

Parametry

Vznětový motor Iveco C78 ENT

C78 ENT FOR INDUSTRIAL APPLICATIONS

Technical code		F2BE0687 *B3..
Thermodynamic cycle		Diesel 4 stroke - DI
Aspiration		TAA
Configuration		6L
Bore x Stroke	mm (in.)	115 X 125 (4.53 X 4.92)
Total displacement	liters (cu. in.)	7.8 (476)
Valves per cylinder		4
Cooling		liquid
Direction of rotation (viewed facing flywheel)		CCW
Compression ratio		16 : 1
Rotation mass moment of inertia (without flywheel)	kgm ² (lbf ²)	0.30 (7.12)
Standard flywheel inertia	kgm ² (lbf ²)	1.93 (45.80)
Air induction		
Max suggested intake restriction with clean air filter	kPa (in. H ₂ O)	3.5 (14)
Max allowable restriction with dirty air filter	kPa (in. H ₂ O)	6.0 (24)
Air requirement for combustion at 100% load/rated speed	kg/h (lb/h)	1280 (2822)
Turbocharging pressure at full load/rated speed	kPa (psi)	160 (23.2)
Turbocharging air max temperature (engine inlet)	°C (°F)	50 (122) @ 77°F amb.
Heat rejected to intercooler at maximum power	kW (BTU/min)	38.5 (2191)
Intercooler system max pressure drop	kPa (in. H ₂ O)	10 (40.1)
Exhaust system		
Max allowable backpressure	kPa (in. Hg)	10 (2.95)
Max exhaust temperature at full load/rated speed	°C (°F)	510 (950)
Exhaust flow at max output	kg/h (lb/h)	1330 (2932)
Lubrication system		
Minimum oil pressure at idle	kPa (psi)	150 (21.75)
Max oil temperature at full load/rated speed	°C (°F)	120 (248)
Engine angularity limits continuous operation: max front up and front down	degrees	17
max left hand and right hand	degrees	17
Total system capacity including pipes, filters etc.	liters (quarts)	28 (29.6)
Cooling system		
Coolant capacity (engine only)	liters (quarts)	15 (16)
Water pump flow at rated speed	m ³ /h (gal/min)	21.5 (94.7)
Heat rejected to coolant at max power	kW (BTU/min)	110.8 (6307)
Thermostat (operating range)	°C (°F)	83 to 95 (181 to 203)
Cooling liquid max temperature	°C (°F)	105 (221)
Min/max pressure in the cooling circuit system	kPa (psi)	30/160 (4.35/23.2)
Radiator max pressure drop	kPa (psi)	35 (5)
Fuel system		
Injection system		Electronic Unit Injection (E.U.I.)
Fuel inlet max restriction	kPa (in. H ₂ O)	30 (120.3)
Fuel inlet max temperature	°C (°F)	40 (104) @ 77°F amb.
Electrical system		
Voltage	V	24

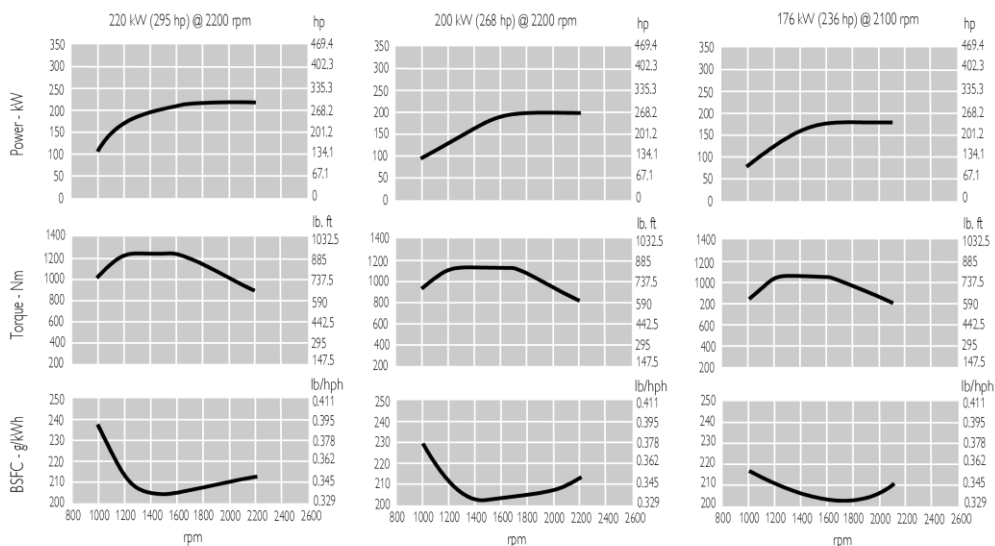
C78 ENT FOR INDUSTRIAL APPLICATIONS

Maximum rating *	kW(hp)	220 (295)	200 (268)	176 (236)
At speed	rpm	2200	2200	2100
Maximum torque	Nm (lb. ft)	1250 (921.9)	1150 (848.1)	1050 (774.4)
At speed	rpm	1200	1200	1200
Maximum no load governed speed	rpm		2400	
Minimum idle speed	rpm		600	
Mean piston speed at rated rpm	m/s (ft/s)	9.2 (30.2)	9.2 (30.2)	8.8 (28.9)
BMEP at max torque	kg/cm ² (psi)	20.51 (291.92)	18.87 (268.57)	17.23 (245.21)
Available certifications	EPA Tier 2 - EC 97/68 Phase 2			
BSFC	g/kWh (lb/hp h) @ rpm	206 (0.338) @ 1500		
Oil consumption at max rating	(% of fuel consumption)	< 0.2		
Noise at rated power (ISO 3744)	dBA	94		
Minimum starting temperature without aids	°C (°F)	-15 (+5)		
Oil and oil filter maintenance interval for replacement	hours	600		
Dry weight (standard configuration)	kg (lb)	675 (1488)		

FOR INFORMATION ON THE AVAILABLE RATINGS NOT LISTED IN THIS DOCUMENT PLEASE CONTACT THE IVECO MOTORS, SALES NETWORK

* Power at flywheel according to 97/68 EC (without fan), after 50 hours running, 3% tolerance, fuel Diesel EN 590

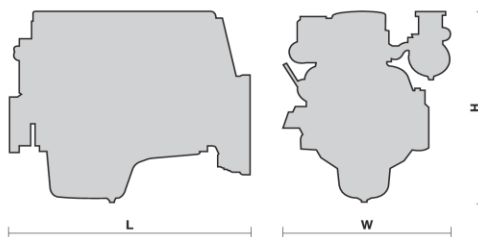
Test conditions : ISO 3046/1, 25 °C air temperature, 100 kPa atmospheric pressure, 30 % relative humidity - Applicable also to DIN 6271, BS 5514, SAE J1349 Standards.



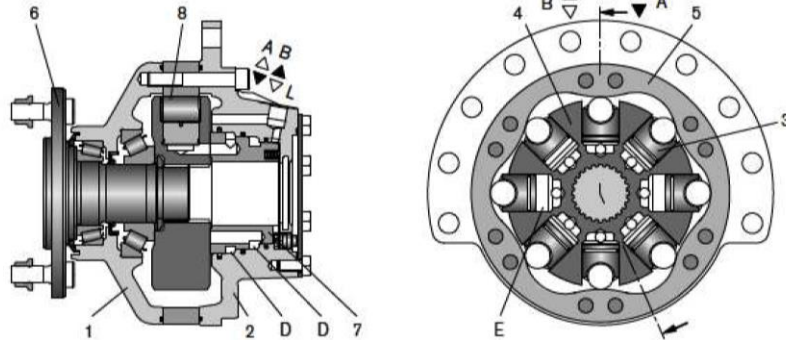
L = 1175 mm (46.3 in)

W = 932 mm (36.7 in)

H = 1038 mm (40.9 in)



Functional description



Hydraulic motors type MCR are radial piston motors with a rotating shaft.

