

# Internal Gear Unit for motor/pump service Series QXM



## 1 General

### 1.1 Product description

The QXM drive unit can be used in open- and closed-loop hydrostatic drives, and can operate both as a pump and as a motor.

This flexibility offers various application possibilities, one example being the raising and lowering of loads. The QXM works as a pump to lift the load and it can recover energy when the load is being lowered.

Used as a fully bi-directional pump/motor (four-quadrant operation), the unit can control the complete motion cycle of a cylinder. Rapid acceleration/deceleration sequences can be achieved.

The unit is based on the well-known QX internal gear pump, which is distinguished by its very low noise levels and almost imperceptible pressure pulsations. The large number of closely spaced sizes ensures that the right size is always available for every application.

### 1.2 Advantages

- § very low noise levels
- § negligible pressure pulsations
- § 400 bar maximum pressure
- § hydrodynamic bearing support ensures long service life
- § suitable for special fluids such as HFB, HFC, HFD and bio-degradables
- § suitable for variable-speed operation
- § 4-quadrant (fully bi-directional pump/motor) or 2-quadrant operation is possible
- § optimised flow path cross-sections and special gear profile give low susceptibility to cavitation

## 2 Technical data

### 2.1 General

Installation attitude	unrestricted
Mounting method (standard)	oval 2-hole flange to ISO 3019/1 (SAE): QXM 3-6 oval 2-hole flange to ISO 3019/2 (metric) QXM 2+8
Direction of rotation	unrestricted
Drive method	in-line, by a flexible coupling
Fluids	HLP mineral oils to DIN 51524, Part 2 HFB, HFD and HFC fluids to VDMA 24317 other fluids - contact Bucher Hydraulics
Min. fluid cleanliness level	NAS 1638, Class 9 or ISO 4406, code 20/18/15 or better
Viscosity range	10 ... 300 cSt (mm <sup>2</sup> /s) (for values outside this range, contact Bucher Hydraulics)
Fluid temperature	HLP-mineral oils 80_C max. HFB, HFD and HFC 50_C max.
Max. pressure at drain port	1.5 bar absolute
Total pressure restriction	Port P1 + Port P2 ≤ continuous-/intermittent pressure
Min. inlet pressure	0,85 - 2 bar absolute (dependet on pump size and speed. Beyond these values please contact Bucher Hydraulics)

## 2.2 Pressure range 1

Displacement / consumption		Maximum speed		Type	Cont.-/ Interm. pressure 1) bar	Torque 2) Nm
nom.	eff.	as a pump	as a motor			
cm <sup>3</sup> /rev	cm <sup>3</sup> /rev	rpm	rpm			
010	10,0	4000		QXM21-010	160/210	
012	12,6	3600	5500	QXM21-012	125/160	25
016	15,6	3200		QXM21-016	100/125	
020	20,3	3200		QXM31-020	160/210	
025	25,1	3000	5000	QXM31-025	125/160	50
032	32,3	2700		QXM31-032	100/125	
040	39,2	2700		QXM41-040	160/210	
050	50,5	2350	4600	QXM41-050	125/160	100
063	63,5	2050		QXM41-063	100/125	
080	80,1	2050		QXM51-080	160/210	
100	100,9	1900	4000	QXM51-100	125/160	200
125	124,6	1620		QXM51-125	100/125	
160	162,7	1500		QXM61-160	160/210	
200	200,9	1350	3200	QXM61-200	125/160	400
250	248,8	1200		QXM61-250	100/125	
315	326	1200		QXM81-315	160/210	
400	402,6	1100	3000	QXM81-400	125/160	800
500	498,5	1000		QXM81-500	100/125	

