

# Internal Gear Pump

for low-viscosity fluids  
Series QXV



- 250 bar can be developed at viscosities around 0,8 mm<sup>2</sup>/s [cSt]
- volumetric efficiency up to 98% by multi-stage principle
- temperatures up to 160°C are possible
- suitable for ATEX compliant explosion protection Ex II 3 G T3 and T4
- used successfully to pump kerosene, diesel fuel, brake fluids, Pentosin and HFA
- suitable for use with variable speed drivers

## 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 almost 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
- Lubrication pump for spindle bearings

### 1.3 ATEX compliant explosion protection

The internal gear pumps QXV are suitable for application in hazardous areas and complies with the following guidelines:

ATEX directive 2014/34/EU  
group II  
equipment category 3  
atmosphere G  
temperature class T3 and T4



II 3 G EEx c II T4  
-20°C ≤ Ta ≤ +40°C



II 3 G EEx c II T3  
-20°C ≤ Ta ≤ +80°C

## 2 Technical data

General characteristics	Unit	Description, value
Installation attitude		unrestricted
Mounting method (standard)		oval 2-hole flange to ISO 3019/1 (SAE): QXV 3 ... 6 oval 2-hole flange to ISO 3019/2 (metric): QXV 2 + 8
Direction of rotation		right
Pump drive method		flexible shaft coupling
Max. admissible level of contamination of the hydraulic fluid		ISO 4406 code 19/17/14

General characteristics	Unit	Description, value
Viscosity range	mm <sup>2</sup> /s	0,8 ... 10 (other values on request)
Fluid temperature	°C	min. -20, max. +80 (HFA up to +50) Optimal range: +30 ... +60 (Observe viscosity limits for respective fluids) With option 179 (see chapter 5.3) temperatures up to +160°C are possible.
Minimum inlet pressure	bar	0,85 ... 1 absolute (dependent on pump size and speed, (other values on request)
Maximum pressure at drain port	bar	< 1,5 absolute

## 2.1 Main characteristics for pressure range 1 - 6

Pressure range 1			Pressure range 2 - 6						
Displacement <sup>1)</sup> [cm <sup>3</sup> /rev]	Speed range <sup>2)</sup> [min <sup>-1</sup> ]	Pressure range 1 operation pressure <sup>4)</sup> 50 bar	Displacement <sup>1)</sup> [cm <sup>3</sup> /rev]	Speed range <sup>2)</sup> [min <sup>-1</sup> ]	Pressure range 2 operation pressure <sup>4)</sup> 50 bar	Pressure range 3 operation pressure <sup>4)</sup> 100 bar	Pressure range 4 operation pressure <sup>4)</sup> 150 bar	Pressure range 5 operation pressure <sup>4)</sup> 200 bar	Pressure range 6 operation pressure <sup>4)</sup> 250 bar
	3000-3600		5,1	3000-3600	QXV22-005R	QXV23-005R	QXV24-005R	QXV25-005R	QXV26-005R
			6,3		QXV22-006R	QXV23-006R	QXV24-006R	QXV25-006R	QXV26-006R
			7,9		QXV22-008R	QXV23-008R	QXV24-008R	QXV25-008R	QXV26-008R
10,3	3000-3600	QXV21-010R	10,0	3000-3600	QXV32-010R	QXV33-010R	QXV34-010R	QXV35-010R	QXV36-010R
12,6		QXV21-012R	12,6		QXV32-012R	QXV33-012R	QXV34-012R	QXV35-012R	QXV36-012R
15,9		QXV21-016R	15,6		QXV32-016R	QXV33-016R	QXV34-016R	QXV35-016R	QXV36-016R
20,0	1800-3000	QXV31-020R	20,3	1800-3000	QXV42-020R	QXV43-020R	QXV44-020R	QXV45-020R	QXV46-020R
25,2		QXV31-025R	25,1		QXV42-025R	QXV43-025R	QXV44-025R	QXV45-025R	QXV46-025R
31,1		QXV31-032R	32,3		QXV42-032R	QXV43-032R	QXV44-032R	QXV45-032R	QXV46-032R
40,6	1500-1800	QXV41-040R	39,1	1800-3000	QXV52-040R	QXV53-040R	QXV54-040R	QXV55-040R	QXV56-040R
50,2		QXV41-050R	50,3		QXV52-050R	QXV53-050R	QXV54-050R	QXV55-050R	QXV56-050R
64,5		QXV41-063R	65,4		QXV52-063R	QXV53-063R	QXV54-063R	QXV55-063R	QXV56-063R
78,3	1500-1800	QXV51-080R	79,8	1500-1800	QXV62-080R	QXV63-080R	QXV64-080R	QXV65-080R	QXV66-080R
100,6		QXV51-100R	100,5		QXV62-100R	QXV63-100R	QXV64-100R	QXV65-100R	QXV66-100R
126,7		QXV51-125R	124,2		QXV62-125R	QXV63-125R	QXV64-125R	QXV65-125R	QXV66-125R
159,7	1200-1500	QXV61-160R	161,9	1200-1800	QXV82-160R	QXV83-160R	QXV84-160R	QXV66-160R	QXV86-160R
201,1		QXV61-200R	200,0	1200-1500	QXV82-200R	QXV83-200R	QXV84-200R	QXV66-200R	QXV86-200R
248,4		QXV61-250R	247,7		QXV82-250R	QXV83-250R	QXV84-250R	QXV66-250R	QXV86-250R
323,9	1200-1500	QXV81-315R <sup>3)</sup>							
400,1		QXV81-400R <sup>3)</sup>							
495,4		QXV81-500R <sup>3)</sup>							

