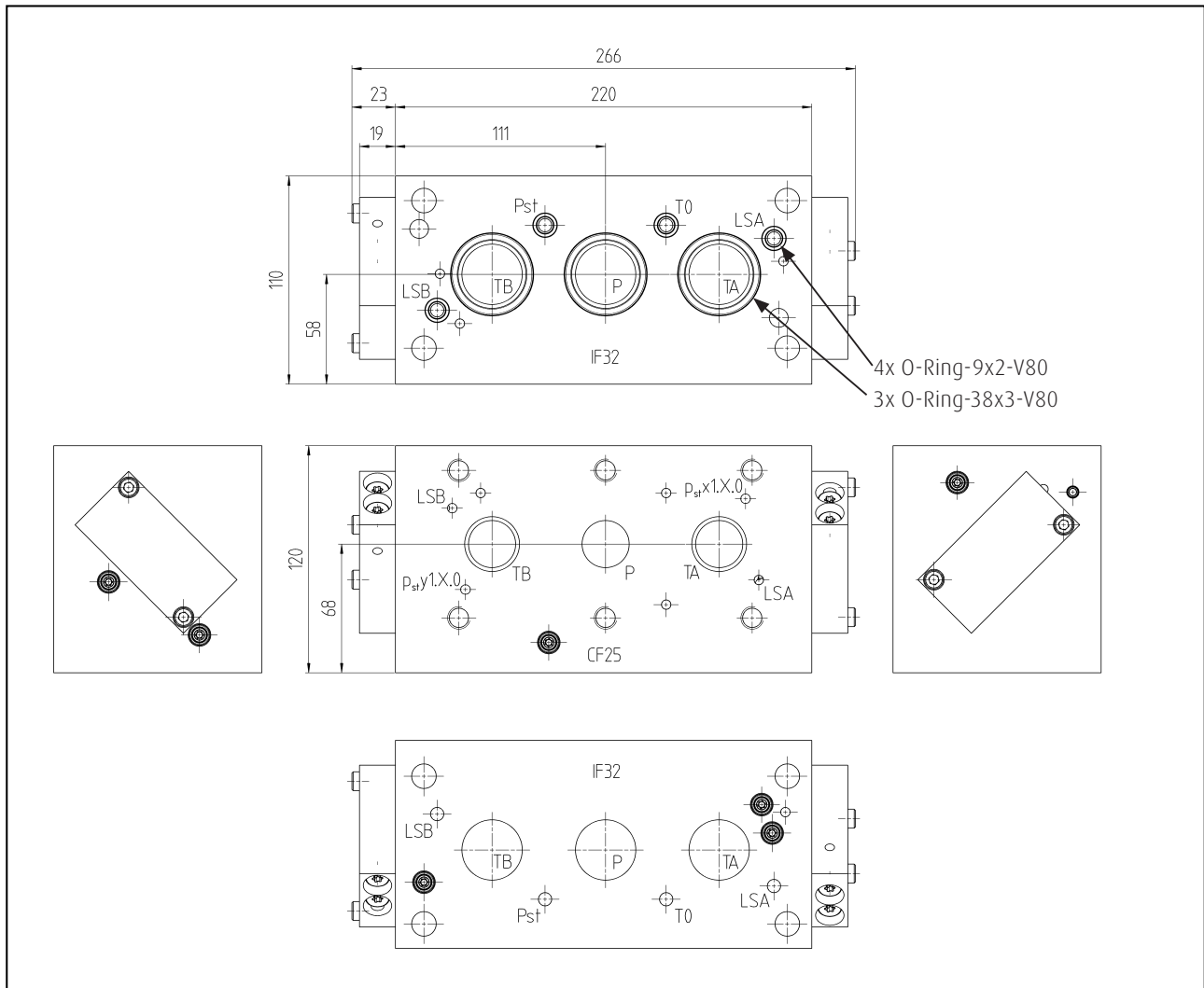
Port function	Port size	DN	Max. permissible pressure
P - Pump	SAE 1 1/2" ISO 6162-2 4x M16 / 29 deep / $M_A = 295Nm$ 1)	38	400bar

1) dependent on screwproperty class according to ISO

Weight [kg]	ca. 18,0
Dimensions [BxHxT]	120 x 110 x 266 mm

## 5 | Assembly of System components. VT1EA/VT1EP with pilot control

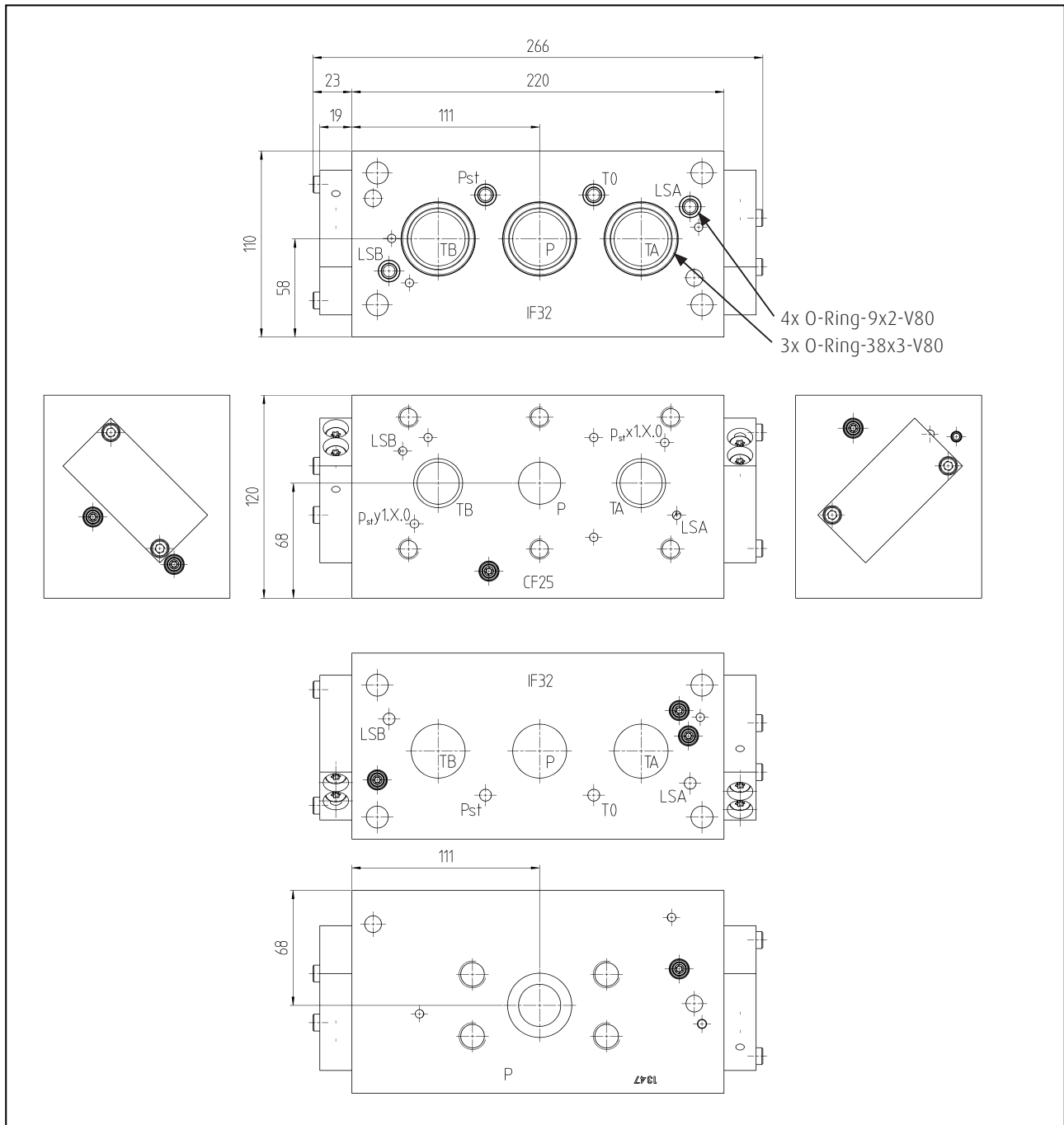
### VT1EA with ABP air-bleed plates for hydraulic actuation





## 5 | Assembly of System components. VT1EA/VT1EP with pilot control

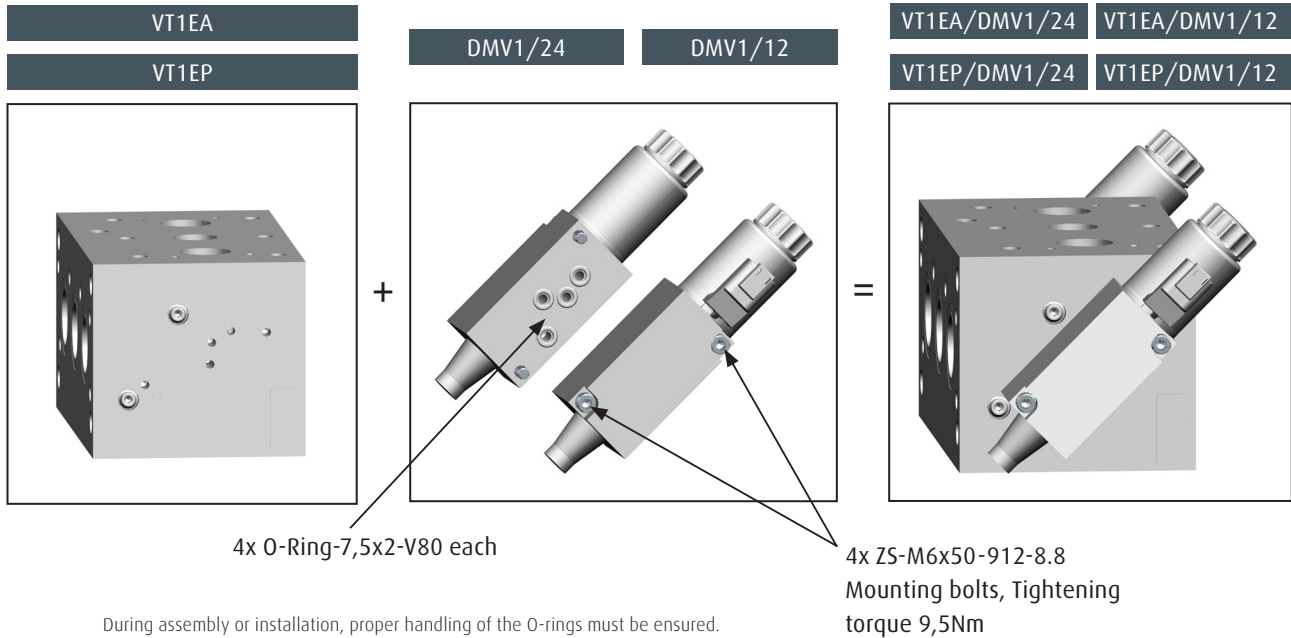
### VT1EP with ABP air-bleed plates for hydraulic actuation



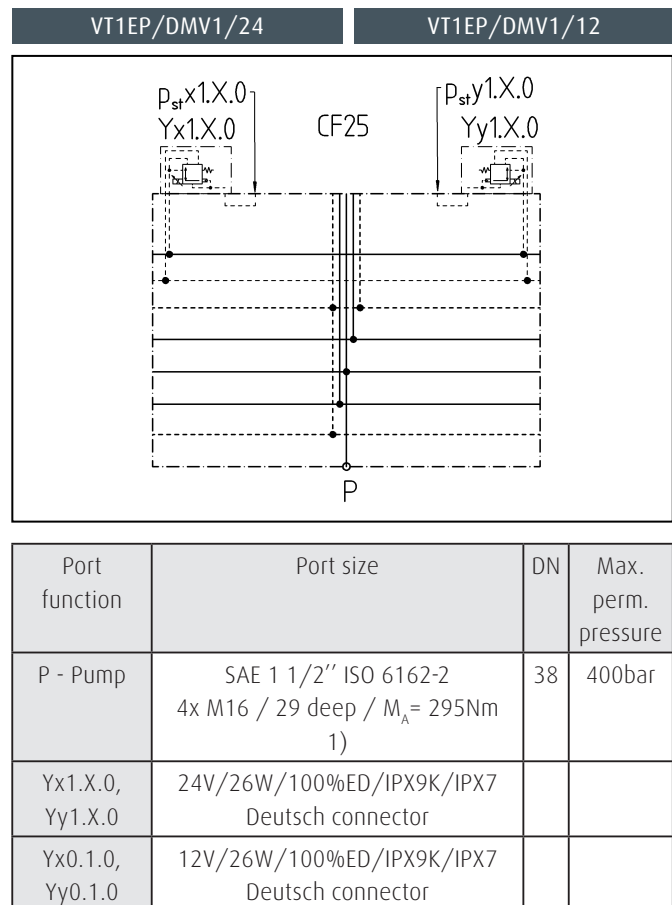
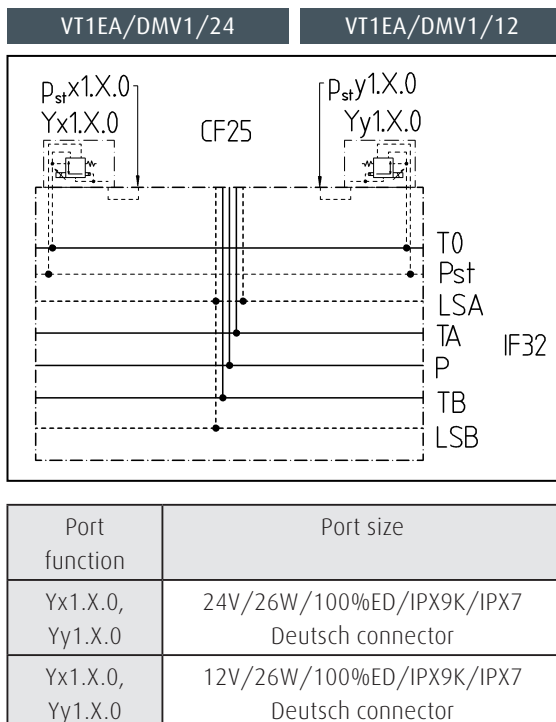
## 5 | Assembly of System components. VT1EA/VT1EP with pilot control

### VT1EA / VT1EP with DMV1/24 or DMV1/12 modules for electro-hydraulic actuation.

This combination is used for electro-hydraulic actuation of a directional control valve fitted on a VT1EA or VT1EP expansion module. The DMV1 modules are bolted onto the fronts of the VT1EA or VT1EP in pairs. You must ensure that the O-rings of the DMV1 modules with the associated P<sub>st</sub>, T0 and P<sub>st</sub>x/y holes fit on top of each other.



