

# Internal Gear Pump

for low-viscosity fluids  
Series QXV



- Very low noise levels
- Negligible pressure pulsations
- To 250 bar can be developed at viscosities around 1 mm<sup>2</sup>/s (cSt)
- Multi-stage principle ensures low pressure loading on each stage, giving outstanding efficiencies
- Hydrodynamic bearing support ensures long service life
- Used successfully to pump kerosene, diesel fuel, brake fluids, Pentosin and HFA.

## 1 General

### 1.1 Product description

The QXV unit is an internal gear pump for low-viscosity fluids. By using several pump stages connected in series, pressures to 250 bar can be developed with high efficiency at viscosities of around 1 mm<sup>2</sup>/s . The QXV is being used with great success to pump aviation jet fuel, automotive fuels, paraffin oil/kerosene, brake fluids, Pentosin and HFA fluids. Dependent on the requirements of the application, up

to five pump stages can be connected in series. The unit is based on the well-known QX internal gear pump, which is distinguished by its very low noise levels and al-most imperceptible pressure pulsations. The large number of closely spaced sizes ensures that the right size is always available for every application.

### 1.2 Application examples

- Test rigs for diesel injection nozzles
- Test rigs for testing Jet A1/fuel controllers for aircraft turbines
- Rolling mills
- Fuel pumps for gasturbines
- Welding machines
- Inbrication pump for spindle bearings

## 2 Technical data

General characteristics	Description, value, unit
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	right, alternatively left (but not reversible)
Pump drive method	flexible shaft coupling
Min. fluid cleanliness level	NAS 1638, class 8 or ISO 4406, code 19/17/14
Viscosity range	0,8...10 mm <sup>2</sup> /s (for values outside this range, consult Bucher Hydraulics)
Fluid temperature (Observe viscosity limits for respective fluids)	min. -20°C, max. +80°C HFA ... +50°C max. Optimal range: +30°C ... +60°C
Minimum inlet pressure	0,85 - 1 bar absolute (dependent on pump size and speed. Beyond these values please contact Bucher Hydraulics)
Maximum pressure at drain port	< 1,5 bar absolute

## 2.1 Main characteristics

Pressure range	1	2	3	4	5	6	1	2-6
Oper. pressure <sup>3)</sup> bar	25	50	100	150	200	250		
Displacement cm <sup>3</sup> /rev	Type	Type	Type	Type	Type	Type	Speed range rpm <sup>1)</sup>	
5,1		QXV 22-005	QXV 23-005	QXV 24-005	QXV 25-005	QXV 26-005		3000 - 3600
6,3		QXV 22-006	QXV 23-006	QXV 24-006	QXV 25-006	QXV 26-006		
8,0		QXV 22-008	QXV 23-008	QXV 24-008	QXV 25-008	QXV 26-008		
10,0	QXV 21-010	QXV 32-010	QXV 33-010	QXV 34-010	QXV 35-010	QXV 36-010	3000 - 3600	3000 - 3600
12,6	QXV 21-012	QXV 32-012	QXV 33-012	QXV 34-012	QXV 35-012	QXV 36-012		
15,6	QXV 21-016	QXV 32-016	QXV 33-016	QXV 34-016	QXV 35-016	QXV 36-016		
20,4	QXV 31-020	QXV 42-020	QXV 43-020	QXV 44-020	QXV 45-020	QXV 46-020	1800 - 3000	3000 - 3600
25,1	QXV 31-025	QXV 42-025	QXV 43-025	QXV 44-025	QXV 45-025	QXV 46-025		
32,4	QXV 31-032	QXV 42-032	QXV 43-032	QXV 44-032	QXV 45-032	QXV 46-032		
39,3	QXV 41-040	QXV 52-040	QXV 53-040	QXV 54-040	QXV 55-040	QXV 56-040	1500 - 1800	1800 - 3000
50,6	QXV 41-050	QXV 52-050	QXV 53-050	QXV 54-050	QXV 55-050	QXV 56-050		
63,7	QXV 41-063	QXV 52-063	QXV 53-063	QXV 54-063	QXV 55-063	QXV 56-063		
80,2	QXV 51-080	QXV 62-080	QXV 63-080	QXV 64-080	QXV 65-080	QXV 66-080	1500 - 1800	1500 - 1800
101,0	QXV 51-100	QXV 62-100	QXV 63-100	QXV 64-100	QXV 65-100	QXV 66-100		
124,4	QXV 51-125	QXV 62-125	QXV 63-125	QXV 64-125	QXV 65-125	QXV 66-125		
163,0	QXV 61-160	QXV 82-160	QXV 83-160	QXV 84-160	QXV 85-160	QXV 86-160	1200 - 1500	1200 - 1800
201,3	QXV 61-200	QXV 82-200	QXV 83-200	QXV 84-200	QXV 85-200	QXV 86-200		
249,2	QXV 61-250 <sup>2)</sup>	QXV 82-250	QXV 83-250	QXV 84-250	QXV 85-250	QXV 86-250		
326,0	QXV 81-315 <sup>2)</sup>						1200 - 1500	
402,6	QXV 81-400 <sup>2)</sup>							
498,5	QXV 81-500 <sup>2)</sup>							

