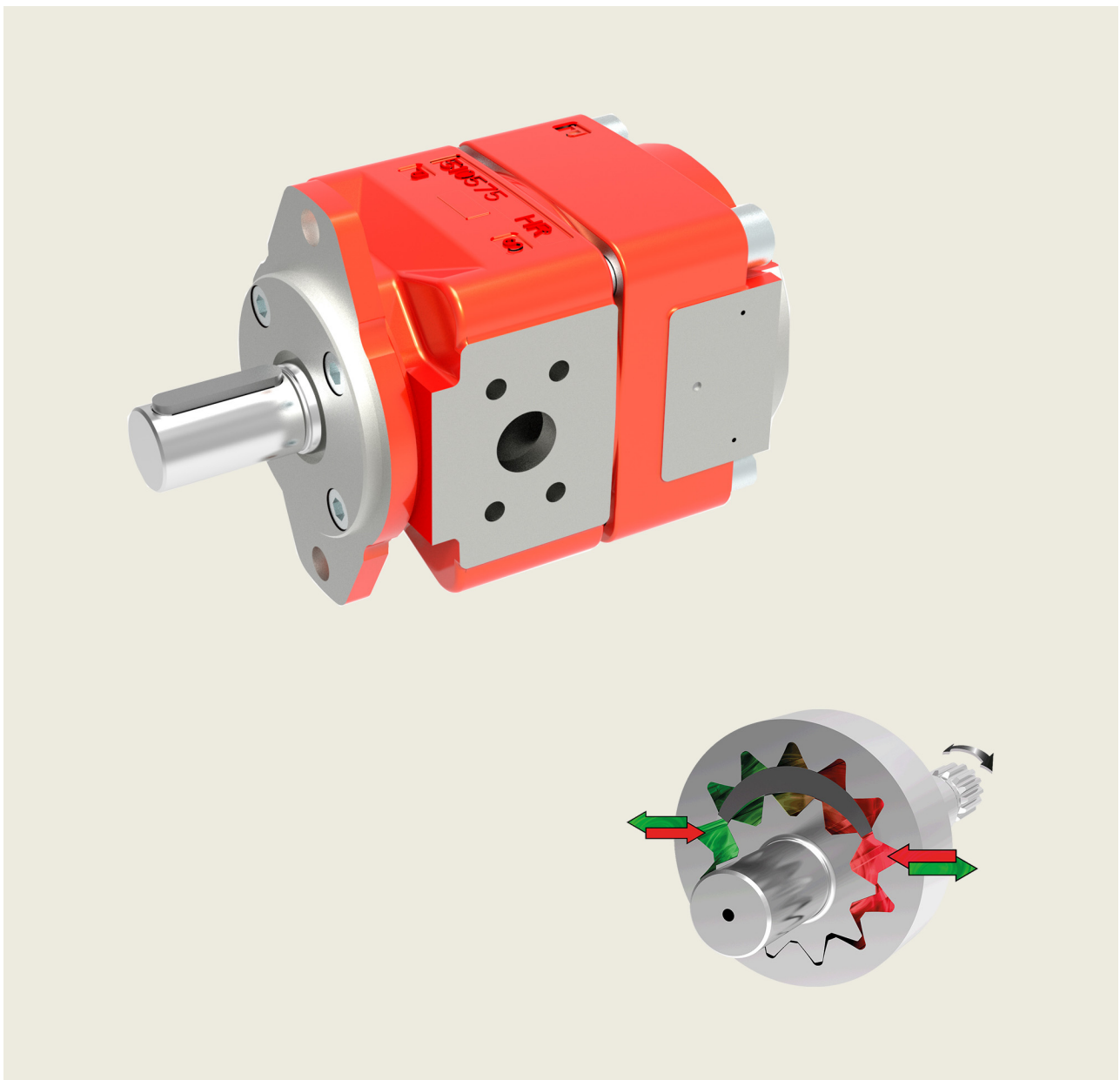


## Internal Gear Unit

for motor/pump service  
Series QXEM





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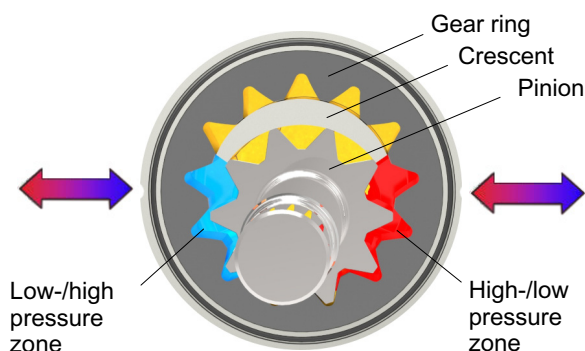
## 1 General

### 1.1 Product description

For applications requiring variable-speed multi-quadrant operation, Bucher Hydraulics has developed a special version: The QXEM internal gear drive unit.