### circuit diagram

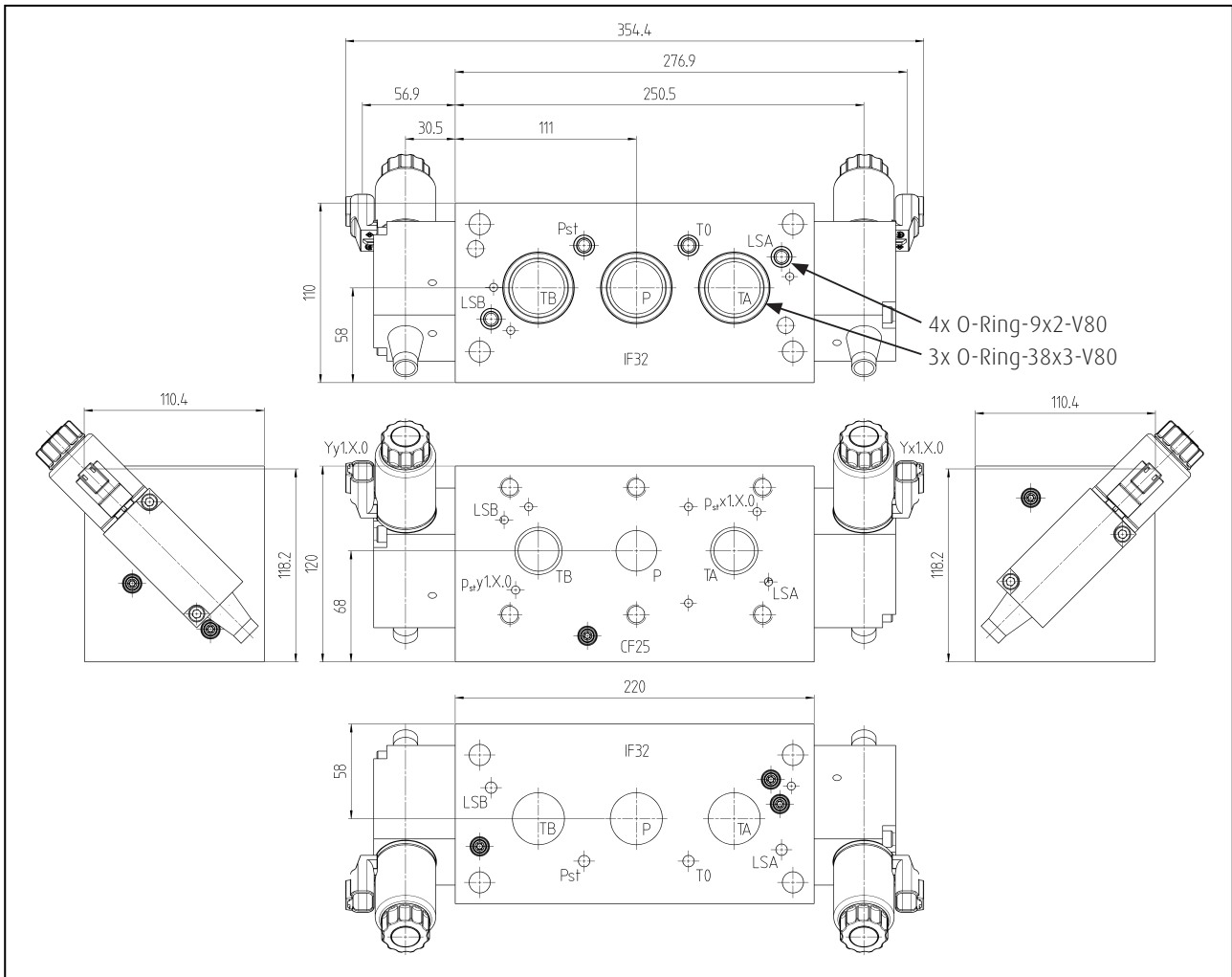


1) dependent on screwproperty class according to ISO

Weight [kg]	ca. 20,4
Dimensions [BxHxT]	120 x 110 x 354 mm

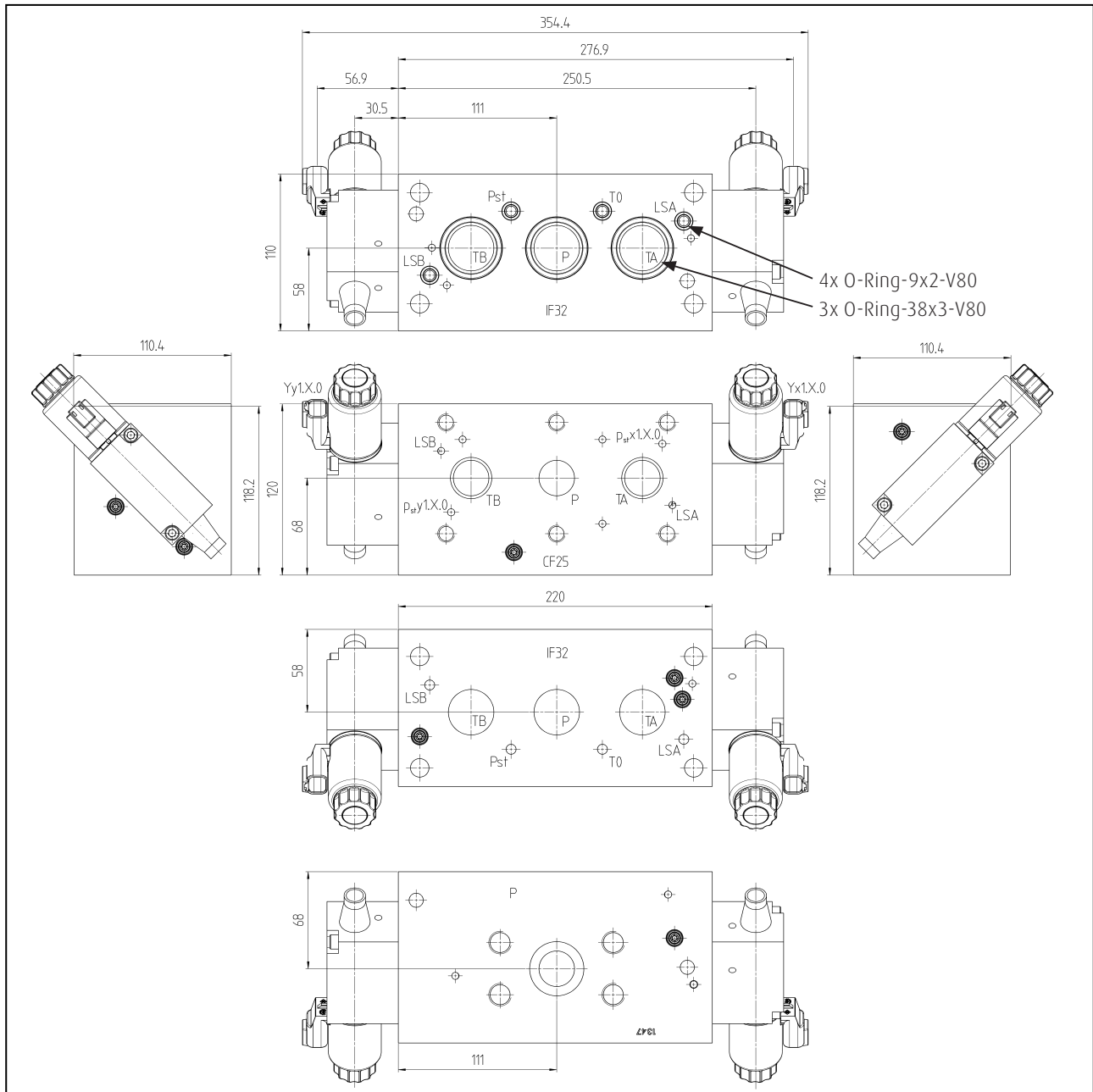
## 5 | Assembly of System components. VT1EA/VT1EP with pilot control

VT1EA with DMV1/24 or DMV1/12 modules for electro-hydraulic actuation.



## 5 | Assembly of System components. VT1EA/VT1EP with pilot control

VT1EP with DMV1/24 or DMV1/12 modules for electro-hydraulic actuation.

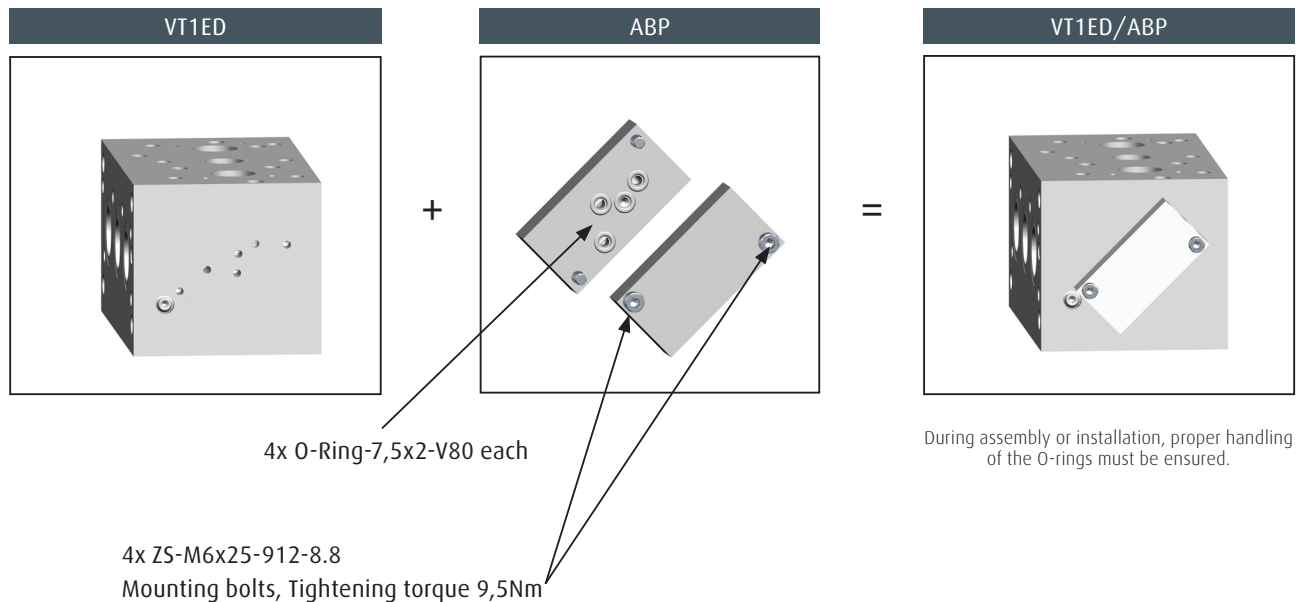


## 5 | Assembly of System components. VT1ED with pilot control

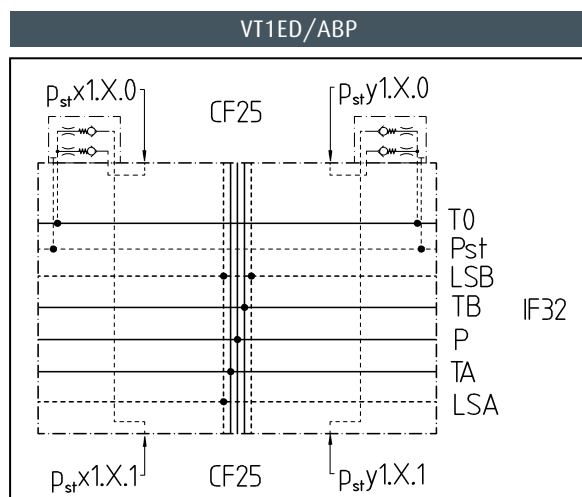
### VT1ED and selected pilot control

#### VT1ED with ABP air-bleed plates for hydraulic actuation

This combination is used for hydraulic actuation of two directional control valves fitted on a VT1ED expansion module. The ports to be used for this are located on top of the directional control valves. The ABP modules are bolted onto the front of the VT1ED in pairs. You must ensure that the O-rings of the ABP modules with the associated  $P_{st}$ , T0 and  $p_{st,x/y}$  holes fit on top of each other.