1) Recommended speeds:

- The lower the speed, the smaller the  $\Delta P$ /stage (linear relationship)
- Speeds for 50 and 60 Hz

2) Second suction port is necessary for  $n > 1200$  rpm (see section 5.3, Special features)

3) Do not run up pump against pressures higher than 20 bar

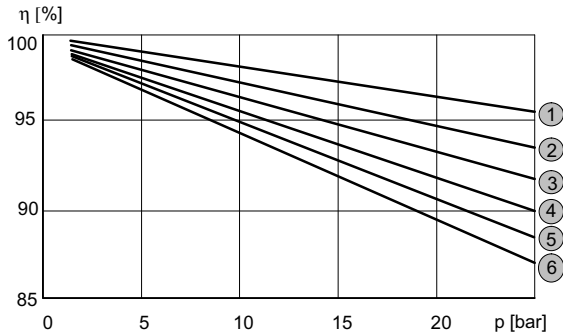
If you use these pumps with viscosity  $< 2,5$  cSt, you must order option 360 or 360-2  
**Option 360** = Pumps size 5, 6 and 8, with metric mounting flange  
**Option 360-2** = Pumps size 5 and 6, pressure range 2 - 6, with SAE mounting flange

### 3 Performance graphs

Measured at a viscosity of 2.3 mm<sup>2</sup>/s (cSt)

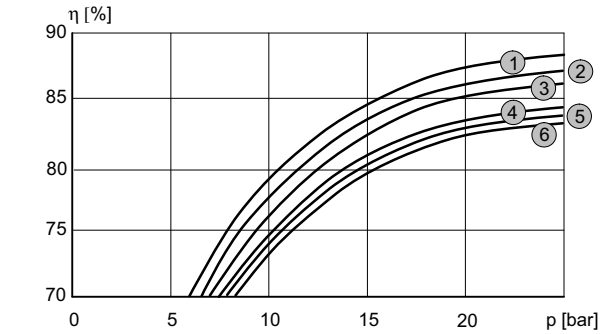
#### 3.1 Pressure range 1

##### 3.1.1 Volumetric efficiency



1	QXV21, 3000 min <sup>-1</sup>	4	QXV51, 1800 min <sup>-1</sup>
2	QXV31, 3000 min <sup>-1</sup>	5	QXV61, 1500 min <sup>-1</sup>
3	QXV41, 1800 min <sup>-1</sup>	6	QXV81, 1500 min <sup>-1</sup>

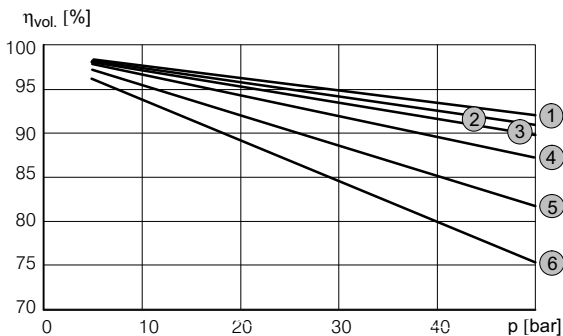
##### 3.1.2 Hydro-mechanical efficiency



1	QXV81, 1500 min <sup>-1</sup>	4	QXV41, 1800 min <sup>-1</sup>
2	QXV61, 1500 min <sup>-1</sup>	5	QXV21, 3000 min <sup>-1</sup>
3	QXV51, 1800 min <sup>-1</sup>	6	QXV31, 3000 min <sup>-1</sup>