One of the central points in the QXEM series is its symmetric construction, with identical high and low pressure areas. With special metering grooves and lubrication systems as well as two same-size pressure-tight connections, the design is specially optimised for 2 and 4 quadrant modes and is thus ideally suited to both directions of rotation at high and low pressures.

Thanks to the use of high-precision gear parts with a pinion shaft (pinion and shaft as one component), extremely low pulsation levels are produced even at low speeds.



### 1.2 Advantages

- compact, non-compensated design
- pressure and flow pulsations are minimal, thanks to pinion-shaft technology
- first-rate reliability at both high and low speeds and in reverse mode
- field-proven in both fixed- and variable-speed drive
- long service life even under highly cyclical loading
- change of direction in the milliseconds range (pinion shaft)
- Suitable for special fluids such as HFB, HFC, HFD and bio-degradables

### 1.3 Application

- Injection molding machines
- Hydraulic presses
- Waste compactors
- Die casting machines

## 2 Technical data

### 2.1 General

Characteristics	Unit	Description, value
Installation attitude		unrestricted
Mounting method (standard)		oval 2-hole flange to ISO 3019/1 (SAE): QXEM 3-6 oval 2-hole flange to ISO 3019/2 (metric) QXEM 2+8
Direction of rotation		unrestricted
Drive method		in-line, by a flexible coupling
Hydraulic fluid		HLP mineral oils to DIN 51524, Part 2 HFB, HFD and HFC fluids to VDMA 24317 (other on request)
Max. admissible level of contamination of the hydraulic fluid		ISO 4406 class 20/18/15, or NAS 1638 class 9
Operating viscosity Starting viscosity	mm <sup>2</sup> /s	10 ... 100 10 ... 300 (higher values on request)
Hydraulic fluid temperature range	°C	min -20 / max +80 (but comply with viscosity limits) ideal range: +30 ... +60 / option 09: -20°C ... +100°C
Max. pressure at drain port	bar	1.5 absolute (higher values on request)
Accumulated pressure restriction		port P1 + port P2 ≤ continuous pressure
Dichtungswerkstoff	bar	NBR = standard / FKM (Viton) = option 09

## 2.2 Main characteristics

**IMPORTANT:** The main characteristics are valid for hydraulic oils DIN 51524 with a viscosity of 42mm<sup>2</sup>/s.

Type	Displacement		maximum Speed [min <sup>-1</sup> ]		Operating pressure [bar]		Torque <sup>2)</sup> [Nm]
	nominal [cm <sup>3</sup> /U]	effective [cm <sup>3</sup> /U]	Pump operat. <sup>3)</sup>	Motor operating	continuous	intermittent <sup>1)</sup>	
QXEM22-005	005	5,1	3250	6000	210	250	17
QXEM22-006	006	6,3					21
QXEM22-008	008	8,0					26,5
QXEM32-010	010	10,0	3050	5500	210	250	33,5
QXEM32-012	012	12,6					42
QXEM32-016	016	15,6					52
QXEM42-020	020	20,3	2900	5000	210	250	68
QXEM42-025	025	25,1					84
QXEM42-032	032	32,3					108
QXEM52-040	040	39,2	2500	4500	210	250	131
QXEM52-050	050	50,5					169
QXEM52-063	063	63,5					212
QXEM62-080	080	80,1	2250	4000	210	250	268
QXEM62-100	100	100,9	2050				337
QXEM62-125	125	124,6	1800				416
QXEM82-160	160	162,7	1600	3500	210	250	544
QXEM82-200	200	200,9	1500				671
QXEM82-250	250	248,8	1350				832

