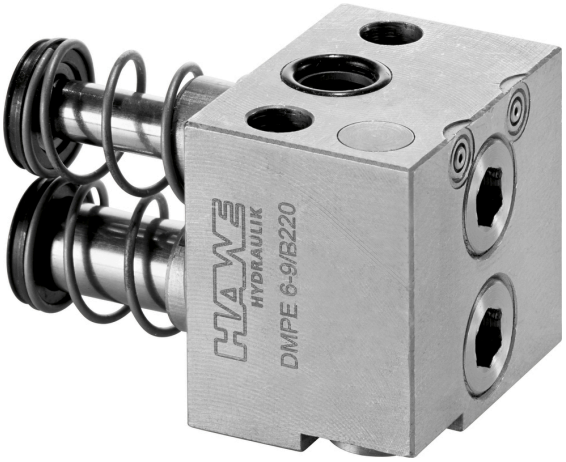
Double pump element type DMPE for radial piston pumps

Product documentation

Operating pressure p_{max}:	700 bar
Geometric displacement $V_{g\ max}$:	0.46 cm^3/rev
Flow rate in high pressure Q_{max} HP:	0.2 lpm (1450 rpm)
Flow rate in low pressure Q_{max} LP:	0.65 lpm (1450 rpm)



D 5600 D
11-2020-1.1

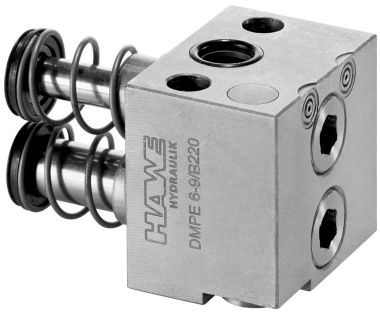
HAWE HYDRAULIK

Printing date / document generated on: 03.11.2020

Contents

1 Overview of pump elements type DMPE for radial piston pumps

The pump element type DMPE delivers lubricating hydraulic fluids while simultaneously generating a pressure opposing the load resistance of a connected consumer. The double pump element (DMPE) consists of a low-pressure and a high-pressure piston. When the low-pressure limit is reached, an integrated valve switches the low-pressure piston to a pressure-free state. Multi-stage pumps can be designed using pump elements and suitable drive parts. These can be adapted to different requirements and spatial conditions.



Features and benefits:

- Can be delivered individually
- Universal application
- Integrated unloading valve
- Multi-stage system possible

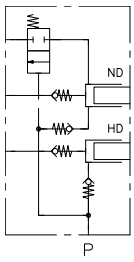
Intended applications:

- All hydraulic pumps in dual-stage or multi-stage versions
- Hand-held tools e.g. hydraulic crimping pliers
- Rescue equipment

2 Available versions, main data

2.1 Order coding

Circuit symbol:



Order coding example:

DMPE	6 - 9	/C 100	F

Supplement "Table 3"

Pressure range for changeover pressure "Table 2"

Piston diameter high pressure – low pressure

Type "Table 1"

2.2 Available versions of type DMPE

The flow rates of an individual double pump element can be conveyed in the low-pressure range up to a changeover pressure of 350 bar. Depending on the selection and setting of the unloading valve, the specified flow rate in "Table 1" relates to the set changeover pressure.

Table 1 Type

Type	Piston∅ HP - LP	Geometric displacement (cm^3/rev)		Flow rate (lpm)				Piston force in stroke direction per 1 bar (N)		p_{max} LP (bar)	p_{max} HP (bar)
		Vg total	Vg HP	Q total	Q HP	Q total	Q HP				
				1450 rpm		2850 rpm		ND	HD		
DMPE	4 - 8	0.314	0.063	0.45	0.09	0.89	0.18	5.03	1.26	350	700
	5 - 8	0.35	0.098	0.50	0.14	0.98	0.27	5.03	1.96	350	700
	6 - 8	0.393	0.141	0.56	0.20	1.11	0.40	5.03	2.83	350	700
	4 - 9	0.381	0.063	0.54	0.09	1.07	0.18	6.36	1.26	350	700
	5 - 9	0.416	0.098	0.59	0.14	1.16	0.27	6.36	1.96	350	700
	6 - 9	0.459	0.141	0.65	0.20	1.29	0.40	6.36	2.83	350	700