1) Due to manufacturing tolerances, there may be slight variations in the displacement.

2) Recommended speeds:

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

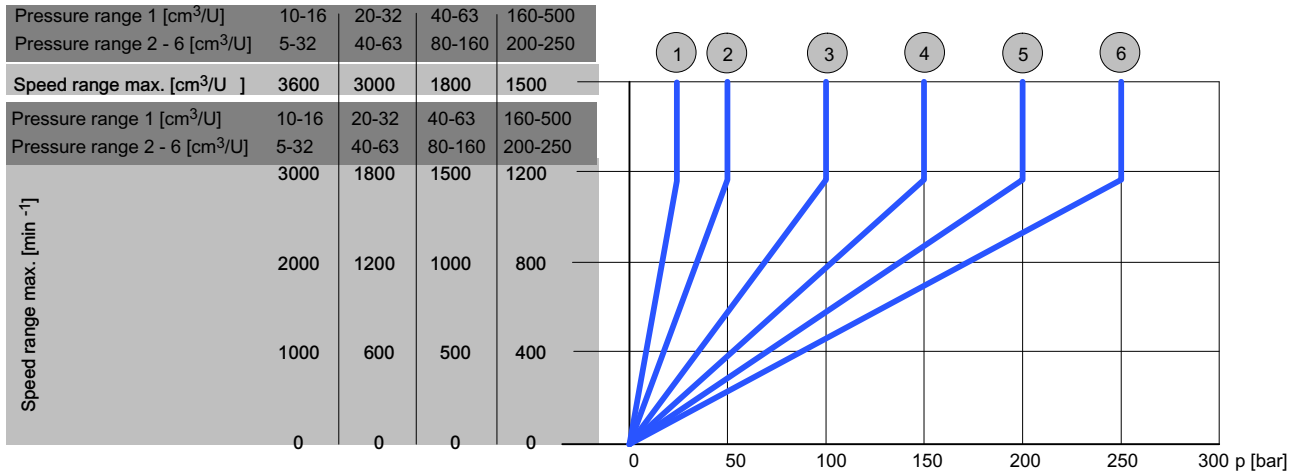
3) Second suction port is necessary for  $n > 1200$  rpm (see section 5.3 Special features)

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

### 3 Performance graphs

Measured at a viscosity of 2.5 mm<sup>2</sup>/s [cSt].

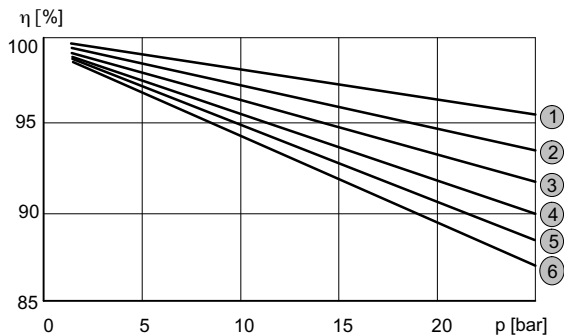
#### 3.1 Speed range dependent on pressure