## 2.3 Pressure ranges 2 and 3

Pressure range				2			3		
Displacement / consumption		Maximum speed 3)		Type	Cont.-/ Interm. pressure 1) bar	Torque 2) Nm	Type	Cont.-/ Interm. pressure 1) bar	Torque 2) Nm
nom.	eff.	as a pump	as a motor						
cm <sup>3</sup> /rev	cm <sup>3</sup> /rev	rpm	rpm						
005	5,1			QXM22-005		17	QXM23-005		26,0
006	6,3	4500	6000	QXM22-006	210/250	21	QXM23-006	320/400	32,0
008	8,0			QXM22-008		26,5	QXM23-008		40,7
010	10,0			QXM32-010		33,5	QXM33-010		51,0
012	12,6	3900	5500	QXM32-012	210/250	42,0	QXM33-012	320/400	64,0
016	15,6			QXM32-016		52,0	QXM33-016		80,0
020	20,3			QXM42-020		68,0	QXM43-020		103,0
025	25,1	3200	5000	QXM42-025	210/250	84,0	QXM43-025	320/400	128,0
032	32,3			QXM42-032		108,0	QXM43-032		164,0
040	39,2			QXM52-040		131,0	QXM53-040		200,0
050	50,5	2700	4500	QXM52-050	210/250	169,0	QXM53-050	320/400	257,0
063	63,5			QXM52-063		212,0	QXM53-063		323,0
080	80,1			QXM62-080		268,0	QXM63-080		408,0
100	100,9	2050	4000	QXM62-100	210/250	337,0	QXM63-100	320/400	514,0
125	124,6			QXM62-125		416,0	QXM63-125		635,0
160	162,7	1500		QXM82-160		544,0	QXM83-160		828,0
200	200,9	1200	3500	QXM82-200	210/250	671,0	QXM83-200	320/400	1023,0
250	248,8	1000		QXM82-250		832,0	QXM83-250		1267,0

These operating data are valid for mineral oils with 42 mm<sup>2</sup>/s only

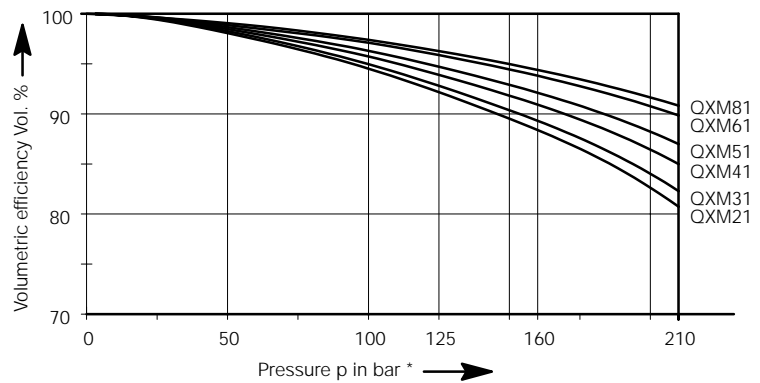
- 1) Intermittent pressure for max. 20 sec/min but not more than 10% of the duty cycle
- 2) Theoretical value at the maximum permitted continuous pressure. For starting torques, see section 5.
- 3) For higher speed contact us