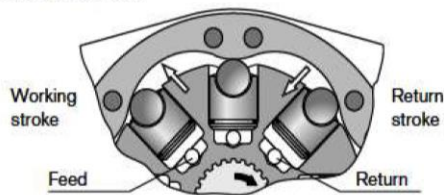
Construction

Two part housing (1, 2), rotary group (3, 4), cam (5), drive shaft (6) and flow distributor (7)

Transmission

The cylinder block (4) is connected to the shaft (6) by means of splines. The pistons (3) are arranged radially in the cylinder block (4) and make contact with the cam (5) via rollers (8).

Torque Generation



The number of working and return strokes corresponds to the number of lobes on the cam x number of pistons (8).

Flow paths

The cylinder chambers (E) are connected to ports A and B via the axial bores and the annular passages (D).

Bearings

Tapered roller bearings capable of transmitting high axial and radial forces are fitted as standard, except on Hydrobase motors.

Freewheeling

In certain applications there may be a requirement to freewheel the motor. This may be achieved by connecting ports A and B to zero pressure and simultaneously applying a pressure of 2 bar to the housing through port L. In this condition, the pistons are forced into the cylinder block which forces the rollers to lose contact with the cam thus allowing free rotation of the shaft.

Two speed operation (2W)

In mobile applications where vehicles are required to operate at high speed with low motor loads, the motor can be switched to a low-torque and high-speed mode. This is achieved by operating an integrated valve which directs hydraulic fluid to only one half of the motor while continuously re-circulating the fluid in the other half. This "reduced displacement" mode reduces the flow required for a given speed and gives the potential for cost and efficiency improvements. The motor maximum speed remains unchanged.

Rexroth has developed a special spool valve to allow smooth switching to reduced displacement whilst on the move. This is known as "soft-shift" and is a standard feature of 2W motors. The spool valve requires either an additional sequence valve or electro-proportional control to operate in "soft-shift" mode.

Flushing valve

In a closed circuit, the same hydraulic fluid continuously flows between the pump and the motor. This could therefore lead to overheating of the hydraulic fluid.

The function of the flushing valve option is to replace hydraulic fluid in the closed circuit with that from the reservoir. When the hydraulic motor is operated under load, either in the clockwise or anti-clockwise direction, the flushing valve opens and takes a fixed flow of fluid through an orifice from the low pressure side of the circuit. This flow is then fed to the motor housing and back to the reservoir normally via a cooler. In order to charge the low pressure side of the circuit, cool fluid is drawn from the reservoir by the boost pump and is fed to the pump inlet through the check valve. Thus the flushing valve ensures a continuous renewal and cooling of the hydraulic fluid. The flushing feature incorporates a relief valve which is used to maintain a minimum boost pressure and operates at a standard setting of 14 bar (other options available on request).

Different orifice sizes may be used to select varying flows of flushing fluid. The following table gives flushing rate values based on a boost / charge pressure of 25 bar.

Functional Description

Flushing flow rates (for $p_{\text{charge}} - p_{\text{case}} = 25 \text{ bar}$)

Ordering code	Flow ($\pm 1 \text{ l/min}$)
F1	3 l/min
F2	5 l/min
F7	7 l/min
F4	10 l/min
F8	12.5 l/min
F6	13.5 l/min

Holding brake (multi-disc brake)

Mounting

By way of rear housing (2) and brake shaft (16).

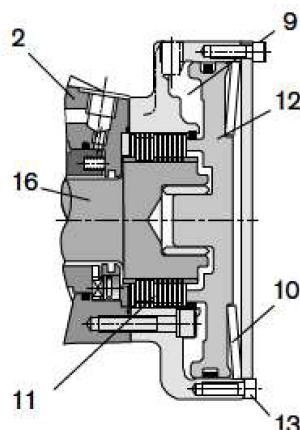
Brake application

As a safety requirement in mobile applications a parking brake may be provided to ensure that the motor cannot turn when the machine is not in use. The parking brake provides holding torque by means of discs (11) that are compressed by a disc spring (10). The brake is released when oil pressure is applied to brake port "Z" and the pressure in the annular area (9) compresses the disc spring allowing the brake discs to turn independently.

Note: This brake is provided solely for static use - not to be used dynamically.

Manual release of holding brake

The brake may also be released manually by loosening screws (13).

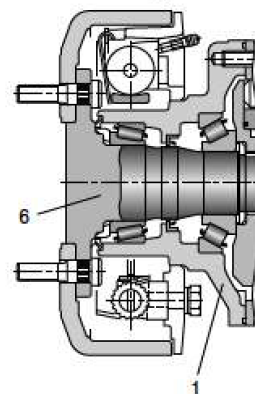


Dynamic brake

Where mechanical dynamic braking is required, a drum brake may be specified. The drum brake is mounted directly onto the drive shaft (6) and front housing (1). Braking torque is provided by brake shoes acting on the inside of the drum.

Operation of brake

- hydraulic brake fluid (special order required for mineral oil operation)
- mechanical brake cable (not supplied)

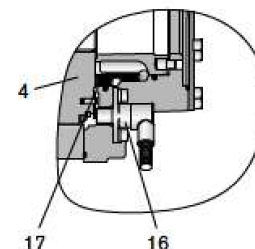


Speed sensor

A Hall-effect speed sensor (16) may be fitted as an option, giving a two-channel output of phase-displaced square waves, and enabling detection of speed and direction. A toothed target disc (17) is fitted to the motor cylinder block (4), and the sensor, fitted to a port in the rear case, produces a pulse on each channel as each tooth passes in front of it. The frequency of the pulses is proportional to the rotational speed.

Versions are available for use with regulated supplies (Code P1) and for direct connection to a 12 V or 24 V unregulated supply (Code P2).

The motor can also be supplied fitted with a target disc and with a speed sensor port machined, but covered and sealed with a blanking plate (Code P0). These "sensor-ready" motors may be fitted with a sensor at a later date.



Technical data

(For operation outside of these parameters, please consult Rexroth)

Description			Radial-piston type, low-speed, high-torque motor							
Frame size			MCR5							
Type of mounting			Flange mounting; face mounting							
Pipe connections ¹⁾²⁾			Threaded per SAE J514							
Shaft loading			see page 9							
Displacement	V _g	cm ³ /rev	380	470	520	565	620	680	750	820
Output torque										
Specific torque (at Δp = 250 bar)		Nm	1360	1680	1860	2020	2220	2440	2690	2940
Maximum torque ³⁾⁴⁾	T _{max}	Nm	2450	3030	3350	3640	3550	3900	4300	4700
Output speed										
Minimum speed for smooth running ⁵⁾	n _{min}	rpm	5	5	5	5	0.5	0.5	0.5	0.5
Maximum speed (1L) ^{6) 7) 8)}	n _{max}	rpm	475	385	350	320	290	265	240	220
Maximum speed (2WL) ^{6) 7)}	n _{max}	rpm	570	465	420	385	350	320	290	265
Output power										
Nominal power ⁹⁾	P	kW	29	29	29	29	35	35	35	35
Weight	m	kg	see unit dimensions on pages 10-17							
Moment of inertia	J _m	kgm ²	see unit dimensions on pages 10-17							
Hydraulic										
Pressure ¹⁰⁾										
Nominal pressure ⁹⁾	p _{nom}	bar	250	250	250	250	250	250	250	250
Maximum differential pressure ³⁾	Δp _{max}	bar	450	450	450	450	400	400	400	400
Maximum pressure at port "A" or "B" ³⁾	p _{max}	bar	470	470	470	470	420	420	420	420
Maximum case drain pressure	p _{case max}	bar	10	10	10	10	10	10	10	10
Hydraulic fluid ^{11) 12)}			Mineral oils (HLP) to DIN 51 524							
Hydraulic fluid temperature range ¹³⁾			-20 to +85							
Viscosity Range			10 to 2000							
Fluid cleanliness			ISO 4406, Class 20/18/15							
Brake										
Holding brake (disc brake)			B2				B4			
Minimum holding torque	T _{min}	Nm	2200				4400			
Release pressure (min/max)	p _{rel}	bar	11/15				11/15			
Maximum pressure at brake port "Z"		bar	40				40			
Oil volume to operate brake	V _{rel}	cm ³	23				46			
Dynamic brake (drum brake)			see information on page 16							

¹⁾ Ensure motor case is filled with oil prior to start-up. See operating manual RE 15215-B.