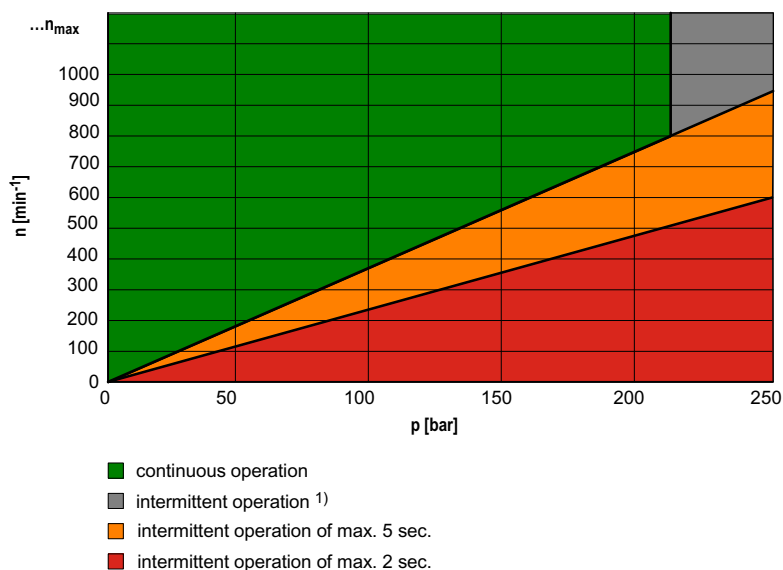
1) Intermittent pressure for max. 20 sec/min but not more than 10% of the duty cycle.

2) Theoretical value at the maximum permitted continuous pressure. For starting torques, see section 3.

3) Minimum inlet pressure 0,98 bar absolute.

## 3 Performance graphs

### 3.1 Minimum speed limit for pump and motor operation

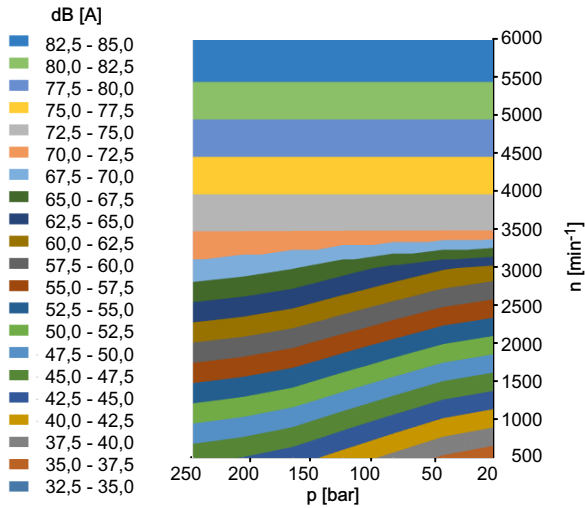


1) Intermittent pressure for max. 20 sec/min but not more than 10% of the duty cycle.

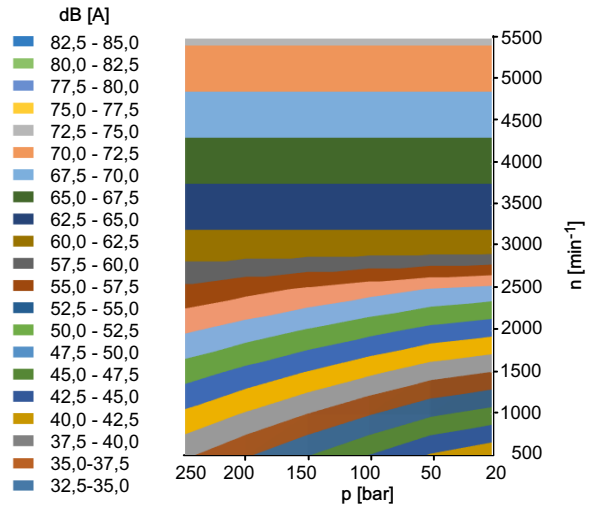
### 3.2 Noise level

Measured to DIN 45635 part 26 in low-echo noise measurement chamber, valid for single units with deviations of  $\pm 1,5$  dB [A].