HP: High pressure

LP: Low pressure

Vg total: HP + LP

Table 2 Pressure range for changeover pressure

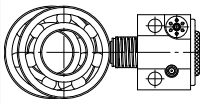
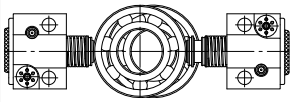
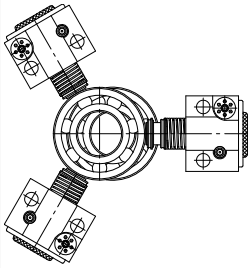
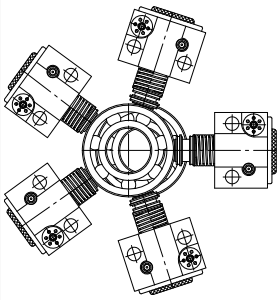
Code letter	Pressure range (bar)
A	281 ... 350
B	141 ... 280
C	40 ... 140

NOTE
The changeover pressure can be freely selected within the pressure range.

Table 3 Supplement

Coding	Description
No designation	Without filter
F	With filter

2.3 Cylinder arrangement

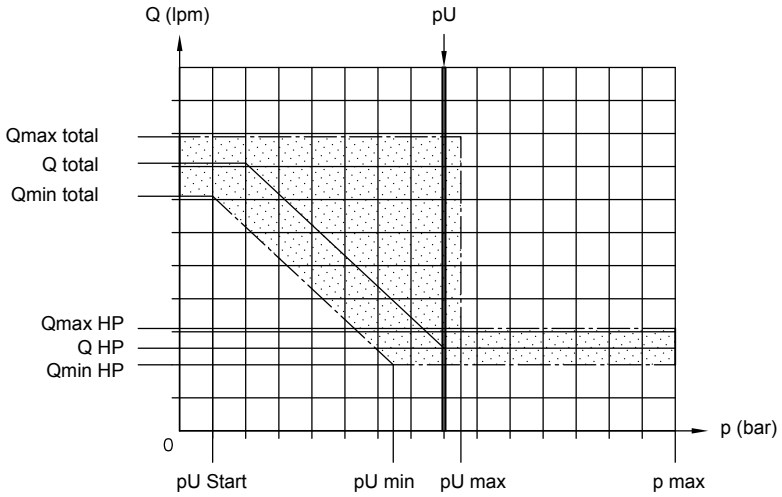
Number of cylinders	Correction factor k	
1	3	
2	1.5	
3 - 4	1	
5 - 7	1	

For designs with several DMPEs with different changeover pressures, your sales partner will gladly be of assistance.

2.4 Changeover pressure

The changeover pressure is reached when the low-pressure piston conveys the medium entirely without pressure.

Setting tolerances of the changeover pressure



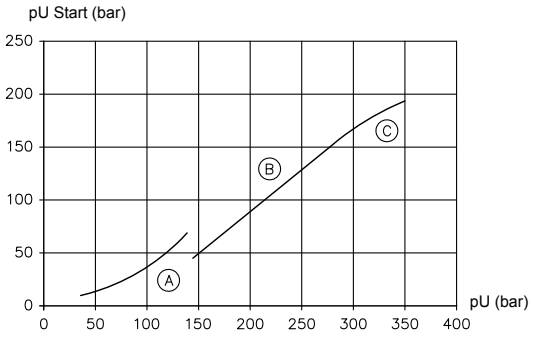
Designation	Description
pU	Changeover pressure according to order coding
pU min / pU max	Tolerance limits of the changeover pressure
pU Start	Start of the changeover process
Pmax	Maximum pressure
Q total	Nominal flow rate in the low-pressure range
Qmin total / Qmax total	Tolerance limits of the flow rate in the low-pressure range
Q HP	Nominal flow rate in the high-pressure range
Qmin HP / Qmax HP	Tolerance limits of the flow rate in the high-pressure range

NOTE
The flow rates relate to circulation without pressure.

Tolerances of the set changeover pressure pU are between -10% and +5%.

Depending on the spring, the unloading valve starts the changeover process at an earlier point pU Start.