²⁾ For installation and maintenance details, please see operating manual RE 15215-B.

³⁾ Maximum values should only be applied for a small portion of the duty cycle. Please consult Rexroth Engineering Department in Glenrothes for motor life calculations based on particular operating cases.

⁴⁾ For motors with housing type D, maximum torque is 3000 Nm, which restricts maximum pressure accordingly.

⁵⁾ For continuous operation at speeds < 5 rpm please consult Rexroth Engineering Department in Glenrothes.

⁶⁾ Based on nominal no-load DP of 20 bar in full-displacement mode.

⁷⁾ Warning! During the running in period of the motor (min. 20 hrs) it should not be run unloaded at >100 rpm.

⁸⁾ Single-speed (1L) motors are available by special order with a 20 % increase in the stated maximum speed.

⁹⁾ When operating motors in series, please consult Rexroth Engineering Department in Glenrothes.

¹⁰⁾ Nominal values are guide values for continuous operation.

¹¹⁾ For use with environmentally acceptable fluids HEES, HEPG, HETG, Viton seals must be specified. For further information, please refer to RE 90221.

¹²⁾ For use with HF hydraulic fluids please refer to RE 90229

Extension of the allowable temperature range may be possible depending on specification.

¹³⁾ Please consult Rexroth Engineering Department in Glenrothes for further details.

Technical data (Mean values, measured at $v = 46 \text{ mm}^2/\text{s}$ and $t = 45 \text{ }^\circ\text{C}$)

			MCR5 . 620					
Pressure Diff. Δp (bar)	Speed n	rpm	0	25	50	100	150	200
100	T	Nm	513	878	888	878	868	845
	q_v	l/min	0.55	16.05	31.55	62.55	9.55	124.55
	q_{vL}	l/min	0.09	0.09	0.09	0.09	0.09	0.09
200	T	Nm	1184	1796	1816	1796	1776	
	q_v	l/min	1.10	16.60	32.10	63.10	94.10	
	q_{vL}	l/min	0.18	0.18	0.18	0.18	0.18	
300	T	Nm	1895	2723	2753	2738		
	q_v	l/min	1.65	17.15	32.65	63.65		
	q_{vL}	l/min	0.27	0.27	0.27	0.27		
400	T	Nm	2684	3513	3552			
	q_v	l/min	2.20	17.70	33.20			
	q_{vL}	l/min	0.35	0.35	0.35			
Min. charge pressure	p	bar	1	2	3	7	12	23

MCR5 . 680					
0	25	50	100	150	200
563	963	974	963	942	920
0.55	17.55	34.55	68.55	102.55	136.55
0.09	0.09	0.09	0.09	0.09	0.09
1299	1970	1991	1970	1948	
1.10	18.10	35.10	69.10	103.10	
0.18	0.18	0.18	0.18	0.18	
2078	2987	3019	3003		
1.65	18.65	35.65	69.65		
0.27	0.27	0.27	0.27		
2944	3853	3896			
2.20	19.20	36.20			
0.35	0.35	0.35			
1	3	4	9	15	25

			MCR5 . 750				
Pressure Diff. Δp (bar)	Speed n	rpm	0	25	50	100	150
100	T	Nm	621	1062	1074	1056	1033
	q_v	l/min	0.55	19.30	38.05	75.55	113.05
	q_{vL}	l/min	0.09	0.09	0.09	0.09	0.09
200	T	Nm	1432	2172	2196	2172	2149
	q_v	l/min	1.10	19.85	38.60	76.10	113.60
	q_{vL}	l/min	0.18	0.18	0.18	0.18	0.18
300	T	Nm	2292	3295	3330	3312	
	q_v	l/min	1.65	20.40	39.15	76.65	
	q_{vL}	l/min	0.27	0.27	0.27	0.27	
400	T	Nm	3247	4249	4297		
	q_v	l/min	2.20	20.95	39.70		
	q_{vL}	l/min	0.35	0.35	0.35		
Min. charge pressure	p	bar	1	3	4	9	15

MCR5 . 820				
0	25	50	100	150
679	1162	1175	1148	1135
0.55	21.05	41.55	82.55	123.55
0.09	0.09	0.09	0.09	0.09
1566	2375	2401	2375	2349
1.10	19.85	38.60	76.10	113.60
0.18	0.18	0.18	0.18	0.18
2506	3602	3641	3622	
1.65	20.40	39.15	76.65	
0.27	0.27	0.27	0.27	
3550	4646	4698		
2.20	20.95	39.70		
0.35	0.35	0.35		
1	4	6	11	19

Hydromotor Bosch Rexroth A2FM 80

Axial Piston Fixed Motor A2FM

RE 91001/06.2012
Replaces: 09.07

1/46

2

Data sheet

Series 6

Size	Nominal pressure/Maximum pressure
5	315/350 bar
10 to 200	400/450 bar
250 to 1000	350/400 bar
Open and closed circuits	



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Features

- Fixed motor with axial tapered piston rotary group of bent-axis design, for hydrostatic drives in open and closed circuits
- For use in mobile and stationary applications
- The output speed is dependent on the flow of the pump and the displacement of the motor.
- The output torque increases with the pressure differential between the high-pressure and the low-pressure side.
- Finely graduated sizes permit far-reaching adaptation to the drive case
- High power density
- Small dimensions
- High total efficiency
- Good starting characteristics
- Economical design
- One-piece tapered piston with piston rings for sealing

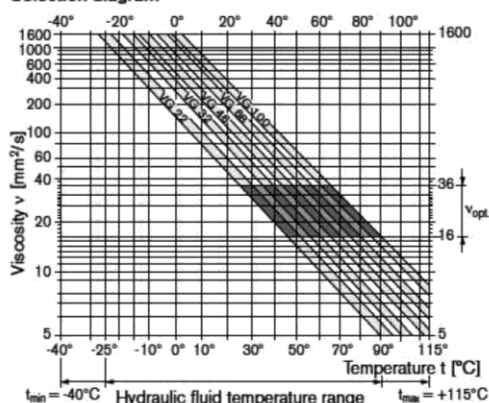
Technical data

Hydraulic fluid

Before starting project planning, please refer to our data sheets RE 90220 (mineral oil), RE 90221 (environmentally acceptable hydraulic fluids), RE 90222 (HFD hydraulic fluids) and RE 90223 (HFA, HFB, HFC hydraulic fluids) for detailed information regarding the choice of hydraulic fluid and application conditions.

The fixed motor A2FM is not suitable for operation with HFA hydraulic fluid. If HFB, HFC or HFD or environmentally acceptable hydraulic fluids are used, the limitations regarding technical data or other seals must be observed.