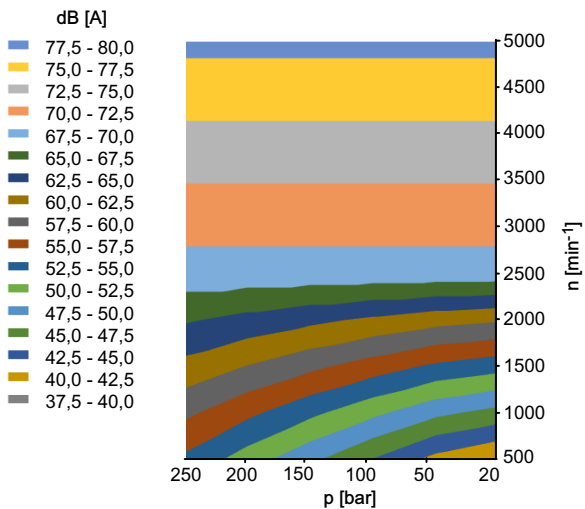
#### 3.2.1 QXEM22



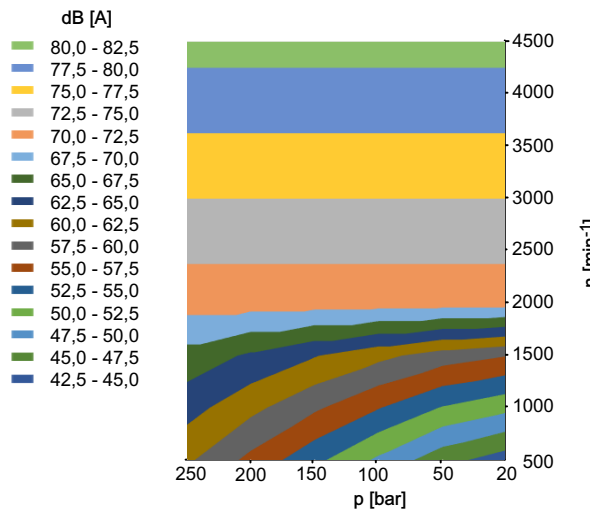
#### 3.2.2 QXEM32



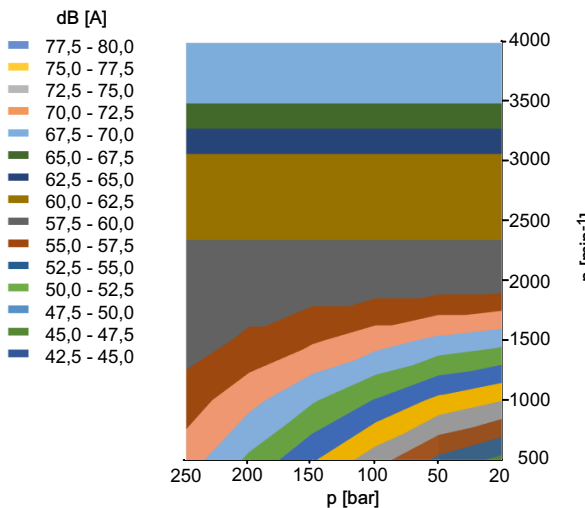
#### 3.2.3 QXEM42



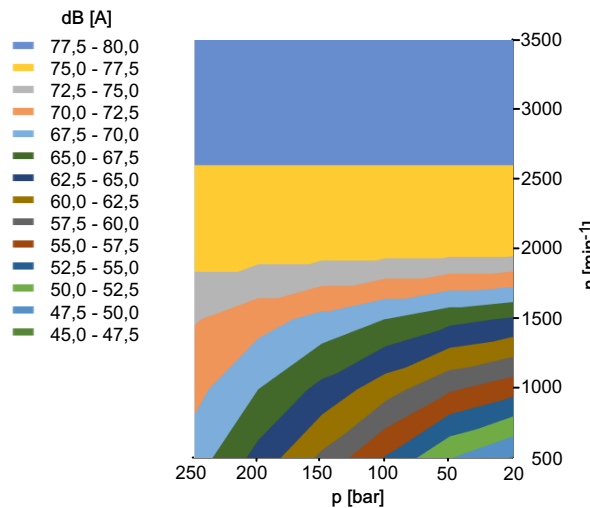
#### 3.2.4 QXEM52



#### 3.2.5 QXEM62



#### 3.2.6 QXEM82

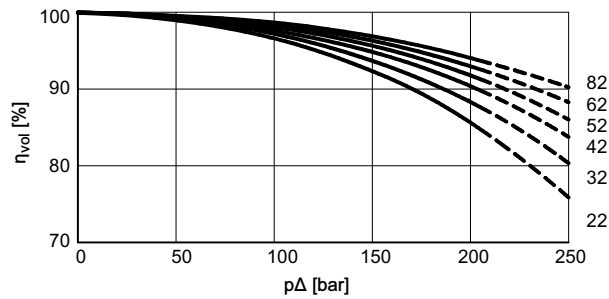


### 3.3 Efficiency ( $\eta$ )

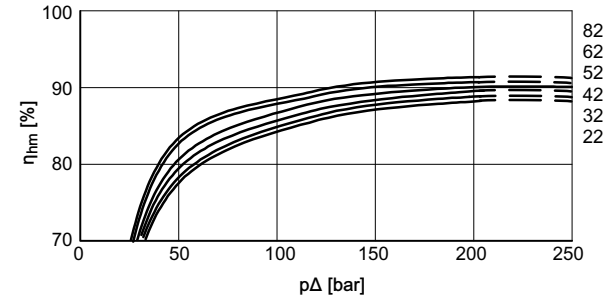
Measured with viscosity 42 mm<sup>2</sup>/s, speed 1450 min<sup>-1</sup>

