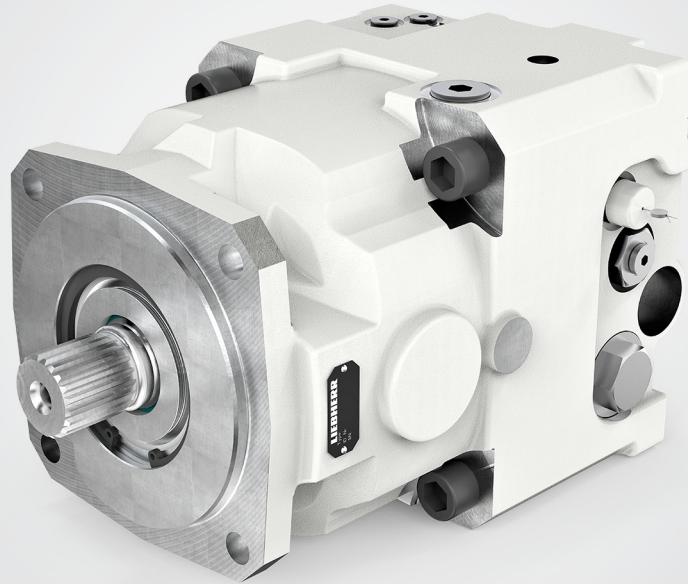


Axial piston motor with variable displacement: DMVA



The Liebherr axial piston motors DMVA series have a swash plate design for the open and closed circuit and were specially developed for use in mobile machinery in harsh environments.

The inverse drive with a swivel angle of 22° is very efficient and has a very high power density, making it ideal for applications that require an adjustable displacement.

The variable flange motors are available in nominal sizes ranging from 108 to 370. The nominal pressure is 450 bar (NS 370 = 400 bar) and the maximum pressure is 500 bar (NS 370 = 450 bar) absolute.

The optional through-drive can be used for mounting a brake or tandem motor.

The DMVA series is available with the most common controls. Speed sensor or preparation for speed sensor available on request.

Valid for:

DMVA 108
DMVA 165
DMVA 215
DMVA 370

Features:

Series D
Open and closed circuit

Regulator types:

Various regulator types can be selected

Pressure range:

Nominal pressure $p_{HD_N} = 450$ bar (NG 370 = 400 bar)
Max. pressure $p_{HD_{max}} = 500$ bar (NG 370 = 450 bar)

Document identification:

ID number: 11378482
Date of issue: 04/2017
Valid for: DMVA
Authors: Liebherr - Department VH13
Version: 1.1

Table of contents

Axial piston motor

DMVA 108 to 370

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5.13	Through-drive DIN 5480	53

1 Type code

Axial piston motor

DMVA 108 to 370

1.	2.	3.	/	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
DMVA			/			1	W		1	A	0			

1. Motor type

D series / motor / variable / flanged	DMVA
---------------------------------------	------

2. Type of circuit

Closed circuit	<input checked="" type="checkbox"/>	G
Open circuit	<input checked="" type="checkbox"/>	O

3. Nominal size (NS)

NS	108	165	215	370
----	-----	-----	-----	-----

4. Residual displacement $V_g \text{ min cm}^3$

	Enter value in cm^3
--	------------------------------

5. Type of drive and regulator

Electro-proportional (negative characteristic)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	EL
Electro-proportional (positive characteristic)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EL1
Electro-proportional (negative characteristic) / pressure regulation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	EL - DA
Hydraulic adjustment depending on high pressure	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	HD
Hydro-proportional (negative characteristic)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	SD
Hydro-proportional (negative characteristic) / pressure regulation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SD - DA
Hydraulic adjustment, two position hydraulically operated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ZH

6. Design

	1
--	---

7. Direction of rotation (front view of the drive shaft)

Varying	W
---------	---

8. Mounting flange

Mounting flange ISO 3019-2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	31
Mounting flange customised	<input type="checkbox"/>	<input type="checkbox"/>	-	<input checked="" type="checkbox"/>	51

9. Shaft end

Toothed shaft	DIN 5480	1
---------------	----------	---

10. Connections

ISO 6162-2 / SAE J518-2, high-pressure connection 6000 psi	A
--	---

11. Accessories

Without add-on parts	0
----------------------	---

1 Type code

Axial piston motor

DMVA 108 to 370

108	165	215	370
-----	-----	-----	-----

12. Through drive

Without through-drive	■	■	■	□	0
Special through-drive	□	□	□	■	K

13. Valves

Without valve	■	■	□	□	0
Flushing, closed circuit	□	■	■	■	SO
Hydraulically adjustable high-pressure limit	■	■	■	□	OH
Flushing, open circuit	□	■	□	□	MO
Flushing, open circuit with high-pressure limitation	□	□	□	□	MH
High-pressure limit with brake valve, open circuit	■	■	■	□	BH

14. Sensors

Without sensor	■	■	■	■	0
Speed sensor	■	■	■	■	D*
Angle sensor	■	■	■	□	W*

* Can be combined, separated by hyphen, e.g.: D-W

- = available
- = on request
- = not possible



Note

Contact addresses for queries are provided on the back of this document.

2 Technical data

Axial piston motor

DMVA 108 to 370

2.1 Table of values

Nominal size			108	165	215	370
Displacement	$V_{g \max}$	cm ³	107.7	167.8	216.5	371.2
	$V_{g \min}$	cm ³	0 - 80% of $V_{g \max}$, value specified in [cm ³ /rev] Other values upon request			
Displacement flow at n_{\max}	qV_{\max}	l/min	361	503	584	891
Max. speed at $V_{g \max}$ and $\Delta p^* = 430$ bar	n_{\max}	rpm	3350	3000	2700	2400
Max. speed at $V_{g \max} = 0.65$ and $\Delta p = 200$ bar	n_{\max}	rpm	5125	4590	4100	3000
Output torque at $V_{g \max}$ and $\Delta p^* = 430$ bar	M_{\max}	Nm	737	1149	1481	2243
Torq constant at $V_{g \max}$	M_K	Nm/bar	1.714	2.67	3.446	5.908
Output power at qV_{\max} and $\Delta p^* = 430$ bar	p_{\max}	kW	259	361	419	564
Torsional rigidity	Nm/rad * 10 ³		266	353	511	961
Driving gear moment of inertia	J_{TW}	kgm ²	0,015	0.0313	0.047	0.13
Weight (approx.)	m	kg	70	80	120	195

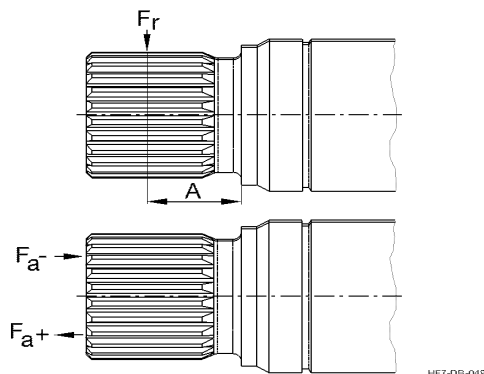
*) For nominal size 370, $\Delta p = 380$ bar



Note

The stated values (maximum values) are theoretical values, rounded, and without efficiencies or tolerances.

2.1.1 Maximum radial and axial load of the driving shaft



Nominal size			108	165	215	355	370
Max. radial force	$F_{r \max}$	N	Values upon request				
Max. axial force	$F_{a\pm \max}$	N					

2 Technical data

Axial piston motor
DMVA 108 to 370

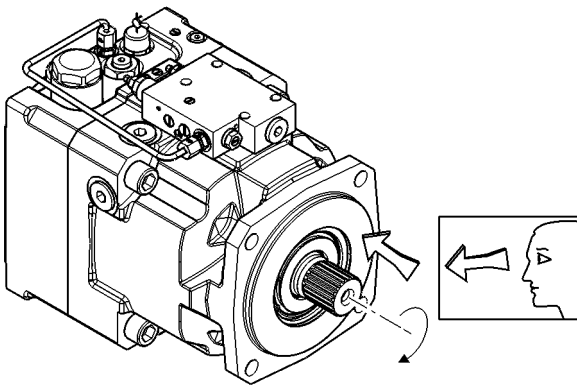


Note

The radial and axial loads depend on the load cycle, e.g. pressure, revolutions and direction of force. If planning a belt drive or continuous axial and/or radial forces are expected, please contact Liebherr.

2.2 Direction of rotation

1.	2.	3.	/	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
DMVA			/			1	W			A				



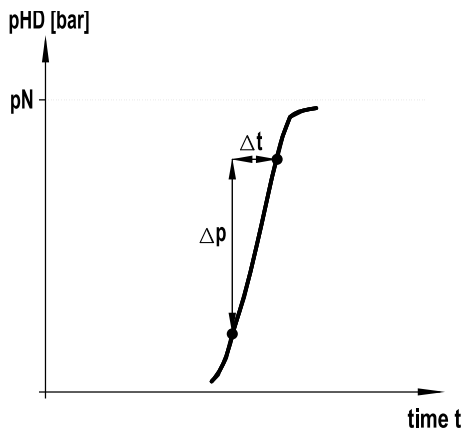
The direction of rotation is stated with view of the driving shaft, as shown in the figure.

- R** Right = clockwise
- L** Left = anti-clockwise
- W** variable = depending on the activation at A / B

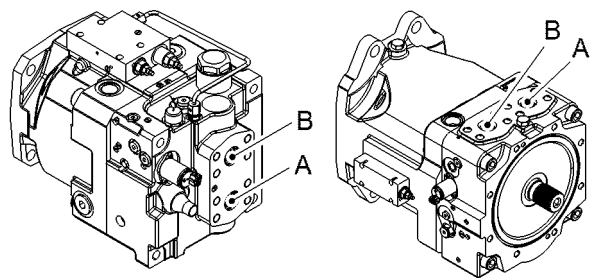
HF3-DB-002

2.3 Permitted pressure range

2.3.1 Operating pressure



DB-LH30V0-024



HF3-DB-003

Operating pressure at connection A / B			108 to 370 ¹	
			open & closed circuit	
Minimum pressure***	pHD _{min}	bar	8	
Nominal pressure (fatigue endurable)	pHD _N	bar	450	
Maximum pressure (single operating period)	pHD _{max}	bar	500	

2 Technical data

Axial piston motor
DMVA 108 to 370

Single operating period at maximum pressure $p_{HD_{max}}$	t	s	< 1
Total operating period at maximum pressure $p_{HD_{max}}$	t	Bh*	300**
Rate of pressure change	RA	bar/s	17000

1) Nominal size 370 = p_{HD_N} 400 bar, $p_{HD_{max}}$ = 450 bar

*) Bh = operating hours

**) If nothing else is stated

***) There must be minimum pressure in the working circuit at connection A / B to ensure adequate lubrication of the driving gear during operation



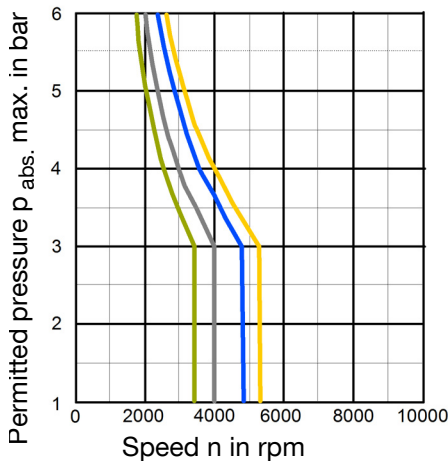
DANGER

Failure of the fastening screws at working connection A / B!

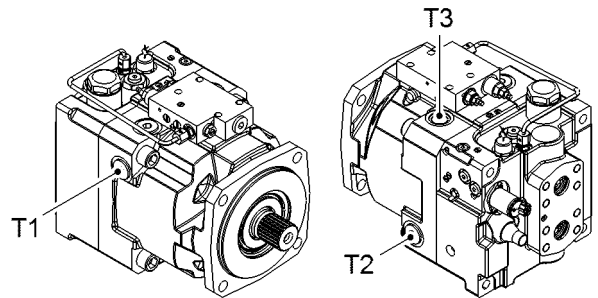
Danger to life.

Use fastening screws of strength category 10.9.

2.3.2 Housing, leakage oil pressure



HF3-DB-006



HF3-DB-004

Characteristic	Nominal size	Shaft diameter (mm)
	108	45
	165	50
	215	60
	355 / 370	70

Leakage oil pressure at connection T1/T2			
Nominal size			108 to 370
Permanent leakage oil pressure, absolute, open and closed circuit	p_L	bar	3
Maximum pressure, absolute, open and closed circuit at reduced speed	$p_{L_{max}}$	bar	6*

*) Short pressure peaks of max. 10 bar abs. are permitted ($t < 0.1$ s).

2 Technical data

Axial piston motor

DMVA 108 to 370



Note

The pressure in the axial piston unit must always be higher than the external pressure on the shaft lip seal.

2.4 Shaft lip seal

2.4.1 General information

The rotary shaft lip seals (RWDR) are special sealing elements which permit a specific housing pressure. To ensure that the tribological system functions optimally, the operating conditions must be complied with.

Sealing edge temperature varies due to the following factors in the housing:

- Circumferential speed
- Hydraulic fluid temperature
- Lubricating medium
- Pressure build-up

The sealing edge temperature may be around 20 °C to 40 °C above the leakage oil temperature of a hydraulic axial piston unit.

2.4.2 Temperature range

The FKM rotary shaft lip seal is permitted for leakage oil temperatures from -25 °C to +115 °C. For applications under -25 °C: Please contact us.

2 Technical data

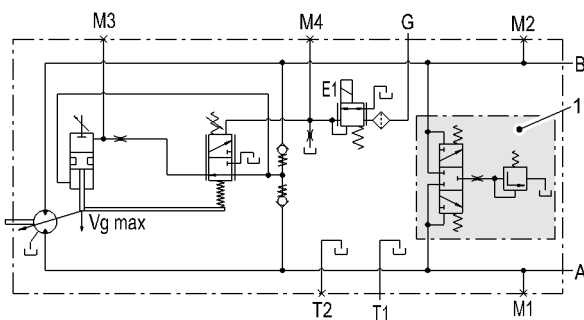
Axial piston motor
DMVA 108 to 370

2.5 Housing flushing

Under different operating conditions, e.g. a very low displacement flow over a longer period of time, the temperature in the housing may rise to its limit. See Chapter 2.6

Depending on the hydraulic setup, a flushing circuit 1 for cooling and filtration may be required, where the "hot" hydraulic oil is led to an external cooler, cools down and is fed back into the hydraulic system.

The flushing volume Q_V in l/min is to be set individually for each nominal size in connection with the application and is the responsibility of the device or system manufacturer.



HF3-DB-009

2.6 Hydraulic fluids

2.6.1 General information

Selection of the appropriate hydraulic fluid is significantly influenced by the anticipated operating temperature relative to the ambient temperature, which is equivalent to the tank temperature.

ATTENTION

You must not mix different mineral oil hydraulic fluids!

Minimum required quality

Specification
LH-00-HYC3A
LH-00HYE3A



Note

For more information, see: www.liebherr.com (brochure: Lubricants and service fluids) Alternatively: Contact lubricants@liebherr.com.

2 Technical data

Axial piston motor
DMVA 108 to 370

2.6.2 Fill quantity

Nominal size	Fill quantity
108 to 370	Values upon request



Note

Before commissioning, the hydraulic unit must be filled with oil and vented.
This process must be checked and repeated if necessary during operation and after long downtimes!

2.6.3 Filtering

- To maintain the specified purity class “21/17/14 according to ISO 4406” under all circumstances, filtering of the hydraulic fluid is necessary.
- The hydraulic fluid is filtered by the device-specific use of oil filters in the hydraulic system.
- Cleaning and maintenance intervals for the oil filters and the entire oil circuit depend on use of the unit (see the device-specific operating instructions).

2.6.4 Operating limits

ATTENTION

Temperatures ≤ -40 °C in the system = axial piston unit must not be operated.
Pre-heat the axial piston unit to at least -40 °C.

Phase	Temperature [°C]**	Viscosity [mm ² /s]*
Cold start phase	-40 to -25	1600-1000
Warm-up phase	above -25	1000-500
Normal operation		< 500

*) Depending on the hydraulic fluid that is used

***) Relative to tank temperature



Note

Optimum operating range: 16-36 mm²/s
The viscosity must not fall below 8 mm²/s (for a short period, thud < 3 minutes, 7 mm²/s) at maximum leakage oil temperature.

2 Technical data

Axial piston motor

DMVA 108 to 370

- Cold start phase:

ATTENTION

The following operating conditions must be maintained during the cold start phase:

- Operating pressure range: $pHD_{\min} < pHD_{\text{cold start}} < 30 \text{ bar}$
- Speed $n_{\text{cold start}} \leq 1000 \text{ rpm}$

Start the drive motor and operate the axial piston unit under the specified operating conditions until a temperature of at least $-25 \text{ }^\circ\text{C}$ has been reached.

- Warm-up phase:

ATTENTION

The following operating conditions must be maintained during the warm-up phase:

- Operating pressure range: $pHD_{\min} < pHD_{\text{warm-up}} < 50\% \text{ of } pHD_N$
- Speed $n_{\text{warm-up}} \leq 50\% \text{ of } n_{\max}$

Start the drive motor and operate the axial piston unit under the specified operating conditions until a viscosity of approx. $500 \text{ mm}^2/\text{s}$ has been reached.

- Normal operation:



Note

No restrictions apply to operating data.

3 Type of drive and regulator

Axial piston motor

DMVA 108 to 370

3.1 Regulator types

1.	2.	3.	/	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
DMVA			/			1	W		1	A	0			



Note

Only one nominal size is illustrated per regulator type or function, typically nominal size 165. Special applications and designs are not included in this chapter. Always use the information from the installation drawing provided or contact Liebherr.

The following applies to all regulator types:



DANGER

The spring-guided reset in the regulating valve is not a safety device!

Contaminants in the hydraulic system such as swarf or dirt from the device or system parts can cause blockages at undefined points of various regulator components.

Under some circumstances, the machine operator's specifications can no longer be implemented.

It is the device or system manufacturer's responsibility to install a safety device e.g. an emergency stop.

The following modular types of drive and regulator can be ordered for the DMVA series:

3.1.1 Mechanic-hydraulic regulators

- HD regulator, see chapter 3.3.1
- SD regulator, see chapter 3.3.3
- SD-DA regulator, see chapter 3.3.3 / see chapter 3.3.5
- ZH regulator, see chapter 3.3.4

3.1.2 Electro-hydraulic regulators

- EL regulator, see chapter 3.3.6
- EL1 regulator, see chapter 3.3.7
- EL-DA regulator, see chapter 3.3.6 / see chapter 3.3.5

Additional regulator types upon request.