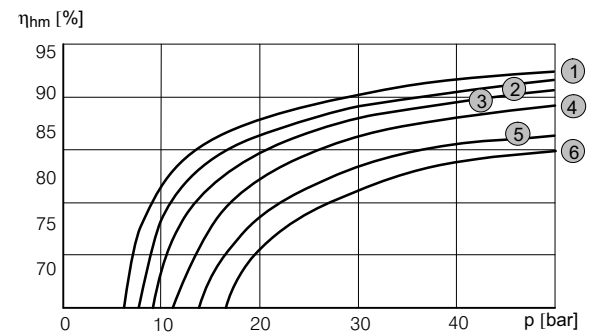
#### 3.2 Pressure range 2

##### 3.2.1 Volumetric efficiency



1	QXV52, 3000 min <sup>-1</sup>	4	QXV42, 3000 min <sup>-1</sup>
2	QXV82, 1800 min <sup>-1</sup>	5	QXV32, 3000 min <sup>-1</sup>
3	QXV62, 1800 min <sup>-1</sup>	6	QXV22, 3000 min <sup>-1</sup>

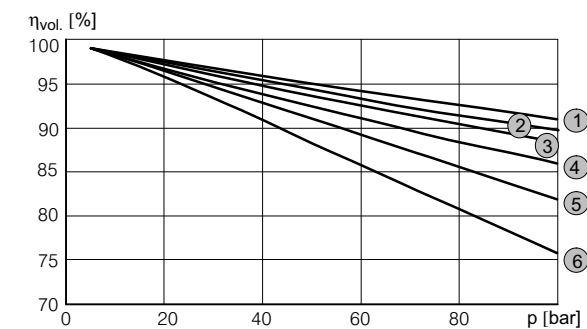
##### 3.2.2 Hydro-mechanical efficiency



1	QXV62, 1800 min <sup>-1</sup>	4	QXV32, 3000 min <sup>-1</sup>
2	QXV42, 3000 min <sup>-1</sup>	5	QXV22, 3000 min <sup>-1</sup>
3	QXV52, 3000 min <sup>-1</sup>	6	QXV82, 1800 min <sup>-1</sup>

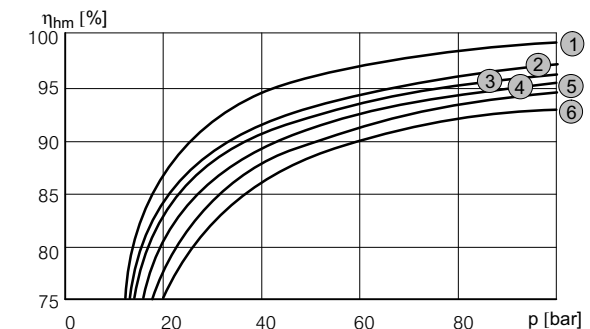
#### 3.3 Pressure range 3

##### 3.3.1 Volumetric efficiency



1	QXV53, 3000 min <sup>-1</sup>	4	QXV63, 1800 min <sup>-1</sup>
2	QXV83, 1800 min <sup>-1</sup>	5	QXV33, 3000 min <sup>-1</sup>
3	QXV43, 3000 min <sup>-1</sup>	6	QXV23, 3000 min <sup>-1</sup>

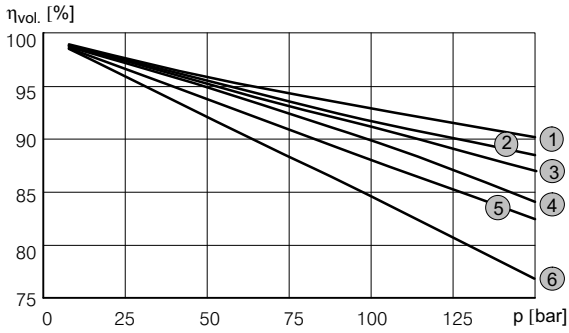
##### 3.3.2 Hydro-mechanical efficiency



1	QXV63, 1800 min <sup>-1</sup>	4	QXV33, 3000 min <sup>-1</sup>
2	QXV53, 3000 min <sup>-1</sup>	5	QXV23, 3000 min <sup>-1</sup>
3	QXV43, 3000 min <sup>-1</sup>	6	QXV83, 1800 min <sup>-1</sup>