1	Pressure range 1	4	Pressure range 4
2	Pressure range 2	5	Pressure range 5
3	Pressure range 3	6	Pressure range 6

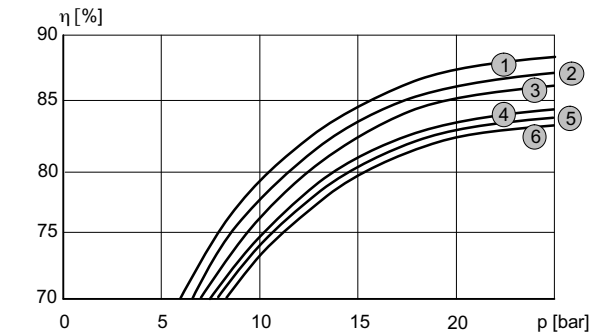
#### 3.2 Pressure range 1

##### 3.2.1 Volumetric efficiency



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

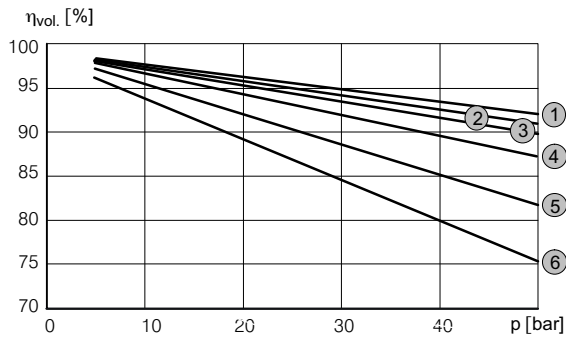
##### 3.2.2 Hydro-mechanical efficiency



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>

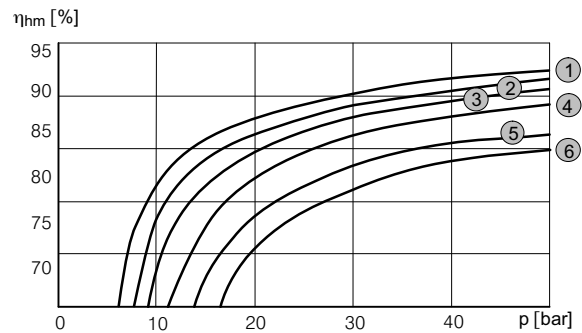
## 3.3 Pressure range 2

### 3.3.1 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>

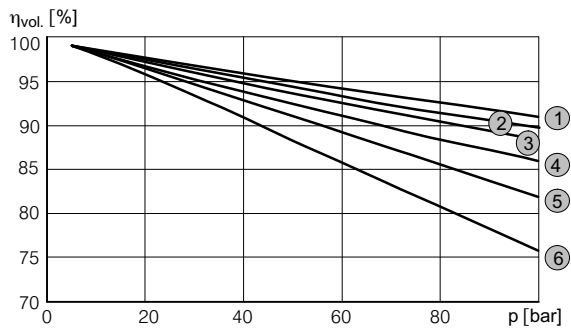
### 3.3.2 Hydro-mechanical efficiency



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>

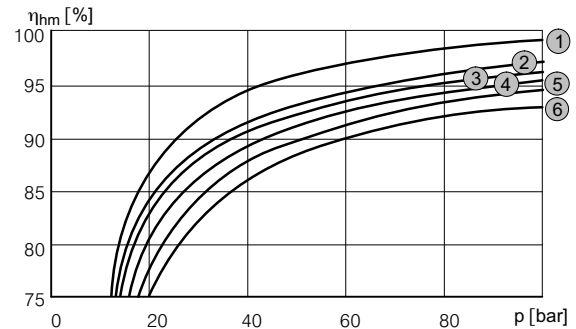
## 3.4 Pressure range 3

### 3.4.1 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>

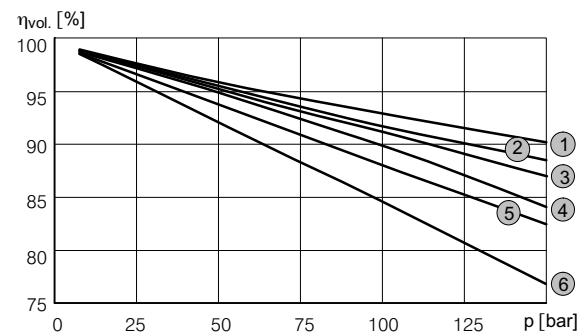
### 3.4.2 Hydro-mechanical efficiency



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>

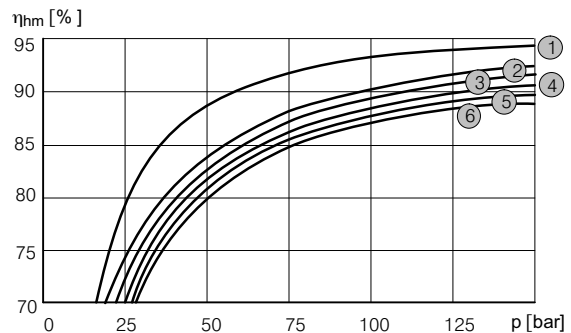
## 3.5 Pressure range 4

### 3.5.1 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>

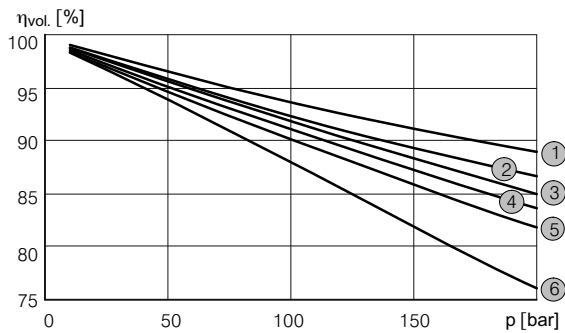
### 3.5.2 Hydro-mechanical efficiency



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>

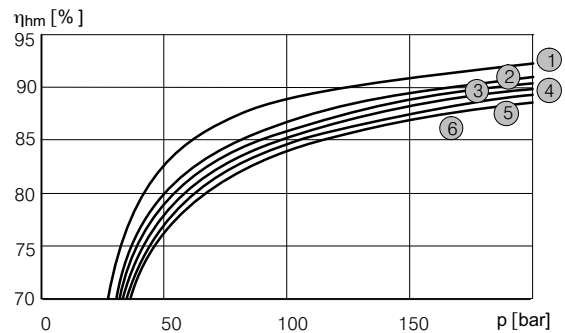
### 3.6 Pressure range 5

#### 3.6.1 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>

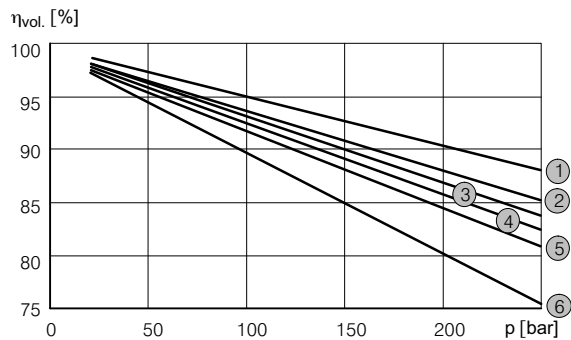
#### 3.6.2 Hydro-mechanical efficiency



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>

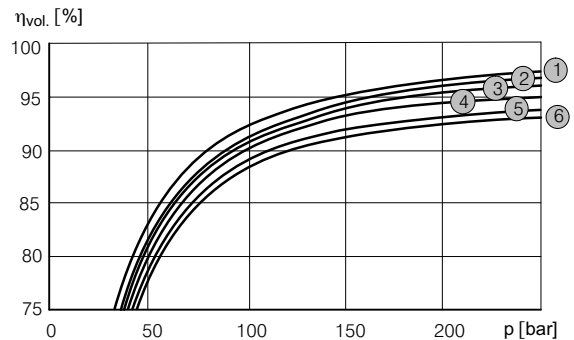
### 3.7 Pressure range 6

#### 3.7.1 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>

#### 3.7.2 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 Dimensions frame size 2 - 3

Frame size		2						3					
