# TXV series

## pumps with
## *Load Sensing* control
variable displacement piston pumps

## ADVANTAGES

▶ *TXV series pumps are variable displacement with pressure-flow control – called **Load Sensing**. They **self-regulate to give just the flow required for each movement**.*

▶ *Specifically designed for the needs of the truck hydraulics market, TXV pumps are particularly well adapted for applications in:*
- *loader cranes,*
- *forestry cranes,*
- *refuse vehicles,*
- *salt spreaders, snow and ice equipment,*
- *construction equipment vehicles.*

▶ *Extremely compact in size to allow direct flange-mounting on vehicle engine or gearbox PTOs.*

▶ *TXV pumps are available in 11 models with maximum displacement from 40 to 150 cc/rev.*

*Maximum pressure is up to 420 bar depending on model.*
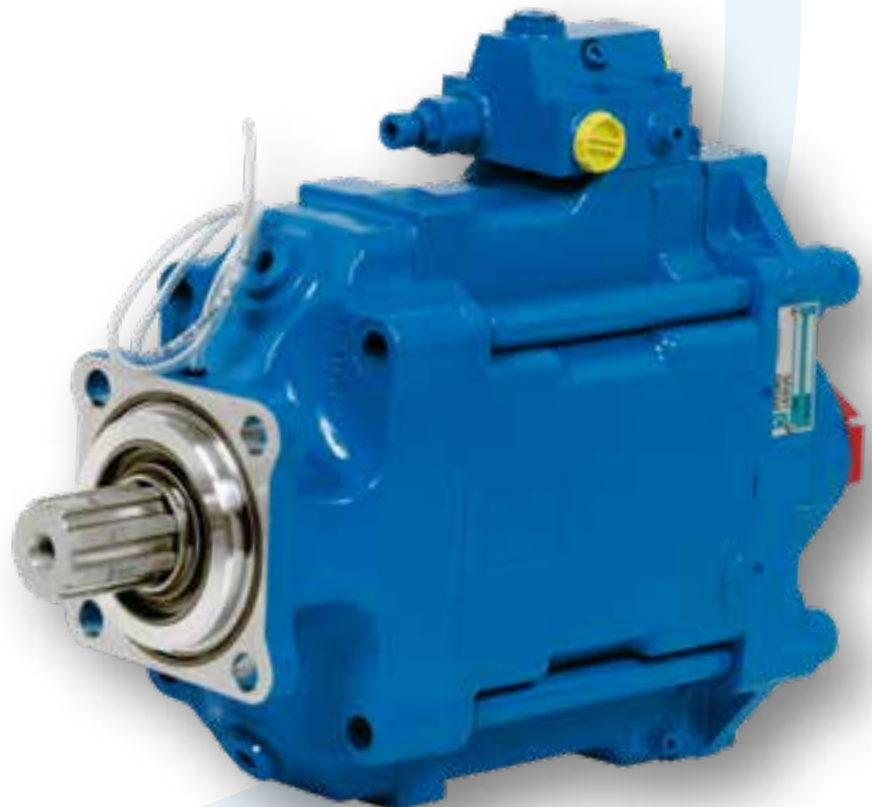
# Why use a variable displacement pump?

▶ *Installing a TXV variable displacement pump will transform your hydraulic equipment. Slow or rapid movements are done with precision, due to the constant adjustment of pump flow rate.*

▶ *The pump incorporates a load sensing device to control flow and maximum pressure. This control device is piloted by a proportional valve which informs the pump of the flow needed for the different circuits supplied by the pump, independently of pressure.*