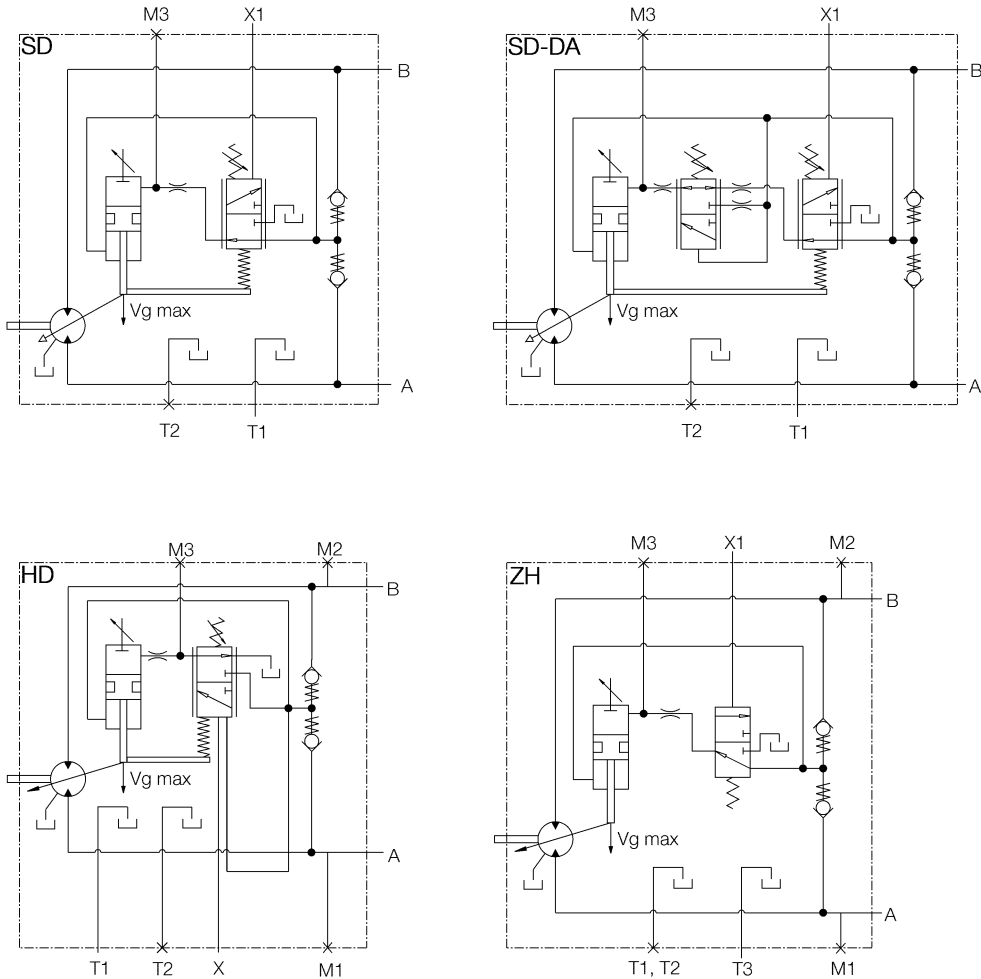
3 Type of drive and regulator

Axial piston motor

DMVA 108 to 370

3.2 Standard hydraulic diagrams

3.2.1 Mechanic-hydraulic regulators



HF3-DB-023

X1	Steering pressure connection ISO 9974-1	M1, M2	High pressure measuring connections ISO 9974-1
A, B	Working connections SAE J 518	M3	Regulating pressure measuring connection ISO 9974-1
T1, T2, T3	Leakage oil connection ISO 9974-1	-	-



Note

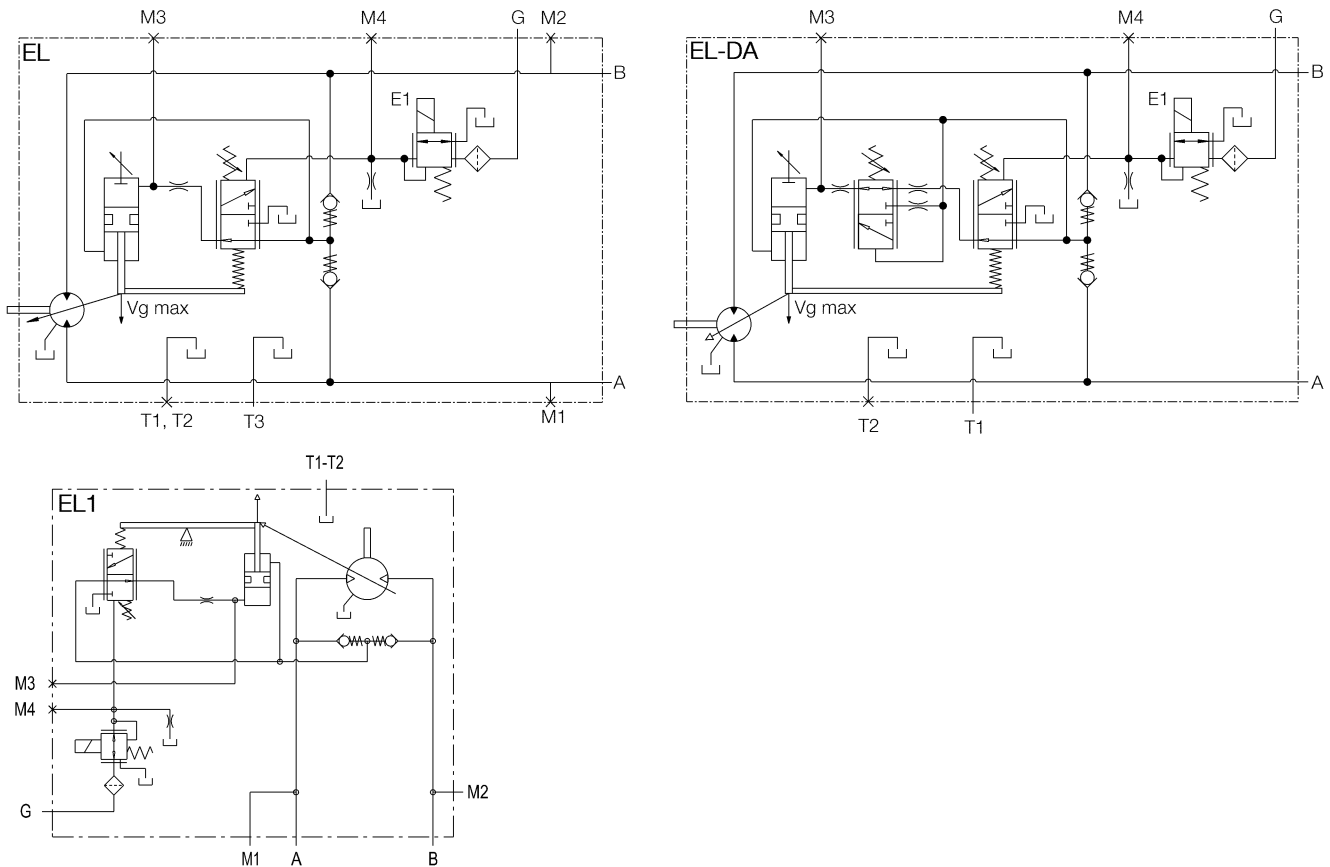
Oil inlet at connection A: direction of rotation = anti-clockwise
 Oil inlet at connection B: direction of rotation = clockwise

3 Type of drive and regulator

Axial piston motor

DMVA 108 to 370

3.2.2 Electro-hydraulic regulators



HF3-DB-024

A, B	Working connections SAE J 518	M3	Regulating pressure measuring connection ISO 9974-1
T1, T2, T3	Leakage oil connection ISO 9974-1	E1	DRE plug-in terminal AMP junior Timer, 2P
G	Regulating pressure supply ISO 9974-1	M4	Steering pressure measuring connection ISO 9974-1
M1, M2	High pressure measuring connections ISO 9974-1	-	-



Note

Oil inlet at connection A: direction of rotation = anti-clockwise

Oil inlet at connection B: direction of rotation = clockwise

3 Type of drive and regulator

Axial piston motor

DMVA 108 to 370

3.2.3 Regulators with brake valve (BV)

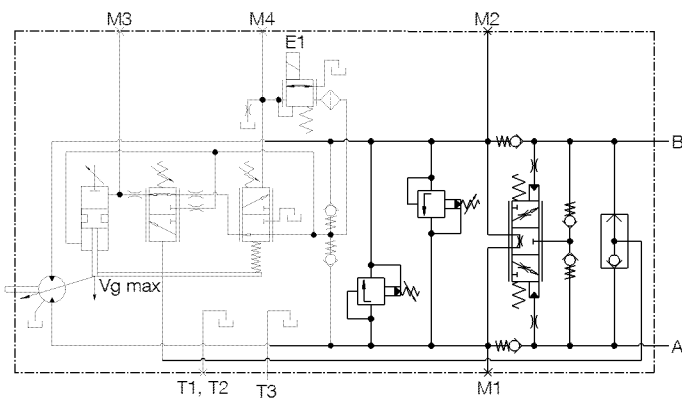


Note

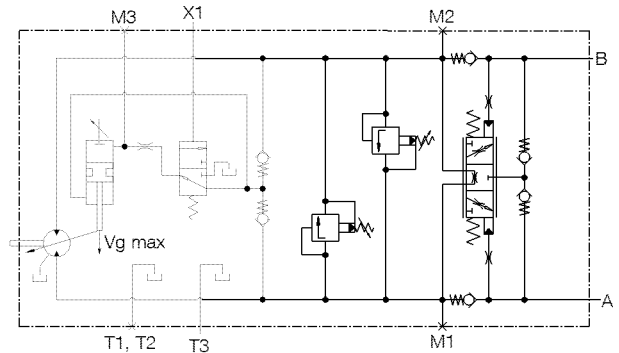
With brake valve means:

- Open circuit = flushing nozzle instead of flushing valve
- Closed circuit = flushing valve

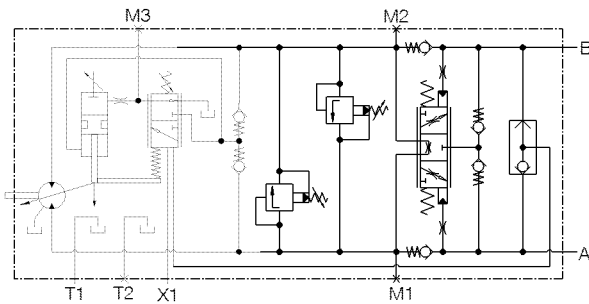
EL-DA- Control with BV
SD-DA- Control with BV



EL- Control with BV
SD- Control with BV
ZH- Control with BV



HD- Control with BV



HF3-DB-025_en

X1	Steering pressure connection ISO 9974-1	M1, M2	High pressure measuring connections ISO 9974-1
A, B	Working connections SAE J 518	M3	Regulating pressure measuring connection ISO 9974-1
T1, T2, T3	Leakage oil connection ISO 9974-1	E1	DRE plug-in terminal AMP junior Timer, 2P
M4	Steering pressure measuring connection ISO 9974-1	-	-



Note

- Oil inlet at connection A: direction of rotation = anti-clockwise
- Oil inlet at connection B: direction of rotation = clockwise

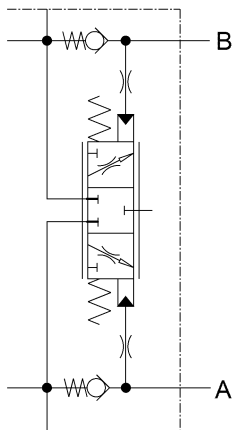
3 Type of drive and regulator

Axial piston motor

DMVA 108 to 370

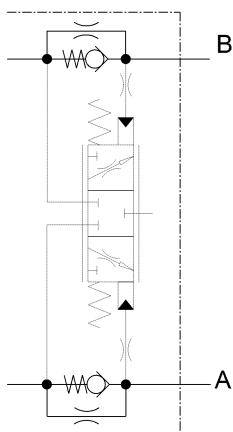
Brake valve options

Application-specific, without bypass



HF3-DB-026

Application-specific, with bypass in the non-return valve (cooling function)



HF3-DB-027

A, B	Working connections SAE J 518	-	-
------	-------------------------------	---	---



Note

Oil inlet at connection A: direction of rotation = anti-clockwise

Oil inlet at connection B: direction of rotation = clockwise

3 Type of drive and regulator

Axial piston motor

DMVA 108 to 370

3.2.4 Regulators with flushing

Note

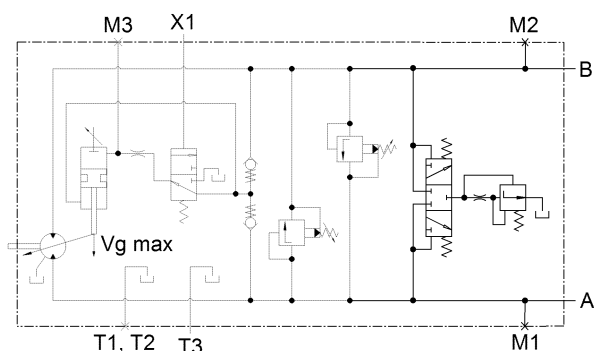
For flushing:



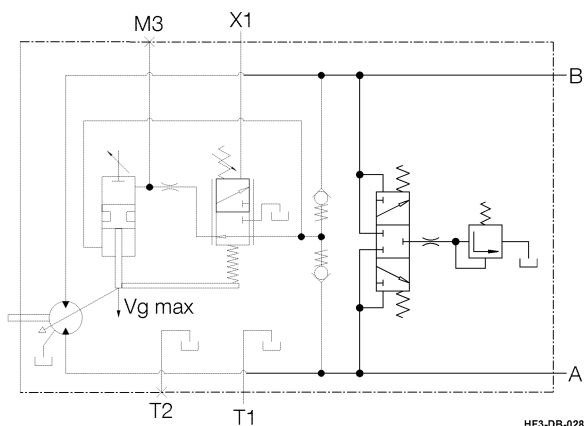
Open circuit = only without brake valve

Closed circuit = flushing compulsory

Open circuit



Closed circuit



A, B	Working connections SAE J 518	M1, M2	High pressure measuring connections ISO 9974-1
T1, T2, T3	Leakage oil connection ISO 9974-1	M3	Regulating pressure measuring connection ISO 9974-1
X1	Steering pressure connection ISO 9974-1	-	-

Note

Oil inlet at connection A: direction of rotation = anti-clockwise

Oil inlet at connection B: direction of rotation = clockwise



3 Type of drive and regulator

Axial piston motor

DMVA 108 to 370

3.2.5 Regulators with secondary pressure limiting valve

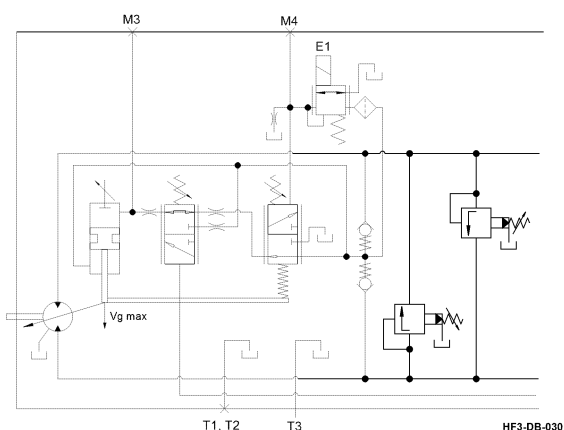


Note

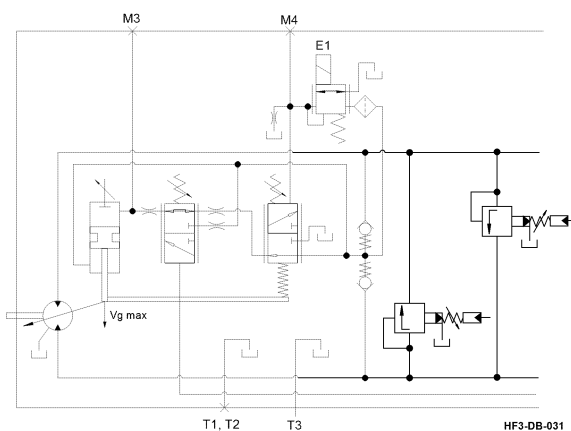
For regulators with secondary pressure limiting valve:

Only in the open circuit.

Simple design



Design with add-on stage



T1, T2, T3	Leakage oil connection ISO 9974-1	M3	Regulating pressure measuring connection ISO 9974-1
M4	Steering pressure measuring connection ISO 9974-1	E1	DRE plug-in terminal AMP junior Timer, 2P



Note

Oil inlet at connection A: direction of rotation = anti-clockwise

Oil inlet at connection B: direction of rotation = clockwise

3 Type of drive and regulator

Axial piston motor

DMVA 108 to 370

3.3 Regulator functions

- HD function / high pressure-dependent hydraulic regulation with oversteering, see chapter 3.3.1
- SD function / steering pressure-proportional hydraulic regulation, see chapter 3.3.3
- ZH function / hydraulically actuated regulation (two-position), see chapter 3.3.4
- DA function / pressure regulation, see chapter 3.3.5
- EL function / electro-proportional regulation, see chapter 3.3.6

Note

For all regulator functions:



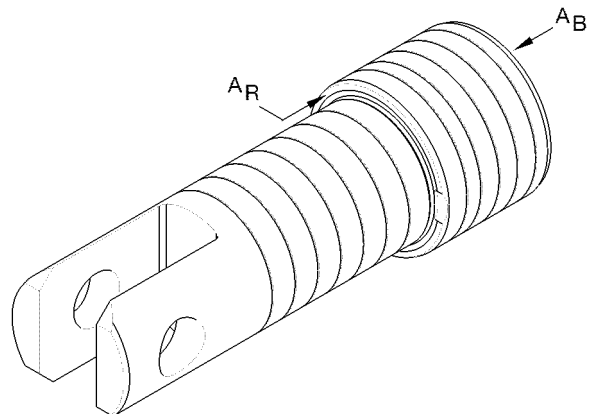
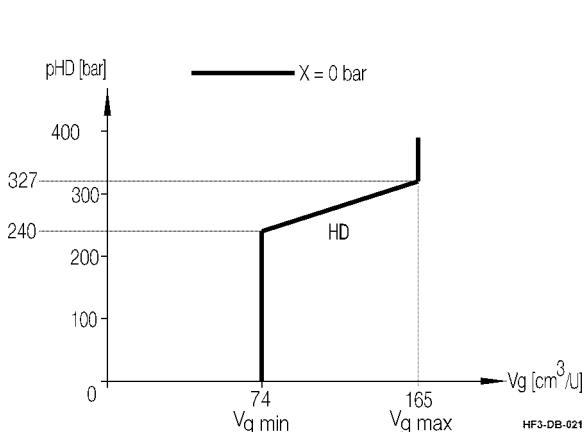
$V_{g \min}$ = small torque "M" = high speed "n"

$V_{g \max}$ = large torque "M" = low speed "n"

3.3.1 HD function

In HD regulation, the displacement V_g within the regulation range is proportionally depending on the operating pressure p_{HD} applied at the high-pressure port A / B (provided by the hydraulic pump).

Characteristic



The high pressure port A / B at the hydraulic motor is loaded with high pressure p_{HD} of the hydraulic pump.

Up to a fixed value set at the $V_{g \min}$ regulating screw, when regulation starts, e.g. 74 cm³, the adjusting piston bottom area A_B is loaded with $p_{Reg} = 0$ bar and the adjusting piston ring area A_R is loaded with high pressure p_{HD} . The axial piston unit is swivelled to $V_{g \min}$.

If p_{HD} at the high pressure port A / B exceeds the value when regulation starts, e.g. 240 bar, the regulating valve loads the adjusting piston bottom area A_B with p_{Reg} (approx. 1/2 p_{HD}). If $p_{Reg} \times A_B$ is greater than $p_{HD} \times A_R$, the adjusting piston moves and swivels the axial piston unit towards $V_{g \max}$, settling depending on the load.

With a load of 0 bar at connection X, the characteristic of the HD function is driven.

Optionally, the HD function can be oversteered.