Pressure range		1	2	3	4	5	6	1	2	3	4	5	6
Suction port: to standard	S	G 1" DIN 3852 / 2						G 1 1/4" DIN 3852 / 2					
Pressure port: to standard	P	G 1/2" <sup>2)</sup> DIN 3852 / 2						G 3/4" <sup>2)</sup> DIN 3852 / 2					
Drain port	R	G 1/4"						G 1/4"					
Mounting: oval 2-hole flange to ISO 3019/1 (SAE) ISO 3019/2 (metric)	A	118						132					
	B (SAE)	-						106					
	B (Metr.)	100						109					
	C	9						11					
	N (SAE)	-						82,55 <sub>-0,05</sub>					
	N (Metr.)	63 h8						80 h8					
	O	8,5						8,5					
	V	6						6					
Shaft end: parallel, to ISO/R775 <sup>1)</sup>	D	20 j6						25 j6					
	E	36						42					
	F	6						8					
	G	22,5						28					
	I	45						50					
Housing	K	37,5						44					
	L	139,5	121,5	157	192	226,5	261,5	165,5	145,5	190,5	235,5	280,5	325,5
	M	-	55	90	125	160	195	-	69,5	114,5	159,5	204,5	249,5
	T1	43						53,5	54	53,5			
	T2	43						53,5	60	53,5			
	Z	100						120					
	W	-						-					
	Weight	[Kg]	5	5	6,5	8	9,5	11	10	9,5	12,5	10	9,5

1) For other shaft ends, consult Bucher Hydraulics GmbH

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

## 4.2 Dimensions frame size 4 - 5

Frame size		4						5					
Pressure range		1	2	3	4	5	6	1	2	3	4	5	6
Suction port: to standard	S	1 1/2" SAE J518						2" SAE J518					
Pressure port: to standard	P	1" SAE J518						1 1/4" SAE J518					
Drain port	R	G 1/4"						G 1/4"					
Mounting: oval 2-hole flange to ISO 3019/1 (SAE) ISO 3019/2 (metric)	A	170						212					
	B (SAE)	146						181					
	B (Metr.)	140						180					
	C	14						18					