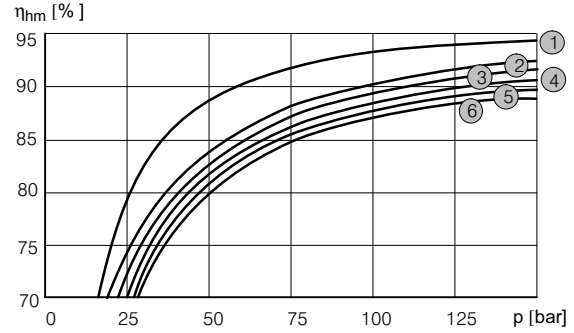
### 3.4 Pressure range 4

#### 3.4.1 Volumetric efficiency



1	QXV54, 3000 min <sup>-1</sup>	4	QXV64, 1800 min <sup>-1</sup>
2	QXV44, 3600 min <sup>-1</sup>	5	QXV34, 3000 min <sup>-1</sup>
3	QXV84, 1800 min <sup>-1</sup>	6	QXV24, 3000 min <sup>-1</sup>

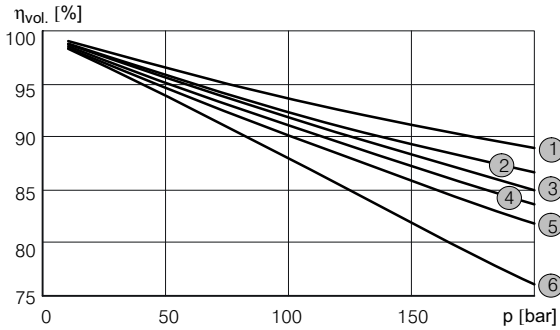
#### 3.4.2 Hydro-mechanical efficiency



1	QXV64, 1800 min <sup>-1</sup>	4	QXV44, 3000 min <sup>-1</sup>
2	QXV24, 3000 min <sup>-1</sup>	5	QXV54, 3000 min <sup>-1</sup>
3	QXV34, 3000 min <sup>-1</sup>	6	QXV84, 1800 min <sup>-1</sup>

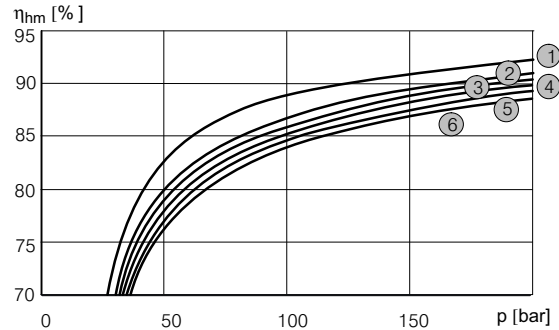
### 3.5 Pressure range 5

#### 3.5.1 Volumetric efficiency



1	QXV55, 3000 min <sup>-1</sup>	4	QXV65, 1800 min <sup>-1</sup>
2	QXV45, 3000 min <sup>-1</sup>	5	QXV35, 3000 min <sup>-1</sup>
3	QXV85, 1800 min <sup>-1</sup>	6	QXV25, 3000 min <sup>-1</sup>

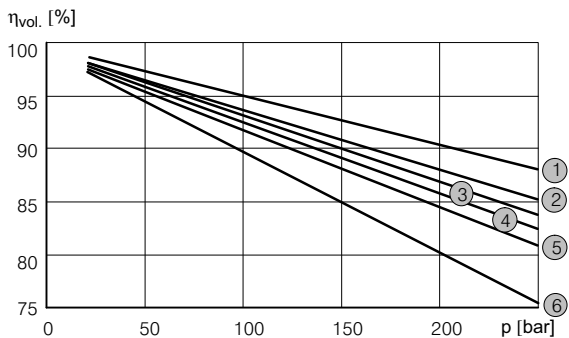
#### 3.5.2 Hydro-mechanical efficiency



1	QXV65, 1800 min <sup>-1</sup>	4	QXV45, 3000 min <sup>-1</sup>
2	QXV25, 3000 min <sup>-1</sup>	5	QXV55, 3000 min <sup>-1</sup>
3	QXV35, 3000 min <sup>-1</sup>	6	QXV85, 1800 min <sup>-1</sup>