### 3 Performance characteristics

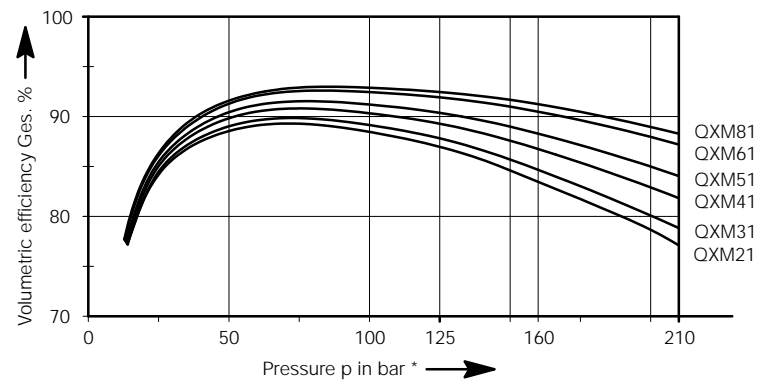
#### 3.1 Pressure range 1

measured with viscosity 42 mm<sup>2</sup>/s

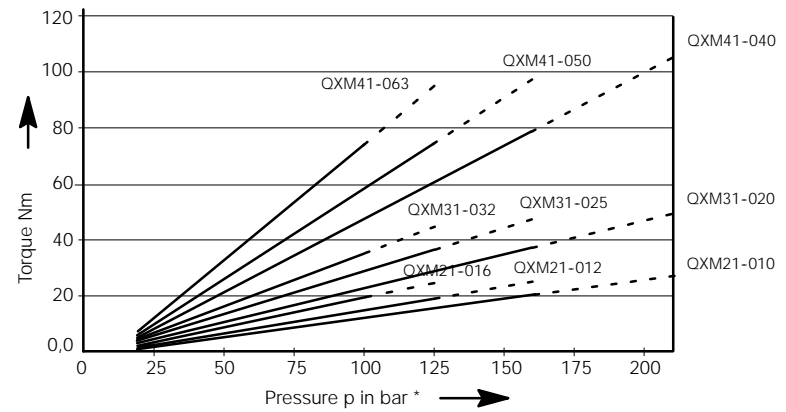
Volumetric efficiency  
speed - 1450 rpm



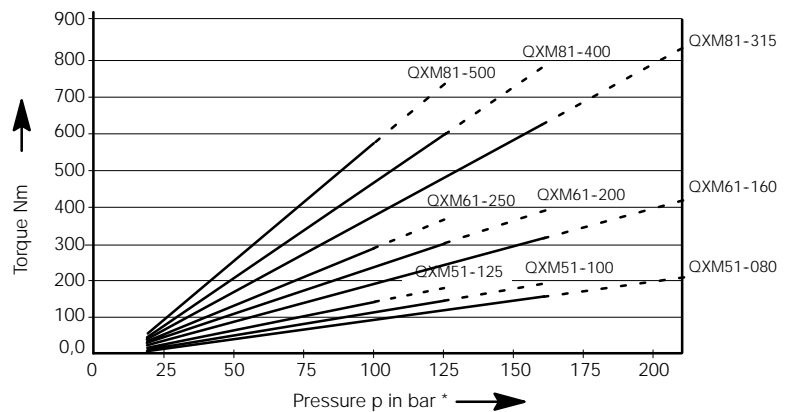
Overall efficiency  
speed - 1450 rpm



Starting torque



Starting torque



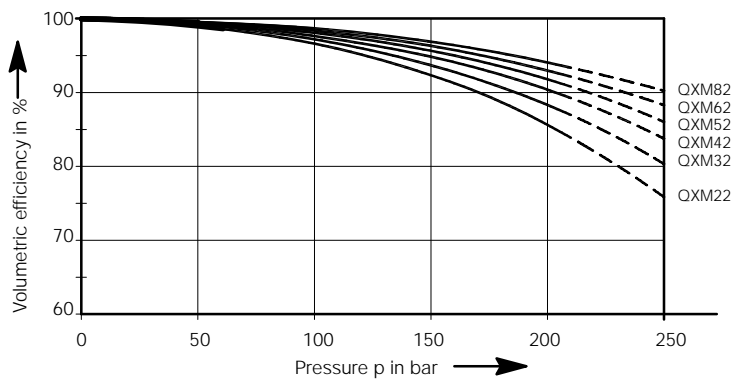
\* Cont.-/Interm. pressure see page 2 (2.2)

### 3.2 Pressure range 2

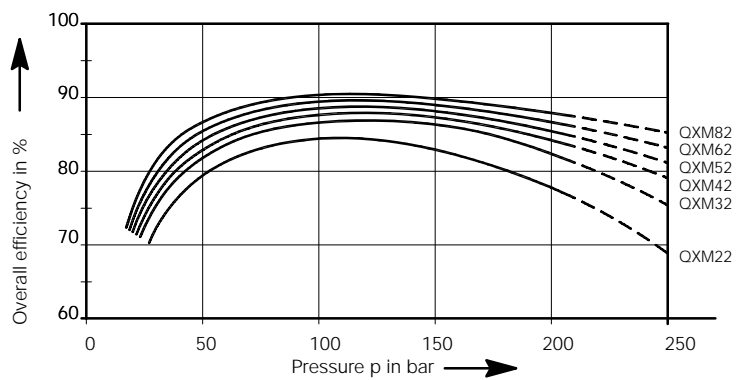
measured with viscosity 42 mm<sup>2</sup>/s