Selection diagram



Details regarding the choice of hydraulic fluid

The correct choice of hydraulic fluid requires knowledge of the operating temperature in relation to the ambient temperature: in a closed circuit, the circuit temperature, in an open circuit, the reservoir temperature.

The hydraulic fluid should be chosen so that the operating viscosity in the operating temperature range is within the optimum range (v_{opt} see shaded area of the selection diagram). We recommended that the higher viscosity class be selected in each case.

Example: At an ambient temperature of X °C, an operating temperature of 60 °C is set in the circuit. In the optimum operating viscosity range (v_{opt} , shaded area), this corresponds to the viscosity classes VG 46 or VG 68; to be selected: VG 68.

Note

The case drain temperature, which is affected by pressure and speed, can be higher than the circuit temperature or reservoir temperature. At no point of the component may the temperature be higher than 115 °C. The temperature difference specified below is to be taken into account when determining the viscosity in the bearing.

If the above conditions cannot be maintained due to extreme operating parameters, we recommend flushing the case at port U (sizes 250 to 1000) or using a flushing and boost pressure valve (see pages 34).

Viscosity and temperature of hydraulic fluid

	Viscosity [mm²/s]	Temperature	Comment
Transport and storage at ambient temperature		$T_{min} \geq -50\text{ °C}$ $T_{opt} = +5\text{ °C to }+20\text{ °C}$	factory preservation: up to 12 months with standard, up to 24 months with long-term
(Cold) start-up ¹⁾	$v_{max} = 1600$	$T_{St} \geq -40\text{ °C}$	$t \leq 3\text{ min}$, without load ($p \leq 50\text{ bar}$), $n \leq 1000\text{ rpm}$ (for sizes 5 to 200), $n \leq 0.25 \cdot n_{nom}$ (for sizes 250 to 1000)
Permissible temperature difference		$\Delta T \leq 25\text{ K}$	between axial piston unit and hydraulic fluid
Warm-up phase	$v < 1600\text{ to }400$	$T = -40\text{ °C to }-25\text{ °C}$	at $p \leq 0.7 \cdot p_{nom}$, $n \leq 0.5 \cdot n_{nom}$ and $t \leq 15\text{ min}$
Operating phase			
Temperature difference		$\Delta T = \text{approx. } 12\text{ K}$	between hydraulic fluid in the bearing and at port T.
Maximum temperature		115 °C	in the bearing
		103 °C	measured at port T
Continuous operation	$v = 400\text{ to }10$ $v_{opt} = 36\text{ to }16$	$T = -25\text{ °C to }+90\text{ °C}$	measured at port T, no restriction within the permissible data
Short-term operation ²⁾	$v_{min} \geq 7$	$T_{max} = +103\text{ °C}$	measured at port T, $t < 3\text{ min}$, $p < 0.3 \cdot p_{nom}$
FKM shaft seal ¹⁾		$T \leq +115\text{ °C}$	see page 5

¹⁾ At temperatures below -25 °C, an NBR shaft seal is required (permissible temperature range: -40 °C to +90 °C).

²⁾ Sizes 250 to 1000, please contact us.

Technical data

Filtration of the hydraulic fluid

Finer filtration improves the cleanliness level of the hydraulic fluid, which increases the service life of the axial piston unit.

To ensure the functional reliability of the axial piston unit, a gravimetric analysis of the hydraulic fluid is necessary to determine the amount of solid contaminant and to determine the cleanliness level according to ISO 4406. A cleanliness level of at least 20/18/15 is to be maintained.

At very high hydraulic fluid temperatures (90 °C to maximum 115 °C), a cleanliness level of at least 19/17/14 according to ISO 4406 is necessary.

If the above classes cannot be achieved, please contact us.

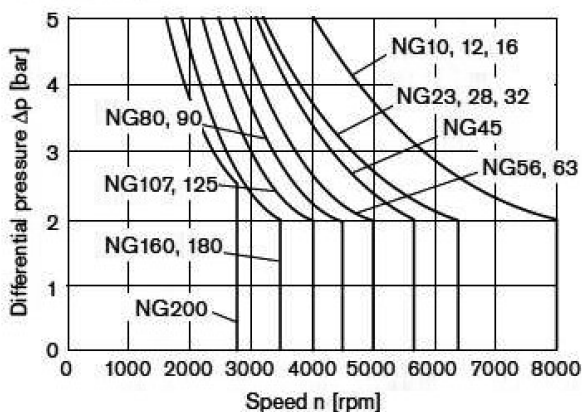
Shaft seal

Permissible pressure loading

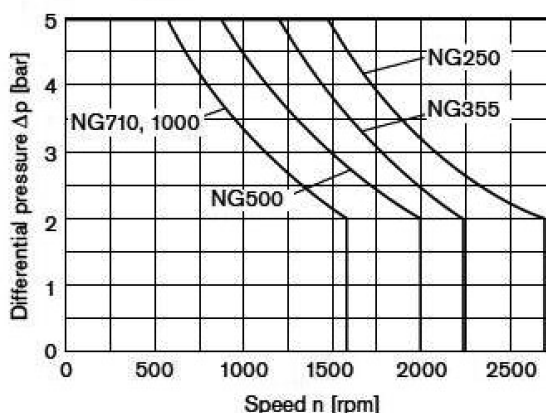
The service life of the shaft seal is influenced by the speed of the axial piston unit and the case drain pressure (case pressure). The mean differential pressure of 2 bar between the case and the ambient pressure may not be enduringly exceeded at normal operating temperature. For a higher differential pressure at reduced speed, see diagram. Momentary pressure spikes ($t < 0.1$ s) of up to 10 bar are permitted. The service life of the shaft seal decreases with an increase in the frequency of pressure spikes.

The case pressure must be equal to or higher than the ambient pressure.

Sizes 10 to 200



Sizes 250 to 1000



The values are valid for an ambient pressure $p_{abs} = 1$ bar.

Temperature range

The FKM shaft seal may be used for case drain temperatures from -25 °C to +115 °C.

Note

For application cases below -25 °C, an NBR shaft seal is required (permissible temperature range: -40 °C to +90 °C). State NBR shaft seal in plain text when ordering. Please contact us.

Direction of flow

Direction of rotation, viewed on drive shaft

clockwise

counter-clockwise

A to B

B to A

Speed range

No limit to minimum speed n_{min} . If uniformity of motion is required, speed n_{min} must not be less than 50 rpm. See table of values on page 7 for maximum speed.

Long-life bearing

Sizes 250 to 1000

For long service life and use with HF hydraulic fluids. Identical external dimensions as motor with standard bearings. Subsequent conversion to long-life bearings is possible. Bearing and case flushing via port U is recommended.