**2** *Quick*

**3** *Slow and precise*
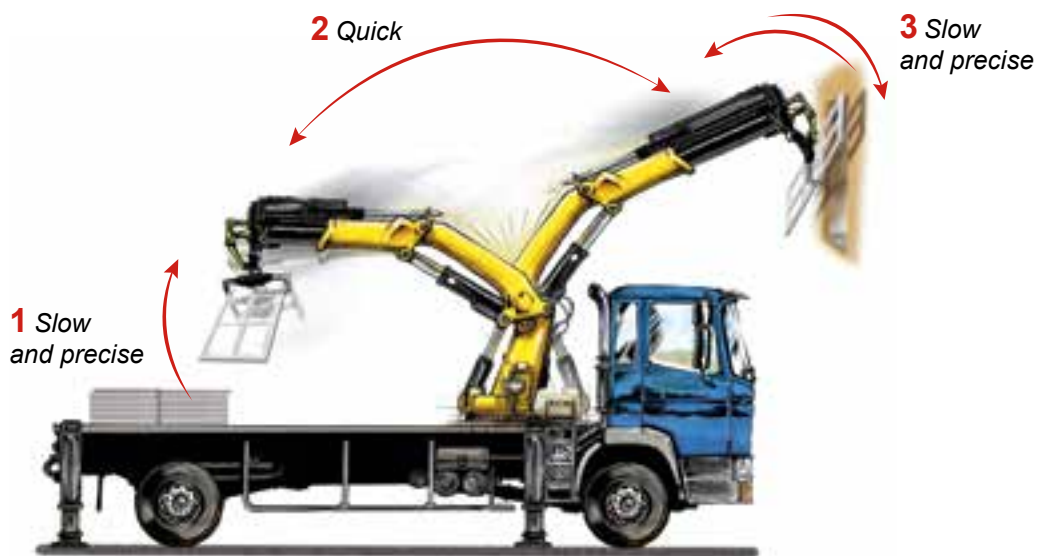
**1** *Slow and precise*

# 1 & 3

For slow and precise movements, the pump adjusts its flow to whatever the user needs, whilst also controlling maximum circuit pressure. Oil heating and lamination, and noise level, are considerably reduced compared to a fixed displacement pump.

The motor driving the pump only provides the power actually needed by the equipment, thus ensuring:

- ▪ longer service life of that equipment;
- ▪ significant gains in energy consumption;
- ▪ and overall a more environmentally friendly solution.

# 2

For rapid movements, the pump supplies the required flow virtually instantaneously.
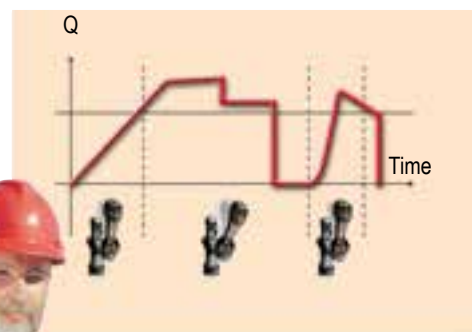


**The proportional movement of the control lever is perfectly reproduced by the pump.**

► TXV variable displacement pumps are of axial piston design with 11 pistons, thus ensuring optimal regularity of flow and a low noise level.

► The displacement of the pump is proportional to the stroke of the pistons.
Displacement – and thus flow - is varied by changing the angle $\alpha$ of the swashplate (Fig.1).