Solid line = continuous pressure / dashed line = max. intermittent pressure

#### 3.3.1 Volumetric efficiency

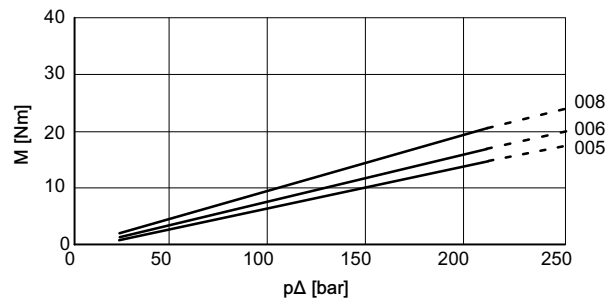


#### 3.3.2 Hydro-mechanical efficiency

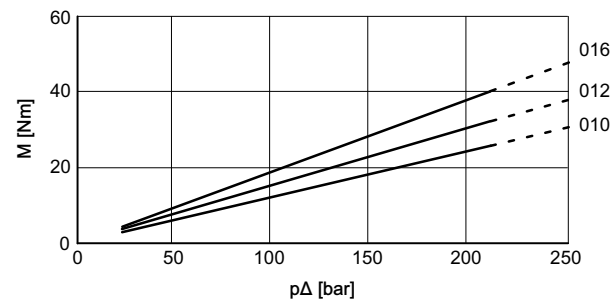


### 3.4 Starting torque

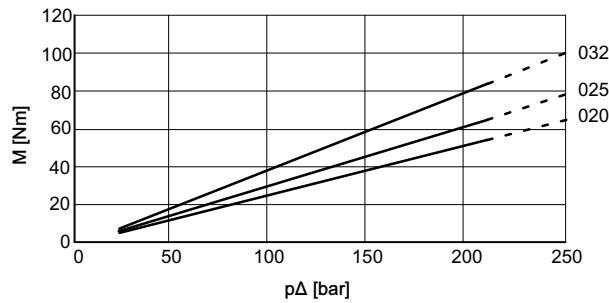
#### 3.4.1 QXEM22



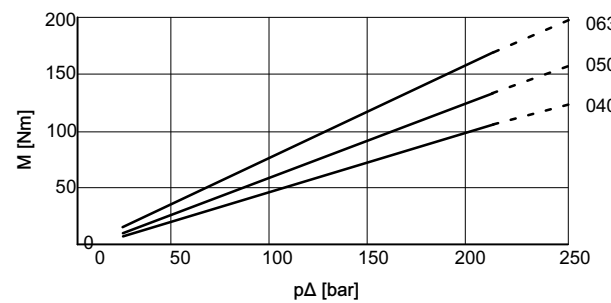
#### 3.4.2 QXEM32



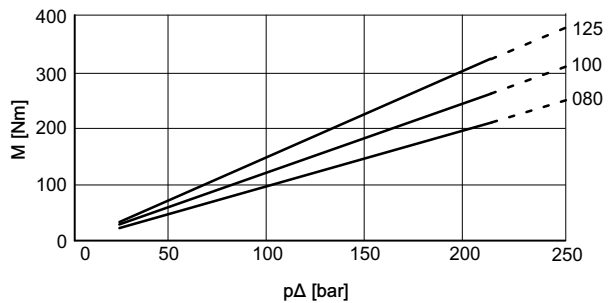
#### 3.4.3 QXEM42



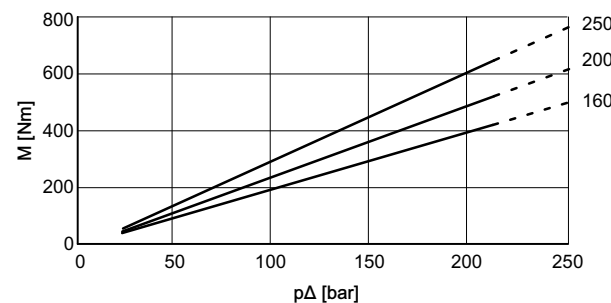
#### 3.4.4 QXEM52



#### 3.4.5 QXEM62



#### 3.4.6 QXEM82





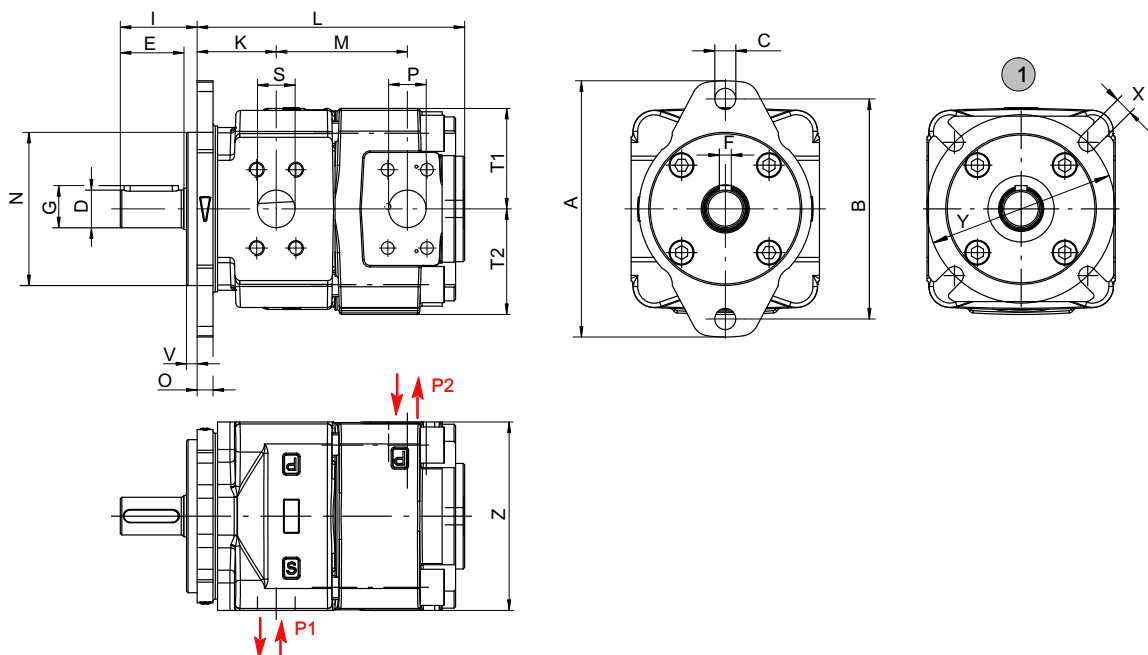
## 4 Dimensions

Frame size	2		3		4		5		6		8								
Pressure range	2		2		2		2		2		2								
Service ports to SAE J518 <sup>1)</sup>	P <sub>1</sub> , P <sub>2</sub>	G1/2" <sup>3)</sup> thread		G 3/4" <sup>3)</sup> thread		1"		1 1/4"		1 1/2"		2"							
Drain port to DIN 3852 Teil 2 Part 2	P <sub>L</sub>	G 1/4"		G 1/4"		G 1/4"		G 1/4"		G 3/8"		G 1/2"							
Mounting: oval 2-hole flange to ISO 3019/1 (SAE - size 3-6) ISO 3019/2 (Metr. - sizes 2+8)	A	118		132		170		212		267		330							