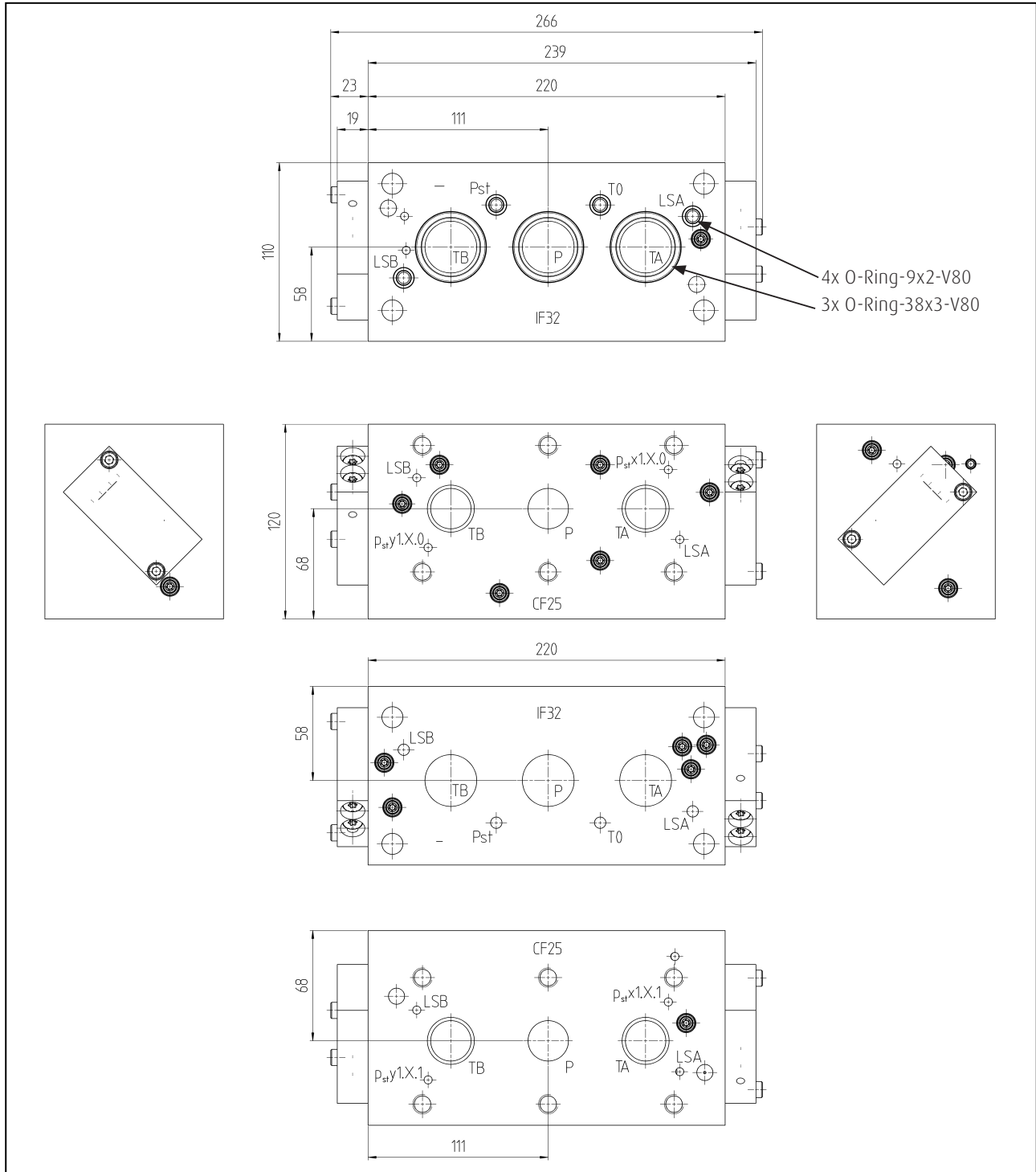
### circuit diagram



Weight [kg]	ca. 17,4
Dimensions [BxHxT]	120 x 110 x 266 mm

## 5 | Assembly of System components. VT1ED with pilot control

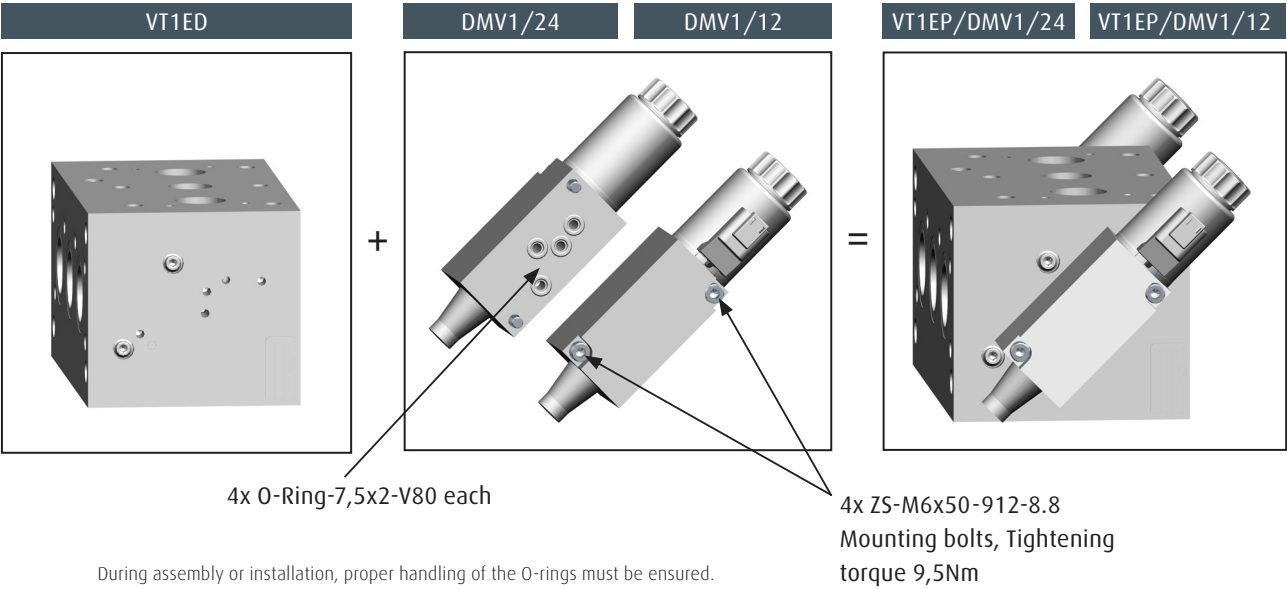
### VT1ED with ABP air-bleed plates for hydraulic actuation



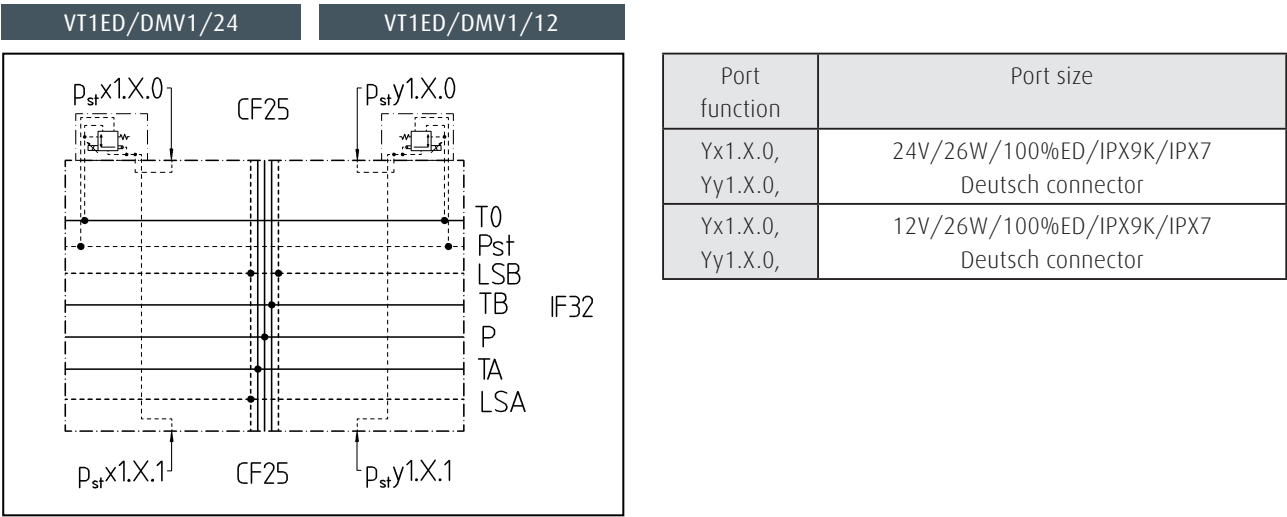
# 5 | Assembly of System components. VT1ED with pilot control

## VT1ED with DMV1/24 or DMV1/12 modules for electro-hydraulic actuation

This combination is used for simultaneous electro-hydraulic actuation of two directional control valves fitted on a VT1ED expansion module. The DMV1 modules are bolted onto the front of the VT1ED in pairs. You must ensure that the O-rings of the DMV1 modules with the associated P<sub>st</sub>, T0 and p<sub>st</sub> x/y holes fit on top of each other.



## circuit diagram



Weight [kg]	ca. 19,8
Dimensions [BxHxT]	120 x 110 x 354 mm

## VT1ED with DMV1/24 or DMV1/12 modules for electro-hydraulic actuation

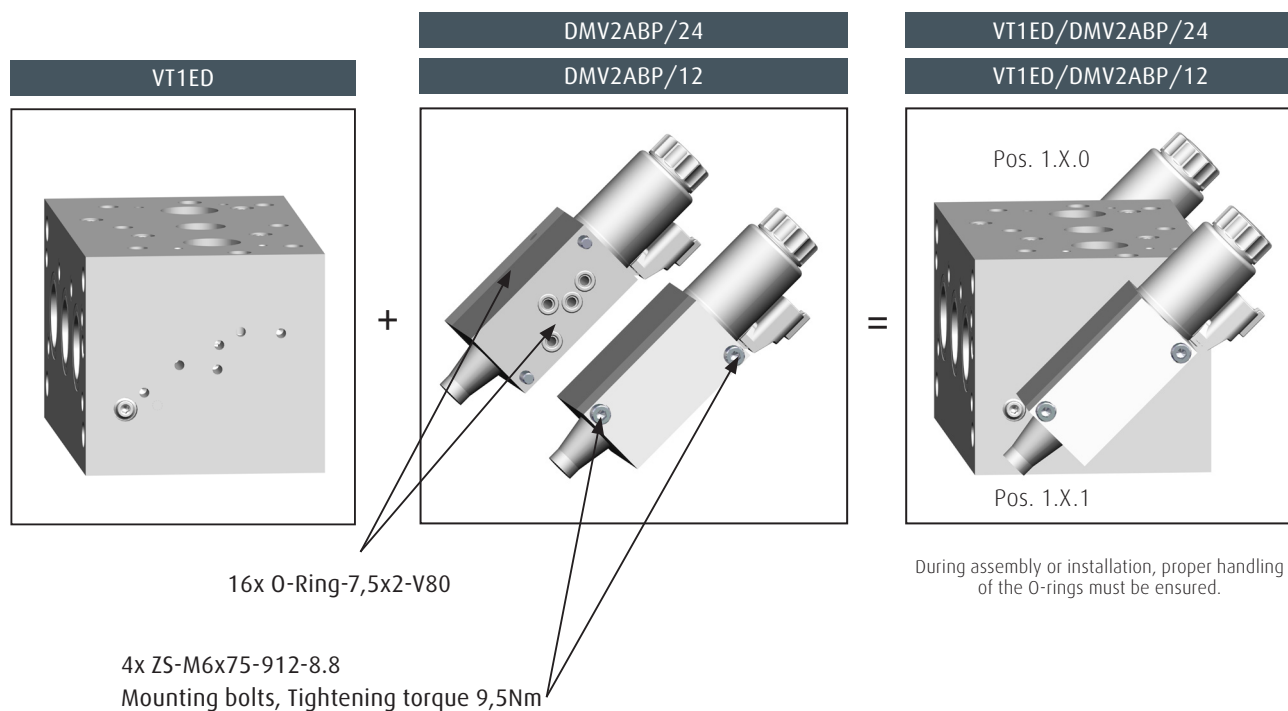




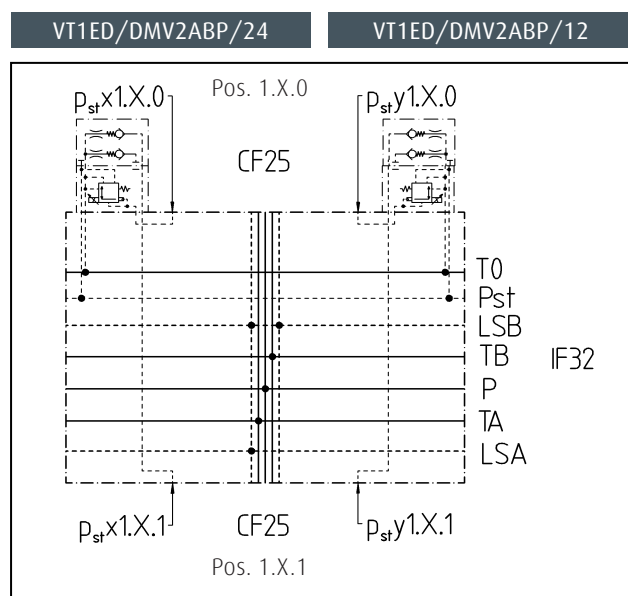
## 5 | Assembly of System components. VT1ED with pilot control

VT1ED with pilot control combination DMV2ABP/24 or DMV2ABP/12 for electro-hydraulic actuation at position 1.X.0 and for hydraulic actuation at position 1.X.1.

This combination is used for electro-hydraulic actuation of a directional control valve fitted at position 1.X.0 on a VT1ED expansion module and for hydraulic actuation of a directional control valve fitted at position 1.X.1 on a VT1ED expansion module. The ports to be used for hydraulic actuation are located on top of the directional control valve. The pilot control combinations are bolted onto the front of the VT1ED in pairs. You must ensure that the O-rings of the respective modules with the associated P<sub>st</sub>, T0 and p<sub>st</sub> x/y holes fit on top of each other.



### circuit diagram

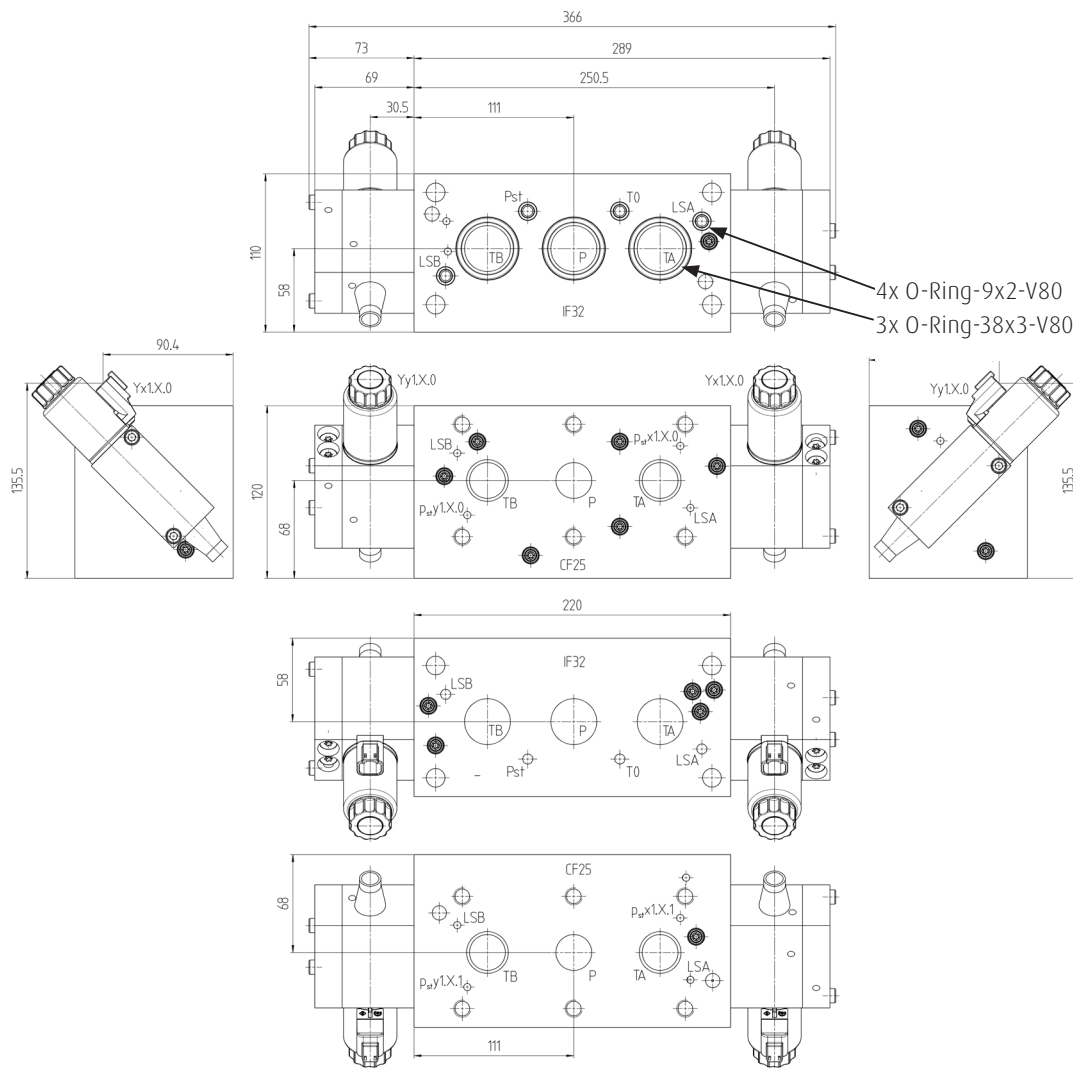


Port function	Port size
Yx1.X.0, Yy1.X.0,	24V/26W/100%ED/IPX9K/IPX7 Deutsch connector
Yx1.X.0, Yy1.X.0,	12V/26W/100%ED/IPX9K/IPX7 Deutsch connector