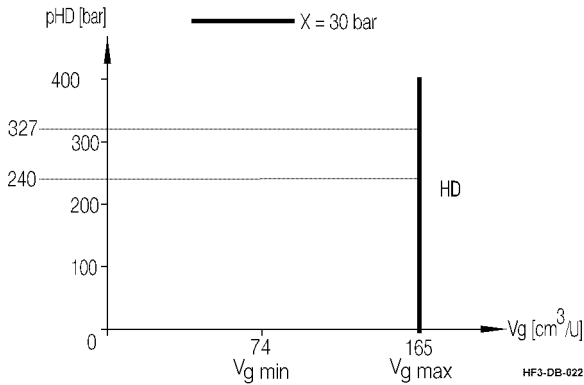
3 Type of drive and regulator

Axial piston motor

DMVA 108 to 370

3.3.2 HD oversteering

Characteristic

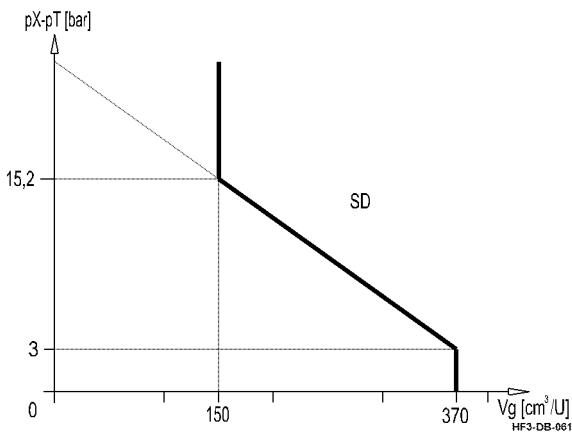


With the oversteering function, connection X is loaded with 30 bar. The axial piston unit swivels to $V_{g \max}$, regardless of the high pressure pHD at port A / B. The hydraulic motor therefore responds more sensitively with maximum torque.

3.3.3 SD function (negative characteristic)

SD regulation is suitable for applications which require a proportionally regulated displacement flow.

Characteristic



If the drive is adjusted from $V_{g \max}$ towards $V_{g \min}$, the axial piston unit swivels to a lower displacement V_g as the SD steering pressure at X1 increases.

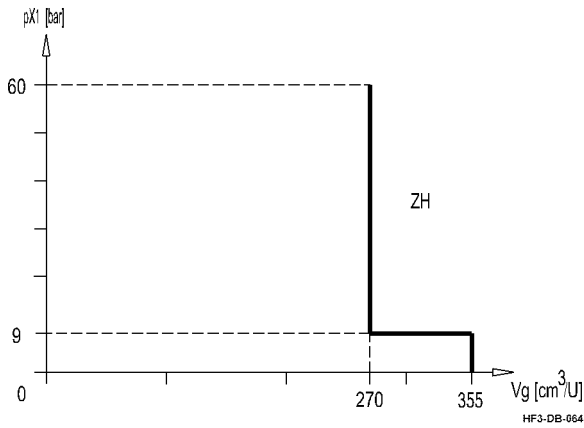
If the activating signal at X1 is decreasing, missing or defective, the axial piston unit swivels towards $V_{g \max}$.

3 Type of drive and regulator

Axial piston motor
DMVA 108 to 370

3.3.4 ZH function

Characteristic



The hydraulically-operated two-point regulation adjusts the axial piston unit either to $V_{g \max}$ or $V_{g \min}$, realised by activating or deactivating the steering signal at connection X1:

- Without steering signal, axial piston unit is at $V_{g \max}$
- With steering signal, axial piston unit is at $V_{g \min}$

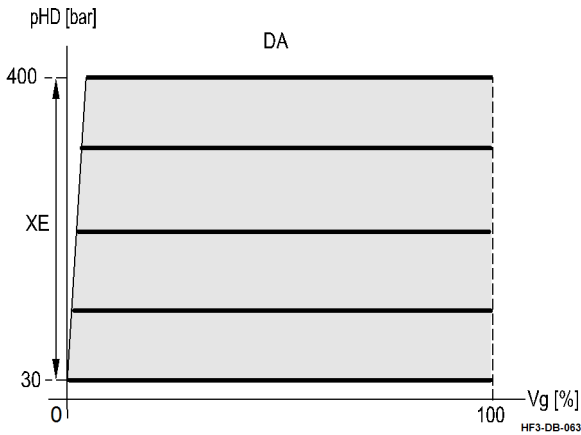
3 Type of drive and regulator

Axial piston motor

DMVA 108 to 370

3.3.5 DA function

Characteristic



The DA function regulates the displacement flow of the axial piston unit. The operating pressure is kept constant after reaching the setpoint, regardless of the torque at the driving shaft of the flange-mounted motor:

- As the output torque increases, the axial piston unit swivels towards $V_{g \max}$ to keep the operating pressure constant.
- As the output torque decreases, the axial piston unit swivels towards $V_{g \min}$ to keep the operating pressure constant.

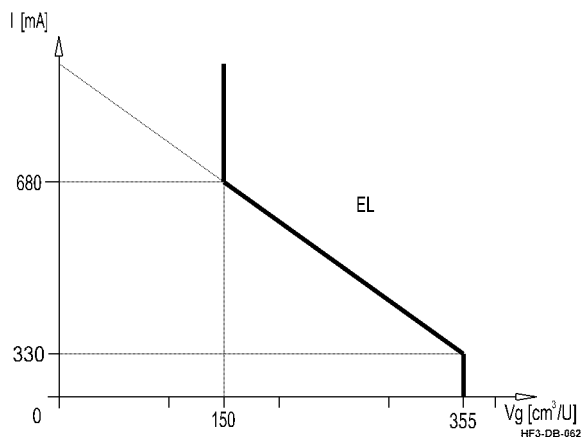
Options

- Other internal design measures for vibration damping by arrangement.

3.3.6 EL function (negative characteristic)

EL regulation is suitable for applications which require a proportionally regulated displacement flow.

Characteristic



If the drive is adjusted from $V_{g \max}$ towards $V_{g \min}$, the axial piston unit swivels to a lower displacement V_g as the activating signal at E1 increases.

If the activating signal at E1 is decreasing, missing or defective, the axial piston unit swivels towards $V_{g \max}$.

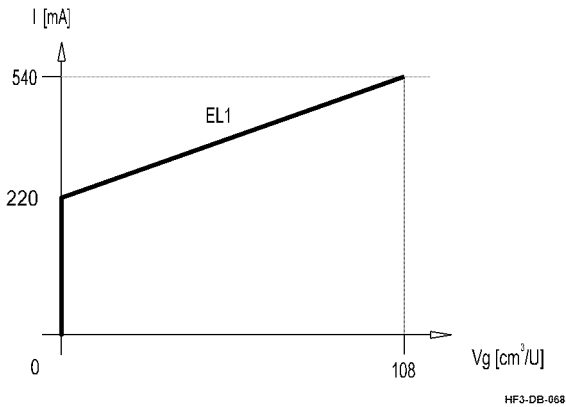
3 Type of drive and regulator

Axial piston motor
DMVA 108 to 370

3.3.7 EL1 function (positive characteristic)

EL regulation is suitable for applications which require a proportionally regulated displacement flow.

Characteristic



If the drive is adjusted from $V_{g \min}$ towards $V_{g \max}$, the axial piston unit swivels to a larger displacement V_g as the activating signal at E1 increases.

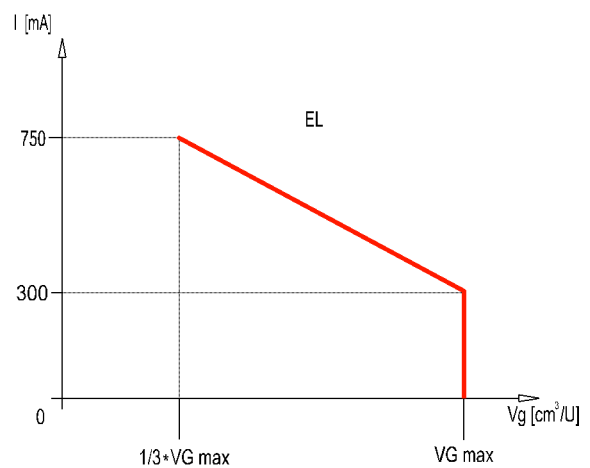
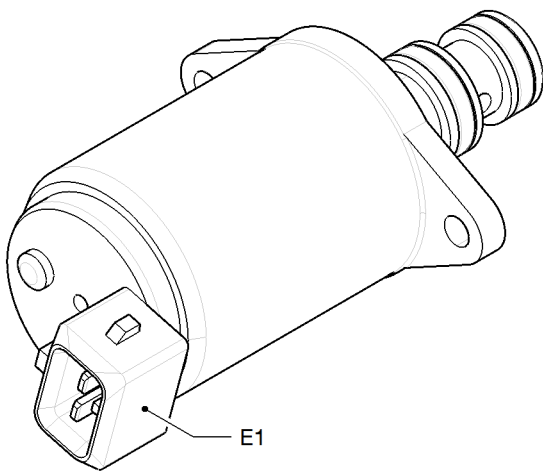
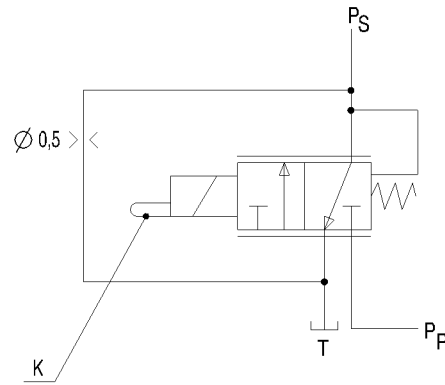
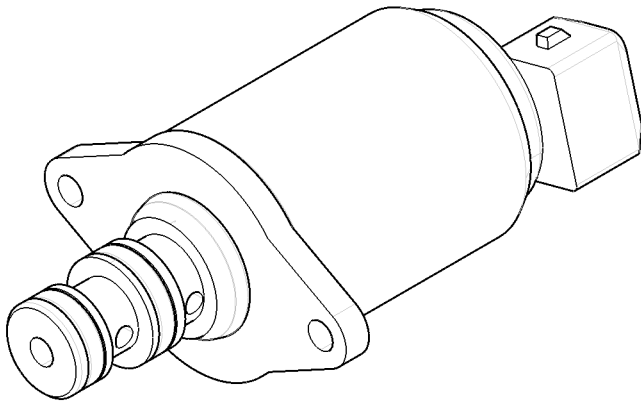
If the activating signal at E1 is decreasing, missing or defective, the axial piston unit swivels towards $V_{g \min}$.

3 Type of drive and regulator

Axial piston motor
DMVA 108 to 370

3.4 Electrical components

3.4.1 Pressure reduction valve (DRE)



HF3-DB-066

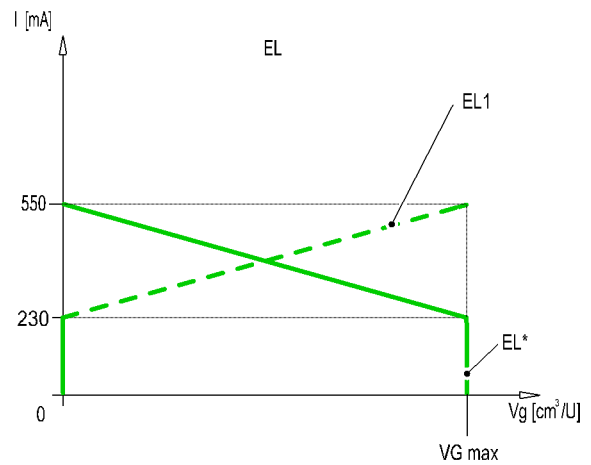
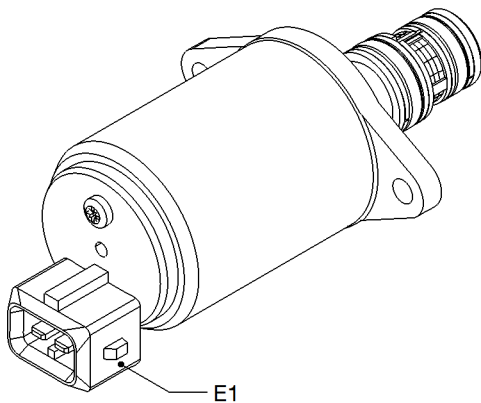
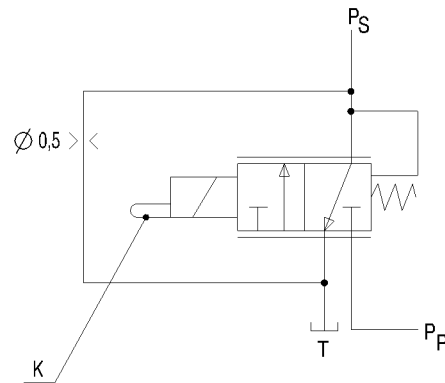
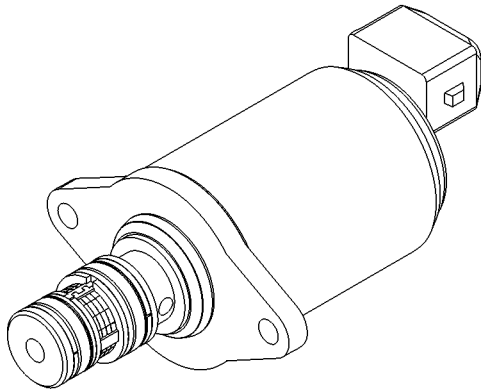
General information

Technical data of pressure reduction valve	
Rated voltage U	24 V
Current I_{\max}	750 mA
Supply pressure p_{\max}	50 bar
Magnet characteristic: flat around the regulating position	-
AMP JUNIOR TIMER plug connection	-

3 Type of drive and regulator

Axial piston motor
DMVA 108 to 370

3.4.2 Pressure reduction valve (DRE)



HF3-DB-067

General information

Technical data of pressure reduction valve	
Rated voltage U	24 V
Current I _{max.}	750 mA
Supply pressure p _{max}	350 bar
Magnet characteristic: flat around the regulating position	-
AMP JUNIOR TIMER plug connection	-

3 Type of drive and regulator

Axial piston motor
DMVA 108 to 370

3.4.3 Sensors

1.	2.	3.	/	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
DMVA			/			1	W		1	A	0			

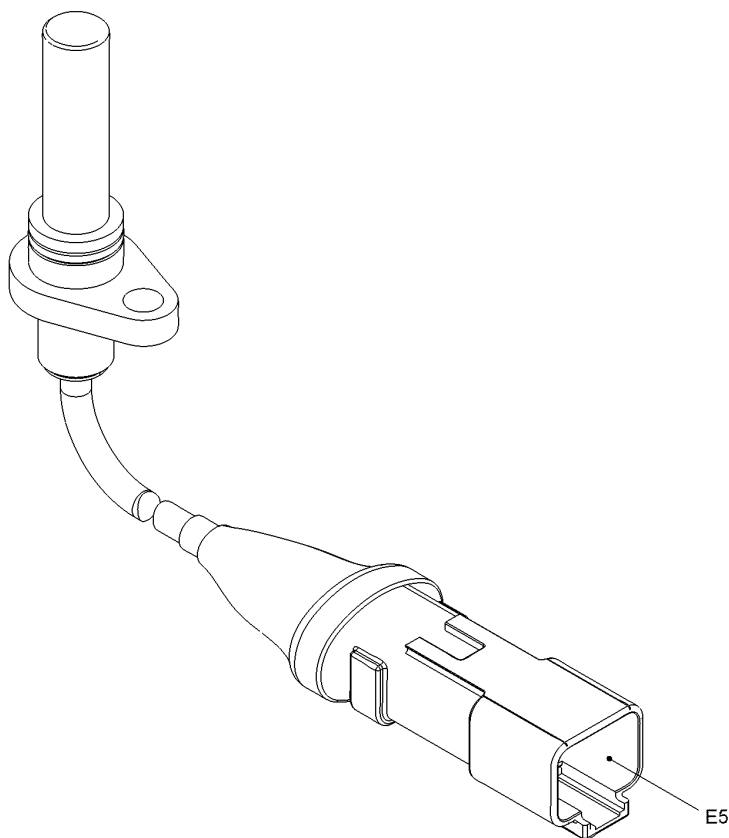
0 without sensor

D* with speed sensor

W* with rotation angle sensor

* can be combined, separated by hyphen, e.g.: D-W

Speed sensor



HF3-DB-065

General information

Technical data of speed sensor	
Technical data according to BA 374E-64799	-
Plug-in terminal Deutsch DT04-4P-CE04	-



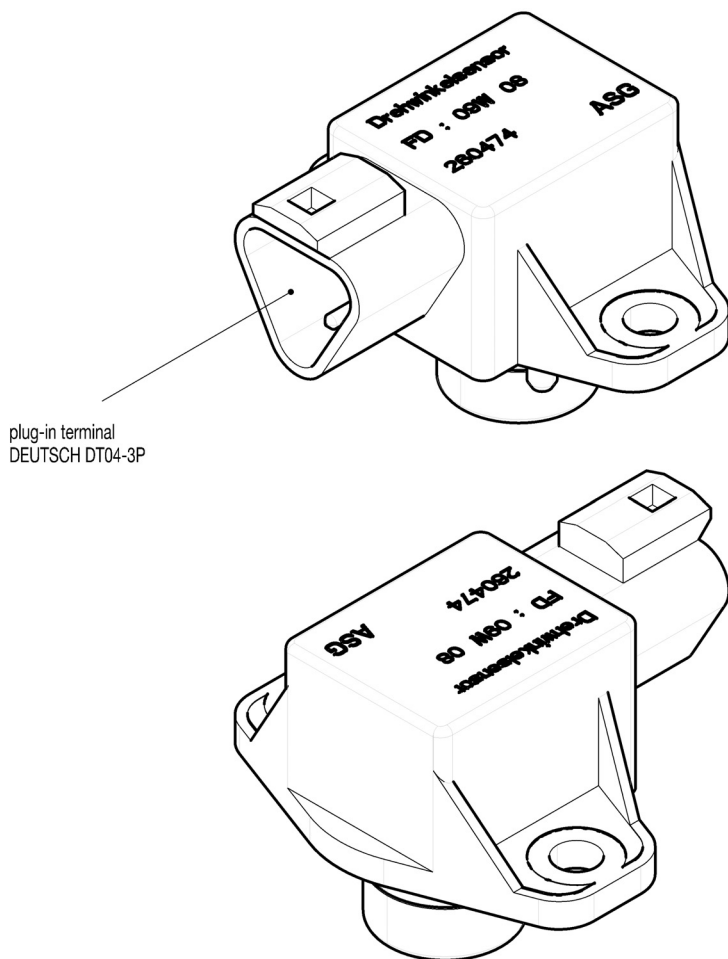
Note

The speed sensor cannot be retrofitted and must be included in the reconfiguration of the DMVA.

3 Type of drive and regulator

Axial piston motor
DMVA 108 to 370

Rotation angle sensor



HF7-DB-140

General information

Technical data of rotation angle sensor	
Rated voltage U	5 V
Measuring range	-27° to +27°
Output signal	0.5 VDC to 4.5 VDC
Working temperature	-40 °C to +125 °C
Plug-in terminal Deutsch DT04-3P	-



Note

The angle sensor cannot be retrofitted and must be included in the reconfiguration of the DMVA.

4 Installation conditions

Axial piston motor

DMVA 108 to 370

The installation variant for the device or system must be coordinated with Liebherr, as well as the installation position, at the conceptual design stage of the axial piston unit and must be approved by Liebherr.

The factory values set by Liebherr are only preset values:

- Readjust the settings on the device or on the system if necessary.
 - Prevent foaming: Make sure that the lines meet at least 200 mm below the minimum liquid level in the tank in every installation variant / position.
-



Note

Liebherr recommends:

Lay the leakage oil lines so that they are above the level of the axial piston unit.

Design the hydraulic fluid tank so that the hydraulic oil cools off sufficiently during circulation and impurities that develop during operation settle to the bottom of the tank.

Liebherr distinguishes between two installation variants for axial piston units: A and B, and six installation positions: 1-6.