	N (SAE)	101,6 <sub>-0,05</sub>						127 - 0,05					
	N (Metr.)	100 h8						125 h8					
	O	10,5						12,5					
	V	7						7					
Shaft end: parallel, to ISO/R775 <sup>1)</sup>	D	32 j6						40 j6					
	E	58						82					
	F	10						12					
	G	35						43					
	I	68						92					
Housing	K	52,5						60,5					
	L	203,5	177,5	233,5	289,5	345,5	401,5	243,5	212	282,5	351,5	421,5	291,5
	M	-	87	143	199	255	311	-	102	172	242	312	382
	T1	66,5					67	88,5					
	T2	66,5					70	88,5					
	Z	125						156					
	W												
Weight	[Kg]	18	17	22	27	32	37	33	31	40	49	58	67

1) For other shaft ends, consult Bucher Hydraulics GmbH

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

### 4.3 Dimensions frame size 6 - 8

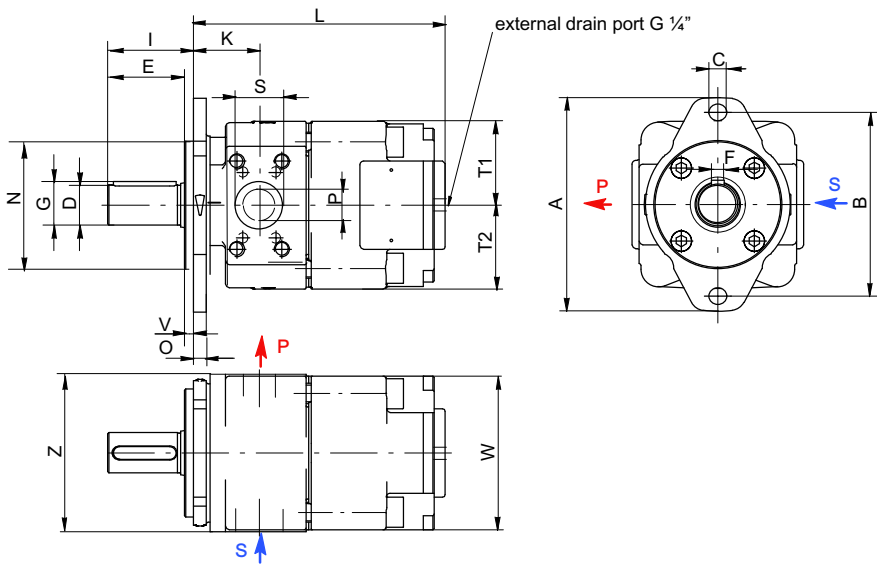
Frame size		6						8					
Pressure range		1	2	3	4	5	6	1	2	3	4	5	6
Suction port: to standard	S	2 1/2" SAE J518						3" SAE J518					
Pressure port: to standard	P	1 1/2" SAE J518						2" SAE J518					
Drain port	R	G 3/8"						G 1/2"					
Mounting: oval 2-hole flange to ISO 3019/1 (SAE) ISO 3019/2 (metric)	A	267						330					
	B (SAE)	229						-					
	B (Metr.)	224						280					
	C	22						26					
	N (SAE)	152,4 - 0,05						-					
	N (Metr.)	160 h8						200 h8					
	O	16,5						20					
V	7						9						
Shaft end: parallel, to ISO/R775 1)	D	50 j6						63 j6					
	E	82						105					
	F	14						18					
	G	53,5						67					
	I	92						117					
Housing	K	74						90					
	L	289	249	339	429	519	609	364	314	429	544	659	774
	M	-	119	209	299	389	479	-	151	266	381	496	611
	T1	107	110				136,5		137,5				
	T2	107	110				136,5		137,5				
	Z	195						250					
	W							264					
Weight	[Kg]	64	60	76	92	108	124	130	120	160	200	240	280