The changeover process is illustrated in the following diagram:



Code letter for spring

A: pU Start = 0.63 * pU - 19.80
B: pU Start = 0.74 * pU - 58.81
C: pU Start = 0.61 * pU - 19.06

Example: Code letter B, selected changeover pressure 250 bar

pU Start = 0.74 * 250 bar - 58.81 = 126.19 bar

3 Parameters

General information

Designation	Double pump element
Design	Valve-controlled double pump element
Installation position	As desired The suction valve opening on the pump element must be completely below the oil level in order to avoid the intake of air. The piston and roller bearings must be completely below the oil level in continuous operation so that continual lubrication is guaranteed.
Material	Steel; hardened, ground functional inner parts
Hydraulic fluid	Hydraulic oil: according to DIN 51 524 Part 1 to 3; ISO VG 10 to 68 according to DIN 51 519 Viscosity range: min. approx. 4; max. approx. 300 mm^2/s Optimal operating range: approx. 10 to 100 mm^2/s PYD, AT and HFA version not available. Note: Efficiency losses are to be expected outside of the optimum range.
Cleanliness level	Recommended cleanliness according to ISO 4406, see oil recommendations D 5488/1
Temperatures	Environment: approx. -25 to +80°C, oil: -25 ... +80°C, pay attention to the viscosity range. Start temperature: down to -25°C is permissible (observe start viscosities!), as long as the steady-state temperature is at least 20K higher during subsequent operation.

Pressure and flow rate

Operating pressure	p_{max} = 700 bar
Efficiency	η_{vol} ~ 0.8
Flow rate	See "Available versions of type DMPE"
Perm. stroke frequency	min. 200 rpm max. 2850 rpm Below min. stroke frequency: volumetric efficiency will drop swiftly. Above max. stroke frequency: suction problems may occur (with small cylinder diameters). Note: Efficiency losses and a shorter lifetime are to be expected outside of the optimum range.

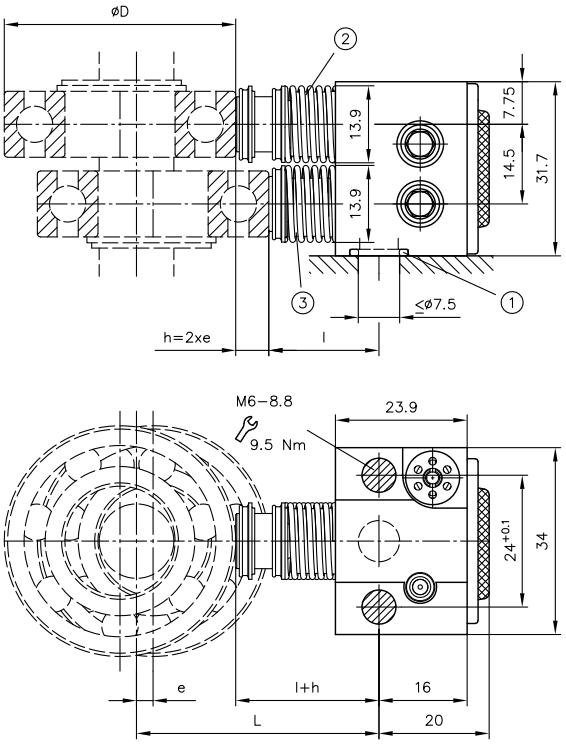
Weight

DMPE	~ 200 g

4 Dimensions

All dimensions in mm, subject to change.

DMPE



1 O-ring 8x1.5 NBR 90 Shore
2 LP piston
3 HP piston

Type	e +0.05	e_{max}	l
DMPE	2.5	3	20

NOTE

- Following selection of the ball bearing, the distance L can be calculated with the following formula:

$$L \pm 0{,}1 = e + \frac{D}{2} + l\ (mm)$$

- The max. permissible piston stroke must not be exceeded.
- Observe reference dimension L to prevent damage to the suction valve (piston dead centre too low).

5 Assembly, operation and maintenance recommendations

5.1 Intended use

This product is exclusively intended for hydraulic applications (fluid engineering).

The user must observe the safety measures and warnings in this documentation.

Essential requirements for the product to function correctly and safely:

- All information in this documentation must be observed. This applies in particular to all safety measures and warnings.
- The product must only be assembled and put into operation by qualified personnel.
- The product must only be operated within the specified technical parameters. The technical parameters are described in detail in this documentation.
- All components must be suitable for the operating conditions in the event of application in an assembly.
- The operating and maintenance manual of the components, assemblies and the specific complete system must also always be observed.

If the product can no longer be operated safely:

1. Remove the product from operation and mark it accordingly.

✓ It is then not permitted to continue using or operating the product.

5.2 Assembly information

⚠ **DANGER**

Risk to life caused by sudden movement of the hydraulic drives when dismantled incorrectly!

Risk of serious injury or death.

- Depressurise the hydraulic system.
- Perform safety measures in preparation for maintenance.

5.3 Operating instructions

Purity and filtering of the hydraulic fluid

Fine contamination can significantly impair the function of the hydraulic component. Contamination can cause irreparable damage.