Note

Liebherr recommends:

Installation variant: Under-the-tank installation A

Installation position: Horizontal driving shaft, regulator on top

4 Installation conditions

Axial piston motor
DMVA 108 to 370

4.1 Installation variants

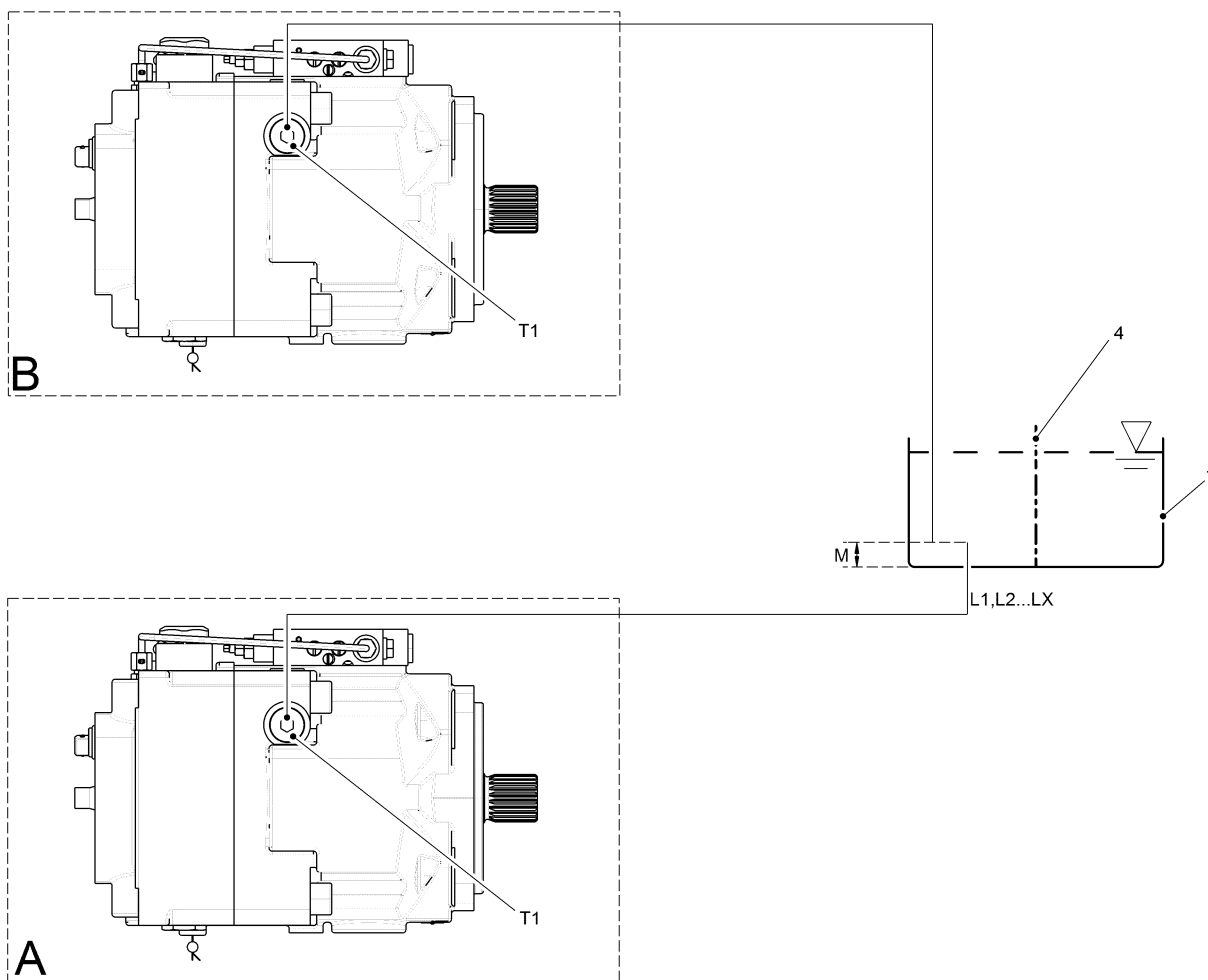


Note

When using the DMVA in a "closed circuit", the installation variant is irrelevant due to the missing tank.

Under-the-tank installation "A": Axial piston unit is installed **under** the minimum liquid level of the tank.

Over-the-tank installation "B": Axial piston unit is installed **over** the minimum liquid level of the tank.



HF3-DB-019

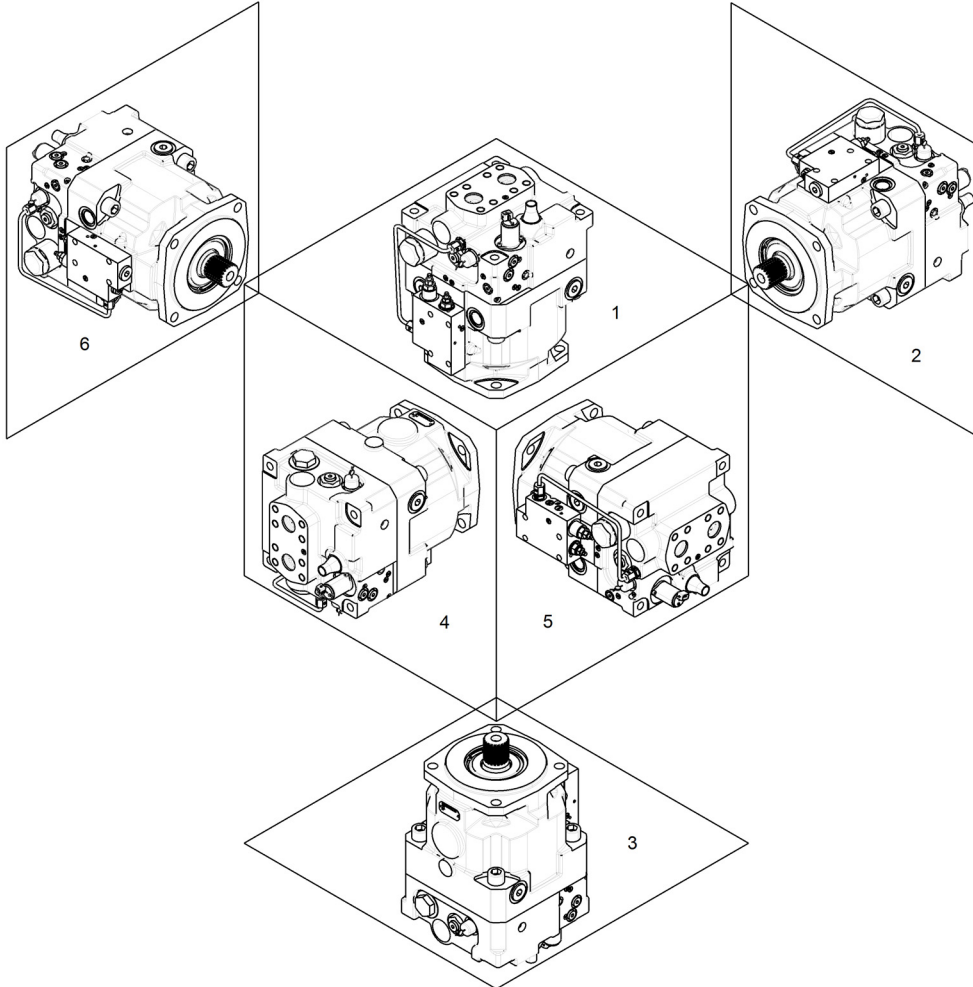
4	Baffle	To calm the hydraulic fluid in the tank
L1, L2...LX	Leakage oil line	Depiction of the feed into the tank is only an example, additional connection options possible, observe distance of the ends of the lines M!
M	Minimum line end distance from tank bottom	115 mm
T	Tank	-
T1	Leakage oil connection	-

4 Installation conditions

Axial piston motor
DMVA 108 to 370

4.2 Installation locations

In each of the two installation variants, there are six possible installation locations.



HF3-DB-020

ATTENTION

The air cushion in the bearing area or on the rotary shaft lip seal “runs hot” in installation positions 1 and 3!
Damage of the hydraulic product.



Make sure that the following requirements are observed:

- Housing is completely filled with hydraulic fluid during commissioning and operation.
- Housing is ventilated during commissioning and operation.

Check hydraulic fluid level in the housing regularly.

Note



Liebherr recommends:

Consult with Liebherr to install a non-return valve with an opening pressure of a maximum of 0.5 bar.
Emptying of the axial piston unit is prevented in installation location 3 and installation variant B.

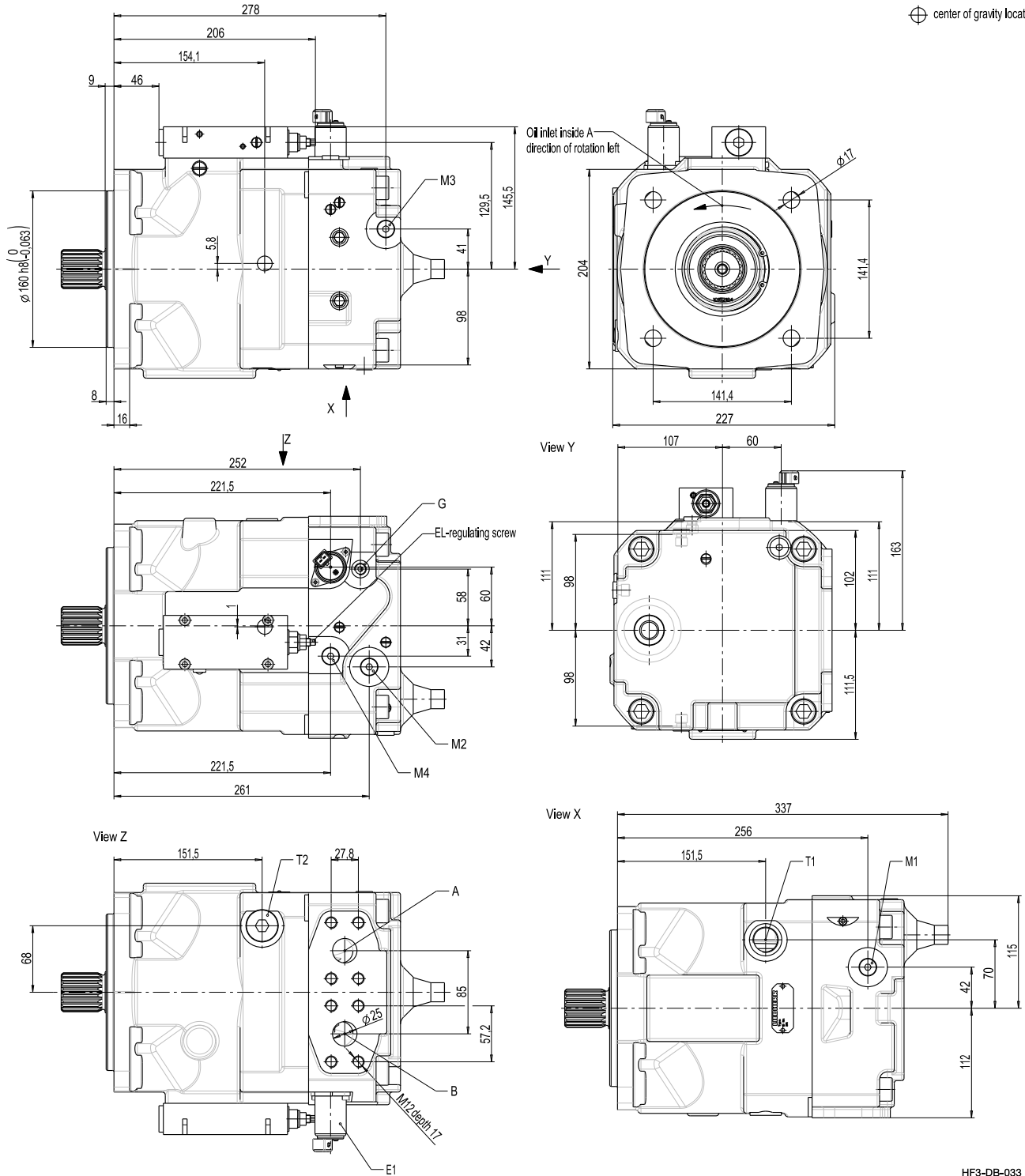
5 Dimensions

Axial piston motor
DMVA 108 to 370

5.1 Nominal size 108

5.1.1 Nominal size 108, regulator EL / EL1

⊕ center of gravity location



HF3-DB-033_en

A / B	Working connection SAE J 518 - 1", 6000 psi
T1 / T2	Leakage oil connection ISO 9974-1, M26x1.5

M4	Steering pressure meas. port ISO 9974-1, M12x1.5
G	Adjusting pressure supply ISO 9974-1, M12x1.5


5 Dimensions

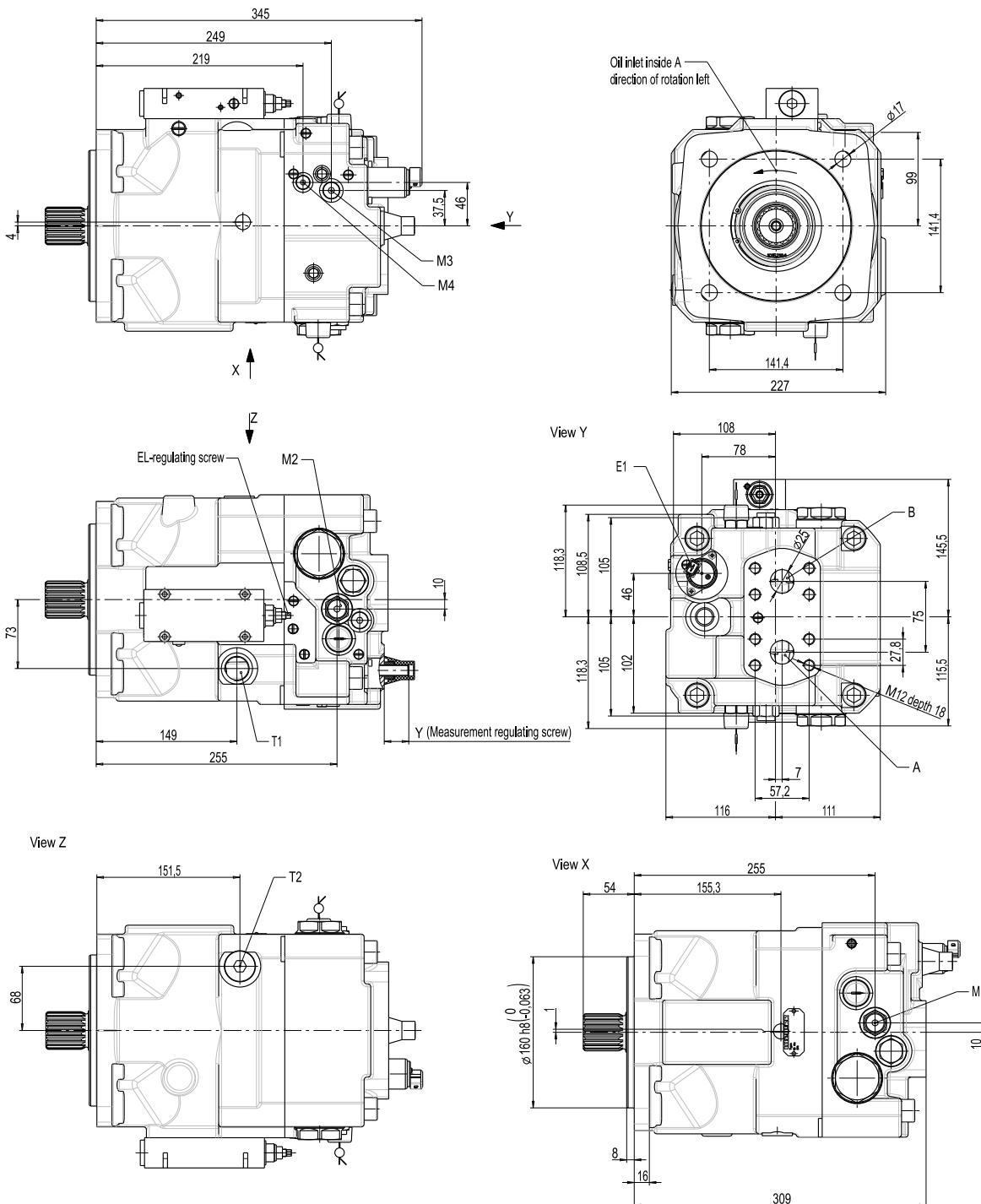
Axial piston motor
DMVA 108 to 370

E1	DRE / AMP Junior Timer 2-pin, PWM= 100 Hz, Un= 24 V, I _{max.} = 750 mA
M1 / M2	High pressure meas. port ISO 9974-1, M12x1.5

M3	Adjusting pressure meas. port ISO 9974-1, M12x1.5
-	-

5.1.2 Nominal size 108, EL-DA regulator with brake valve

 center of gravity location



A / B	Working connection SAE J 518 - 1", 6000 psi
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M4	Steering pressure meas. port ISO 9974-1, M10x1
----	--

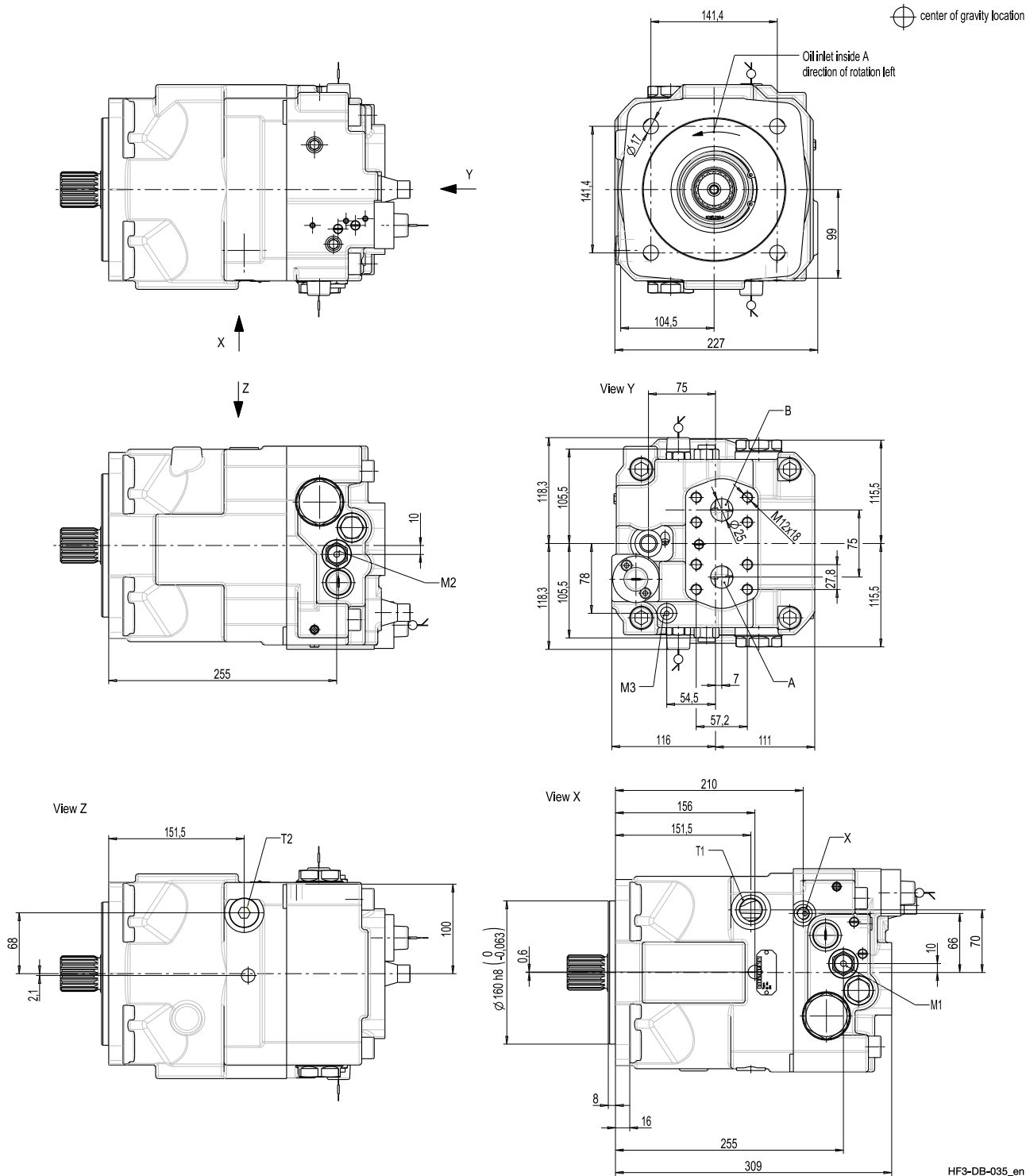
5 Dimensions

Axial piston motor
DMVA 108 to 370

T1 / T2	Leakage oil connection ISO 9974-1, M26x1.5
E1	DRE / AMP Junior Timer 2-pin, PWM= 100 Hz, Un= 24 V, I _{max.} = 750 mA