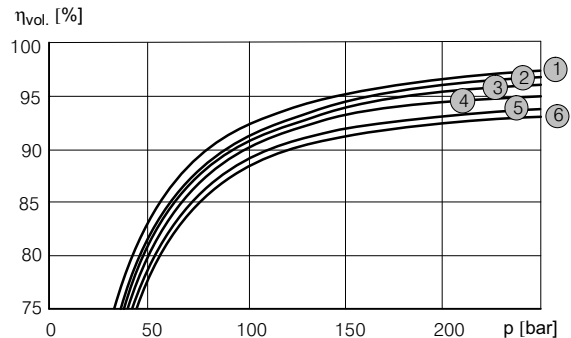
### 3.6 Pressure range 6

#### 3.6.1 Volumetric efficiency



1	QXV56, 3000 min <sup>-1</sup>	4	QXV66, 1800 min <sup>-1</sup>
2	QXV46, 3600 min <sup>-1</sup>	5	QXV36, 3000 min <sup>-1</sup>
3	QXV86, 1800 min <sup>-1</sup>	6	QXV26, 3000 min <sup>-1</sup>

#### 3.6.2 Hydro-mechanical efficiency



1	QXV56, 3000 min <sup>-1</sup>	4	QXV66, 1800 min <sup>-1</sup>
2	QXV46, 3600 min <sup>-1</sup>	5	QXV36, 3000 min <sup>-1</sup>
3	QXV86, 1800 min <sup>-1</sup>	6	QXV26, 3000 min <sup>-1</sup>

## 4 Dimensions

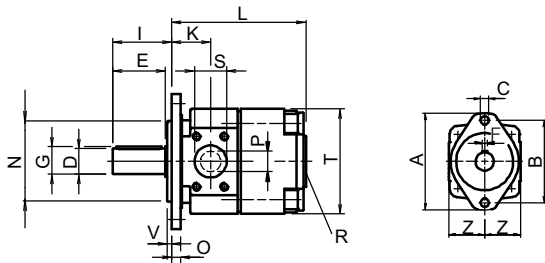
### 4.1 Pressure ranges 1 / 2 / 3

Frame size		2			3			4			5			6			8		
Pressure range		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Suction port: to standard	S	G1" DIN 3852 / 2			G1 1/4" DIN 3852 / 2			1 1/2" SAE J518			2" SAE J518			2 1/2" SAE J518			3" SAE J518		
Pressure port: to standard	P	G1/2" <sup>2)</sup> DIN 3852 / 2			G3/4" <sup>2)</sup> DIN 3852 / 2			1" SAE J518			1 1/4" SAE J518			1 1/2" SAE J518			2" SAE J518		
Drain port	R	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) ISO 3019/2 (metric)	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>1)</sup>	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		
	I	45			50			68			92			92			117		
Housing	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	114,5	-	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

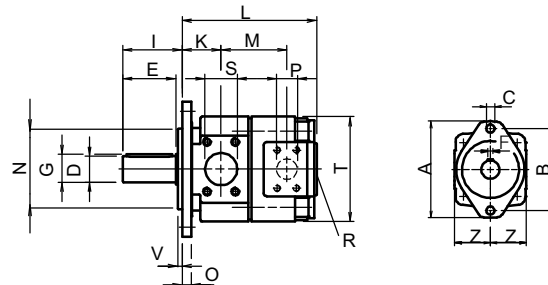
1) For other shaft ends, consult Bucher Hydraulics