1) For other shaft ends, consult Bucher Hydraulics GmbH

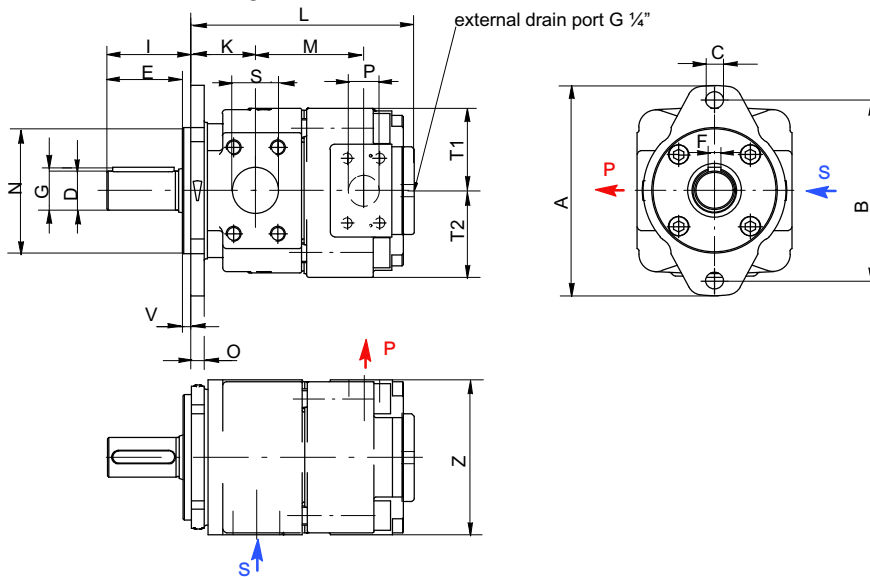
2) Pressure port to SAE J518 can be supplied for pressure ranges 2+3