Examples of fine contamination include:

- Swarf
- Rubber particles from hoses and seals
- Dirt from installation and maintenance
- Mechanical debris
- Chemical ageing of the hydraulic fluid

NOTE

Fresh hydraulic fluid from the drum does not always have the necessary degree of purity.

Filter hydraulic fluid before use.

Adhere to the cleanliness level of the hydraulic fluid in order to maintain faultless operation.
(Also see cleanliness level in Chapter 3, "Parameters")

Additionally applicable document: D 5488/1 Oil recommendations

5.4 Maintenance information

This product is maintenance-free.

6 Other information

6.1 Functional description

Drive type: motor via rotating shaft

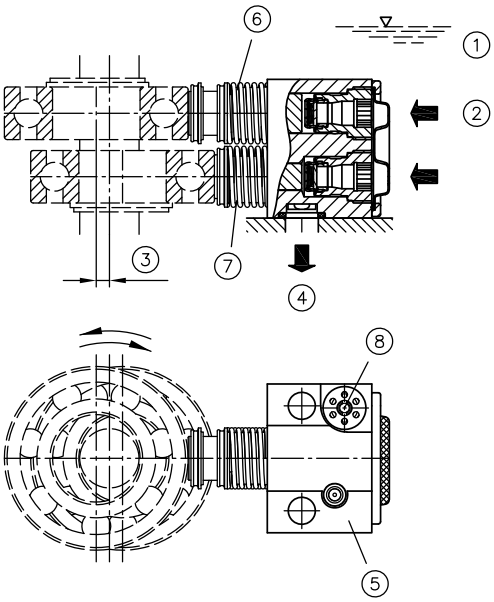
Shaft rotation direction: any (direction of delivery remains unchanged)

Two roller bearings are located eccentrically (same direction or opposing direction) on the shaft. The outer race of the roller bearings acts on the back of the piston in the double pump element.

This generates the lifting movement in conjunction with the return spring.

The flow rate is controlled by automatic suction and pressure control valves installed in the basic body.

When the changeover pressure is reached, the delivery flow from the low-pressure piston drains via the outlet bores. The DMPE must be enclosed in a housing to avoid any injuries due to the return stream (e.g. in a tank housing).



1 Oil level
2 Suction side
3 Eccentricity
4 To pressure line
5 Pump element
6 LP piston
7 HP piston
8 Unloading valve

NOTE
The default recommendation is to install the eccentric tappets in the opposing direction. It is fundamentally possible to use the eccentric tappets in the same direction. The individual applicable piston forces can be found in "Table 1". When using eccentric tappets in the same direction, the larger piston forces must not be disregarded.

Further information

Additional versions

- Pump element type MPE and PE for radial piston pumps: D 5600

HAWE Hydraulik SE
Einsteinring 17 | 85609 Aschheim/Munich | Postfach 11 55 | 85605 Aschheim | Germany
Tel +49 89 379100-1000 | Fax +49 89 379100-91000 | info@hawe.de | www.hawe.com

Further information

- Pump element type MPE and PE for radial piston pumps: D 5600

HAWE Hydraulik SE is a responsible development partner with application expertise and experience in more than 70 areas of mechanical engineering and plant engineering. The product range includes hydraulic power packs, constant and variable pumps, valves, sensors and accessories. The modular system is complemented by electronic components that are perfectly coordinated with the hydraulic components and that simplify control, signal evaluation and fault detection. The intelligent system solutions reduce energy consumption and operating costs. Compact drives save space and permit innovative machine design.

Across the globe, approximately 2000 employees in 16 countries and sales partners in more than 40 countries provide customers with local, professional and personal support.
The company is certified in accordance with ISO 9001, ISO 4413, ISO 50001, OHSAS 18001.

HAWE subsidiaries and service repair shops

- Germany
- Finland
- France
- Italy
- Austria
- Switzerland

HAWE sales partners

- Slovenia
- Spain
- Sweden
- USA
- Canada
- Russia
- China
- India
- Japan
- Korea
- Singapore
- Australia

You can find further information on HAWE Hydraulik, your local contact and the range of hydraulics training sessions offered at: www.hawe.com/contact.

HAWE Hydraulik SE
Einsteinring 17 | 85609 Aschheim/Munich | Postfach 11 55 | 85605 Aschheim | Germany
Tel +49 89 379100-1000 | Fax +49 89 379100-91000 | info@hawe.de | www.hawe.com

D 5600 D - 11-2020-1.1