	B(SAE)	-		106		146		181		229		-							
	B(Metr.)	100		109		140		180		224		280							
	C	9		11		14		18		22		26							
	N(SAE)	-		82,55 - 0,05		101,6 - 0,05		127 - 0,05		152,4 - 0,05		-							
	N(Metr.)	63 h8		80 h8		100 - h8		125 h8		160 h8		200 h8							
	O	8,5		8,5		10,5		12,5		16,5		20							
V	6		6		7		7		7		9								
Shaft end: parallel, to ISO/R775 <sup>2)</sup>	D	16 j6		20 j6		25 j6		32 j6		40 j6		50 j6							
	E	28		36		42		58		82		110							
	F	5		6		8		10		12		14							
	G	18		22,5		28		35		43		53,5							
	I	37		44		51		68		92		122							
Housing	K	38		44		52		60,5		74		90							
	L	136	118	153	164	144	189	202	176	232	242	210	280	288	248	338	361	331	446
	M	-	55	90	-	70	114	-	87	143	-	102	172	-	119	209	-	151	266
	T1	43		54		67		89		107		110		137		138			
	T2	43		54		60		67		70		89		107		110		137	
	Z	100		120		126		156		195		197		250					
	W	80		100		136		165		203		256							
Weight	kg	5	5	6,5	10	9,5	12,5	18	17	22	33	31	40	64	60	76	130	120	160