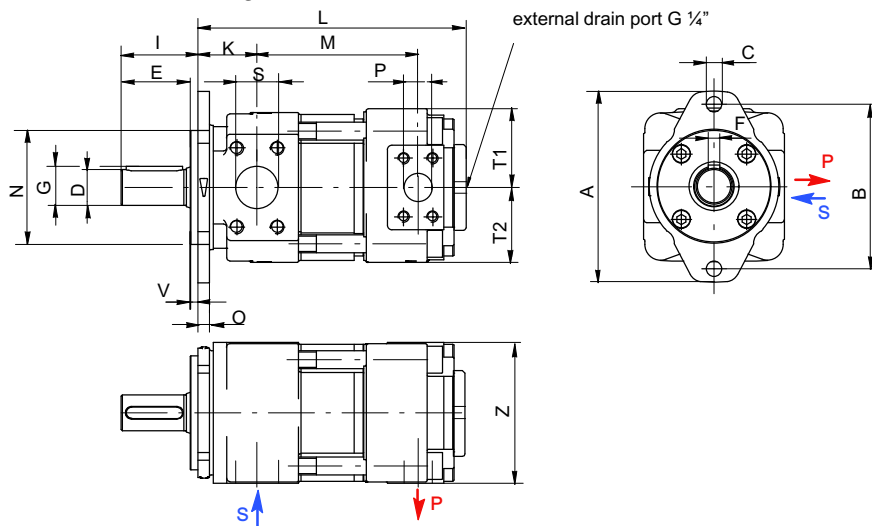
4.3.1 Pressure range 1



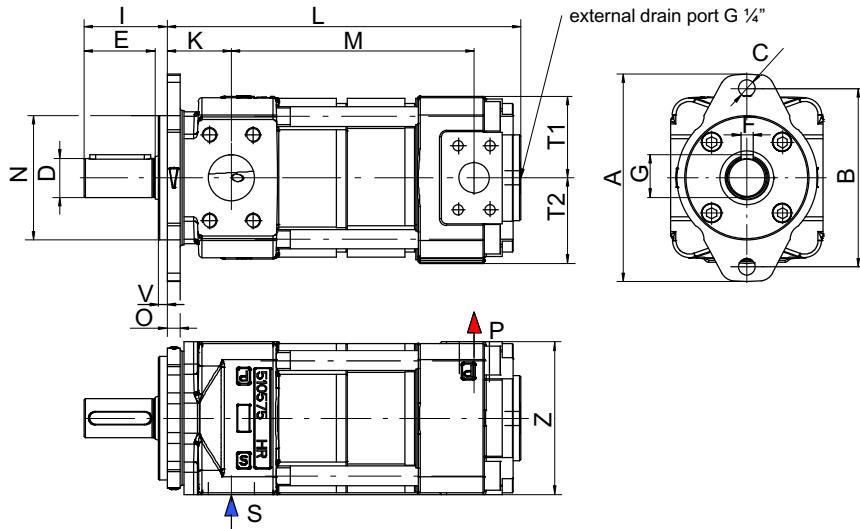
4.3.2 Pressure range 2



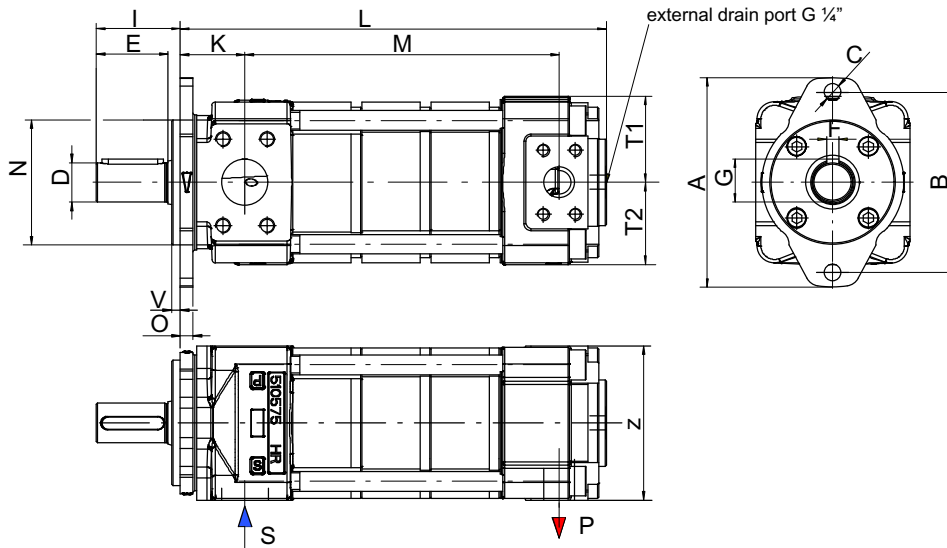
4.3.3 Pressure range 3



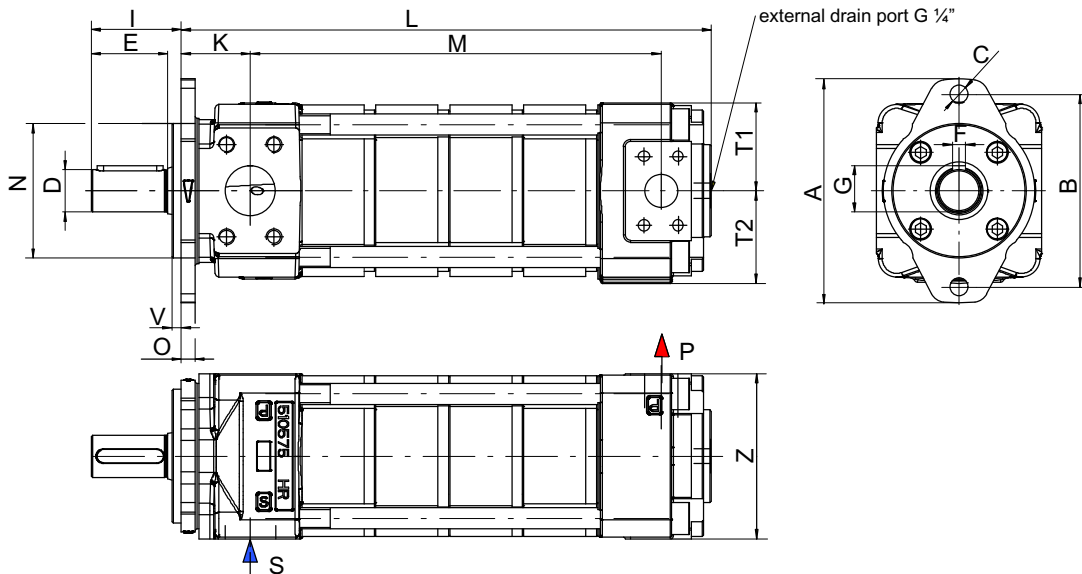
4.3.4 Pressure range 4



4.3.5 Pressure range 5



4.3.6 Pressure range 6



## 5 Ordering code

		Q	X	V	6	4	-	1	2	5	R	***
Series:	internal gear pumps for low-viscosity fluids QXV											
Frame size	2 / 3 / 4 / 5 / 6 / 8											
Pressure range	1 / 2 / 3 / 4 / 5 / 6											
Displacement [cm <sup>3</sup> /rev]	005 - 500											
Direction of rotation	right = R											
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:	QXV36-012R

### 5.2 Standard configuration

- Direction of rotation - right