M1 / M2	High pressure meas. port ISO 9974-1, M14x1.5
M3	Adjusting pressure meas. port ISO 9974-1, M12x1.5

5.1.3 Nominal size 108, HD regulator with brake valve



A / B	Working connection SAE J 518 - 1", 6000 psi
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M3	Adjusting pressure meas. port ISO 9974-1, M10x1
----	---

5 Dimensions

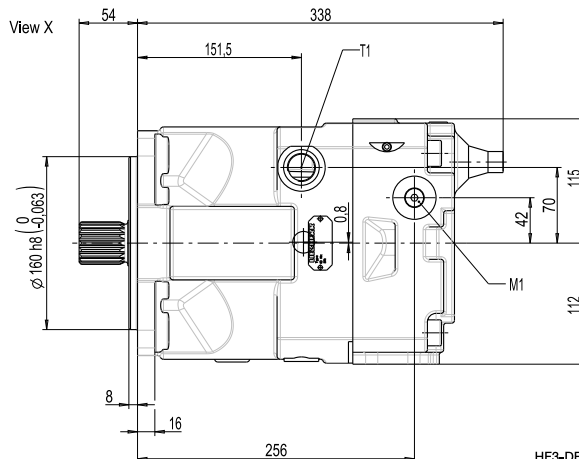
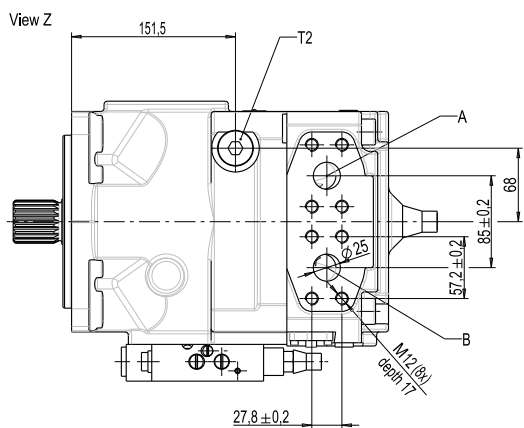
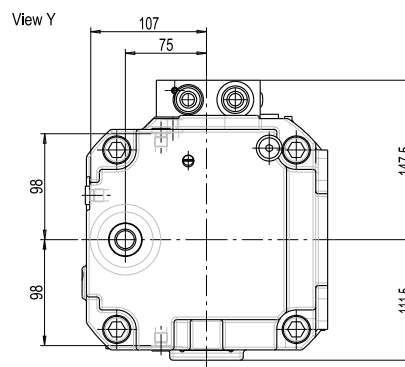
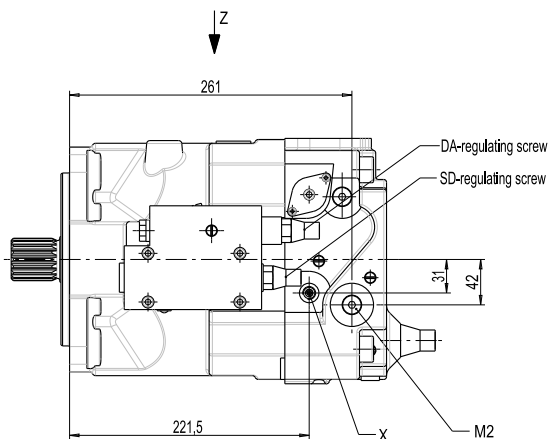
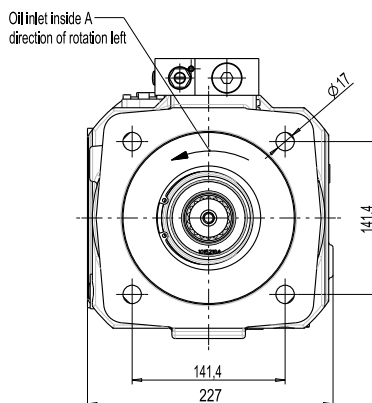
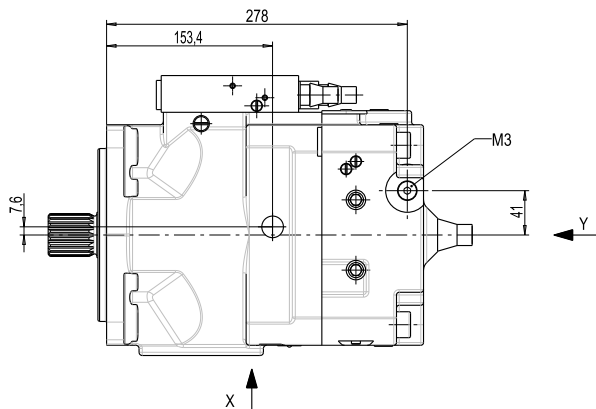
Axial piston motor
DMVA 108 to 370

T1 / T2	Leakage oil connection ISO 9974-1, M26x1.5
M1 / M2	High pressure meas. port ISO 9974-1, M14x1.5

X	Steering pressure port ISO 9974-1, M14x1.5
-	-

5.1.4 Nominal size 108 / SD-DA regulator

⊕ center of gravity location



HF3-DB-036_en

A / B	Working connection SAE J 518 - 1", 6000 psi
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M3	Adjusting pressure meas. port ISO 9974-1, M12x1.5
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5 Dimensions

Axial piston motor
DMVA 108 to 370

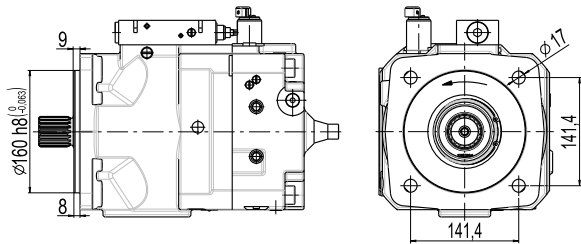
T1 / T2	Leakage oil connection ISO 9974-1, M26x1.5
M1 / M2	High pressure meas. port ISO 9974-1, M12x1.5

X	Steering pressure port ISO 9974-1, M12x1.5
-	-

5.2 Nominal size 108, mounting flange

1.	2.	3.	/	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
DMVA			/			1	W		1	A	0			

ISO 3019-2



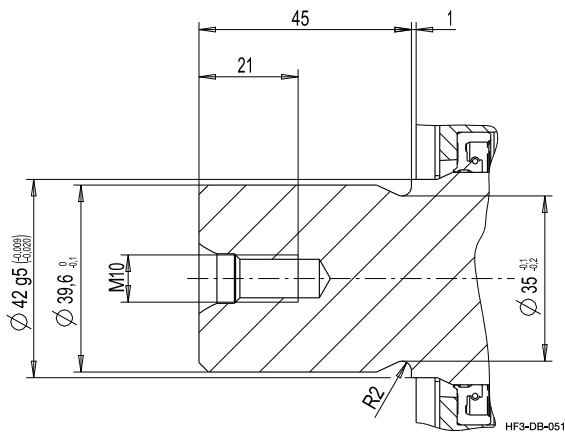
HF3-DB-050

31

5.3 Nominal size 108, shaft end

1.	2.	3.	/	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
DMVA			/			1	W		1	A	0			

DIN 5480 splined shaft W40x2x18x9g



HF3-DB-051

1

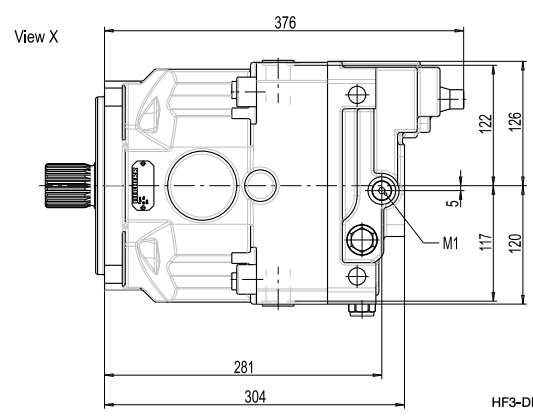
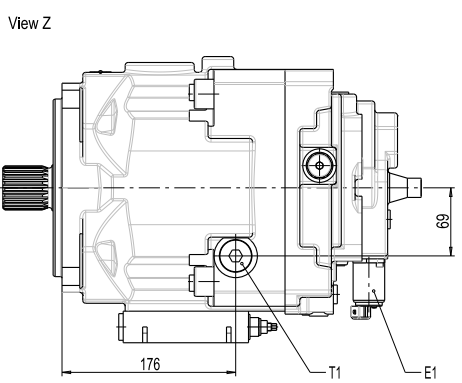
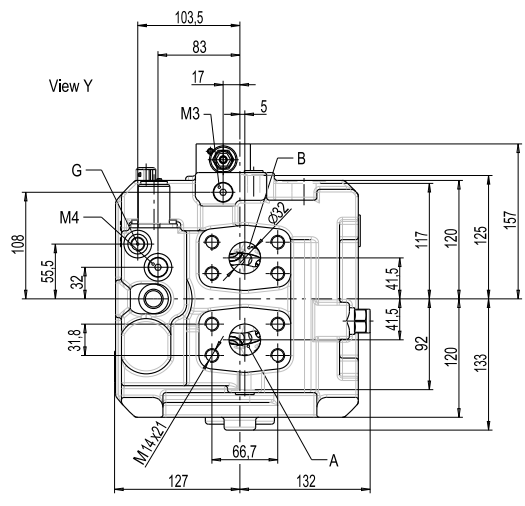
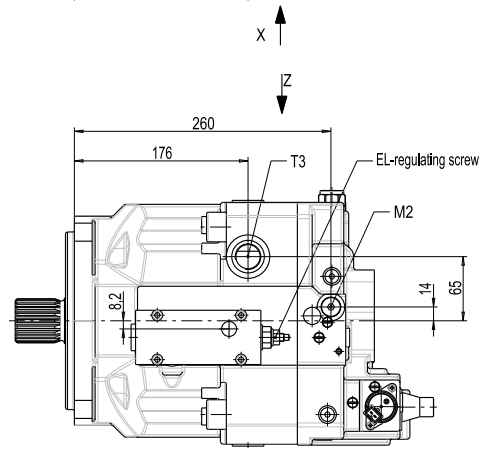
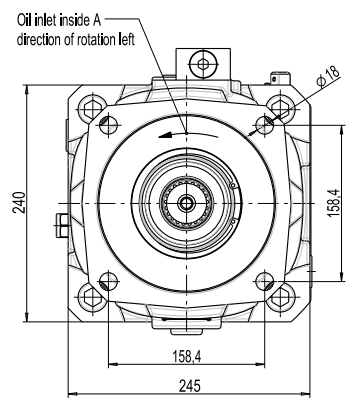
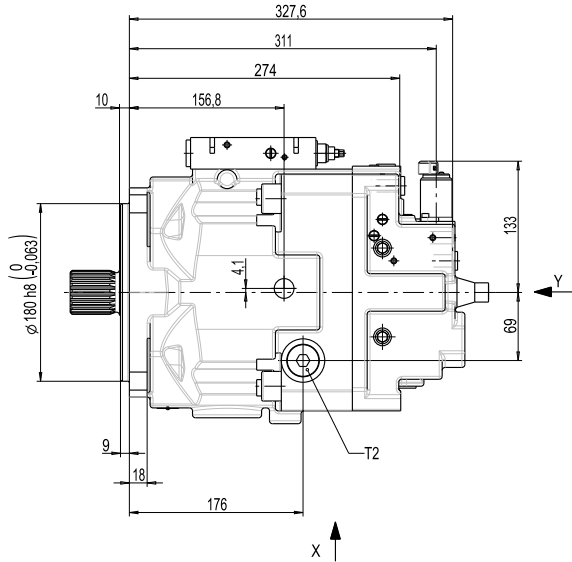
5 Dimensions

Axial piston motor
DMVA 108 to 370

5.4 Nominal size 165

5.4.1 Nominal size 165, EL regulator

center of gravity location



HF3-DB-037_en

E1	DRE / AMP Junior Timer 2-pin, PWM= 100 Hz, Un= 24 V, I _{max.} = 750 mA
A / B	Working connection SAE J 518 - 1, 1/4", 6000 psi

M3	Adjusting pressure meas. port ISO 9974-1, M14x1.5
M4	Steering pressure meas. port ISO 9974-1, M14x1.5

5 Dimensions

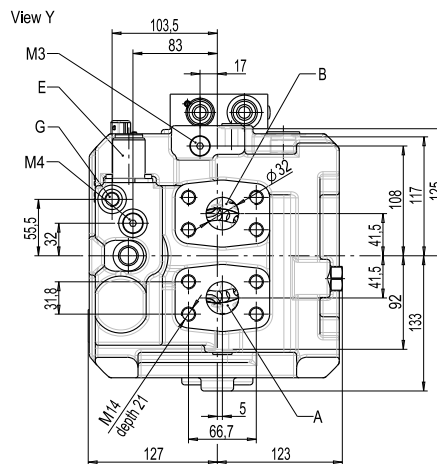
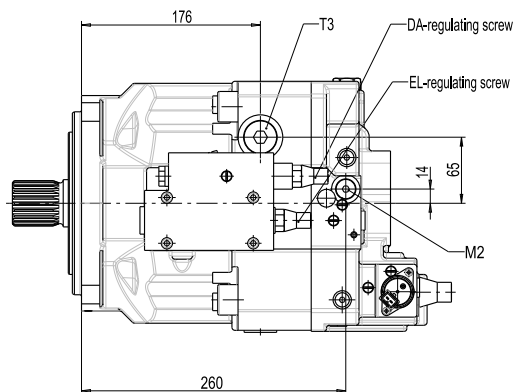
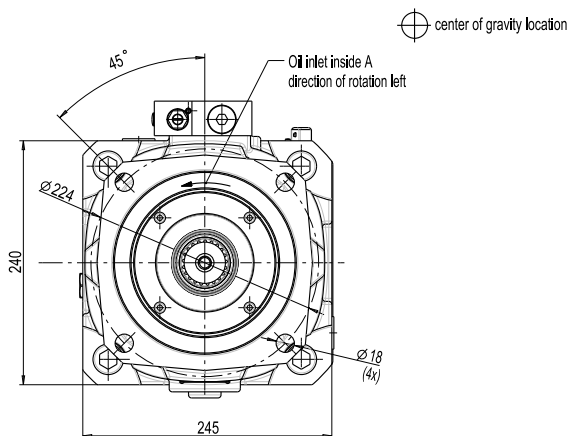
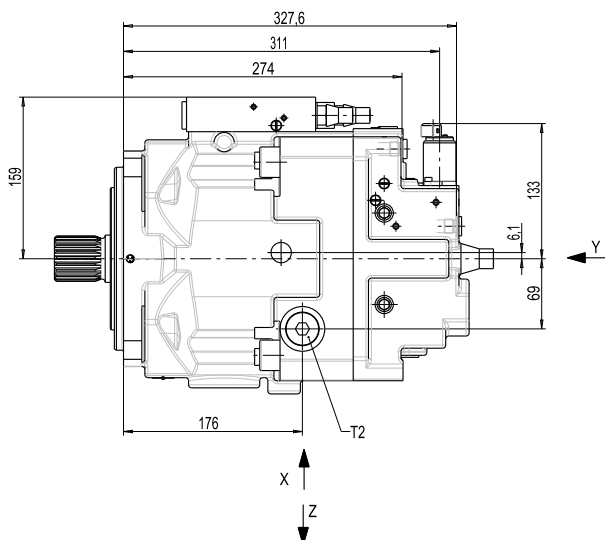
Axial piston motor

DMVA 108 to 370

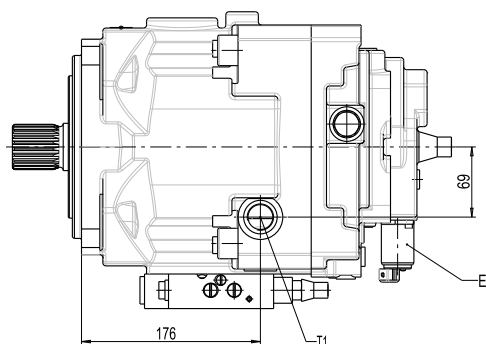
T1/T2/T3	Leakage oil connection ISO 9974-1, M26x1.5
M1 / M2	High pressure meas. port ISO 9974-1, M14x1.5