2) Pressure port to SAE J518 can be supplied for pressure ranges 2+3

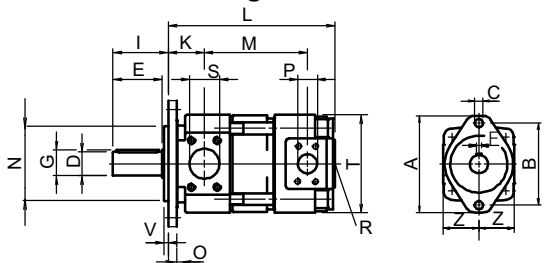
#### 4.1.1 Pressure range 1



#### 4.1.2 Pressure range 2



#### 4.1.3 Pressure range 3



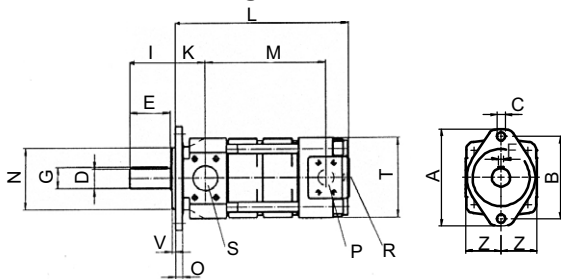
## 4.2 Pressure ranges 4 / 5 / 6

Frame size		2			3			4			5			6			8		
Pressure range		4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6
Suction port: to standard	S	G1" DIN 3852 / 2			G1 1/4" DIN 3852 / 2			1 1/2" SAE J518			2" SAE J518			2 1/2" SAE J518			3" SAE J518		
Pressure port: to standard	P	G1/2" <sup>2)</sup> DIN 3852 / 2			G3/4" <sup>2)</sup> DIN 3852 / 2			1" SAE J518			1 1/4" SAE J518			1 1/2" SAE J518			2" SAE J518		
Drain port	R	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) ISO 3019/2 (metric)	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>1)</sup>	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		
	I	45			50			68			92			92			117		
Housing	K	37,5			44			52,5			60,5			74			90		
	L	192	227	262	236	281	326	290	346	402	352	422	492	429	519	609	544	659	774
	M	125	160	195	159,5	204,5	249,5	199	255	311	242	312	382	299	389	479	381	496	611
	T	86			107			133			177			220			273		
	Z	50			60			62,5			78			97,5			125		
Weight	kg	8	9,5	11	15,5	18,5	21,5	27	32	37	49	58	67	92	108	124	200	240	280

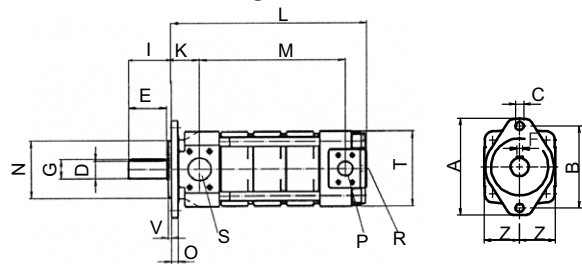
1) For other shaft ends, consult Bucher Hydraulics

2) Pressure port to SAE J518 can be supplied for pressure ranges 2+3

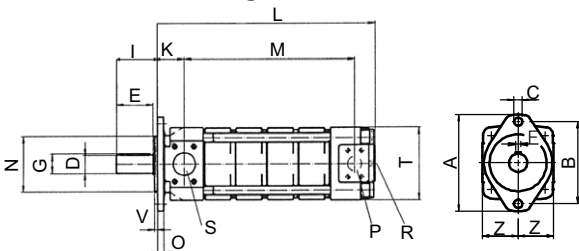
### 4.2.1 Pressure range 4



### 4.2.2 Pressure range 5



### 4.2.3 Pressure range 6



## 5 Ordering code

Q X V 3 6 - 0 1 2 R \* \* \*

Series:	internal gear pumps for low-viscosity fluids QXV	Q	X	V	3	6	-	0	1	2	R	*	*	*	
Frame size	2 / 3 / 4 / 5 / 6 / 8														
Pressure range	1 / 2 / 3 / 4 / 5 / 6														
Geom. displacement in cm <sup>3</sup> /rev	005 - 500														
Direction of rotation	right = R left = L														
Option	- see section 5.3 for a selection														