Weight [kg]	ca. 20,7
Dimensions [BxHxT]	120 x 110 x 366 mm

## 5 | Assembly of System components. VT1ED with pilot control

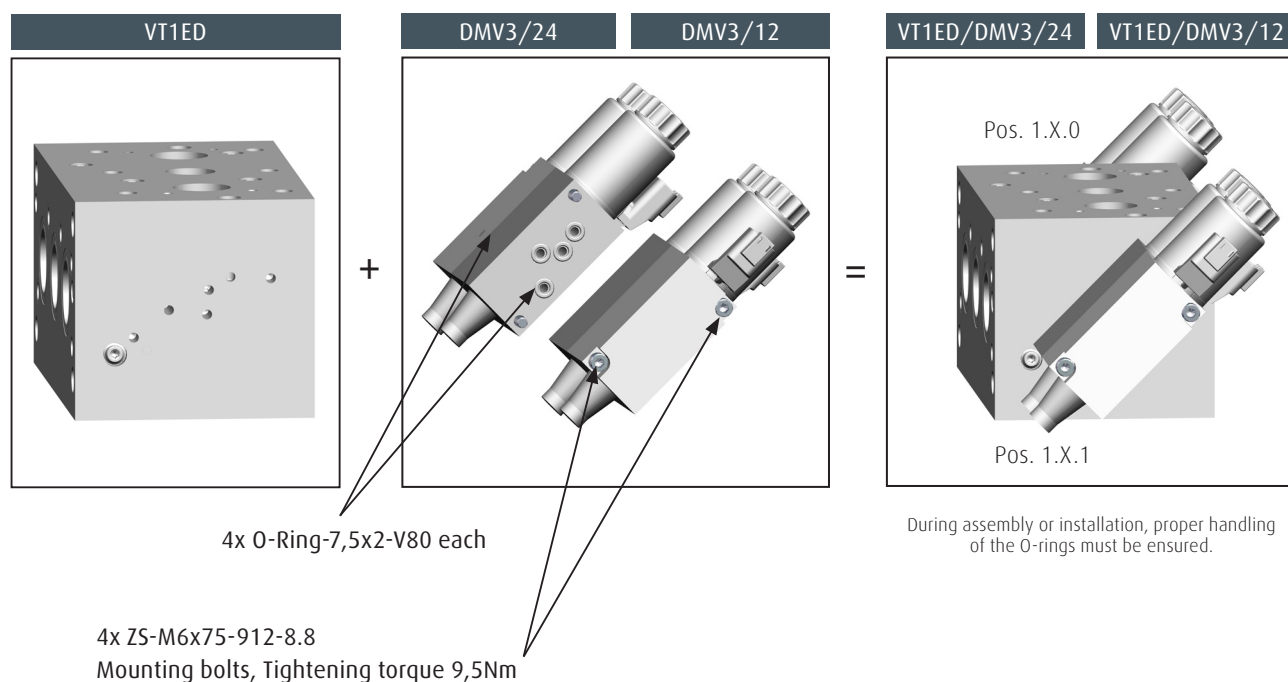
VT1ED with pilot control combination DMV2ABP/24 or DMV2ABP/12 for electro-hydraulic actuation at position 1.X.0 and for hydraulic actuation at position 1.X.1.



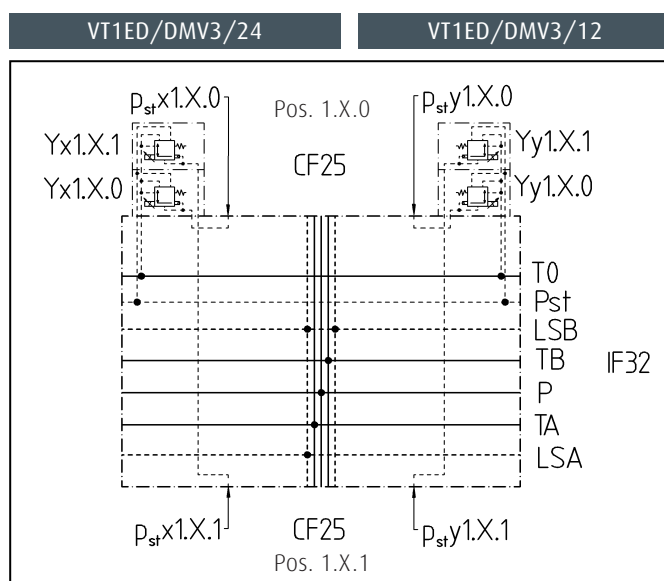
## 5 | Assembly of System components. VT1ED with pilot control

VT1ED with pilot control combination DMV3/24 or DMV3/12 for separate electro-hydraulic actuation of directional control valves at positions 1.X.0 and 1.X.1.

This combination is used for electro-hydraulic actuation of a directional control valve fitted at position 1.X.0 on a VT1ED expansion module and for electro-hydraulic actuation of a directional control valve fitted at position 1.X.1, independently of each other. The pilot control combinations are bolted onto the front of the VT1ED in pairs. You must ensure that the O-rings of the respective modules with the associated P<sub>st</sub>, T0 and p<sub>st</sub>x/y holes fit on top of each other.



### circuit diagram

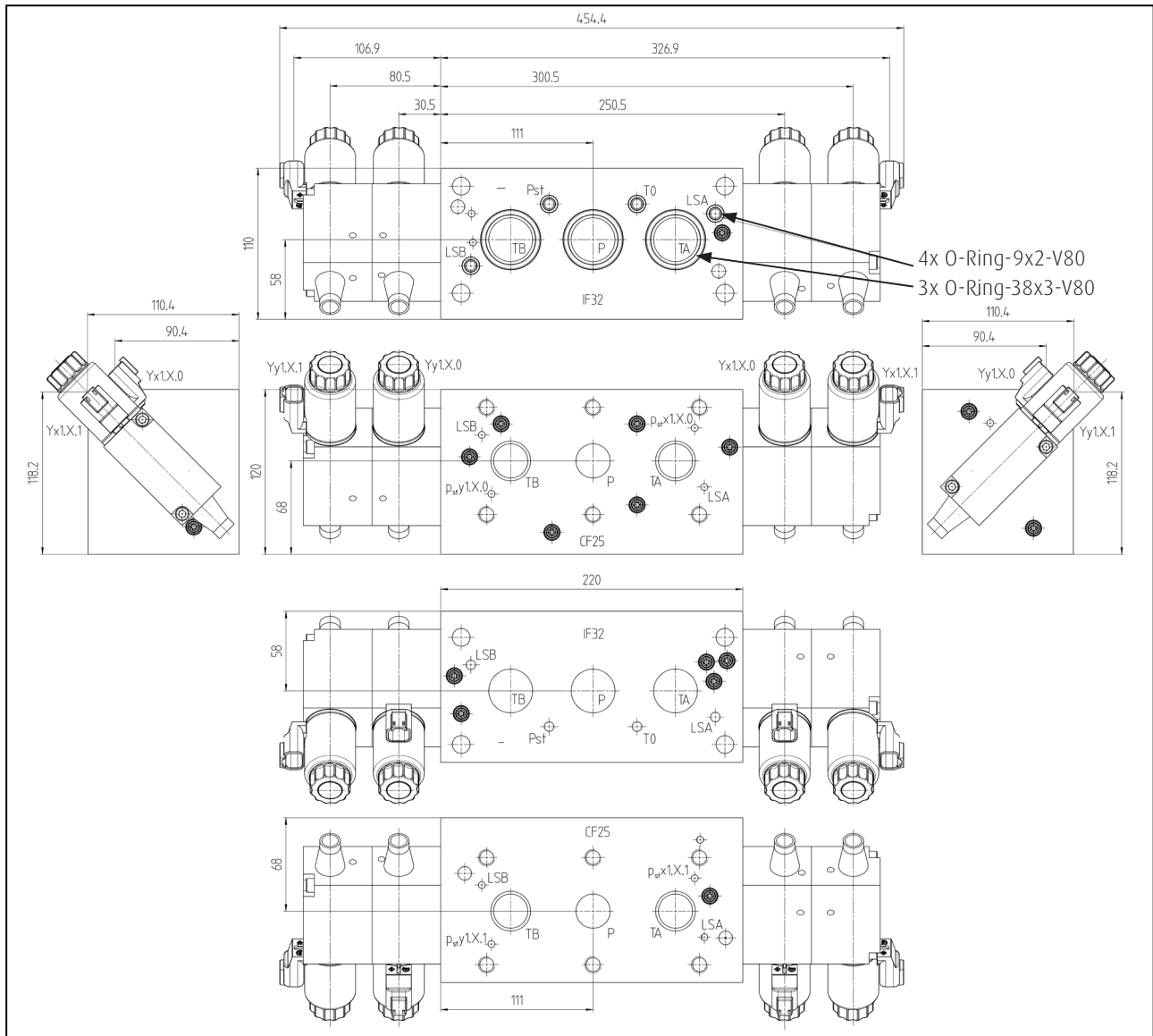


Port function	Port size
Yx1.X.0, Yy1.X.0, Yx1.X.1, Yy1.X.1	24V/26W/100%ED/IPX9K/IPX7 Deutsch connector
Yx1.X.0, Yy1.X.0, Yx1.X.1, Yy1.X.1	12V/26W/100%ED/IPX9K/IPX7 Deutsch connector

Weight [kg]	ca. 23,0
Dimensions [BxHxT]	120 x 110 x 454 mm

## 5 | Assembly of System components. VT1ED with pilot control

VT1ED with pilot control combination DMV3/24 or DMV3/12 for separate electro-hydraulic actuation of directional control valves at positions 1.X.0 and 1.X.1.



## 5 | Assembly of System components. Preparation

### Tie rods and cap nuts

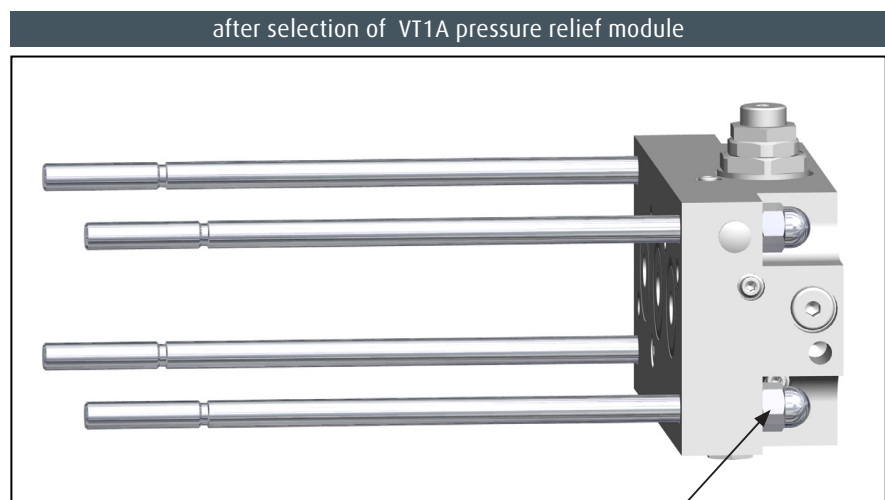
First the selected tie rods are bolted together with the cap nuts. It must be ensured that the short threaded end of the tie rod is screwed hand-tight down to the base of the cap nut.



### Tie rods and cap nuts with VT1A pressure relief module / VT1B blanking plate

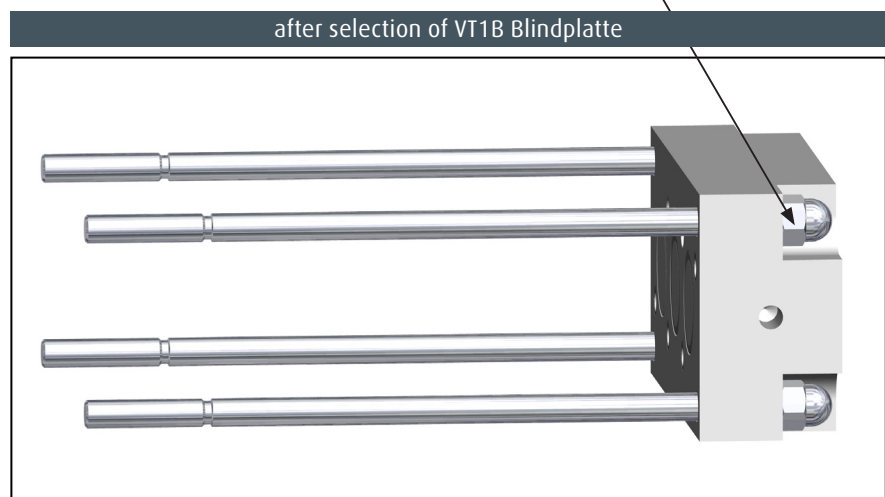
The selected tie rods with the bolted cap nuts are inserted in the existing holes of the VT1A pressure relief module or VT1B blanking plate, as shown in the image. The tie rods with the bolted cap nuts are then guided through the existing holes in the expansion modules (if present) and screwed into the VT1EE.

Possible base plate or  
expansion modules:  
VT1EE, VT1EA, VT1EP, VT1ED



4x tie rod with cap nut size 19, tightening torque 86 Nm

Possible base plate or  
expansion modules:  
VT1EE, VT1EA, VT1EP, VT1ED



## 5 | System components. Order components

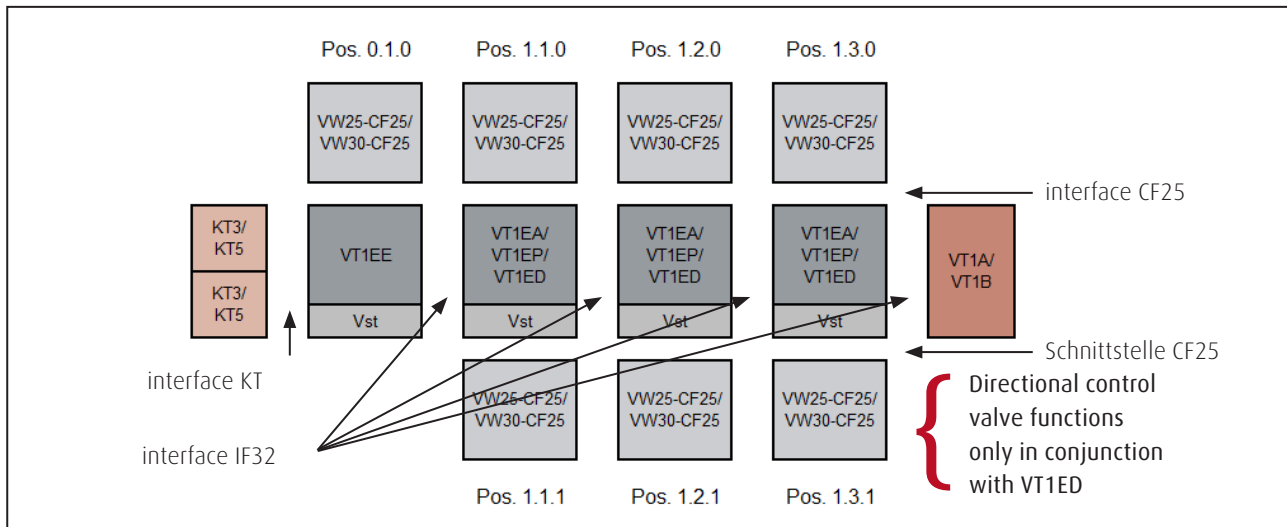
System components to be ordered after selection of the modules

Modules	to be ordered System components
VW25-CF25	25ZY
	25N
	25ZU
	25D1
	25D2
	25W1
	25W2
	25F1
	25F2
VW30-CF25	30ZY
	30ZU
	30W
	30A
CF25B	CF25B
KT3	KT3
KT5	KT5
ABP	ABP
ABP1	ABP1
DMV1/24	DMV1/24
DMV11/24	DMV11/24
DMV1/12	DMV1/12
DMV11/12	DMV11/12
DMV2/24	DMV2/24
DMV2/12	DMV2/12
VT1EE	VT1EE
VT1EA	VT1EA
VT1EP	VT1EP
VT1ED	VT1ED
VT1B	VT1B
VT1A	VT1A
TR0 TR1 TR2 TR3	TR0; TR1; TR2; TR3 1)

1) only with 4 pcs. each

## 5 | Assembly of System components. Modular system

### Display and assignment of system components and modules — summary



The dimensions are derived from the dimensional drawings of the system components.