Flushing flow (recommended)

NG	250	355	500	710	1000
$q_{v \text{ flush}}$ (L/min)	10	16	16	16	16

Technical data

Operating pressure range (operating with mineral oil)

Pressure at service line port A or B

Size 5

Nominal pressure p_{nom} _____ 315 bar absolute

Maximum pressure p_{max} _____ 350 bar absolute

Single operating period _____ 10 s

Total operating period _____ 300 h

Summation pressure (pressure A + pressure B) p_{Su} 630 bar

Sizes 10 to 200

Nominal pressure p_{nom} _____ 400 bar absolute

Maximum pressure p_{max} _____ 450 bar absolute

Single operating period _____ 10 s

Total operating period _____ 300 h

Summation pressure (pressure A + pressure B) p_{Su} 700 bar

Sizes 250 to 1000

Nominal pressure p_{nom} _____ 350 bar absolute

Maximum pressure p_{max} _____ 400 bar absolute

Single operating period _____ 10 s

Total operating period _____ 300 h

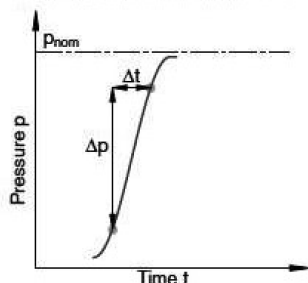
Summation pressure (pressure A + pressure B) p_{Su} 700 bar

Minimum pressure (high-pressure side) _____ 25 bar absolute

Rate of pressure change $R_{A\ max}$

with integrated pressure-relief valve _____ 9000 bar/s

without pressure-relief valve _____ 16000 bar/s

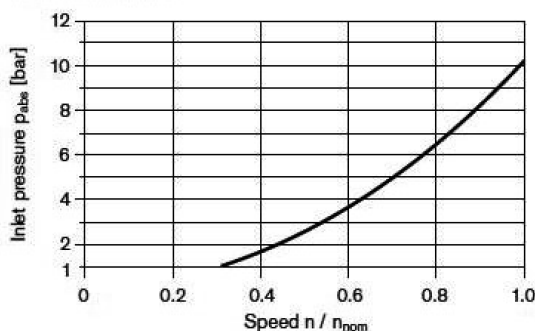


Note

Values for other hydraulic fluids, please contact us.

Minimum pressure – pump mode (inlet)

To prevent damage to the axial piston motor in pump operating mode (change of high-pressure side with unchanged direction of rotation, e. g. when braking), a minimum pressure must be guaranteed at the service line port (inlet). The minimum pressure depends on the speed of the axial piston unit (see characteristic curve below).



This diagram is valid only for the optimum viscosity range from $\nu_{opt} = 36$ to $16\text{ mm}^2/\text{s}$.

Please contact us if these conditions cannot be satisfied.

Definition

Nominal pressure p_{nom}

The nominal pressure corresponds to the maximum design pressure.

Maximum pressure p_{max}

The maximum pressure corresponds to the maximum operating pressure within the single operating period. The sum of the single operating periods must not exceed the total operating period.

Minimum pressure (high-pressure side)

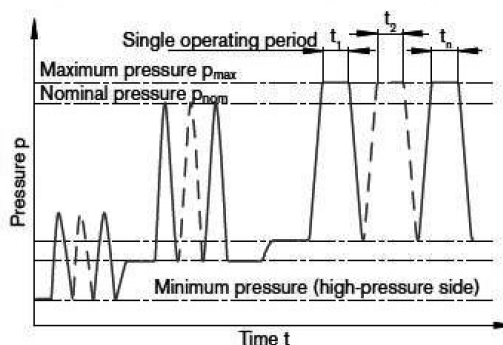
Minimum pressure at the high-pressure side (A or B) which is required in order to prevent damage to the axial piston unit.

Summation pressure p_{Su}

The summation pressure is the sum of the pressures at both service line ports (A and B).

Rate of pressure change R_A

Maximum permissible rate of pressure rise and reduction during a pressure change over the entire pressure range.



Total operating period = $t_1 + t_2 + \dots + t_n$

Technical data

Table of values (theoretical values, without efficiency and tolerances; values rounded)

Size	NG		5	10	12	16	23	28	32	45	56	63	80	
Displacement geometric, per revolution	V _g	cm ³	4.93	10.3	12	16	22.9	28.1	32	45.6	56.1	63	80.4	
Speed maximum ¹⁾	n _{nom}	rpm	10000	8000	8000	8000	6300	6300	6300	5600	5000	5000	4500	
	n _{max} ²⁾	rpm	11000	8800	8800	8800	6900	6900	6900	6200	5500	5500	5000	
Input flow ³⁾														
at n _{nom} and V _g	q _v	L/min	49	82	96	128	144	177	202	255	281	315	362	
Torque ⁴⁾	at V _g and Δp = 350 bar	T	Nm	24.7 ⁵⁾	57	67	89	128	157	178	254	313	351	448
		Δp = 400 bar	T	Nm	–	66	76	102	146	179	204	290	357	401
Rotary stiffness	c	kNm/rad	0.63	0.92	1.25	1.59	2.56	2.93	3.12	4.18	5.94	6.25	8.73	
Moment of inertia for rotary group	J _{GR}	kgm ²	0.00006	0.0004	0.0004	0.0004	0.0012	0.0012	0.0012	0.0024	0.0042	0.0042	0.0072	
Maximum angular acceleration	α	rad/s ²	5000	5000	5000	5000	6500	6500	6500	14600	7500	7500	6000	
Case volume	V	L		0.17	0.17	0.17	0.20	0.20	0.20	0.33	0.45	0.45	0.55	
Mass (approx.)	m	kg	2.5	5.4	5.4	5.4	9.5	9.5	9.5	13.5	18	18	23	
Size	NG		90	107	125	160	180	200	250	355	500	710	1000	
Displacement geometric, per revolution	V _g	cm ³	90	106.7	125	160.4	180	200	250	355	500	710	1000	
Speed maximum ¹⁾	n _{nom}	rpm	4500	4000	4000	3600	3600	2750	2700	2240	2000	1600	1600	
	n _{max} ²⁾	rpm	5000	4400	4400	4000	4000	3000	–	–	–	–	–	
Input flow ³⁾														
at n _{nom} and V _g	q _v	L/min	405	427	500	577	648	550	675	795	1000	1136	1600	
Torque ⁴⁾	at V _g and Δp = 350 bar	T	Nm	501	594	696	893	1003	1114	1393	1978	2785	3955	5570
		Δp = 400 bar	T	Nm	573	679	796	1021	1146	1273	–	–	–	–
Rotary stiffness	c	kNm/rad	9.14	11.2	11.9	17.4	18.2	57.3	73.1	96.1	144	270	324	
Moment of inertia for rotary group	J _{GR}	kgm ²	0.0072	0.0116	0.0116	0.0220	0.0220	0.0353	0.061	0.102	0.178	0.55	0.55	
Maximum angular acceleration	α	rad/s ²	6000	4500	4500	3500	3500	11000	10000	8300	5500	4300	4500	
Case volume	V	L	0.55	0.8	0.8	1.1	1.1	2.7	2.5	3.5	4.2	8	8	
Mass (approx.)	m	kg	23	32	32	45	45	66	73	110	155	325	336	

1) The values are valid:

- for the optimum viscosity range from $\nu_{opt} = 36$ to 16 mm²/s
- with hydraulic fluid based on mineral oils

2) Intermittent maximum speed: overspeed for unload and overhauling processes, $t < 5$ s and $\Delta p < 150$ bar