- 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
- FPM (viton) seals
- Cylindrical shaft end to ISO R775
- External drain port R in pump end cover

### 5.3 Options

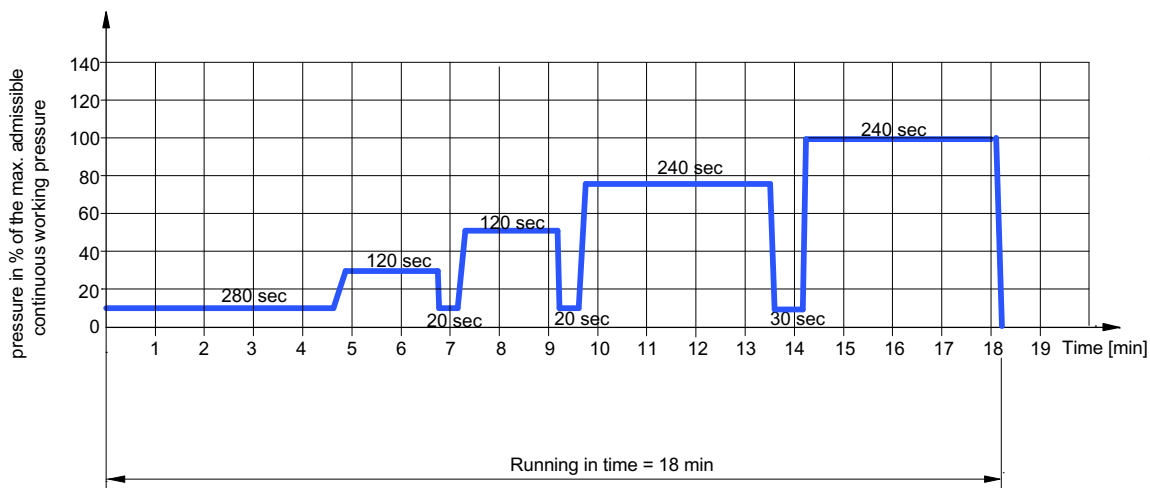
12	2-hole mounting flange to ISO 3019/2 (metric) for frame sizes QXV 3-6
83	Second suction port on QXV 61, size SAE 2" Second suction port on QXV 81, size SAE 2 1/2"
179	For applications with higher fluid temperatures - maximum 160°C

For other options, consult Bucher Hydraulics GmbH.

## 6 Recommendations for use

- Good filtration is extremely important with low viscosity fluids. Maximum fluid cleanliness 19/17/14 of ISO4406.
- 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.