## 5 | Assembly of System components. dimensions and masses

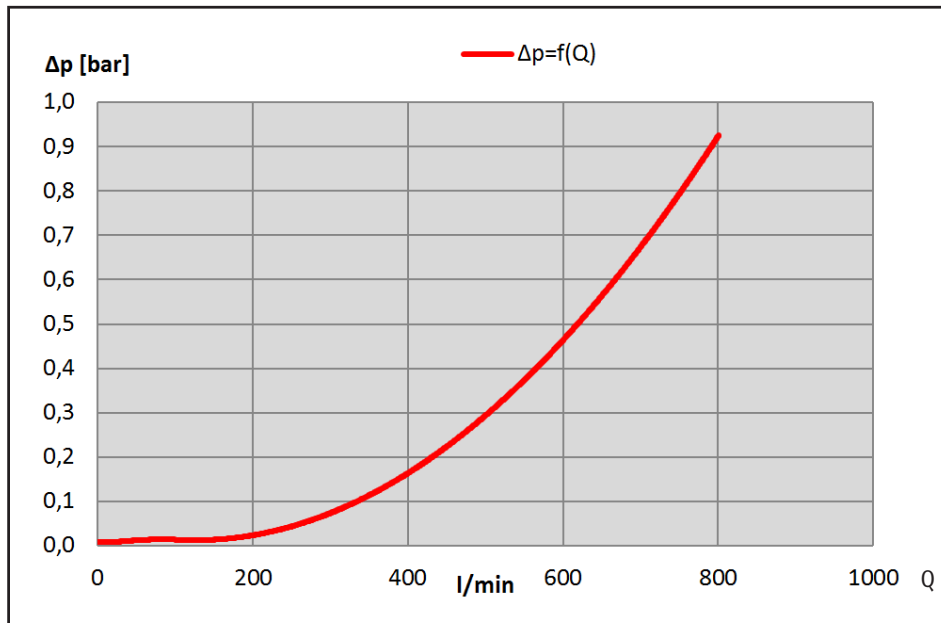
The external dimensions and the weight of the configured control plate can be estimated by adding the values of the components on the basis of the table.

System component	version	B [mm]	H [mm]	T [mm]	M [kg]
VT1EE	base plate	120	110	220	17,85
	with ABP	120	110	266	18,77
	with DMV1	120	110	354	21,13
VT1EA	IF32 expansion module	120	110	220	17,1
	with ABP	120	110	266	18,0
	with DMV1	120	110	354	20,4
VT1EP	IF32 expansion module	120	110	220	16,5
	with ABP	120	110	266	17,4
	with DMV1	120	110	354	19,8
VT1ED	IF32 expansion module	120	110	220	16,5
	with ABP	120	110	266	17,4
	with DMV1	120	110	354	19,8
	with DMV2ABP	120	110	366	20,7
	with DMV3	120	110	454	23,0
KT3/KT5	tank check module	109	96	80	5,2
VT1A	pressure relief module	70	144	288,5	10,8
VT1B	blanking plate	60	104	218	8,8
Wegeventil	VW25-CF25	104	125	416	18,2
Wegeventil	VW30-CF25	102	192	428	27,2
CF25B	blanking plate	102	38	210	6,0

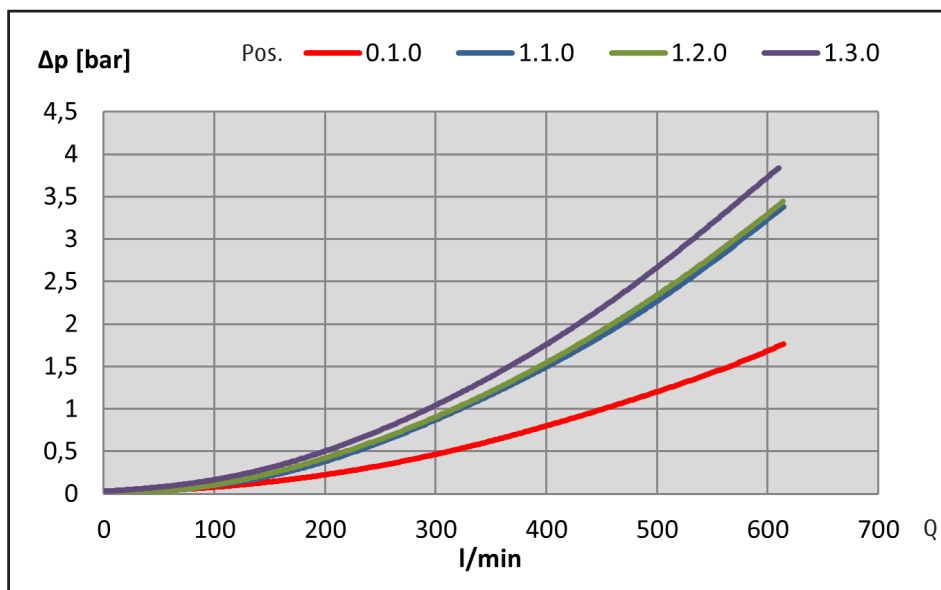
The location of the hydraulic ports can be derived from the dimensional drawings of the individual components.

## 5 | System components. General hydraulic information for the mod. system

Characteristic for average losses from interface CF25 to interface KT



Characteristic losses from SAE-P to CF25 by positions

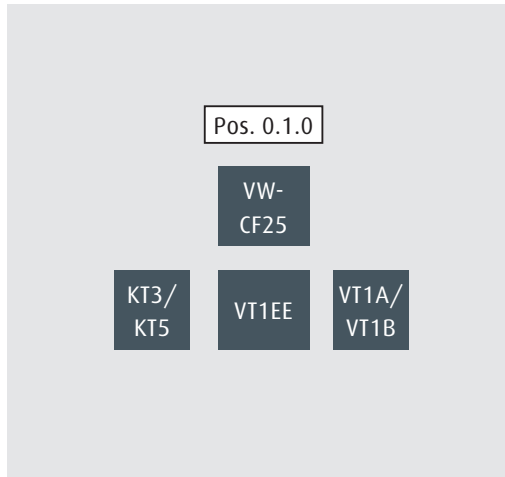




## 6 | Configuration of the valve system.

Interfaces IF32 and CF25 and pilot control interfaces are to be observed. O-rings and mounting screws are an integral part of the respective system components. During assembly or installation, proper handling of the O-rings must be ensured.

### Configuration with one directional control valve function



#### Step 1

- Determination of the directional control valve characteristics required, such as nominal size, flow, secondary valves and spool stroking times (see Chapter 4 "Directional control valve variants. Distinction").
- Selection of the VW-CF25
- Required return throttles are inserted under the VW-CF25 at TA and/or TB in the VT1EE.
- The selected VW-CF25 is mounted on the VT1EE with the associated cylinder bolts. The desired orientation (A side of the VW-CF25 to A or B side of the VT1EE) must be observed.

#### Step 2

The selected pilot control (hydraulic or electro-hydraulic) is mounted on the VT1EE (see Chapter 5 "Assembly of system components. VT1EE with pilot control").

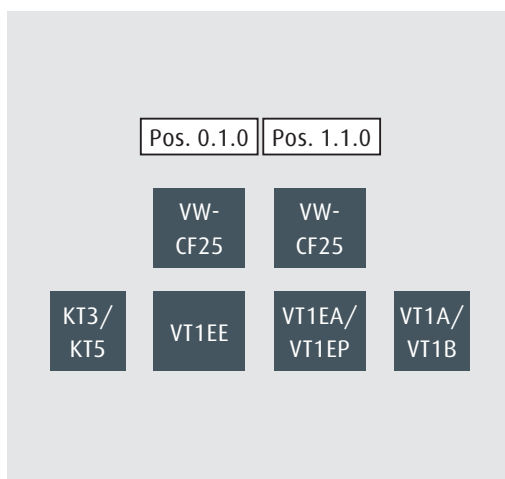
#### Step 3

Bolt selected component VT1B or VT1A (observe cross-section IF32) with pre-assembled tie rods and cap nuts onto the VT1EE (see Chapter 5 "Assembly of system components. Preparation").

#### Step 4

Bolt selected components KT3 and/or KT5 onto the VT1EE in the desired direction of connection (see chapter 5 "Assembly of system components. VT1EE with KT3, KT5 tank check function").

### Configuration with two directional control valve functions



#### Step 1

- Determination of the directional control valve characteristics required, such as nominal size, flow, secondary valves and spool stroking times (see chapter 4 "Directional control valve variants. Distinction").
- Selection of the VW-CF25
- Required return throttles are inserted under the VW-CF25 at TA and/or TB in the VT1EE, VT1EA or VT1EP.
- The selected VW-CF25s are mounted on the VT1EE and VT1EA or VT1EP with the associated cylinder bolts. The desired orientation (A side of the VW-CF25 to A or B side of the VT1EE) must be observed.

#### Step 2

The selected pilot controls (hydraulic or electro-hydraulic) are mounted on the VT1EE and the VT1EA and/or VT1EP (see chapter 5 "Assembly of VT1EE with pilot control" and "Assembly of VT1EA/VT1EP with pilot control").

#### Step 3

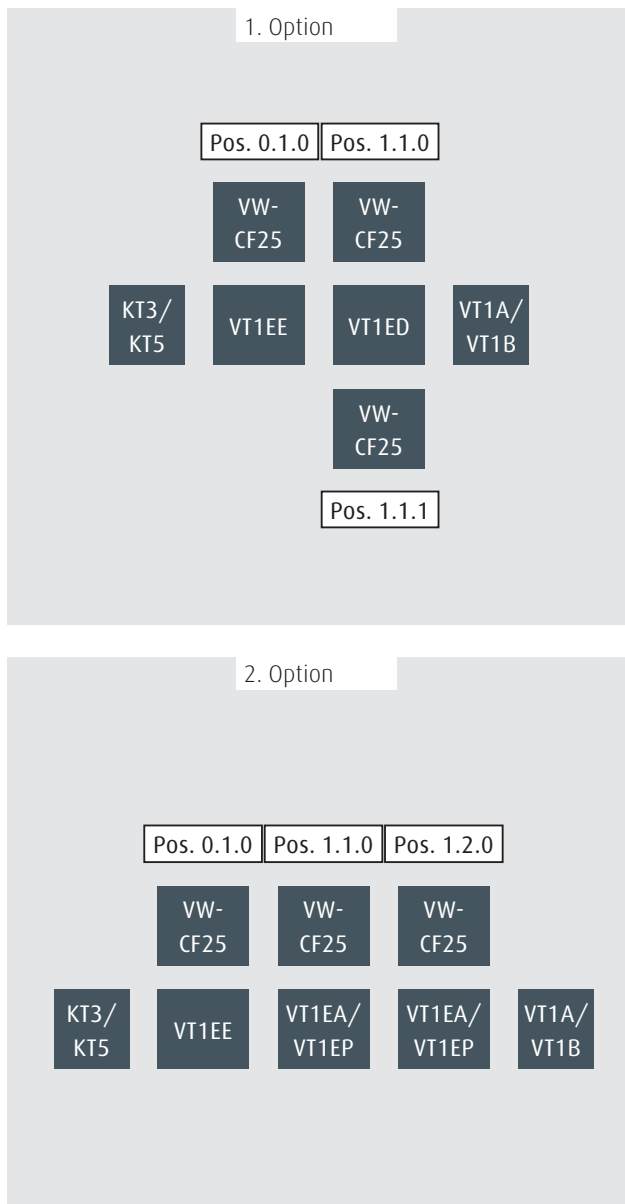
Then bolt the selected component VT1B or VT1A (observe interface IF32) with pre-assembled tie rods and cap nuts at position 1.1.0 VT1EA or VT1EP on the VT1EE (see chapter 5 "Assembly of system components. Preparation").

#### Step 4

Bolt selected components KT3 and/or KT5 onto the VT1EE in the desired direction of connection (see chapter 5 "Assembly of system components. VT1EE with KT3, KT5 tank check function").

## 6 | Configuration of the valve system.

### Configuration with three directional control valve functions



#### Step 1

a) Determination of the directional control valve characteristics required, such as nominal size, flow, secondary valves and spool stroking times (see chapter 4 "Directional control valve variants. Distinction").

b) Selection of the VW-CF25

c) Required return throttles are inserted under the VW-CF25 at TA and/or TB in the VT1EE, VT1EA or VT1EP and VT1ED.

d) The selected VW-CF25s are mounted on the VT1EE, VT1EA or VT1EP and VT1ED with the associated cylinder bolts. The desired orientation (A side of the VW-CF25 to A or B side of the VT1EE) must be observed.

1st option: A VT1ED expansion module is positioned at position 1.1.0.

2nd option: A VT1EA or VT1EP expansion module is positioned at position 1.1.0 and 1.2.0.

#### Step 2

The selected pilot controls (hydraulic or electro-hydraulic) are mounted on the VT1EE, VT1EA or VT1EP and the VT1ED (see chapter 5 "Assembly of VT1EE with pilot control", "Assembly of VT1EA/VT1EP with pilot control" and "Assembly of VT1ED with pilot control").