3) Restriction of input flow with counterbalance valve, see page 39

4) Torque without radial force, with radial force see page 8

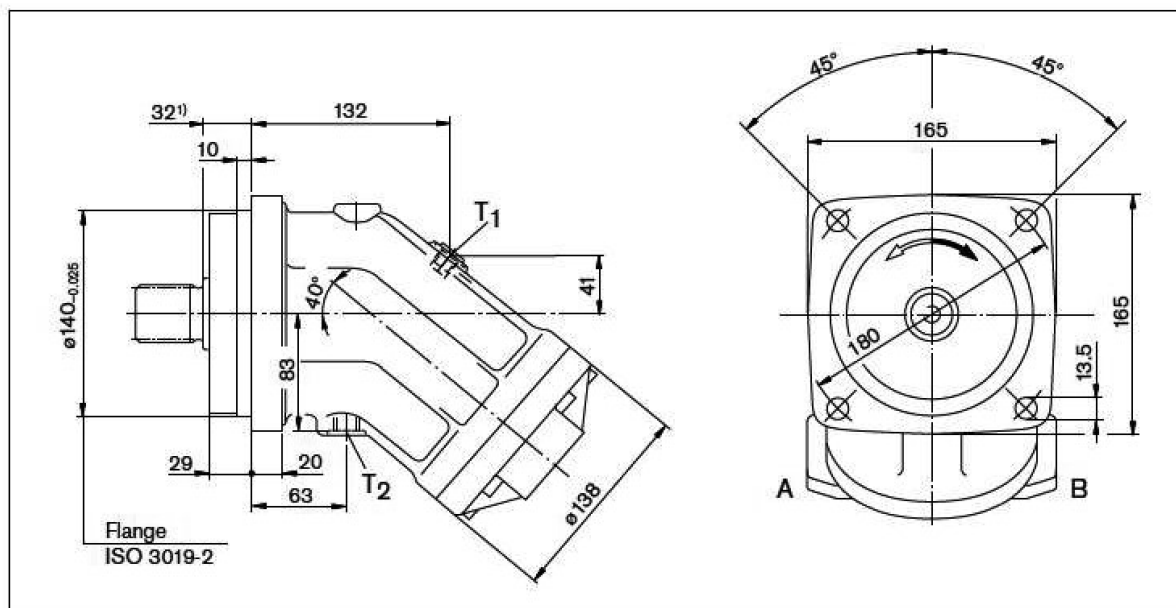
5) Torque at $\Delta p = 315$ bar

Note

Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit. Other permissible limit values, with respect to speed variation, reduced angular acceleration as a function of the frequency and the permissible start up angular acceleration (lower than the maximum angular acceleration) can be found in data sheet RE 90261.

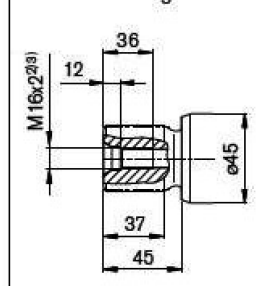
Dimensions sizes 80, 90

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

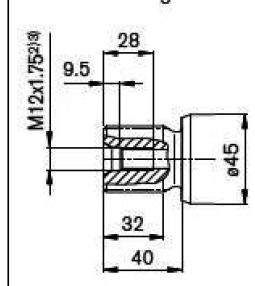


Drive shafts

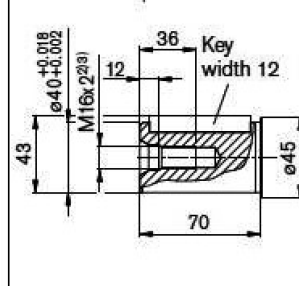
NG80, 90

A Splined shaft DIN 5480
W40x2x18x9g

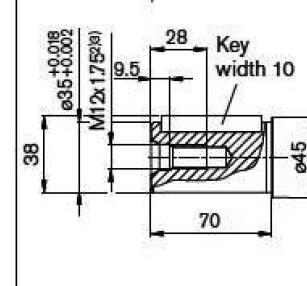
NG80

Z Splined shaft DIN 5480
W35x2x16x9g

NG80, 90

B Parallel keyed shaft
DIN 6885, AS12x8x56

NG80

P Parallel keyed shaft
DIN 6885, AS10x8x56

Ports

Designation	Port for	Standard	Size ³⁾	Maximum pressure [bar] ⁴⁾	State ⁷⁾
A, B	Service line (see port plates)			450	
T ₁	Drain line	DIN 3852 ⁶⁾	M18 x 1.5; 12 deep	3	X ⁵⁾
T ₂	Drain line	DIN 3852 ⁶⁾	M18 x 1.5; 12 deep	3	O ⁵⁾

1) To shaft collar

2) Center bore according to DIN 332 (thread according to DIN 13)

3) Observe the general instructions on page 46 for the maximum tightening torques.

4) Momentary pressure spikes may occur depending on the application. Keep this in mind when selecting measuring devices and fittings.

5) Depending on installation position, T₁ or T₂ must be connected (see also installation instructions on page 44).

6) The spot face can be deeper than specified in the appropriate standard.

7) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

Hydromotor PARKER F-12 80

Catalogue HY30-8249/UK
Specifications

Hydraulic motor/pump
Series F12

Frame size F12	-030	-040	-060	-080	-090	-110	-125	-152	-162	-182	-250
Displacement [cm ³ /rev]	30.0	40.0	59.8	80.4	93.0	110.1	125.0	149.8	163.1	179.8	242
Operating pressure											
max intermittent ¹⁾ [bar]	480	480	480	480	420	480	480	480	480	480	420
max continuous [bar]	420	420	420	420	350	420	420	420	420	420	350
Motor operating speed [rpm]											
max intermittent ¹⁾	7300	6700	5800	5300	5000	4800	4600	4000	4000	4000	3000
max continuous ³⁾	6700	6100	5300	4800	4600	4400	4200	3700	3700	3700	2700
min continuous	50	50	50	50	50	50	50	50	50	50	50
Max pump selfpriming speed ²⁾											
L or R function; max [rpm]	3150	2870	2500	2300	2250	2200	2100	-	-	-	1500
Motor input flow											
max intermittent ¹⁾ [l/min]	219	268	347	426	465	528	575	608	648	728	726
max continuous [l/min]	201	244	317	386	428	484	525	547	583	655	653
Drain temperature ³⁾ , max [°C]	115	115	115	115	115	115	115	115	115	115	115
min [°C]	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40
Theoretical torque at 100 bar [Nm]	47.6	63.5	94.9	127.6	147.6	174.8	198.4	241	257	289	384.1
Mass moment of inertia											
(x10 ⁻³) [kg m ²]	1.7	2.9	5	8.4	8.4	11.2	11.2	21	21	21	46
Weight [kg]	12	16.5	21	26	26	36	36	40	40	40	77

1) Intermittent: max 6 seconds in any one minute.

2) Selfpriming speed valid at sea level. Find more info on page 42

3) See also installation information. Page 69

Selfpriming speed and required inlet pressure

Series F12

When operating the F12 as a pump (with L or R valve plate) above the selfpriming speed, the inlet must be pressurized. Increased noise and deteriorating performance may otherwise be experienced.

Diagrams 2 and 3 shows required pump inlet pressure vs. shaft speed.

The F12 motor (type M valve plate) sometimes operates as a pump e.g. when used in a propel transmission and the vehicle is going downhill.

Minimum required inlet pressure versus shaft speed is shown in the diagrams.

The inlet pressure can be charged by external pump, pressurized reservoir or using BLA Boost unit.

Find more info about the BLA unit at page 68.

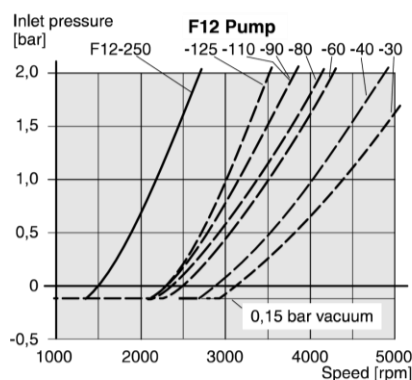


Diagram 2. Min. required pump (F12-L or -R) inlet press.

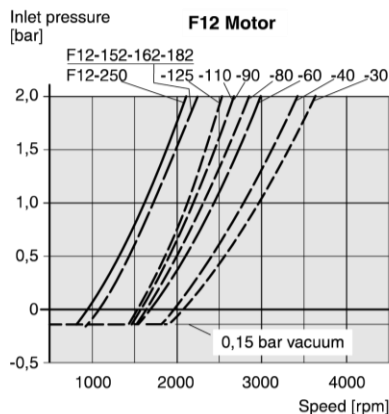


Diagram 3. Min. required motor (F12-M) inlet pressure.