### 5.1 Ordering example

Required: internal gear pump, type QXV  
 Displacement: 12 cm<sup>3</sup>/rev  
 Continuous pressure 250 bar  
 For use with diesel fuel oil.  
 Ordering code: QXV 36-012 R

### 5.2 Standard configuration

- Direction of rotation - right, alternatively left
- 2-hole mounting flange to ISO 3019/1 (SAE): sizes QXV 3-6  
2-hole mounting flange to ISO 3019/2 (metric): sizes QXV 2+8
- Viton seals
- Cylindrical shaft end to ISO R775
- External drain port R in pump end cover

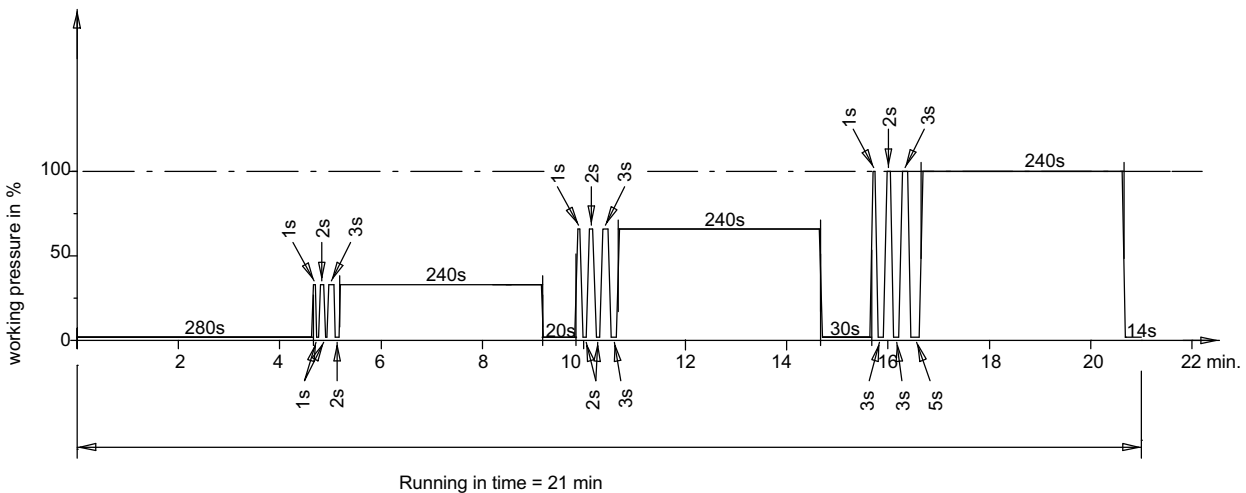
### 5.3 Option

- 12 2-hole mounting flange to ISO 3019/2 (metric) for frame sizes QXV 3-6  
 83 Second suction port on QXV 61, size SAE 2"  
 Second suction port on QXV 81, size SAE 2 1/2"  
 179 For applications with higher fluid temperatures - maximum 160°C  
 360 For application with viscosity < 2,5 mm<sup>2</sup>/s (cSt). Pumps size 5, 6 and 8, with metric mounting flange  
 360-2 For application with viscosity < 2,5 mm<sup>2</sup>/s (cSt). Pumps size 5 and 6, pressure range 2 - 6, with SAE mounting flange  
 For other options, consult Bucher Hydraulics

## 6 Recommendations for use

- Good filtration is extremely important with low viscosity fluids. Maximum fluid cleanliness 19/17/14 of ISO4406. Level of NAS 1638, class 8
- Only use QXV pumps within the specified speed range.
- We recommend that the fluid level in the reservoir should be above the centre line of the pump
- Pumps must be driven by means of a flexible coupling
- The temperature difference between a pump and the fluid entering it must not exceed 20 °C
- Before the initial start-up, fill the pump by hand (via the drain line). When starting the system for the first time, switch to vented-bypass mode so that the pump and hydraulic lines can fill, and air can escape, as quickly as possible. Do not build up pressure until all air has been purged from the system.
- Attention: check the motor's direction of rotation!
- For details, see Operating Manual 100-I-000014
- When running the pump under pressure for the first time, use the running-in cycle shown below.

## 7 QXV internal gear pumps - running-in cycle for the first operation under pressure



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Classification: 410.100.