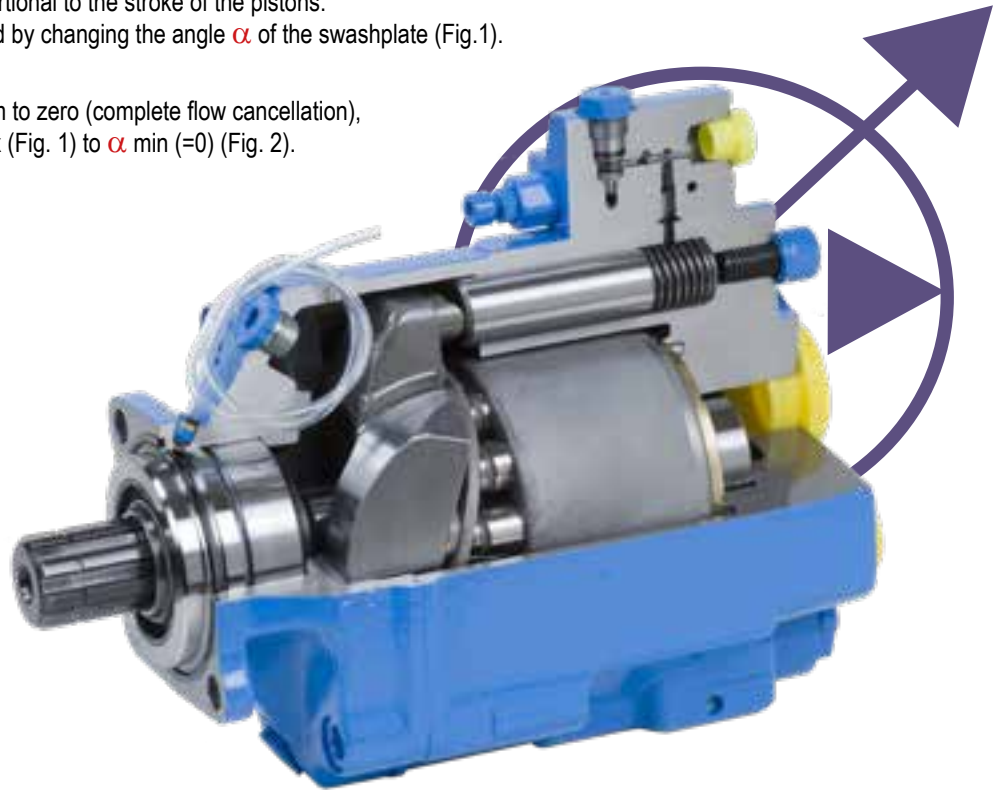► To change displacement from maximum to zero (complete flow cancellation), the swashplate angle goes from $\alpha$ max (Fig. 1) to $\alpha$ min (=0) (Fig. 2).
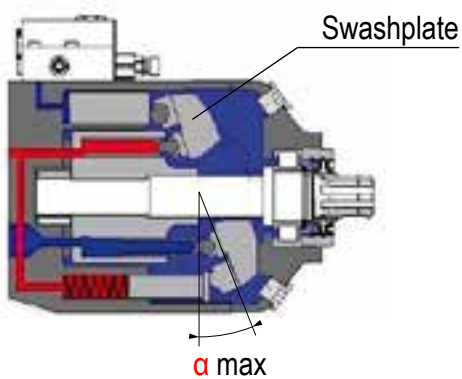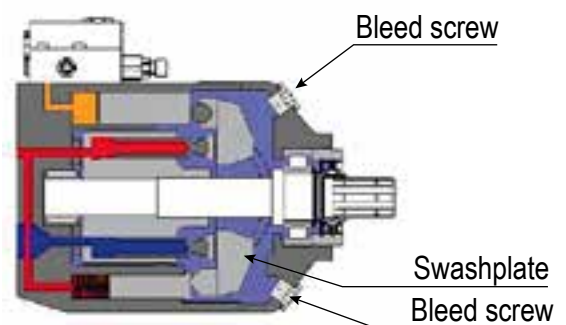


### Figure 1 - Maximum displacement

Swashplate

α max

### Figure 2 - zero displacement

Bleed screw

Swashplate
Bleed screw

► Setting the servo pump.

Standby pressure setting

Max. pump output pressure (PC)

Direct return to tank (drain)

Pump pilot pressure line (LS)
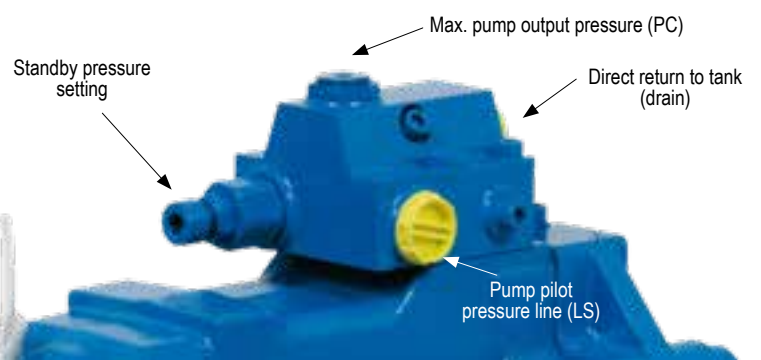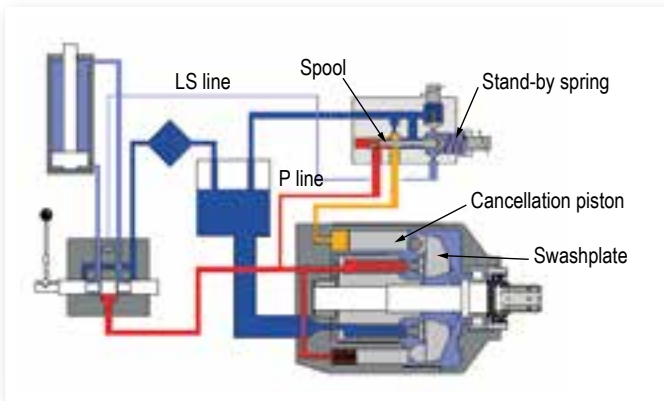
### ► Zero flow (standby)