Hydrogenerátory A4VG

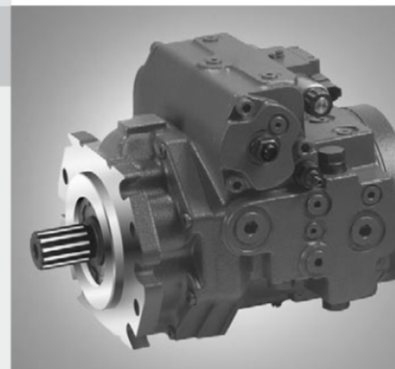
Axial Piston Variable Pump A4VG

RE 92004/06.12
Replaces: 12.11

1/66

Data sheet

Series 40
Size 45 to 280
Nominal pressure 450 bar
Maximum pressure 500 bar
Closed circuit



Contents

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Features

- Variable axial piston pump of swashplate design for hydrostatic drives in closed circuit
- The flow is proportional to the drive speed and displacement.
- The flow can be infinitely varied by adjusting the swashplate angle.
- Flow direction changes smoothly when the swashplate is moved through the neutral position.
- A wide range of highly adaptable control devices with different control and regulating functions, for all important applications.
- Two pressure-relief valves are provided on the high-pressure side to protect the hydrostatic transmission (pump and motor) from overload.
- The high-pressure relief valves also function as boost valves.
- The integrated boost pump acts as a feed pump and control pressure supply.
- The maximum boost pressure is limited by a built-in low-pressure relief valve.
- High pressure level for high power density and good efficiency

Technical data

Table of values (theoretical values, without efficiency and tolerances; values rounded)

Size	NG			45	65	85	110	145	175	210	280	
Displacement geometric, per revolution												
variable pump	V _{g max}	cm ³		45.3	65.2	85.4	110.4	145.3	175.4	210.6	280.3	
boost pump (at p = 20 bar)	V _{g Sp}	cm ³		11	14.5	19	24.5	32	39	46	60	
Standard rotary group												
Speed ¹⁾												
maximum at V _{g max}	n _{nom S}	rpm		4300	3800	3300	3150	2850	2650	2500	2400	
at Δp ≥ 40 bar (t < 15 s)	n _{max 40}	rpm		4500	4000	3500	3350	3000	2800	2650	2550	
minimum	n _{min}	rpm		500	500	500	500	500	500	500	500	
Flow												
at n _{nom S} and V _{g max}	q _v	L/min		195	248	282	348	414	465	527	673	
Power ²⁾												
at n _{nom S} , V _{g max} and Δp = 430 bar	P	kW		140	178	202	249	297	333	377	482	
High-speed rotary group												
Speed ¹⁾												
maximum at V _{g max}	n _{nom H}	rpm		–	–	–	3400	3050	3000	–	–	
at Δp ≥ 40 bar (t < 15 s)	n _{max 40}	rpm		–	–	–	3600	3200	3100	–	–	
minimum	n _{min}	rpm		–	–	–	500	500	500	–	–	
Flow												
at n _{nom H} and V _{g max}	q _v	L/min		–	–	–	375	443	526	–	–	
Power ²⁾												
at n _{nom H} , V _{g max} and Δp = 430 bar	P	kW		–	–	–	269	318	377	–	–	
Torque ²⁾												
at V _{g max} and	Δp = 430 bar	T	Nm	310	446	584	756	994	1200	1441	1918	
	Δp = 100 bar	T	Nm	72	104	136	176	231	279	335	446	
Rotary stiffness drive shaft	1 1/4 S7	c	kNm/rad	82.1	102	–	–	–	–	–	–	
	1 1/2 S9	c	kNm/rad	94.8	133	–	–	–	–	–	–	
	1 3/8 V8	c	kNm/rad	–	–	136	168	–	–	–	–	
	1 3/4 T1	c	kNm/rad	–	–	166	⁴⁾	248	263	–	–	
	2 T2	c	kNm/rad	–	–	–	247	296	–	399	464	
	2 1/4 T3	c	kNm/rad	–	–	–	–	–	371	473	571	
Moment of inertia for rotary group			J _{GR}	kgm ²	0.0048	0.0089	0.014	0.0218	0.0330	0.0570	0.0632	0.0975
Maximum angular acceleration ³⁾			α	rad/s ²	28000	22000	18000	14500	12000	10000	8000	5000
Case volume			V	L	1.4	1.5	2.3	2.5	3.3	3.1	4.9	5.4
Mass approx. (without through drive)			m	kg	55	58	77	88	106	115	152	160

1) The values are valid:

- for the optimum viscosity range from $\nu_{opt} = 36$ to $16 \text{ mm}^2/\text{s}$
- with hydraulic fluid based on mineral oils

2) Without boost pump

3) The data are valid for values between the minimum required and maximum permissible speed.

Valid for external excitation (e. g. engine 2 to 8 times rotary frequency; cardan shaft twice the rotary frequency).

The limit value applies for a single pump only.

The load capacity of the connection parts must be considered.

4) On request

Note

Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit. We recommend testing the loads by means of experiment or calculation / simulation and comparison with the permissible values.

Modul RTM

The Drive & Control Company

Rexroth
Bosch Group

Traction module (Flow divider) RTM

RE 64592

Edition: 05.2015

Replaces: 05.2012



- ▶ Series 1X
- ▶ Sizes 16 and 25
- ▶ Nominal pressure 500 bar
- ▶ Maximum flow
 - 160 l/min (size 16)
 - 440 l/min (size 25)

Features

- ▶ Protects hydraulic motors from overspinning in control operation
- ▶ Synchronous operation of parallel consumers in a wide flow range
- ▶ Variable division accuracy can be preselected or adjusted using proportional orifice
- ▶ Double-acting (dividing and summing) flow divider
- ▶ Constant division ratio for summing flow division
- ▶ Suitable for open and closed circuits
- ▶ Optionally with or without free-wheel operation
- ▶ Can be switched in all functions
- ▶ Built-in pressure relief/feed valves for protecting hoses and preventing cavitation
- ▶ Switchable or electro-proportional control of the measurement edge

Fields of application (examples)

- ▶ Road rolling
- ▶ Rollers
- ▶ Special machines

Contents

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Flushing valve

RA 95 512/07.02

RA 95 512/07.02

replaces: 03.93

Rexroth
Bosch Group

Flushing and Boost Pressure Valve
with limitation of the flushing oil volume
for installation in closed circuits



Flushing and boost pressure valve

Features

The flushing and boost pressure valve is used to flush the closed circuit when excess heat is generated.

The valve is fitted between service line A and B.

When the pressure difference exceeds 45 - 75 psi (3 - 5 bar) between the two lines A and B, the flushing valve is opened by the high pressure. The flushing and boost pressure valve is set at a fixed pressure of 230 psi (16 bar) and serves to maintain the boost pressure. The flushing operation is effected via a orifice from the low pressure line into the tank or to the pump case (case flushing). The oil fluid which is removed from the circuit has to be replaced with cooled oil by the boost pump.

The adjusted value at the valve ① has to be at least 29 psi (2 bar) higher than at the boost pressure valve of the flushing valve ②.

Different flushing volumes can be selected by means of orifices.

Orifice-Order-No.