G	Adjusting pressure supply ISO 9974-1, M14x1.5
-	-

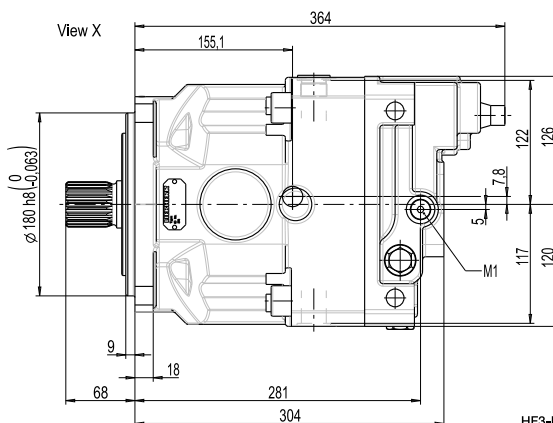
5.4.2 Nominal size 165, EL-DA regulator



View Z



View X



HF3-DB-038_en

A / B	Working connection SAE J 518 - 1, 1/4", 6000 psi
-------	--

M4	Steering pressure meas. port ISO 9974-1, M10x1
----	--

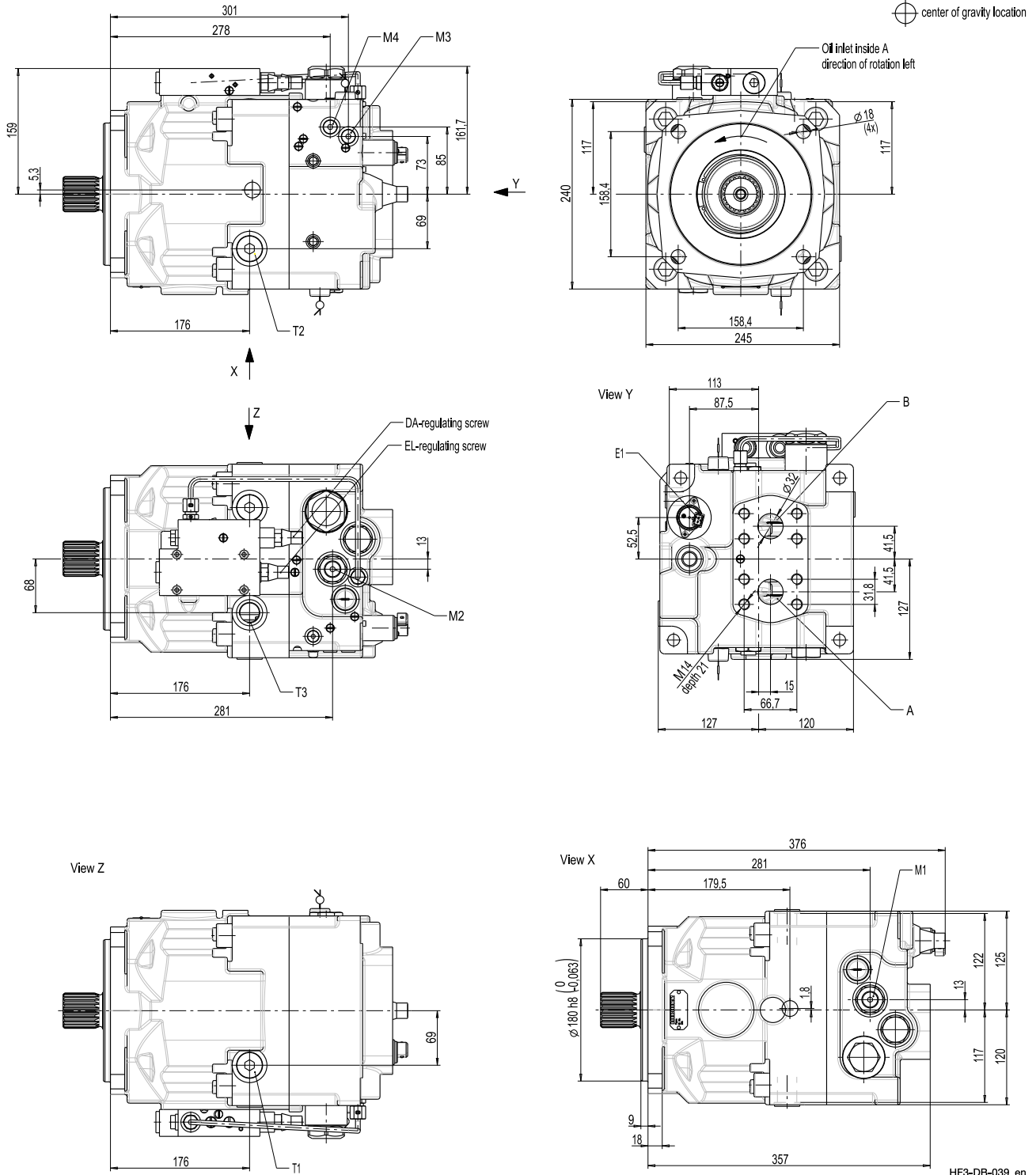
5 Dimensions

Axial piston motor
DMVA 108 to 370

T1 / T2	Leakage oil connection ISO 9974-1, M26x1.5
E1	DRE / AMP Junior Timer 2-pin, PWM= 100 Hz, Un= 24 V, I _{max.} = 750 mA

M1 / M2	High pressure meas. port ISO 9974-1, M14x1.5
M3	Adjusting pressure meas. port ISO 9974-1, M12x1.5

5.4.3 Nominal size 165, EL-DA regulator with brake valve



A / B	Working connection SAE J 518 - 1, 1/4", 6000 psi
-------	--

M4	Steering pressure meas. port ISO 9974-1, M12x1.5
----	--

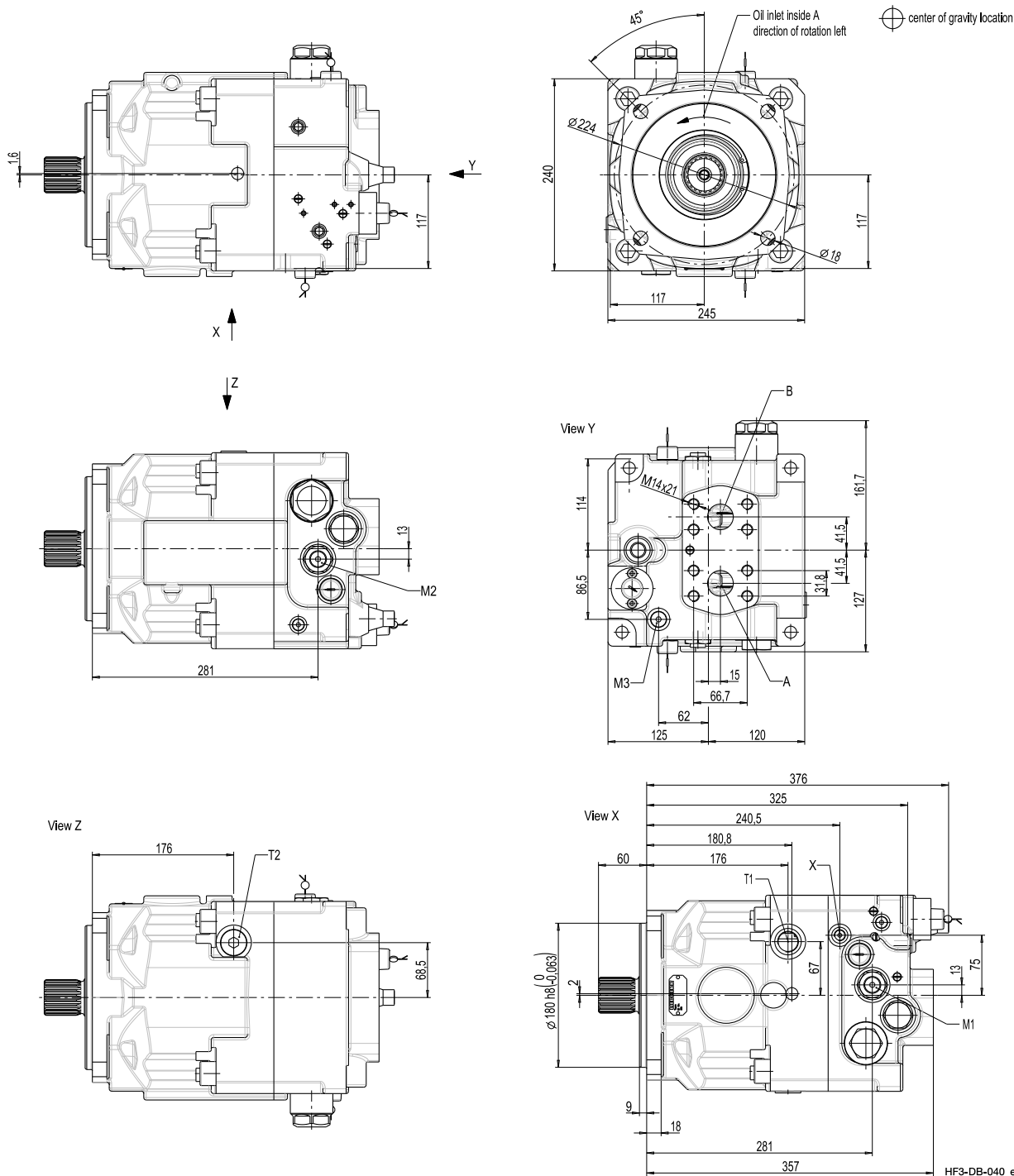
5 Dimensions

Axial piston motor
DMVA 108 to 370

T1/T2/T3	Leakage oil connection ISO 9974-1, M26x1.5
M1 / M2	High pressure meas. port ISO 9974-1, M14x1.5
E1	DRE / AMP Junior Timer 2-pin, PWM= 100 Hz, Un= 24 V, I _{max.} = 750 mA

-	-
-	-
M3	Adjusting pressure meas. port ISO 9974-1, M12x1.5

5.4.4 Nominal size 165, HD regulator with brake valve



A / B	Working connection SAE J 518 - 1, 1/4", 6000 psi
-------	--

M3	Adjusting pressure meas. port ISO 9974-1, M14x1.5
----	---

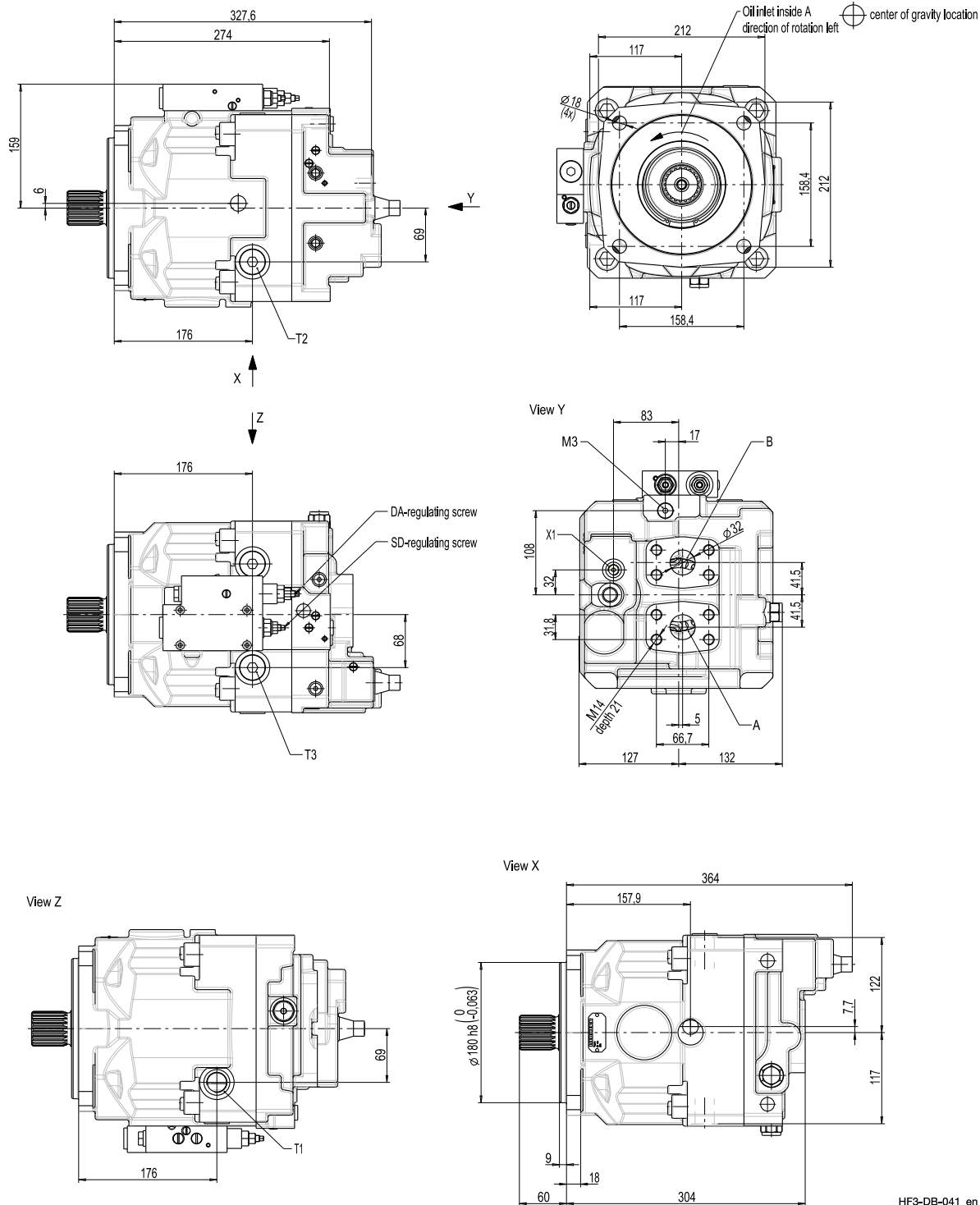
5 Dimensions

Axial piston motor
DMVA 108 to 370

T1 / T2	Leakage oil connection ISO 9974-1, M26x1.5
M1 / M2	High pressure meas. port ISO 9974-1, M14x1.5

X	Steering pressure port ISO 9974-1, M14x1.5
-	-

5.4.5 Nominal size 165, SD-DA regulator



A / B	Working connection SAE J 518 - 1, 1/4", 6000 psi
T1/T2/T3	Leakage oil connection ISO 9974-1, M26x1.5

M3	Adjusting pressure meas. port ISO 9974-1, M14x1.5
X1	Steering pressure port ISO 9974-1, M14x1.5

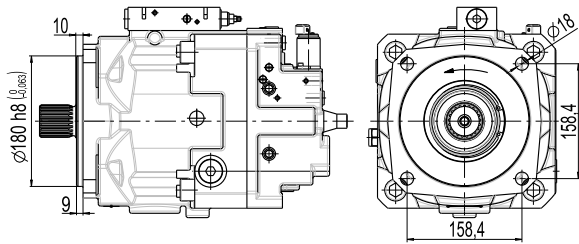
5 Dimensions

Axial piston motor
DMVA 108 to 370

5.5 Nominal size 165, mounting flange

1.	2.	3.	/	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
DMVA			/			1	W		1	A	0			

ISO 3019-2



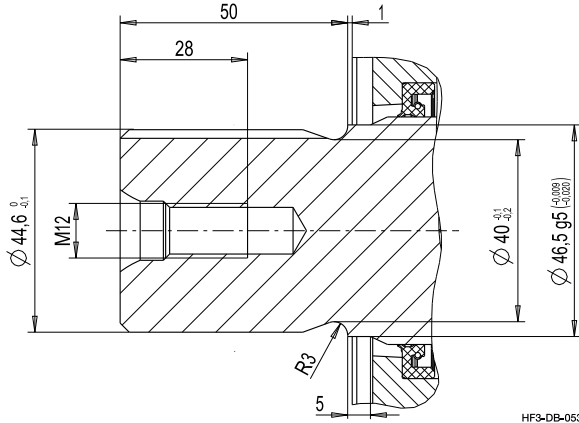
31

HF3-DB-052

5.6 Nominal size 165, shaft end

1.	2.	3.	/	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
DMVA			/			1	W		1	A	0			

DIN 5480 splined shaft W45x2x21x9g



1

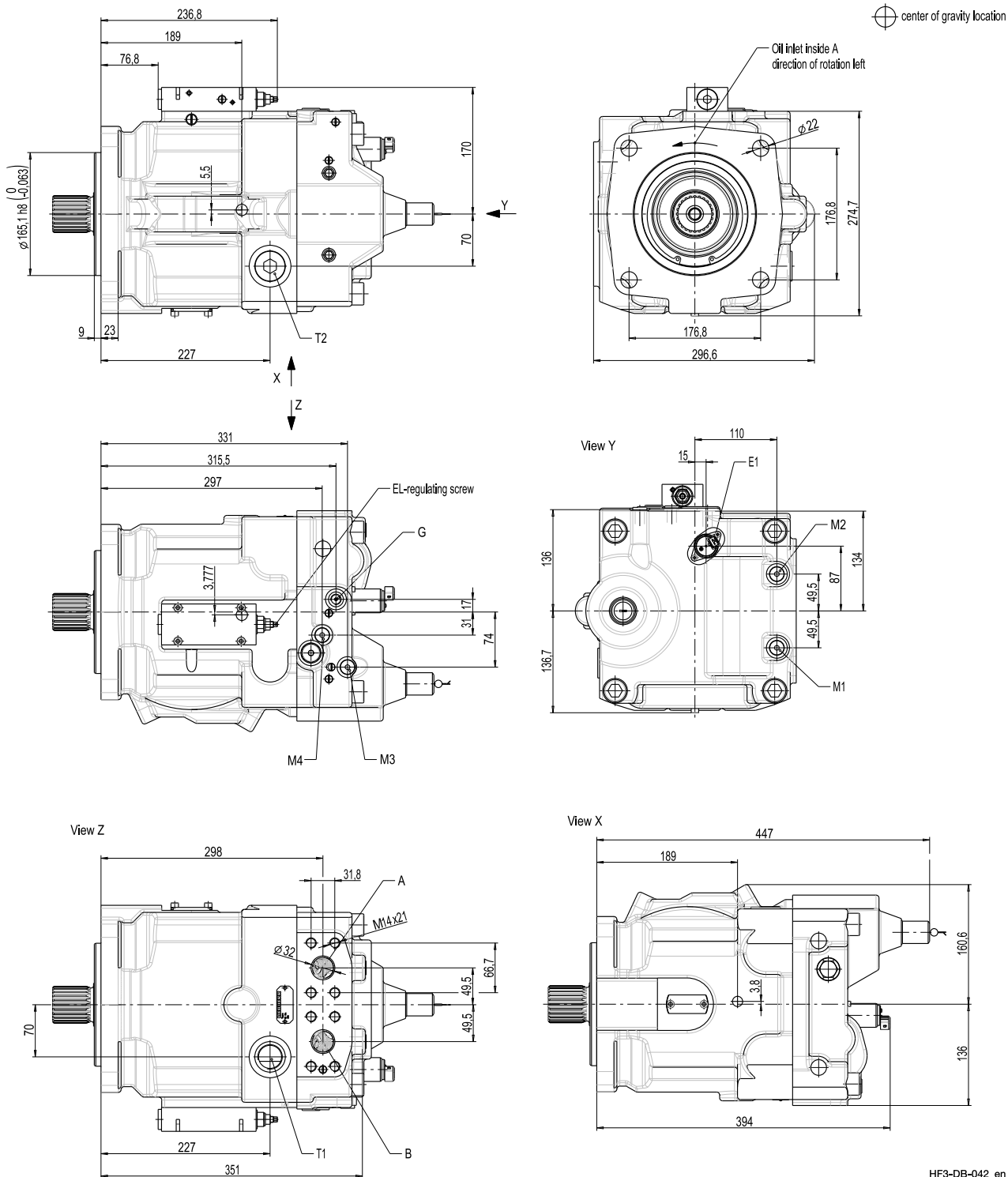
HF3-DB-053

5 Dimensions

Axial piston motor
DMVA 108 to 370

5.7 Nominal size 215

5.7.1 Nominal size 215, EL regulator



E1	DRE / AMP Junior Timer 2-pin, PWM= 100 Hz, Un= 24 V, I _{max.} = 750 mA
A / B	Working connection SAE J 518 - 1, 1/4", 6000 psi

M3	Adjusting pressure meas. port ISO 9974-1, M14x1.5
M4	Steering pressure meas. port ISO 9974-1, M14x1.5