1) For SAE J518 code 61 bzw. ISO6162-1 pipe flange dimensions see section 10

2) For other shaft ends, contact Bucher Hydraulics

3) Threaded ports to DIN 3852 Part 2



1 Option 66 = 4-hole mounting flange ISO 3019/2

### 5 Ordering details

		Q X E M	5	2	-	0	4	0	N	*	*	*
Internal gear unit	QXEM											
Frame size	2 / 3 / 4 / 5 / 6 / 8											
Pressure range	2											
Geom. Displ./Consump. in cm <sup>3</sup> /rev	005 - 250											
Direction of rotation, unrestricted	N (see section 5.4)											
Options	(to be inserted by the factory, see section 5.3 for a selection)											

#### 5.1 Ordering example

Required:	internal gear drive unit QXEM
Displ./Consump.:	40 cm <sup>3</sup> /rev
Continuous pressure:	210 bar
For use with mineral oil:	HLP
Ordering code:	QXEM 52-040 N

#### 5.2 Standard configuration

- Direction of rotation - unrestricted
- 2-hole mounting flange to ISO 3019/1;  
Frame size QXEM 3-6
- 2-hole mounting flange to ISO 3019/2;  
Frame size QXEM 2+8
- Nitrile seals
- Cylindrical shaft end to ISO R775
- Separate drain port in rear cover of the drive unit
- Ports P1 + P2 both the same size
- Compression proof shaft seal
- black priming, flange without priming

#### 5.3 Options

- O = without priming
- 09 = FPM (Viton) seals, without priming
- 66 = 4-hole mounting flange to ISO 3019/2 (metric)
- 130 = 2-quadrant operation, service port dimensions as per QX pumps  
2-hole mounting flange to ISO 3019/2 (metric)

For other special features, contact Bucher Hydraulics

#### 5.4 Direction of rotation

**Direction of rotation: right:**  
(clockwise, viewed from the shaft end) = oil flows from P<sub>1</sub> to P<sub>2</sub>

**Direction of rotation: left:**  
(counterclockwise, viewed from the shaft end) = oil flows from P<sub>2</sub> to P<sub>1</sub>

## 6 Fluid cleanliness

QXEM internal gear units require a fluid with a minimum cleanliness level of NAS 1638, Class 9 or ISO 4406, code 20/18/15.

We recommend the use of fluids that contain anti-wear additives for mixed-friction operating conditions. Fluids without appropriate additives can reduce the service life of pumps and motors. The user is responsible for maintaining, and regularly checking, the fluid quality. Bucher Hydraulics recommends a load capacity of  $\geq 30 \text{ N/mm}^2$  to Brügger DIN 51347-2.

## 7 Note

This catalogue is intended for users with specialist knowledge. The user must check the suitability of the equipment described herein in order to ensure that all of the conditions necessary for the safety and proper functioning of the system are fulfilled. If you have any doubts or questions concerning the use of these pumps, please consult Bucher Hydraulics.

## 8 Fluid cleanliness

Cleanliness class (RK) as per ISO 4406 and NAS 1638

Code ISO 4406	Dirt particle number / 100 ml			
	$\geq 4 \mu\text{m}$	$\geq 6 \mu\text{m}$	$\geq 14 \mu\text{m}$	NAS 1638
23/21/18	8000000	2000000	250000	12
22/20/18	4000000	1000000	250000	-
22/20/17	4000000	1000000	130000	11
22/20/16	4000000	1000000	64000	-
21/19/16	2000000	500000	64000	10
20/18/15	1000000	250000	32000	9
19/17/14	500000	130000	16000	8
18/16/13	250000	64000	8000	7
17/15/12	130000	32000	4000	6
16/14/12	64000	16000	4000	-
16/14/11	64000	16000	2000	5
15/13/10	32000	8000	1000	4
14/12/9	16000	4000	500	3
13/11/8	8000	2000	250	2

## 9 Operational reliability

To ensure a reliable operation and a long service life of the QXEM internal gear units, a maintenance schedule must be prepared for the power unit, machine or system. The maintenance schedule must make sure that the provided or permissible operating conditions of the QXEM internal gear units are adhered to over the period of use.