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

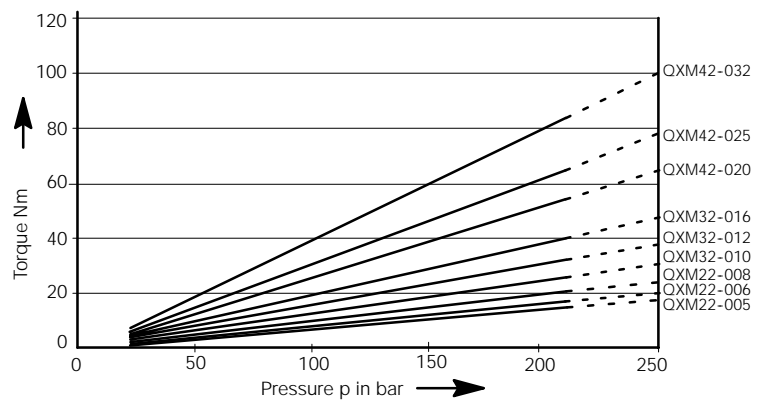
Volumetric efficiency  
speed - 1450 rpm



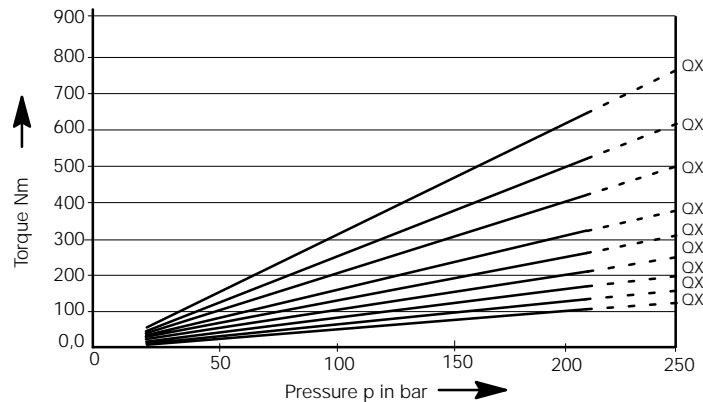
Overall efficiency  
speed - 1450 rpm



Starting torque



Starting torque

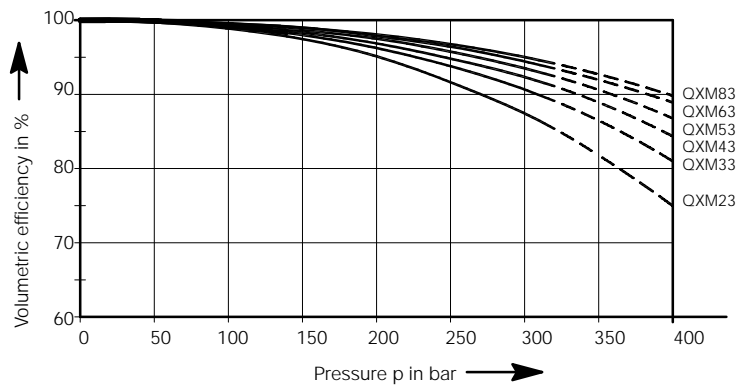


### 3.3 Pressure range 3

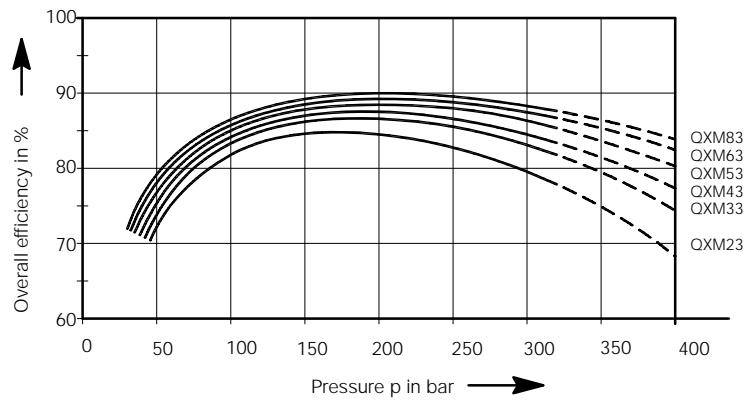
measured with viscosity 42 mm<sup>2</sup>/s

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

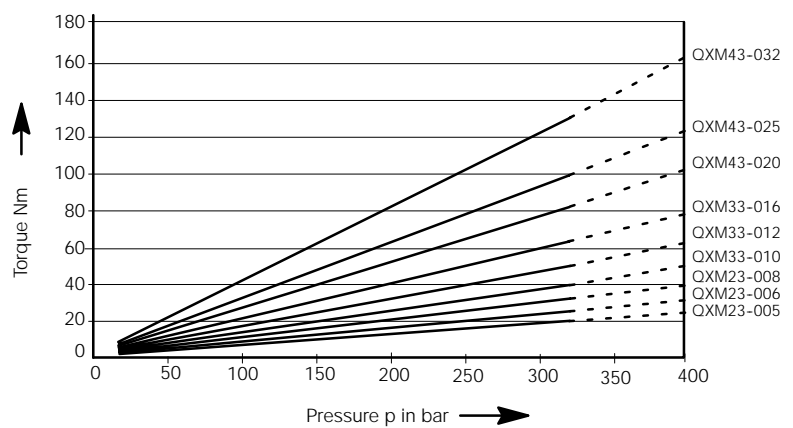
Volumetric efficiency  
speed - 1450 rpm