#### Step 3

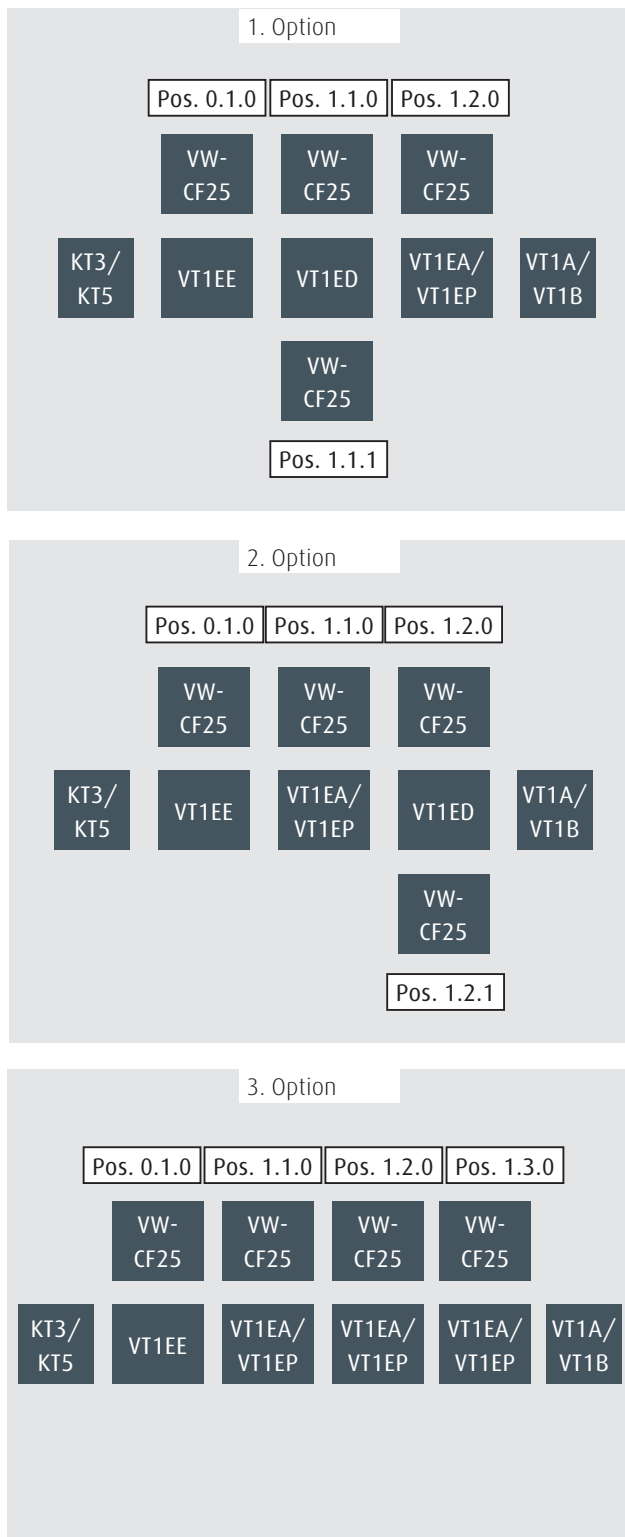
Bolt the selected component VT1B or VT1A (observe interface IF32) with pre-assembled tie rods and cap nuts onto the VT1EE (see chapter 5 "Assembly of system components. Preparation"). The position is dependent on the selected option

#### Step 4

Bolt the selected components KT3 and/or KT5 onto the VT1EE in the desired direction of connection (see chapter 5 "Assembly of system components. VT1EE with KT3, KT5 tank check function").

## 6 | Configuration of the valve system.

### Configuration with four directional control valve functions



#### Step 1

a) Determination of the directional control valve characteristics required, such as nominal size, flow, secondary valves and spool stroking times (see chapter 4 “Directional control valve variants. Distinction”).

b) Selection of the VW-CF25

c) Required return throttles are inserted under the VW-CF25 at TA and/or TB in the VT1EE, VT1EA or VT1EP and VT1ED.

d) The selected VW-CF25s are mounted on the VT1EE, VT1EA or VT1EP and VT1ED with the associated cylinder bolts. The desired orientation (A side of the VW-CF25 to A or B side of the VT1EE) must be observed.

1st option: A VT1ED expansion module is positioned at position 1.1.0, and then a VT1EA or VT1EP expansion module is assigned to position 1.2.0.

2nd option: A VT1EA or VT1EP expansion module is positioned at position 1.1.0, and then a VT1ED expansion module is assigned to position 1.2.0.

3rd option: A VT1EA or VT1EP expansion module can be positioned at positions 1.1.0, 1.2.0 and 1.3.0.

#### Step 2

The selected pilot controls (hydraulic or electro-hydraulic) are mounted on the VT1EE, VT1EA or VT1EP and the VT1ED (see chapter 5 “Assembly of VT1EE with pilot control”, “Assembly of VT1EA/VT1EP with pilot control” and “Assembly of VT1ED with pilot control”).

#### Step 3

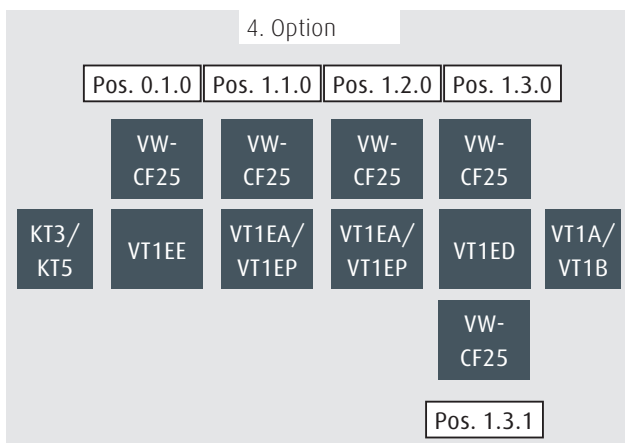
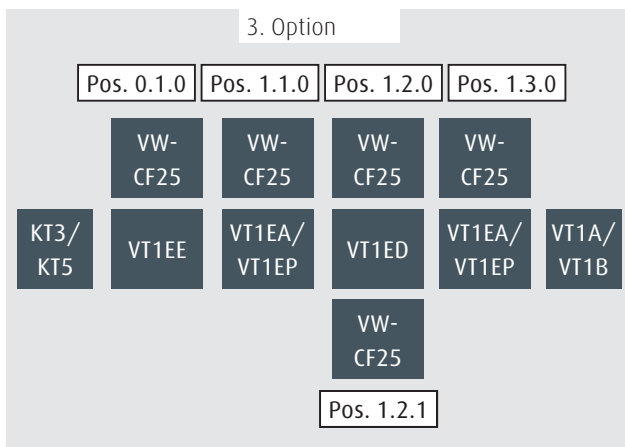
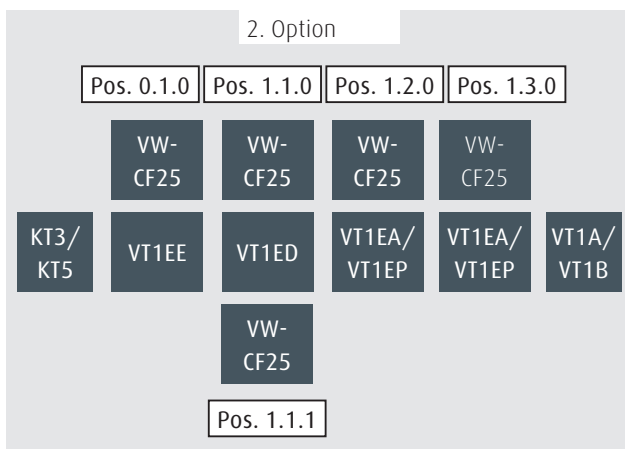
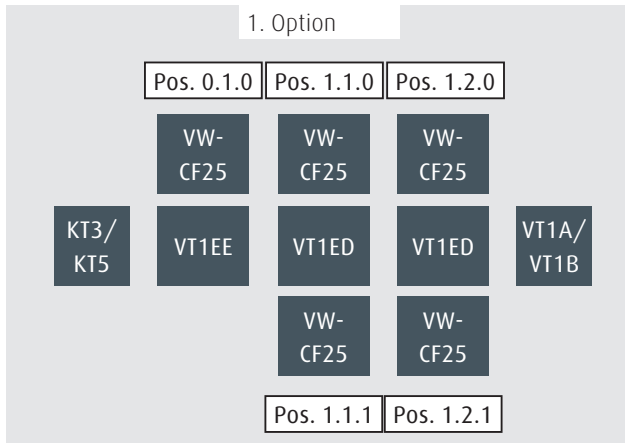
Bolt the selected component VT1B or VT1A (observe interface IF32) with pre-assembled tie rods and cap nuts onto the VT1EE (see chapter 5 “Assembly of system components. Preparation”). The position is dependent on the selected option

#### Step 4

Bolt the selected components KT3 and/or KT5 onto the VT1EE in the desired direction of connection (see chapter 5 “Assembly of system components. VT1EE with KT3, KT5 tank check function”).

## 6 | Configuration of the valve system.

### Configuration with five directional control valve functions



#### Step 1

- Determination of the directional control valve characteristics required, such as nominal size, flow, secondary valves and spool stroking times (see chapter 4 "Directional control valve variants. Distinction").
- Selection of the VW-CF25
- Required return throttles are inserted under the VW-CF25 at TA and/or TB in the VT1EE, VT1EA or VT1EP and VT1ED.
- The selected VW-CF25s are mounted on the VT1EE, VT1EA or VT1EP and VT1ED with the associated cylinder bolts. The desired orientation (A side of the VW-CF25 to A or B side of the VT1EE) must be observed.

1st option: One VT1ED expansion module each is positioned at positions 1.1.0 and 1.2.0.

2nd option: A VT1ED expansion module is positioned at position 1.1.0, and then a VT1EA or VT1EP each is assigned to positions 1.2.0 and 1.3.0.

3rd option: A VT1ED expansion module is positioned at position 1.2.0, and then a VT1EA or VT1EP each is assigned to positions 1.1.0 and 1.3.0.

4th option: A VT1ED expansion module is positioned at position 1.3.0, and then a VT1EA or VT1EP each is assigned to positions 1.1.0 and 1.2.0.

#### Step 2

The selected pilot controls (hydraulic or electro-hydraulic) are mounted on the VT1EE, VT1EA or VT1EP and the VT1ED (see chapter 5 "Assembly of VT1EE with pilot control", "Assembly of VT1EA/VT1EP with pilot control" and "Assembly of VT1ED with pilot control").

#### Step 3

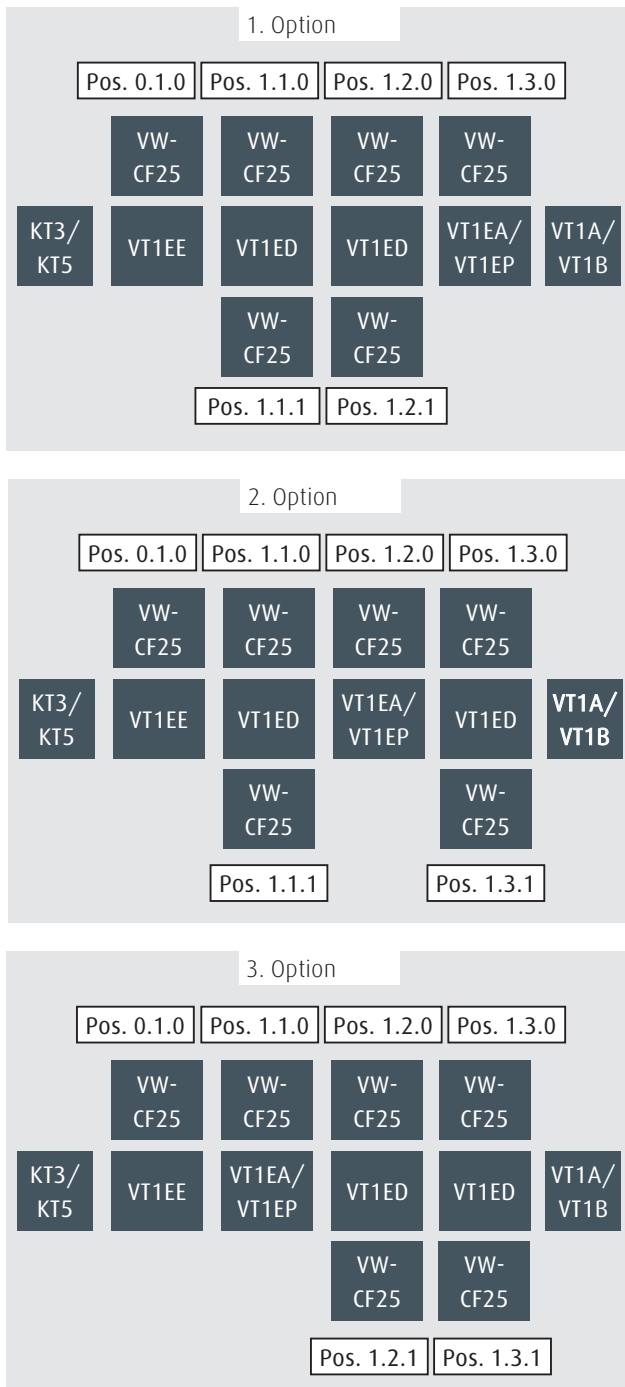
Bolt the selected component VT1B or VT1A (observe interface IF32) with pre-assembled tie rods and cap nuts onto the VT1EE (see chapter 5 "Assembly of system components. Preparation"). The position is dependent on the selected option.

#### Step 4

Bolt the selected components KT3 and/or KT5 onto the VT1EE in the desired direction of connection (see chapter 5 "Assembly of system components. VT1EE with KT3, KT5 tank check function").

## 6 | Configuration of the valve system.

### Configuration with six directional control valve functions



#### Step 1

- Determination of the directional control valve characteristics required, such as nominal size, flow, secondary valves and spool stroking times (see chapter 4 "Directional control valve variants. Distinction").
- Selection of the VW-CF25
- Required return throttles are inserted under the VW-CF25 at TA and/or TB in the VT1EE, VT1EA or VT1EP and VT1ED.
- The selected VW-CF25s are mounted on the VT1EE, VT1EA or VT1EP and VT1ED with the associated cylinder bolts. The desired orientation (A side of the VW-CF25 to A or B side of the VT1EE) must be observed.

1st option: One VT1ED expansion module each is positioned at positions 1.1.0 and 1.2.0, and a VT1EA or VT1EP expansion module is positioned at position 1.3.0.

2nd option: One VT1ED expansion module each is positioned at positions 1.1.0 and 1.3.0, and a VT1EA or VT1EP expansion module is positioned at position 1.2.0.

3rd option: One VT1ED expansion module each is positioned at positions 1.2.0 and 1.3.0, and a VT1EA or VT1EP expansion module is positioned at position 1.1.0.

#### Step 2

The selected pilot controls (hydraulic or electro-hydraulic) are mounted on the VT1EE, VT1EA or VT1EP and the VT1ED (see chapter 5 "Assembly of VT1EE with pilot control", "Assembly of VT1EA/VT1EP with pilot control" and "Assembly of VT1ED with pilot control").

#### Step 3

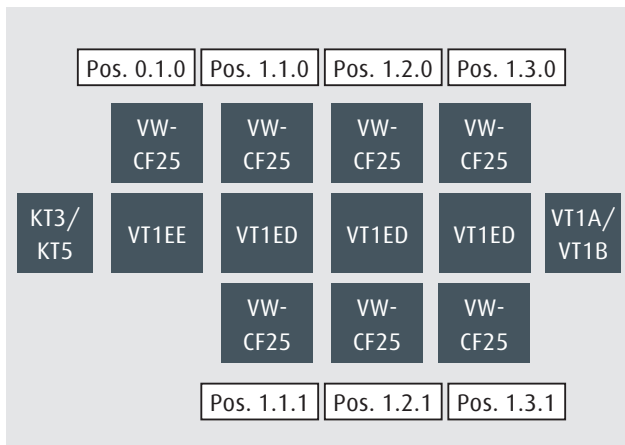
Bolt the selected component VT1B or VT1A (observe interface IF32) with pre-assembled tie rods and cap nuts onto the VT1EE (see chapter 5 "Assembly of system components. Preparation"). The position is dependent on the selected option.