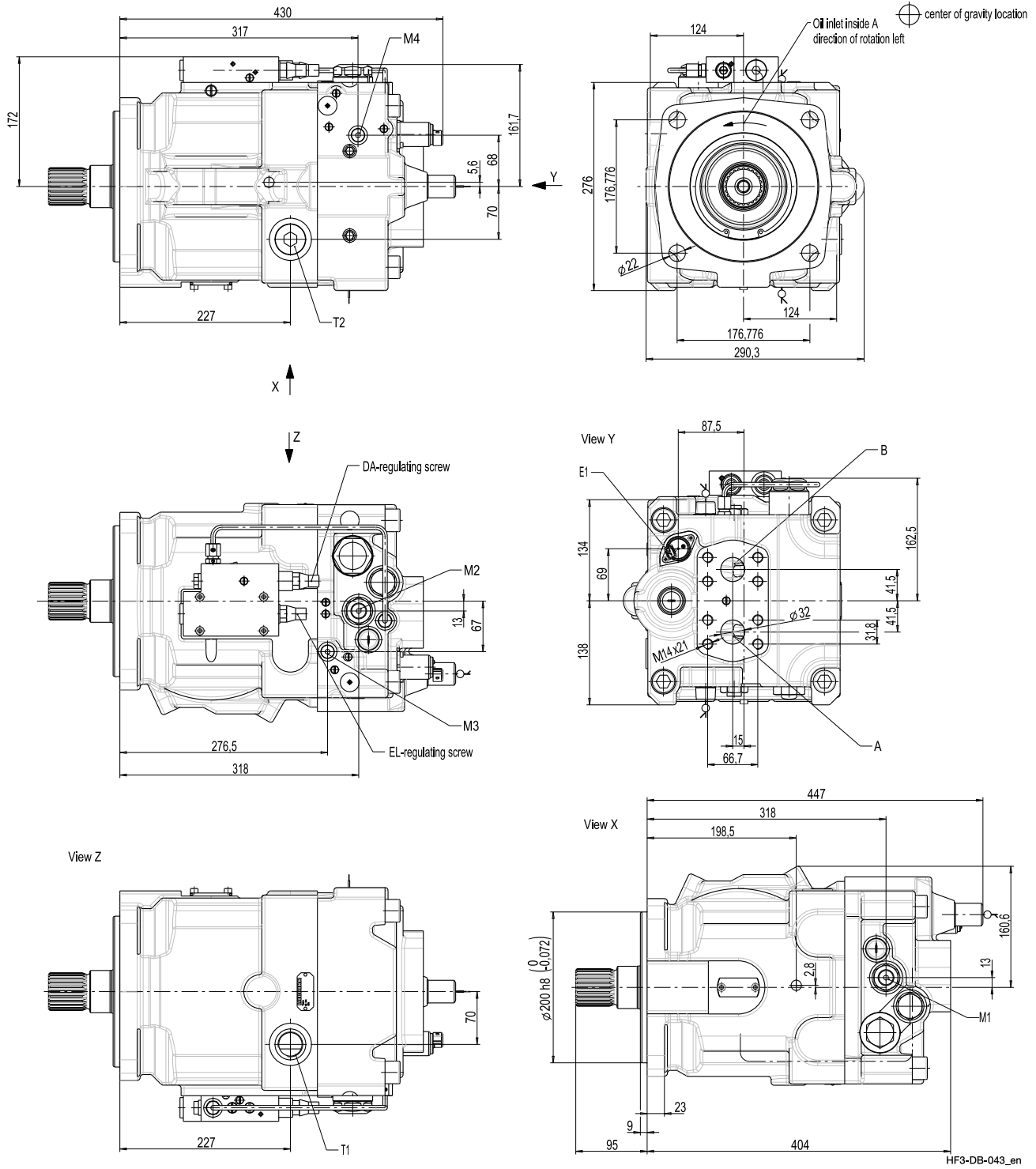
5 Dimensions

Axial piston motor
DMVA 108 to 370

T1 / T2	Leakage oil connection ISO 9974-1, M33x2
M1 / M2	High pressure meas. port ISO 9974-1, M14x1.5

G	Adjusting pressure supply ISO 9974-1, M14x1.5
-	-

5.7.2 Nominal size 215, EL-DA regulator with brake valve



E1	DRE / AMP Junior Timer 2-pin, PWM= 100 Hz, Un= 24 V, I _{max.} = 750 mA
----	---

M3	Adjusting pressure meas. port ISO 9974-1, M12x1.5
----	---

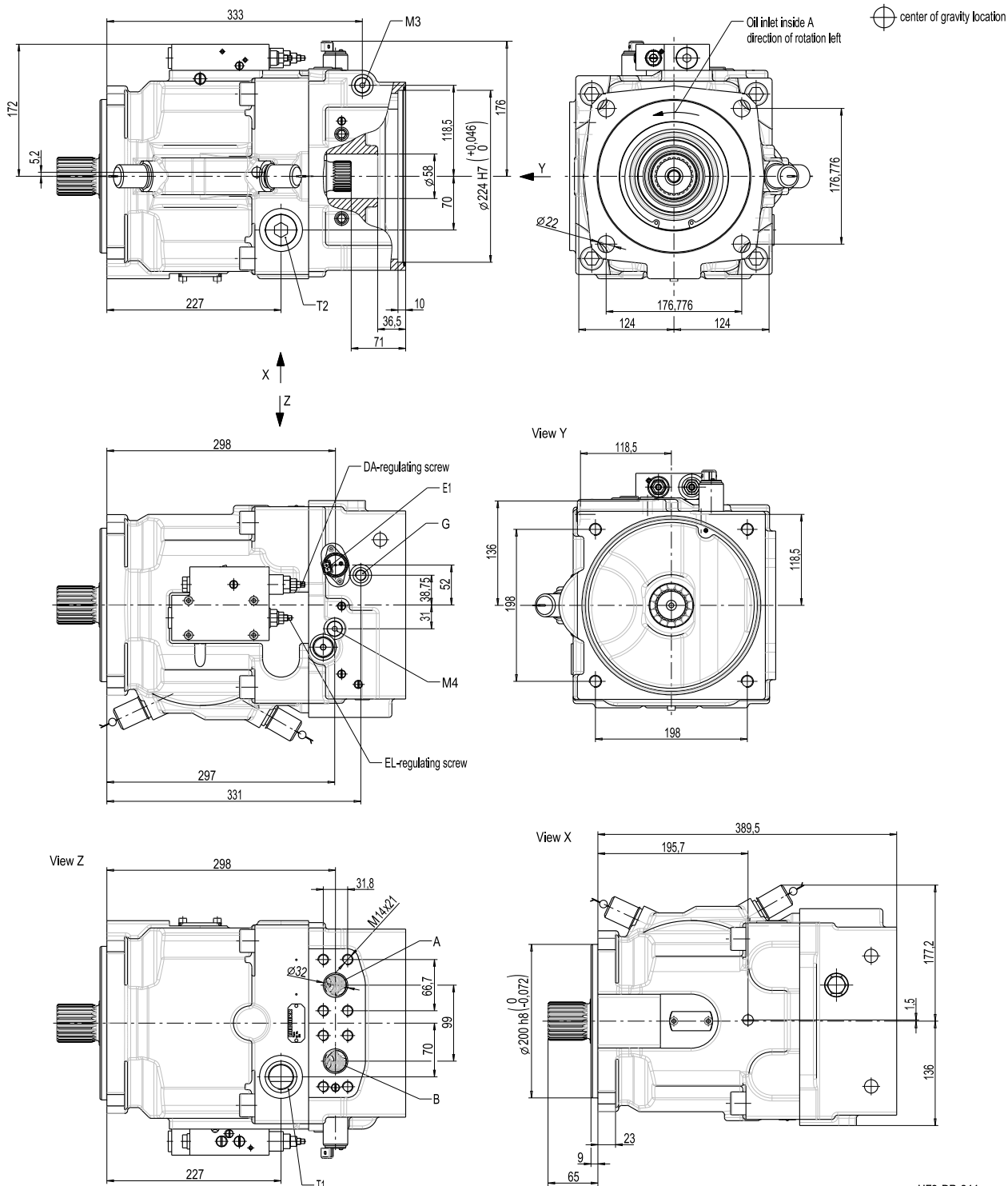
5 Dimensions

Axial piston motor
DMVA 108 to 370

A / B	Working connection SAE J 518 - 1, 1/4", 6000 psi
T1 / T2	Leakage oil connection ISO 9974-1, M33x2

M4	Steering pressure meas. port ISO 9974-1, M12x1.5
M1 / M2	High pressure meas. port ISO 9974-1, M14x1.5

5.7.3 Nominal size 215, EL-DA regulator with through-drive



A / B	Working connection SAE J 518 - 1, 1/4", 6000 psi
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M4	Steering pressure meas. port ISO 9974-1, M14x1.5
----	--

5 Dimensions

Axial piston motor
DMVA 108 to 370

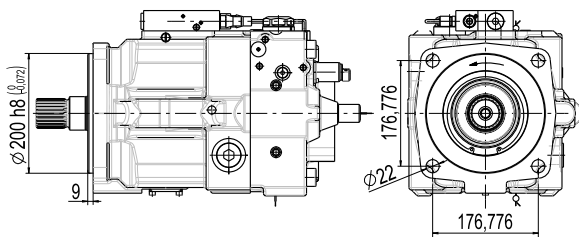
T1 / T2	Leakage oil connection ISO 9974-1, M33x2
E1	DRE / AMP Junior Timer 2-pin, PWM= 100 Hz, Un= 24 V, I _{max.} = 750 mA

G	Adjusting pressure supply ISO 9974-1, M14x1.5
M3	Adjusting pressure meas. port ISO 9974-1, M14x1.5

5.8 Nominal size 215, mounting flange

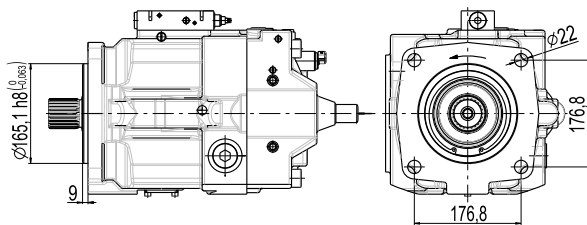
1.	2.	3.	/	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
DMVA			/			1	W		1	A	0			

ISO 3019-2



HF3-DB-054

Customised design



HF3-DB-055

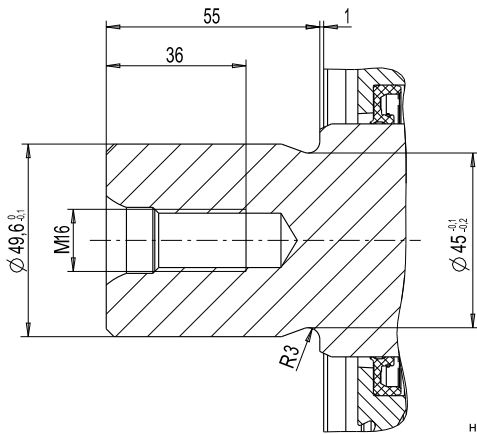
5 Dimensions

Axial piston motor
DMVA 108 to 370

5.9 Nominal size 215, shaft end

1.	2.	3.	/	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
DMVA			/			1	W		1	A	0			

DIN 5480 splined shaft W50x2x24x9g



HF3-DB-056

1

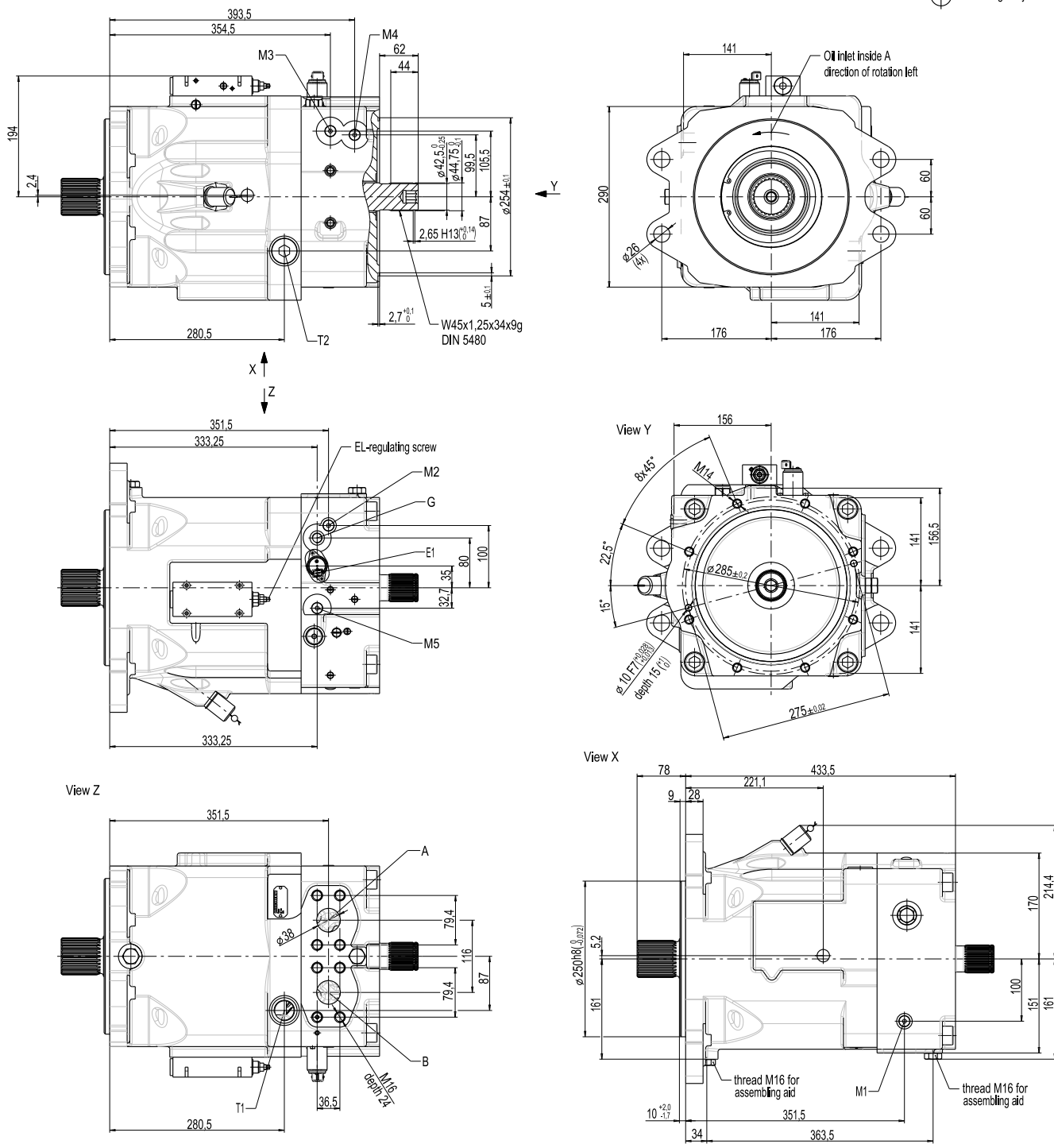
5 Dimensions

Axial piston motor
DMVA 108 to 370

5.10 Nominal size 355/370

5.10.1 Nominal size 355/370, EL regulator with through-drive

⊕ center of gravity location



HF3-DB-045_en

E1	DRE / AMP Junior Timer 2-pin, PWM= 100 Hz, Un= 24 V, I _{max.} = 750 mA
A / B	Working connection SAE J 518 - 1, 1/2", 6000 psi

M3	Balanced high pressure meas. port ISO 9974-1, M12x1.5
M4	Adjusting pressure meas. port ISO 9974-1, M12x1.5

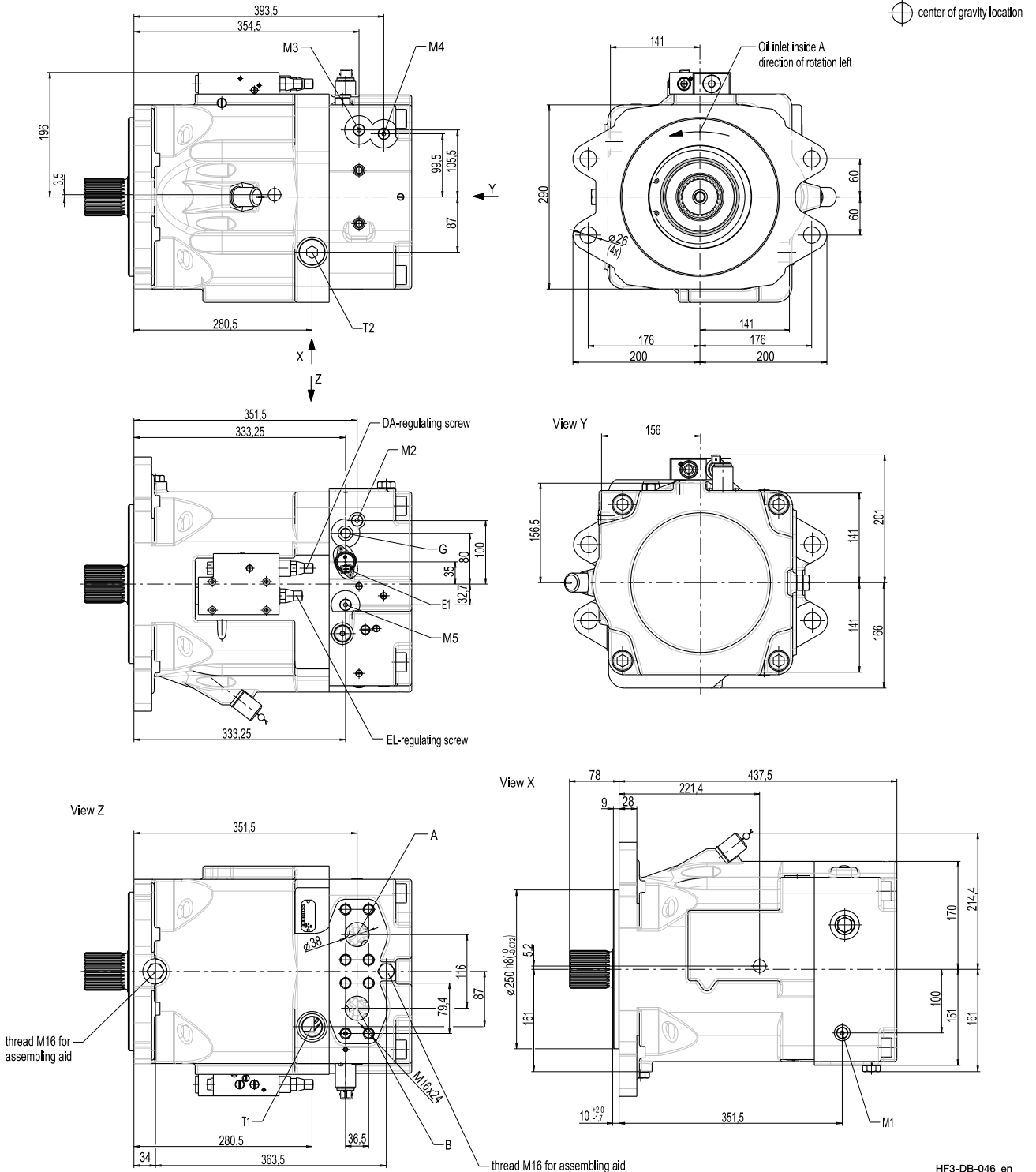
5 Dimensions

Axial piston motor
DMVA 108 to 370

T1 / T2	Leakage oil connection ISO 9974-1, M33x2
M1 / M2	High pressure meas. port ISO 9974-1, M12x1.5

M5	Steering pressure meas. port ISO 9974-1, M12x1.5
G	Adjusting pressure supply ISO 9974-1, M16x1.5