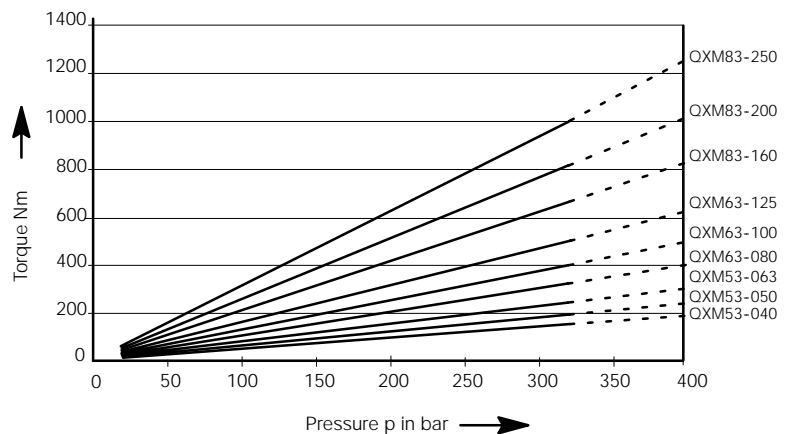
Overall efficiency  
speed - 1450 rpm



Starting torque

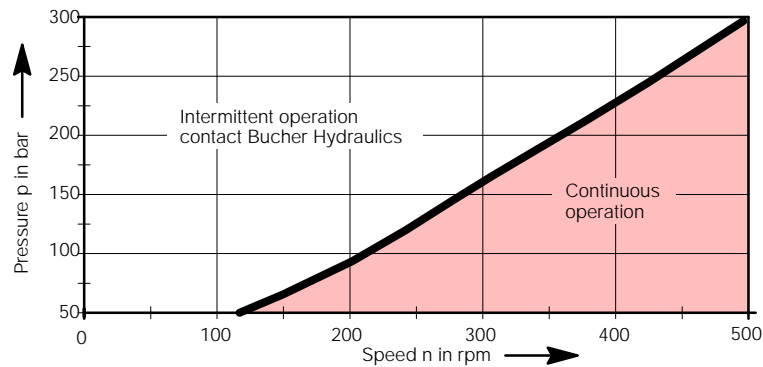


Starting torque



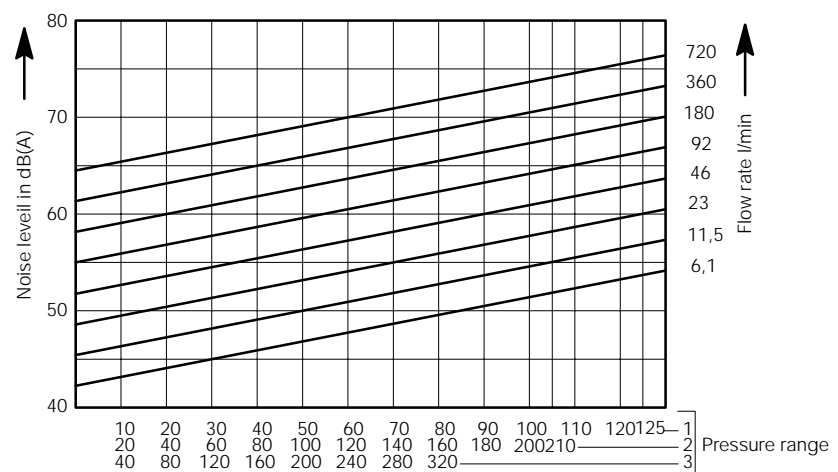
### 3.4 Minimum speed v. pressure

Drive unit QXM52-063  
measured with viscosity 42 mm<sup>2</sup>/s



### 3.5 Noise level

measured to DIN 45635, Part 26, in Stuttgart University's low-echo noise measurement chamber;  
measurement distance 1 m;  
speed n = 1500 rpm  
viscosity = 42 mm<sup>2</sup>/s (cSt)



## 4 Dimensions

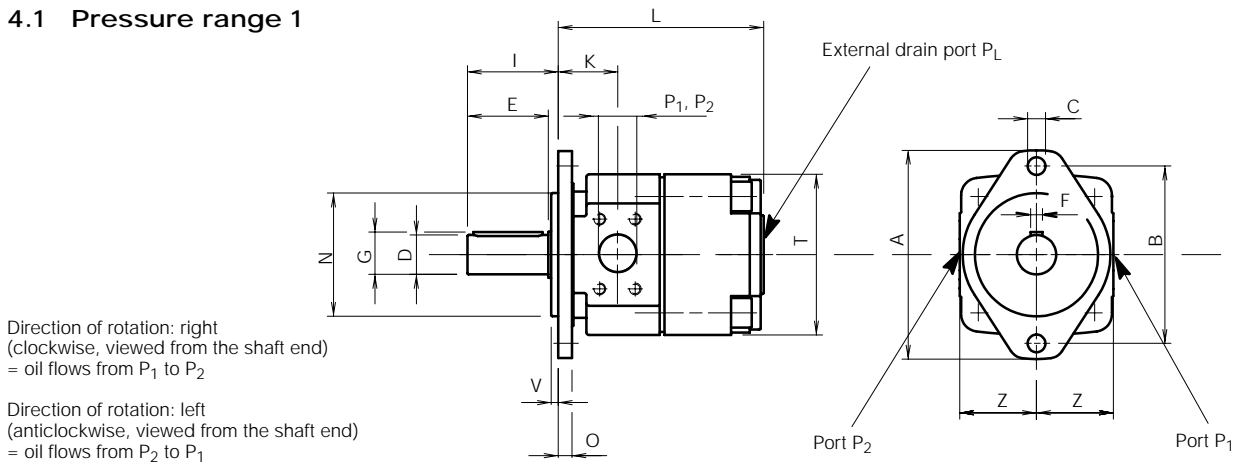
Frame size	2			3			4			5			6			8					
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3			
Pressure range																					
Service ports to SAE J518 <sup>1)</sup>	P <sub>1</sub> , P <sub>2</sub>		G1/2" <sup>3)</sup> thread	G 3/4" <sup>3)</sup> thread			1"			1 1/4"			1 1/2"			2"					
Drain port to DIN 3852 Teil 2 Part 2	P <sub>L</sub>		G1/4"	G1/4"			G1/4"			G1/4"			G 3/8"			G1/2"					
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					
Shaft end: parallel, to ISO/R775 <sup>2)</sup>	V		6	6			7			7			7			9					
	D		20 j6	25 j6			32 j6			40 j6			50 j6			63 j6					
	E		36	42			58			82			82			105					
	F		6	8			10			12			14			18					
	G		22,5	28			35			43			53,5			67					
Housing	I		45	50			68			92			92			117					
	K		37,5	44			52,5			60,5			74			90					
	L		140	122	157	166	146	191	204	178	234	244	212	282	289	249	339	364	314	429	
	M		-	55	90	-	69,5	114	-	87	143	-	102	172	-	119	209	-	151	266	
	T		86			107			133			177			214		220		273		275
	Z		50			60			62,5			78			97,5			125			
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 3000 psi pipe flange dimensions see brochure P00049