In particular, compliance with the following operating parameters must be ensured:

- The required oil cleanliness
- The operating temperature range
- The fluid level

Moreover, the QXEM internal gear units and the system must be inspected at regular intervals for changes in the following parameters:

- Vibration
- Noise
- Differential temperature of internal gear unit – fluid in the tank
- Foaming in the tank
- Freedom from leakage

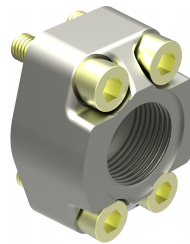
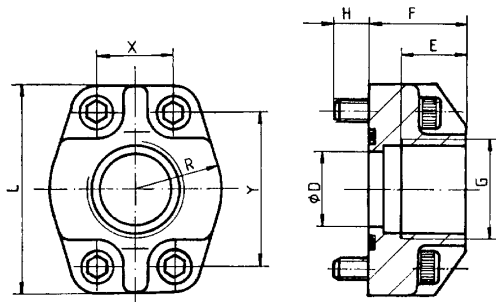
Changes in these parameters indicate wear of components (e.g. drive motor, coupling, internal gear unit, etc.). The cause must be immediately pinpointed and eliminated.

To provide high operational reliability of the QXEM internal gear unit in the machine or system, we recommend continuous, automatic checks of the above parameters and an automatic shutdown in the case of changes that exceed the usual fluctuations within the provided operating range.

Commissioning see operating instructions 100-B-000014

## 10 Accessories

### 10.1 Pipe flanges - high pressure type



- max. operating pressure 420 bar

- Material ST37 / Viton seals (on request)

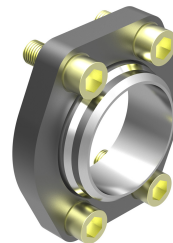
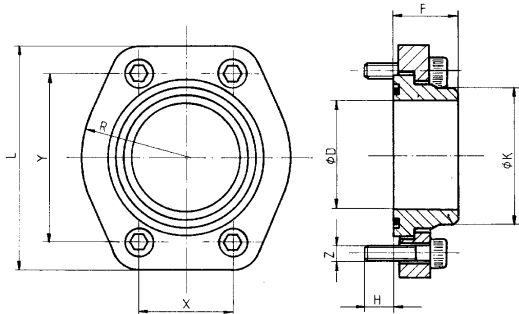
- flange size SAE J518 code 61 / ISO 6162-1

Threaded pipe flanges are spot-faced for DIN 2353 pipe fittings Material

Ordering-number	Ordering code	Size	D $\varnothing$	E	F	H	L	R	X	Y	Viton seal 90 Shore 'A'	Retaining screws DIN912-12.9 / Torque Nm
037000	RF 01-R08	G 1/2"	12,5	16	27	13	54	23	17,5	38	20,24x2,62	M8x30 30
037010	RF 02-R10	G 3/4"	20	18	30	12	65	26	22,2	47,6	26,65x2,62	M10x30 60
037020	RF 03-R11	G 1"	25	20	34	13	70	29	26,2	52,4	32,99x2,62	M10x35 60
037030	RF 04-R12	G 1 1/4"	32	22	38	14	80	36	30,2	58,6	40,86x3,53	M10x40 60
037040	RF 05-R13	G 1 1/2"	38	24	41	19	94	41	35,7	70	44,04x3,53	M12x45 120
037050	RF 06-R14	G 2"	50	26	45	20	102	48	42,9	77,8	59,92x3,53	M12x50 120
055470*	RF 07-R16	G 2 1/2" *	63	30	50	18	114	57	50,8	89	72,62x3,53	M12x45 120

\* For RF07 only to 210 bar be allowed

### 10.2 Pipe flanges - low pressure type



- max. operating pressure 16 bar

- Material: ST37 / Viton seals (on request)

- flange size SAE J518 code 61 / ISO 6162-1

Ordering number	Ordering code	SAE flange Size	D	K	F	H	L	R	X	Y	Viton seal 90 Shore 'A'	Retaining screws DIN 912-8.8 Torque Nm	pipe <sup>1)</sup> O/dia. approx.
062450	RN 07-S	2 1/2"	63	75	35	14	120	57	51	89	69,44x3,53	M12 x 30 70	75
063880	RN 08-S	3"	76	88			140,5	68	62	106,5	85,32x3,53	M16 x 40 180	88
063890	RN 09-S	3 1/2"	89	100	40	19	158,5	73	70	120,3	98,02x3,53	M16 x 40 180	100
063900	RN 10-S	4"	103	115			168	79	78	130	110,72x3,53	M16 x 40 180	115

1) We recommend the use of seamless precision steel tube to DIN 2391 with-wallthick. max 6 mm

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