5.10.2 Nominal size 355/370, EL-DA regulator



A / B	Working connection SAE J 518 - 1, 1/2", 6000 psi
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M4	Adjusting pressure meas. port ISO 9974-1, M12x1.5
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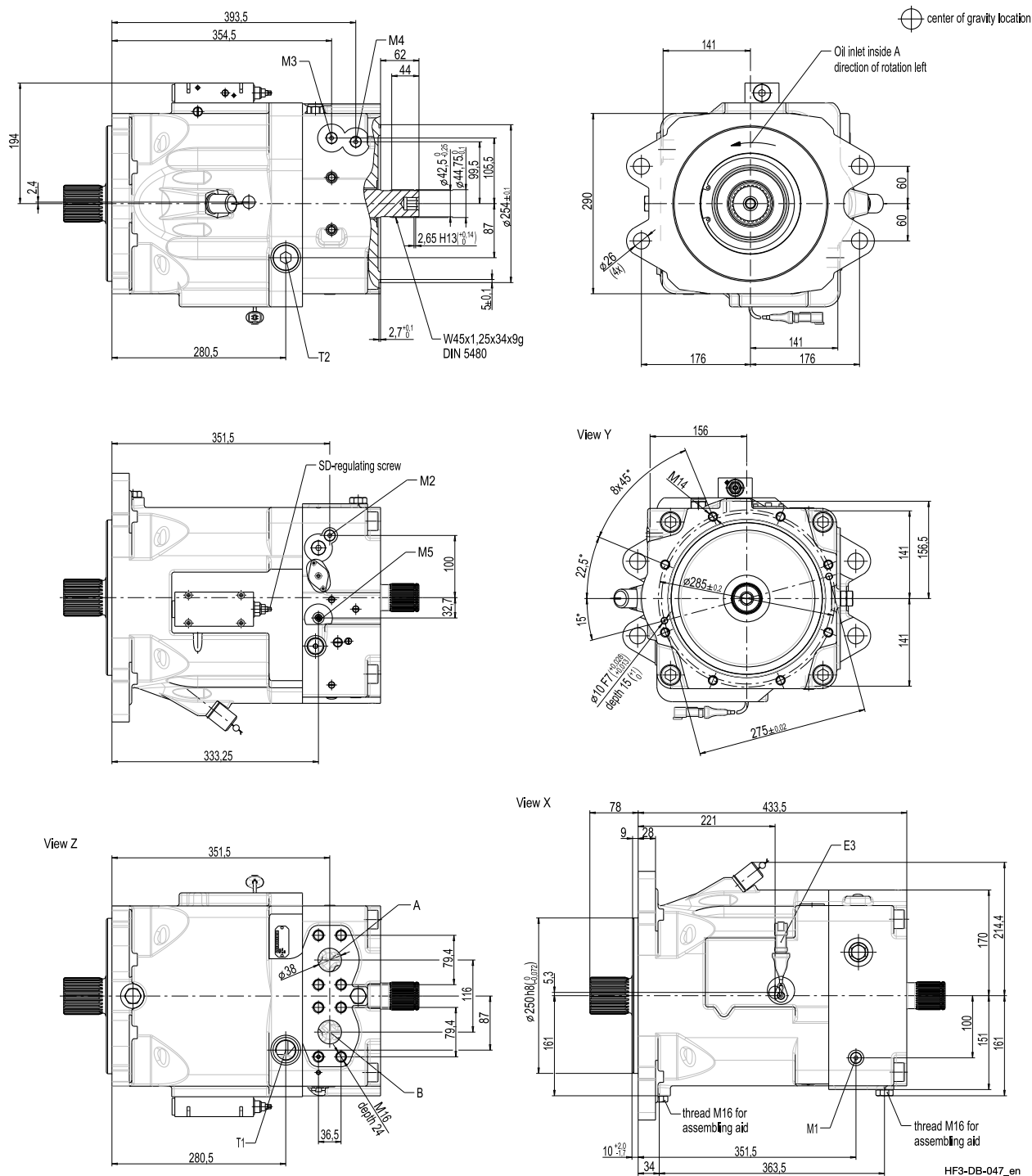
5 Dimensions

Axial piston motor
DMVA 108 to 370

T1 / T2	Leakage oil connection ISO 9974-1, M33x2
M1 / M2	High pressure meas. port ISO 9974-1, M12x1.5
E1	DRE / AMP Junior Timer 2-pin, PWM= 100 Hz, Un= 24 V, I _{max.} = 750 mA

M5	Steering pressure meas. port ISO 9974-1, M12x1.5
G	Adjusting pressure supply ISO 9974-1, M16x1.5
M3	Balanced high pressure meas. port ISO 9974-1, M12x1.5

5.10.3 Nominal size 355/370, SD regulator with through-drive



A / B	Working connection SAE J 518 - 1, 1/2", 6000 psi
-------	--

M4	Adjusting pressure meas. port ISO 9974-1, M12x1.5
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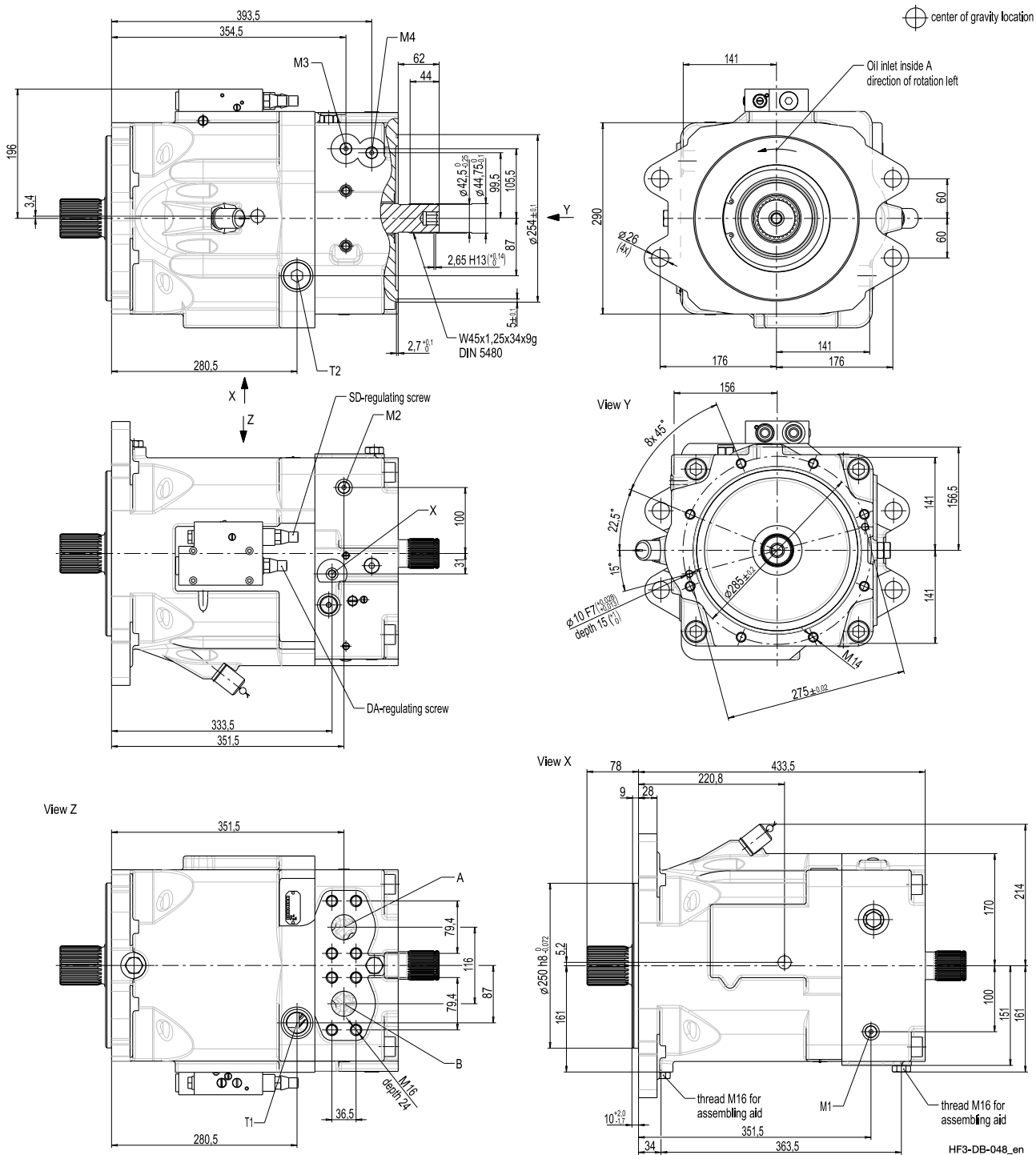
5 Dimensions

Axial piston motor
DMVA 108 to 370

T1 / T2	Leakage oil connection ISO 9974-1, M33x2
M1 / M2	High pressure meas. port ISO 9974-1, M12x1.5
E1	Speed sensor Deutsch connector DT04-4P-CE04, cable length 800 mm

M5	Steering pressure meas. port ISO 9974-1, M12x1.5
-	-
M3	Balanced high pressure meas. port ISO 9974-1, M12x1.5

5.10.4 Nominal size 355/370, regulator SD-DA with through-drive



M1 / M2	High pressure meas. port ISO 9974-1, M12x1.5
---------	--

X	Steering pressure port ISO 9974-1, M12x1.5
---	--

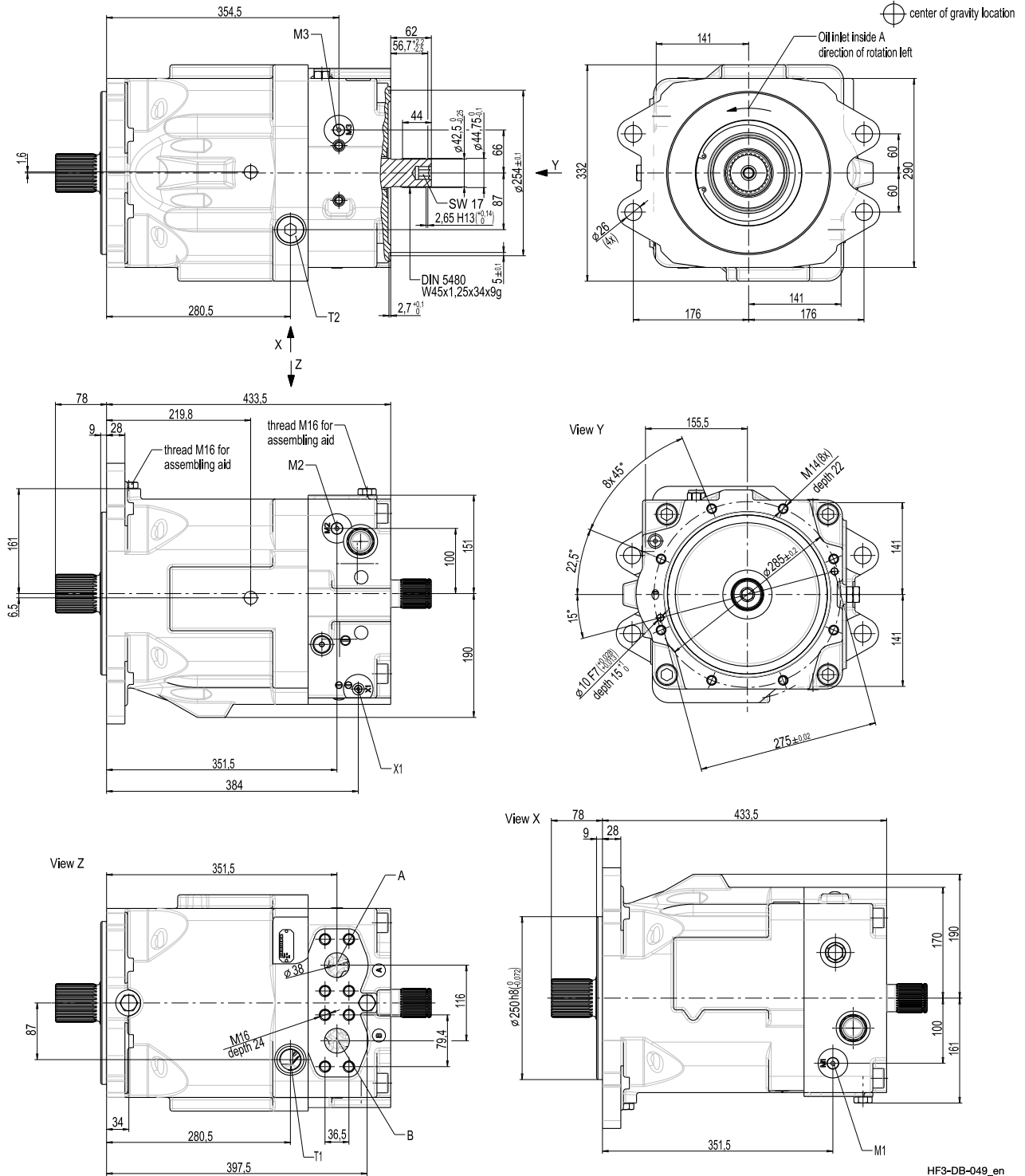
5 Dimensions

Axial piston motor
DMVA 108 to 370

A / B	Working connection SAE J 518 - 1, 1/2", 6000 psi
T1 / T2	Leakage oil connection ISO 9974-1, M33x2

M3	Balanced high pressure meas. port ISO 9974-1, M12x1.5
M4	Adjusting pressure meas. port ISO 9974-1, M12x1.5

5.10.5 Nominal size 355/370, regulator ZH with through-drive



HF3-DB-049_en

M1 / M2	High pressure meas. port ISO 9974-1, M12x1.5
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-	-
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5 Dimensions

Axial piston motor
DMVA 108 to 370

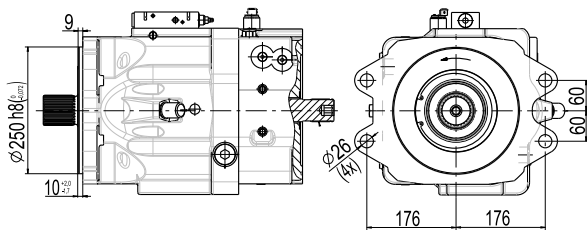
A / B	Working connection SAE J 518 - 1, 1/2", 6000 psi
T1 / T2	Leakage oil connection ISO 9974-1, M33x2

M3	Balanced high pressure meas. port ISO 9974-1, M12x1.5
X	Steering pressure port ISO 9974-1, M12x1.5

5.11 Nominal size 355/370, mounting flange

1.	2.	3.	/	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
DMVA			/			1	W		1	A	0			

Customised design

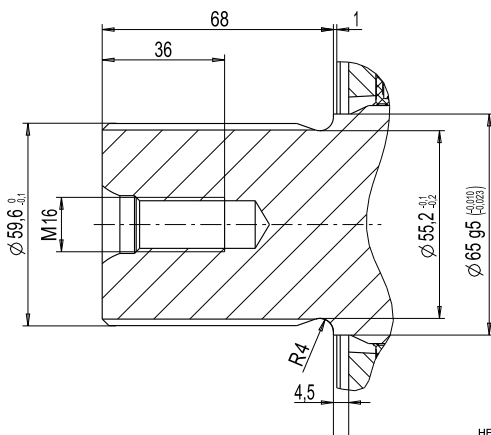


HF3-DB-057

5.12 Nominal size 355/370, shaft end

1.	2.	3.	/	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
DMVA			/			1	W		1	A	0			

DIN 5480 splined shaft W60x2x28x9g



HF3-DB-058

5 Dimensions

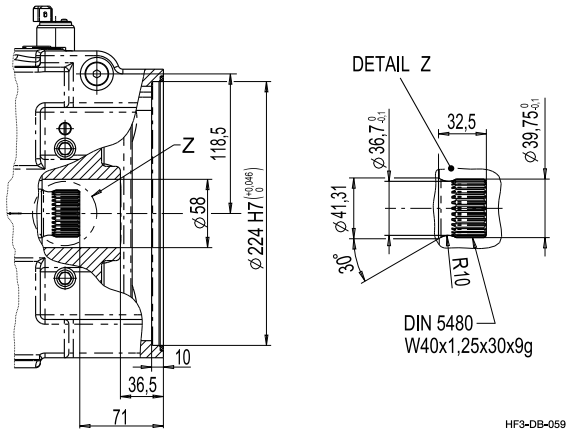
Axial piston motor
DMVA 108 to 370

5.13 Through-drive DIN 5480

1.	2.	3.	/	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
DMVA			/			1	W		1	A	0			

5.13.1 Nominal size 215 special through-drive

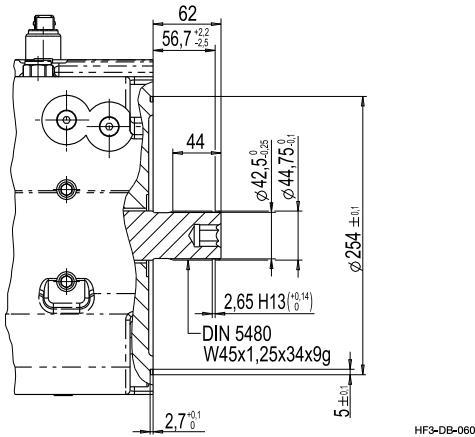
W40x1.25x30x9g



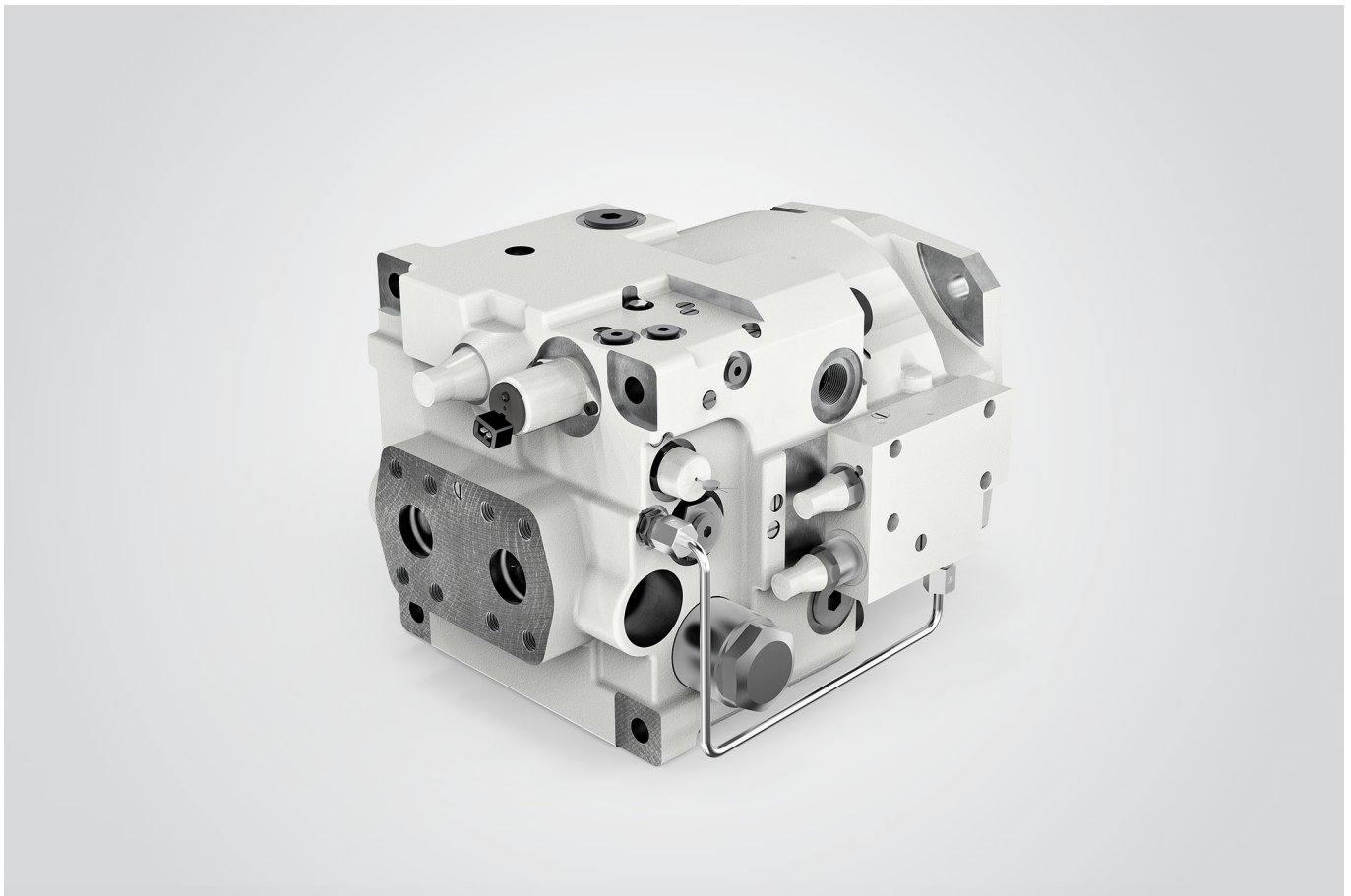
K

5.13.2 Nominal size 355/370, special through-drive

W45x1.25x34x9g



K



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Deviations are likewise possible with data and values in this data sheet; these only serve to select the product configuration and are not binding. Unless indicated otherwise, the values stated are for the example configuration (DMVA 165, EL-DA). Always use the values from the installation drawing provided.

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