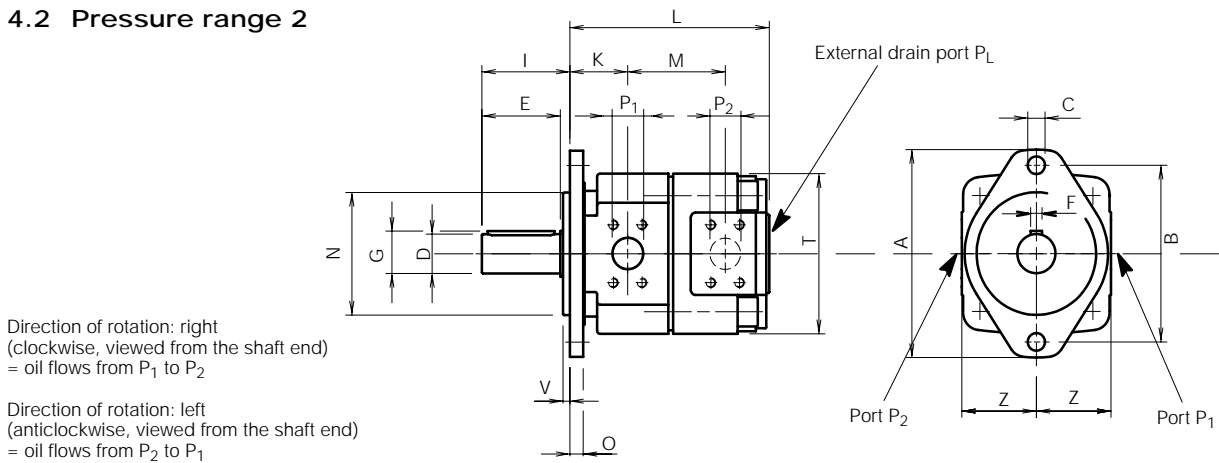
2) for other shaft ends, contact Bucher

3) threaded ports to DIN 3852, Part 2

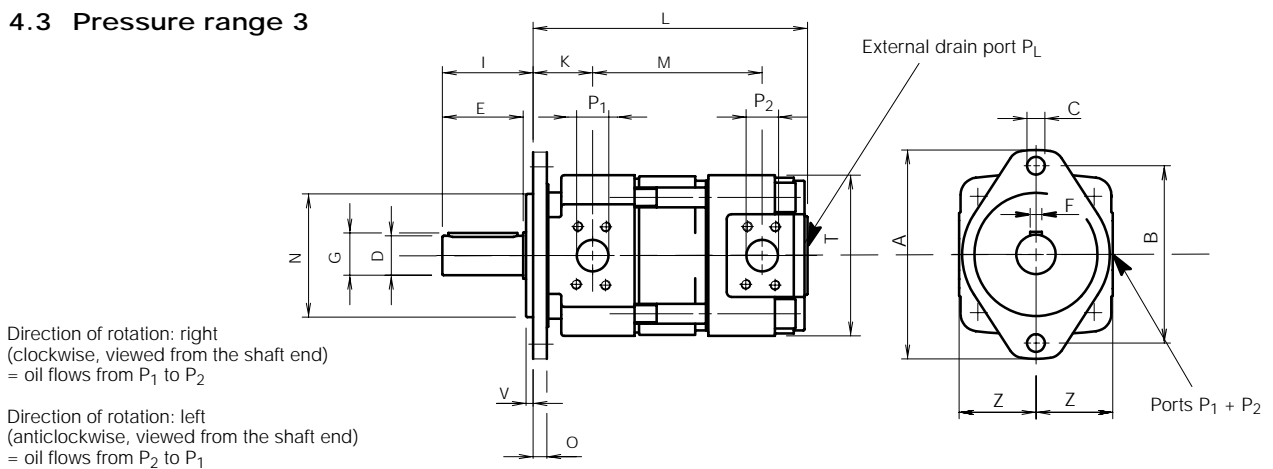
#### 4.1 Pressure range 1



#### 4.2 Pressure range 2



#### 4.3 Pressure range 3



## 5 Ordering details

		Q	X	M	5	3	-	0	4	0	N	
Internal gear unit	QXM											
Frame size	2 / 3 / 4 / 5 / 6 / 8											
Pressure range	1 / 2 / 3											
Geom. Displ./Consump. in cm <sup>3</sup> /rev	005 - 500											
Direction of rotation, unrestricted <sup>4)</sup>	= N											
Variants / special features (to be inserted by the factory, see section 5.3 for a selection)												

- 4) Direction of rotation on the right (on the shaft end looked: in the clockwise direction) = Oil flow flows from P<sub>1</sub> to P<sub>2</sub>  
 Direction of rotation on the left (on the shaft end looked: against the clockwise direction) = Oil flow flows from P<sub>2</sub> to P<sub>1</sub>

### 5.1 Ordering example

Required: internal gear drive unit QXM  
 Displ./Consump.: 40 cm<sup>3</sup>/rev  
 Continuous pressure: 300 bar  
 For use with mineral oil:  
 Ordering code: QXM 53-040 N

### 5.2 Standard configuration

S direction of rotation - unrestricted  
 S 2-hole mounting flange to ISO 3019/1; Frame size QXV 3-6  
 2-hole mounting flange to ISO 3019/2; Frame size QXV 2+8  
 S Nitrile seals  
 S cylindrical shaft end to ISO R775  
 S separate drain port in rear cover of the drive unit  
 S ports P1 + P2 both the same size

### 5.3 Special features

09 = Viton seals  
 12 = 2-hole mounting flange to ISO 3019/2 (metric): Frame size QXV 3-6  
 29 = for HFB and HFC fluids, frame sizes 2-5  
 66 = 4-hole mounting flange to ISO 3019/2 (metric)  
 86 = for HFB and HFC fluids, frame sizes 6-8  
 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

Commissioning see Operating Instructions100-I-000002-E-03



## 6 Fluid cleanliness

QX pumps require fluid with a minimum cleanliness level of NAS 1638, Class 9 or ISO 4406, code 20/18/15. This can be achieved with a filter ratio of  $\beta_{10} \geq 100$ .

HLP hydraulic oils to DIN 51524, Part 2, can be used without any special restriction as long as they remain within the specified temperature and viscosity ranges. HFC fire-resistant fluids to DIN 51502 can be used with the QR, QT, QX and QXM series. Note that all fire-resistant fluids require special versions of the pumps or motors and must be approved by Bucher Hydraulics. 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.

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