#### Step 4

Bolt the selected components KT3 and/or KT5 onto the VT1EE in the desired direction of connection (see chapter 5 "Assembly of system components. VT1EE with KT3, KT5 tank check function").

## 6 | Configuration of the valve system.

### Configuration with seven directional control valve functions



#### Step 1

- Determination of the directional control valve characteristics required, such as nominal size, flow, secondary valves and spool stroking times (see chapter 4 "Directional control valve variants. Distinction").
- Selection of the VW-CF25
- Required return throttles are inserted under the VW-CF25 at TA and/or TB in the VT1EE and VT1ED.
- The selected VW-CF25s are mounted on the VT1EE and VT1ED with the associated cylinder bolts. The desired orientation (A side of the VW-CF25 to A or B side of the VT1EE) must be observed.

#### Step 2

The selected pilot controls (hydraulic or electro-hydraulic) are mounted on the VT1EE and the VT1ED (see chapter 5 "Assembly of VT1EE with pilot control" and "Assembly of VT1ED with pilot control").

#### Step 3

Bolt the selected component VT1B or VT1A (observe interface IF32) with pre-assembled tie rods and cap nuts onto the VT1EE (see chapter 5 "Assembly of system components. Preparation"). The position is dependent on the selected option.

#### Step 4

Bolt the selected components KT3 and/or KT5 onto the VT1EE in the desired direction of connection (see chapter 5 "Assembly of system components. VT1EE with KT3, KT5 tank check function").

## 6 | Configuration of the valve system. Example configuration 1

### Example configuration VW25-CF25 "25ZY" on VT1EE with ABP and VT1B

Number of directional control valve functions	Position	VT1EE/ VT1EA/ VT1EP/ VT1ED	Pilot control	Tank check function	Pressure relief module / blanking plate	Return throttle	Tie rod
1x VW25-CF25 "25ZY"	0.1.0	VT1EE	ABP	Without	VT1B	Without	TR0

#### Step 1

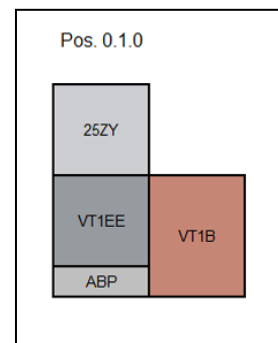
The selected VW25-CF25 "25ZY" (chapter 4 'Directional control valve variants. Distinction') is mounted on the VT1EE with the associated cylinder bolts. The desired orientation (A side of the VW-CF25 to A or B side of the VT1EE) must be observed.

#### Step 2

The selected hydraulic pilot control ABP is mounted on the VT1EE for combination VT1E/ABP (Chapter 5 "Assembly of system components. VT1EE with pilot control").

#### Step 3

Bolt the selected system component VT1B with pre-assembled tie rod and cap nut onto the VT1EE (Chapter 5 "Assembly of system components. Preparation").

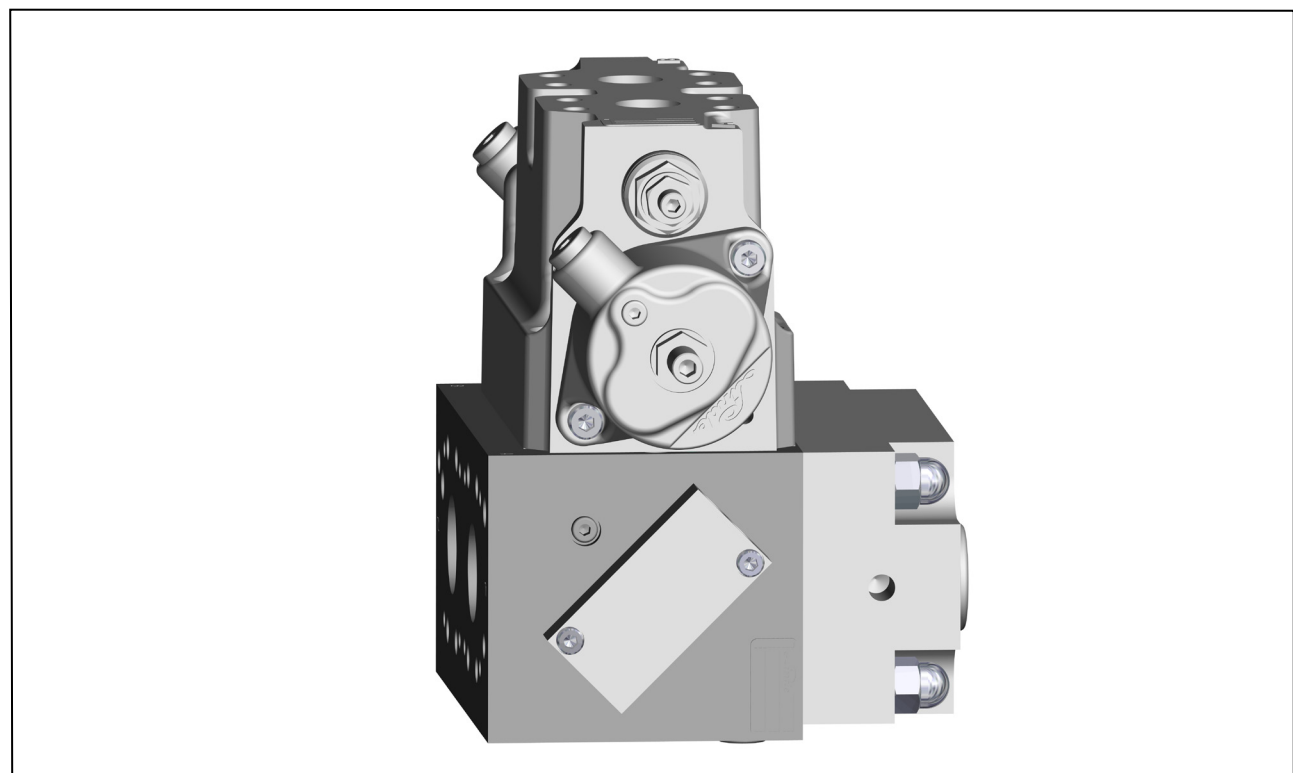
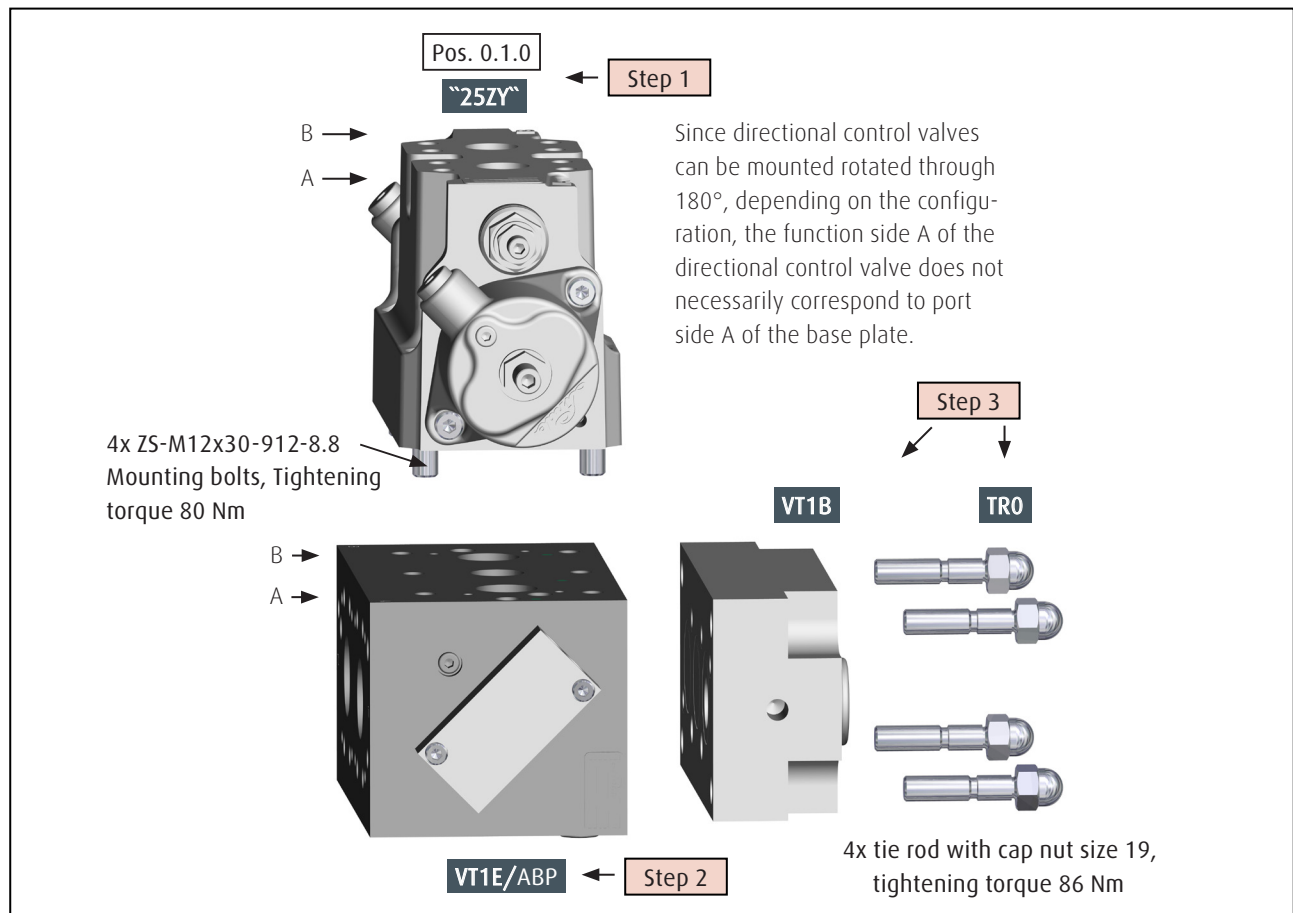


- >> O-rings and mounting bolts are an integral part of the respective system components.
- >> During assembly or installation, proper handling of the O-rings must be ensured.
- >> Observe interfaces IF32, CF25

## 6 | Configuration of the valve system. Example configuration 1

### Example configuration VW25-CF25 "25ZY" on VT1EE with ABP and VT1B

The dimensions are derived from the dimensional drawings of the system components.





## 6 | Configuration of the valve system. Example configuration 2

Example configuration 4x VW25-CF25, 2x VW30-CF25 (selection) on VT1EE with ABP, VT1ED with DMV2ABP, VT1ED with DMV3, VT1EP with DMV1 and VT1A

Number of Directional control valve functions	Position	VT1EE/ VT1EA/ VT1EP/ VT1ED	Pilot control	Tank check func- tion	Pressure relief module / blanking plate	Return throttle	Tie rod
VW30-CF25 "30ZY"	0.1.0	VT1EE	ABP	KT3/ KT5	VT1A	Without	TR3
VW25-CF25 "25M1"	1.1.0	VT1ED	DMV2ABP/24			Without	
VW25-CF25 "25ZU"	1.1.1					Without	
VW25-CF25 "25F1"	1.2.0	VT1ED	DMV3/24			Without	
VW25-CF25 "25F2"	1.2.1					Without	
VW30-CF25 "30W"	1.3.0	VT1EP	DMV1/24			Without	

### Step 1

The selected VW-CF25s (Chapter 4 "Directional control valve variants. Distinction") are assigned to the positions and mounted on the assigned VT1EE, VT1ED and VT1EP with the associated cylinder bolts. The desired orientation (A side of the VW-CF25 to A or B side of the VT1EE) must be observed.

### Step 2

The selected pilot controls (hydraulic or electro-hydraulic) are mounted on the VT1EE, VT1EP and the VT1ED (see chapter 5 "Assembly of VT1EE with pilot control", "Assembly of VT1EA/VT1EP with pilot control" and "Assembly of VT1ED with pilot control").

Combinations VT1E/ABP, VT1ED/DMV2ABP/24, VT1ED/DMV3/24 and VT1EP/DMV1/24 are obtained.

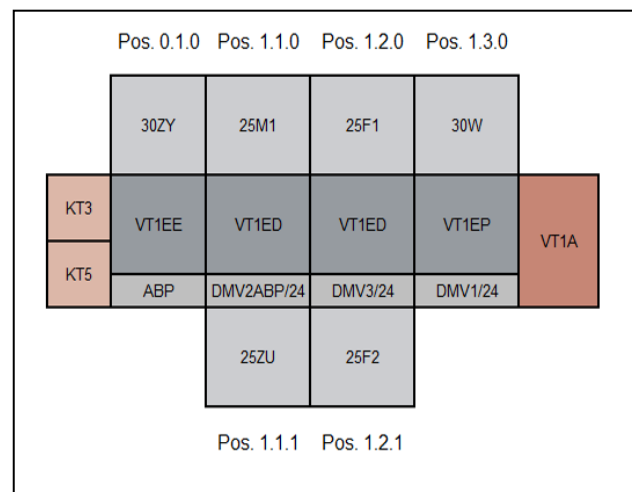
These are assigned to the positions.

### Step 3

Bolt the selected system component VT1A with pre-assembled tie rod and cap nut onto the VT1EE (Chapter 5 "Assembly of system components. Preparation").

### Step 4

Bolt the selected components KT3 and KT5 onto the VT1EE in the desired direction of connection (see chapter 5 "Assembly of system components. VT1EE with KT3, KT5 tank check function").