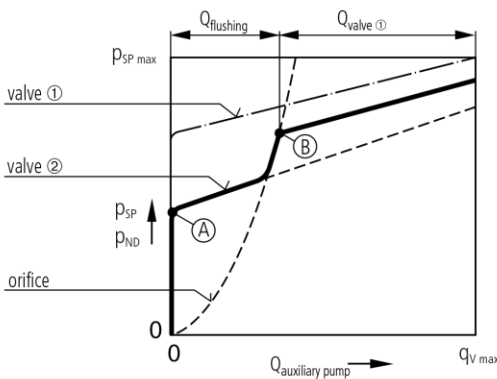
Flushing and boost pressure valve

	R902061919
--	-------------------

Flushing volume ¹⁾	Orifice-Ø	Orifice-Order-No.
1.0 GPM (4 L/min)	1,2 mm	R909440249
1.6 GPM (6 L/min)	1,6 mm	R909432472
2.6 GPM (10 L/min)	2,0 mm	R909431308
4.2 GPM (16 L/min)	2,5 mm	R909431309
5.3 GPM (20 L/min)	2,8 mm	R909431310
7.9 GPM (30 L/min)	3,5 mm	R909435172
9.5 GPM (36 L/min)	4,0 mm	R909436622

¹⁾ Flushing oil volume at low pressure $\Delta p = 365$ psi (25 bar), (set on valve ①). When ordering please state required orifice.

Characteristical curve



Point A: Boost pressure relief valve ② opens [230 psi (16 bar)].

Point B: $Q_{max\ flushing}$, boost pressure relief valve of the variable displacement pump ① opens.

$Q_{flushing}$ = flushing oil volume; flows via valve ② to the tank.

$Q_{valve\ ①}$ = Remaining oil volume of the aux. pump; will be flushed out via valve ① into the housing of the variable pump.

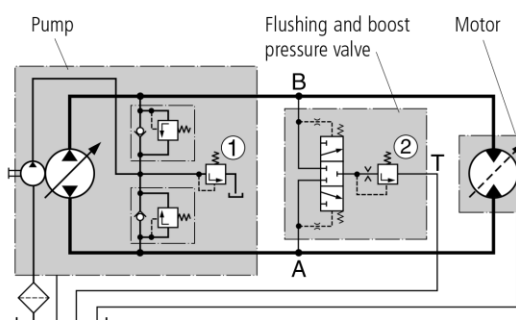
— Flushing valve in center position
- - - Flushing valve addressed

RA 95 512/07.02

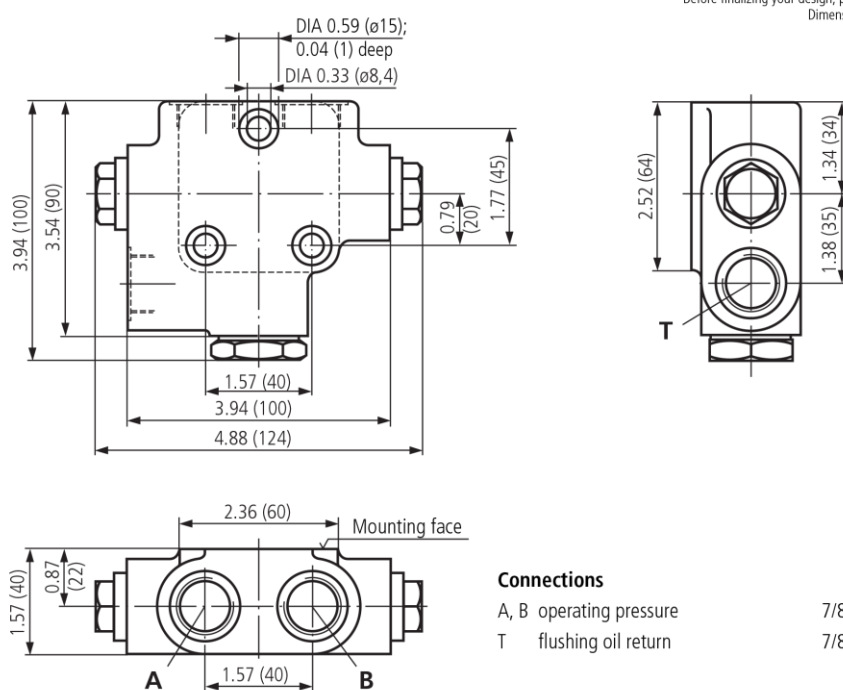
Technical Data

Type	
Pressure setting of the boost pressure valve	230 psi (16 bar), fixed
Opening pressure of the flushing valve	Δp 45 - 75 psi (3 - 5 bar)
Mounting position	optional
Seals	FKM (fluor-caoutchouc)
Weight (approx.)	3.7 lbs (1.7 kg)

Hydraulic circuit



Unit Dimensions



Connections

A, B operating pressure	7/8" -14 UNF-2B; 17 deep
T flushing oil return	7/8" -14 UNF-2B; 17 deep

The specified data is for product description purposes only and may not be deemed to be guaranteed unless expressly confirmed in the contract.

Mannesmann Rexroth Corporation
Industrial Hydraulics Division, 2315 City Line Road, Bethlehem, PA 18017-2131 Tel. (610) 694-8300 Fax: (610) 694-8467
Mobile Hydraulics Division, 1700 Old Mansfield Road, Wooster, OH 44691-0394 Tel. (330) 263-3400 Fax: (330) 263-3330
Brueninghaus Hydromatik North America, 8 Southchase Court, Fountain Inn, SC 29644-9018 Tel. (864) 967-2777 Fax: (864) 967-8900

Poznámka 1

V této příloze se nachází také výkres hydraulického schématu a výpočet trakční charakteristiky tohoto pohonu.

Poznámka 2

Všechny katalogové parametry jsou dostupné na webu společnosti Bosch Rexroth a jsou dohledatelné podle kódu ve tvaru RExxxx. Pro získání jincých než katalogových parametrů je nutno kontaktovat výrobce.

Date	12.5.2016	Drive Diagram	<h1>Rexroth</h1> <h2>Bosch Group</h2>
Project Engineer	NOŽKA	Program FADI 5.102	
Page	1	mj	
Proj. No.	H3716	Vehicle Type:	
Manufacturer	No ka	Sigma4	
File	nozka.FA5		

Vehicle's Mass m_{Min}	5000 kg	Vehicle's Mass m_{Max}	6000 kg	Rolling resistance factor f_R	0,2
Final Gear / Wheel	Type	Ratio i_{FG}	Efficiency η_{FG}	stat. Radius R_{ws}	
01	MCR	1	1,00	0,353 m	

Engine Type:	IVECO C78ENT	Pump Splitter Gear box	Pump1: 1xA4VG 210/40
Input speed n_{Eng}	2000 R/min	Ratio $i_{SpIG} = n_{Eng}/n_{Pump}$	$V_{gPump1Max}$ 210,0 cm ³ /R
Input Drive Power P_{EngNom}	55,00 kW	Efficiency η_{SpIG}	Speed n_{Pump1} 2000 R/min
P Charge Pump(s) P_{ChP}	5,00 kW		Power P_{Pump} 140,00 kW
Auxiliary Drive Power P_{Aux}	10,00 kW		

Motor	Motor State	Ratio i_{MRG}	Range Gear box	Efficiency η_{MRG}	Final Gear / Wheel
4xMCR05 2WL 820	Active	1	1,00		01

Operation Stages Nr.	1	2	3	4
Tractive effort F_{Tr}	47770	24013	21179	10173 N
Velocity v_v	8,26	16,55	16,59	33,03 km/h
Complete Flow Q	209,4	410,1	209,4	410,1 l/min
Differential Pressure Δp_{Pump}	350	181	350	181 bar
Motor(s) speed n_{Mot}	62	124	125	248 R/min
Motor(s) torque M_{Mot}	4216	2119	1869	898 Nm
Motor(s) stroke vol. V_{gMot}	820,0	820,0	410,0	410,0 cm ³ /R
Motor(s) Angle α	-	-	-	- °