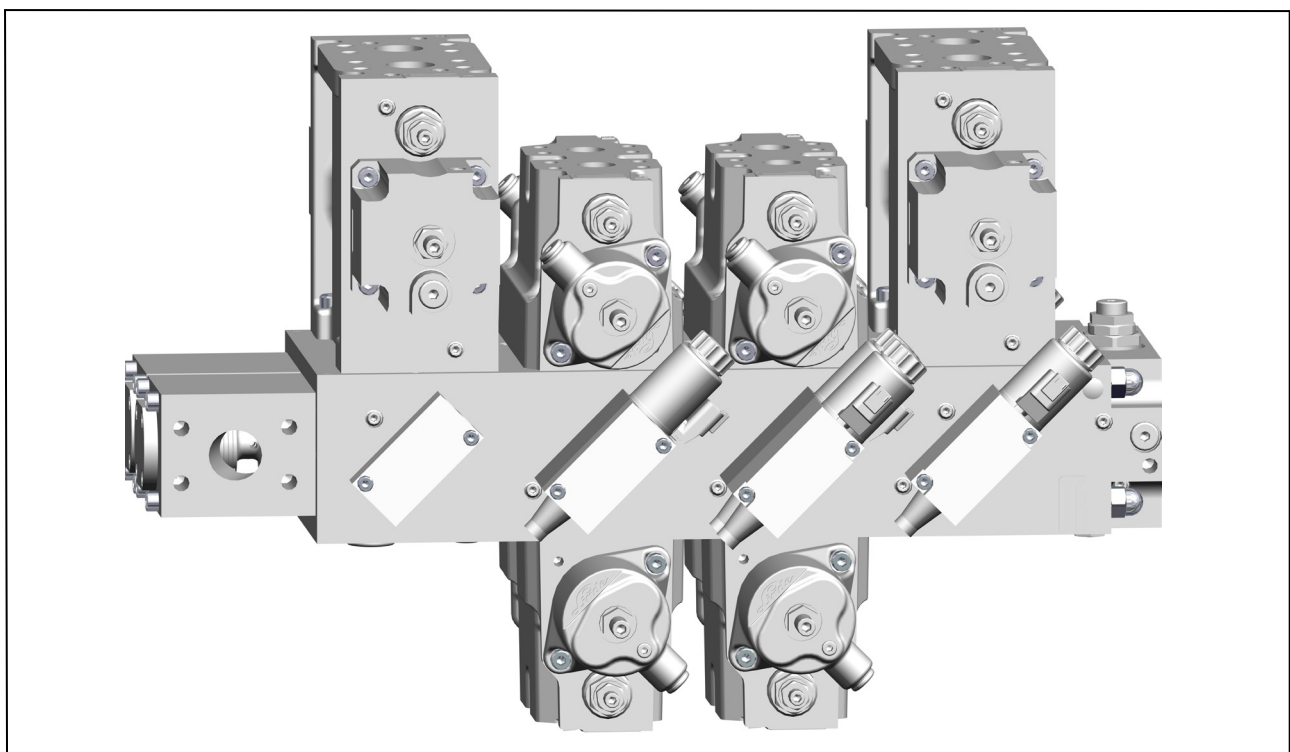
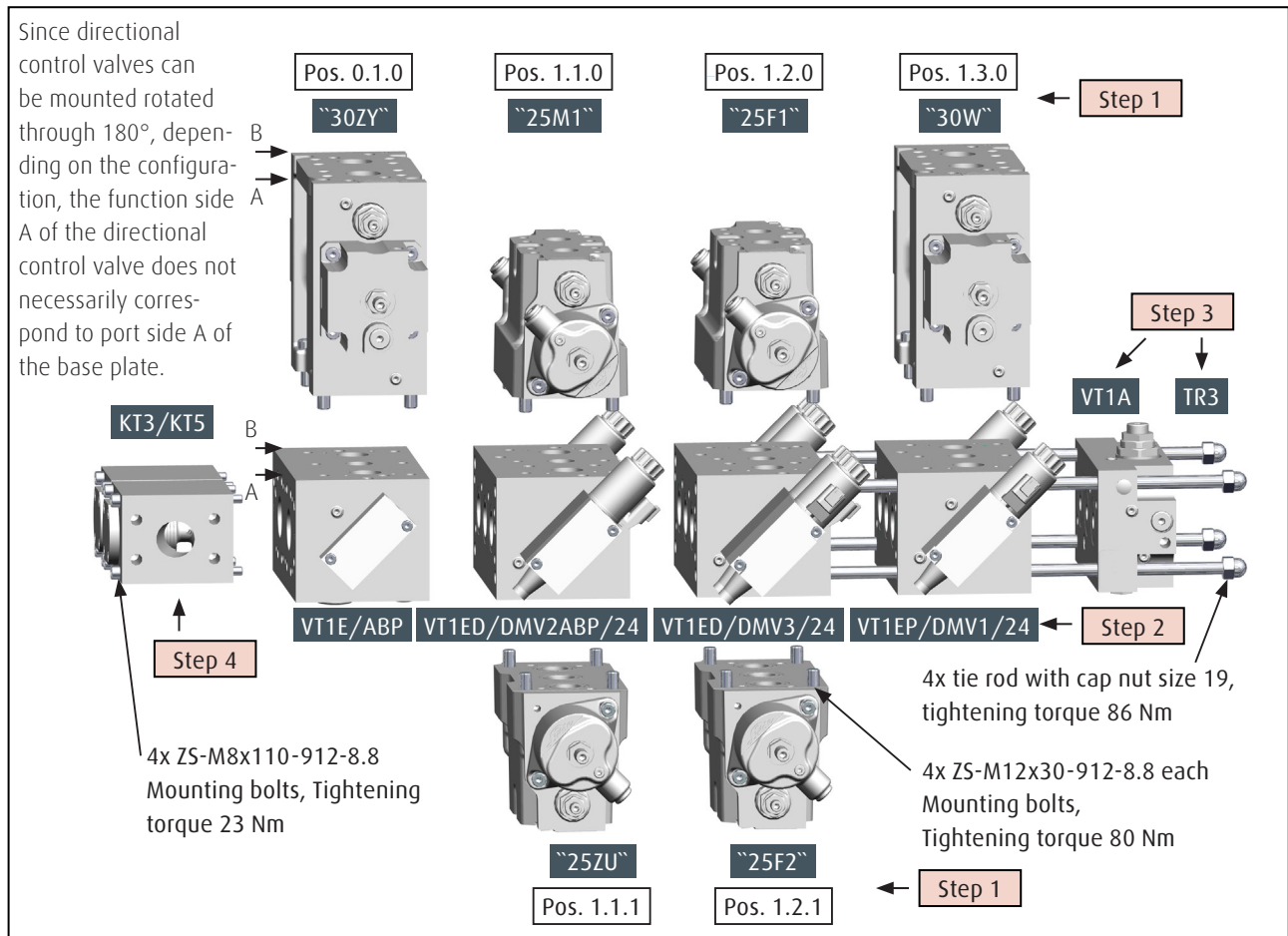


- >> O-rings and mounting bolts are an integral part of the respective system components.
- >> During assembly or installation, proper handling of the O-rings must be ensured.
- >> Observe interfaces IF32, CF25

## 6 | Configuration of the valve system. Example configuration 2

Beispielkonfiguration 4x VW25-CF25, 2x VW30-CF25 auf VT1EE mit ABP, VT1ED/DMV2ABP, VT1ED/DMV3, VT1EP/DMV1 und VT1A

The dimensions are derived from the dimensional drawings of the system components.



## 6 | Configuration of the valve system. Mounting the control plate

The pre-configured control plate must be mounted at the installation location. For this purpose, system components VT1EE, VT1B and VT1A are equipped with appropriate M12 threaded holes. In order to ensure a firm hold, screws with strength 8.8 and appropriate tightening torques must be used.

### Important note:

In any case, an additional stress-free bearing must be guaranteed!

For this purpose, the following conditions apply:

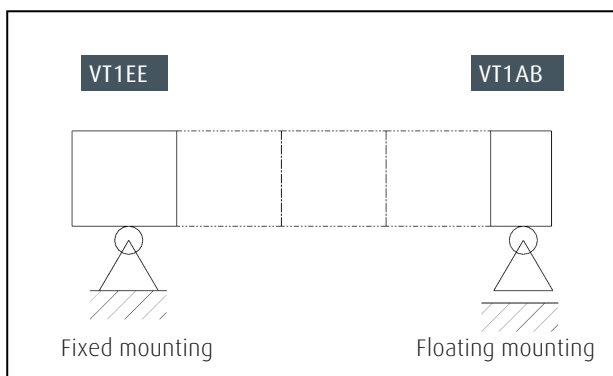
- >> If the VT1EE base plate is used only without an IF32 expansion module, no further measures need to be taken. The control plate is mounted only at the existing threaded holes M12/16 deep of the VT1EE base plate.
- >> If IF32 expansion modules are used, the customer must provide an additional stress-free mounting to support the mass and acceleration forces that occur. The corresponding -threaded holes are available on the VT1B blanking plate and on the VT1A pressure relief module.

In addition, the respective installation location and use must be analyzed in detail by the user.

The position of the mountings can be derived from the dimensional drawings of the system components.

Information for special applications is available on request.

### Schematic diagram of mounting

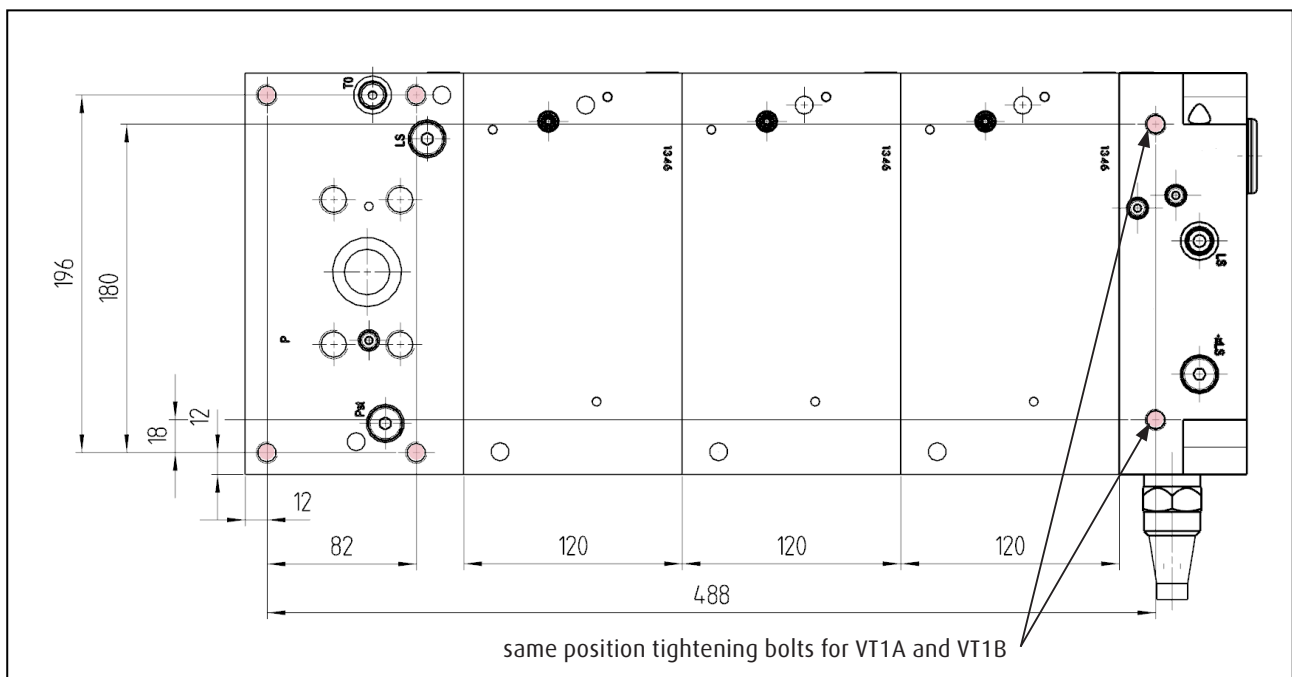


#### M12 mounting bolts

- >> Strength class 8.8
- >> 80 Nm tightening torque
- >> Minimum screw depth 12 mm
- >> Recommended screw clamping length 30 mm

### Mounting of VT1EE base plate with three IF32 expansion modules and VT1A pressure relief module Illustration without KT, VW-CF25

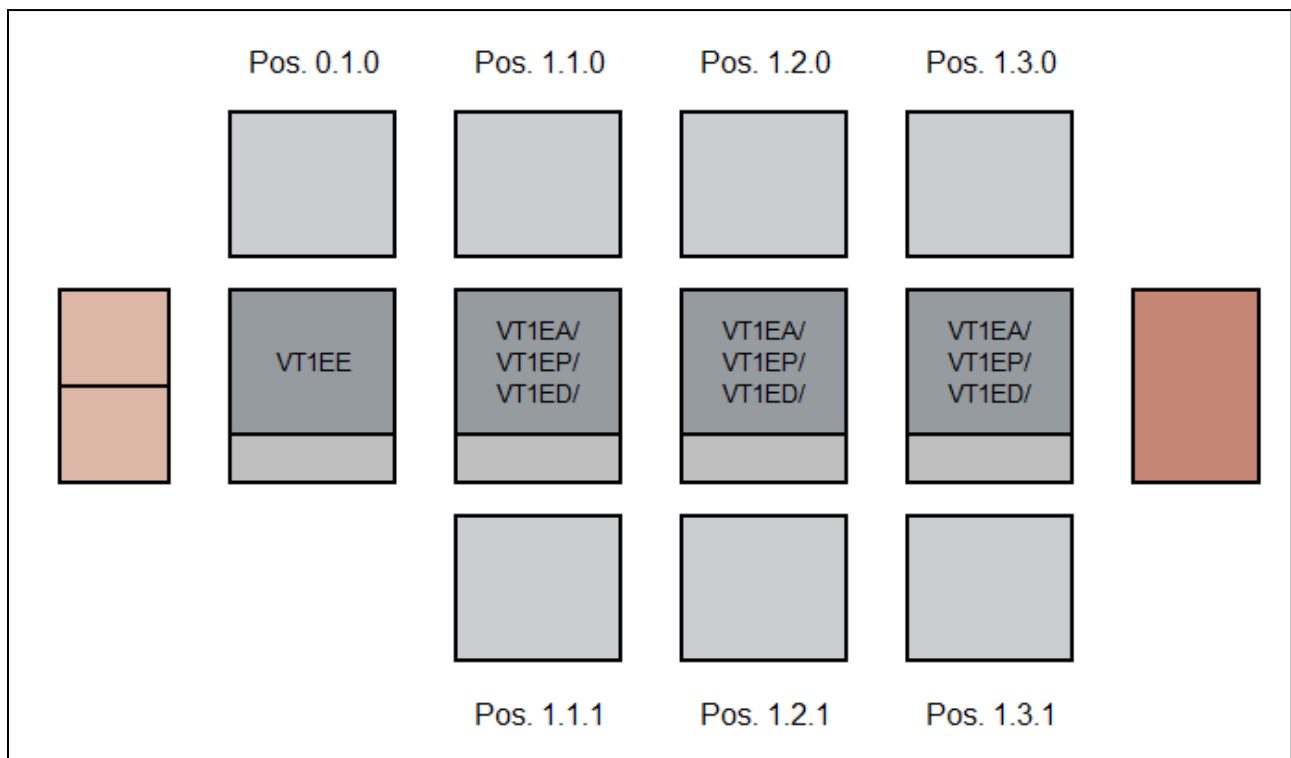
● M12/16 deep



## 7 | Your configuration.

### Your application configuration

Number of Directional control valve functions	Position	VT1EE/ VT1EA/ VT1EP/ VT1ED	Pilot control	Tank check function	Pressure relief module / blanking plate	Return throttle	Tie rod
VW -CF25 " "	0.1.0	VT1EE		/	VT1A/ VT1B		TR
VW -CF25 " "	1.1.0	VT1E_					
VW -CF25 " "	1.1.1						
VW -CF25 " "	1.2.0	VT1E_					
VW -CF25 " "	1.2.1						
VW -CF25 " "	1.3.0	VT1E_					
VW -CF25 " "	1.3.1						



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