The proportional valve is closed.
The pressure in the P line increases until it reaches the value at which the standby spring is set.
Under the pressure in the P line, the spool moves and oil flow supplies the setting piston which moves the swashplate into vertical position (angle $\alpha$ =0): no flow, but standby pressure is maintained. The pump stays in standby mode.
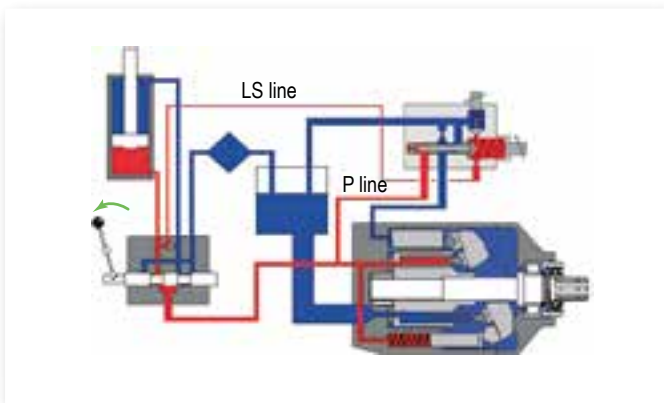


### ► Full flow

The proportional valve is fully open, allowing passage of pump flow.
The pressure in the LS line is the same as in the P line.
Hydraulic pressure is the same on either side of the spool.
The standby spring holds the spool in its closed position.
The cancellation piston is not supplied with oil.
The swashplate is at maximum angle $\alpha$: the pump is at full displacement.
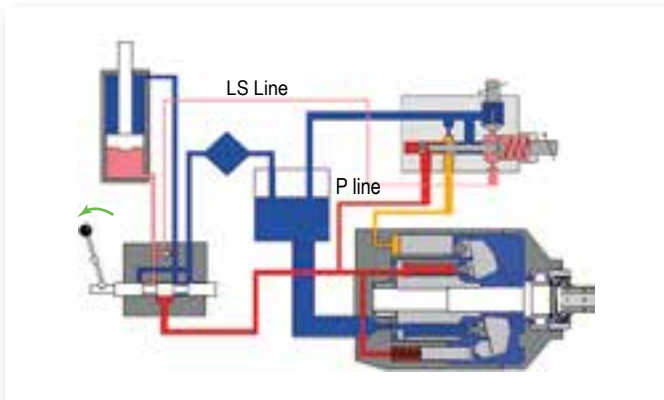


### ► Flow control

As soon as the proportional valve tends to reduce the flow requested by the user, the pressure drop created allows the pump displacement setting piston to be piloted.
This setting piston automatically adjusts pump displacement to match the order given by the proportional valve.
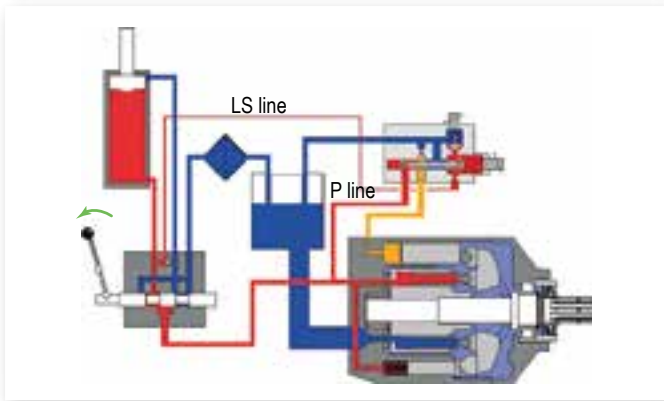
### ► Zero flow (maximum pressure)

This is the case for example of a cylinder which arrives at a mechanical stop. The proportional valve is still open.
The pressure of the cylinder at a mechanical stop is sensed by the pump pressure relief valve which opens at the set pressure (PC).
This allows the pump displacement setting piston to be supplied and the pump sets itself to a displacement just sufficient to maintain the circuit pressure.



TXV series

*TXV pumps are available in 11 models from 40 to 150 cc/rev maximum displacement.*

| Pump reference | | Direction of rotation | Maximum displac.[1] | Max. opera-ting pressure | Max. peak pressure (intermittent: 5%) | Torque at 300 bar[2] | Max.speed at full displa-cement[3] | Max.speed in stand-by | Weight | Overhang torque[4] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cc/rev) | (bar) | (bar) | (N.m) | rpm | rpm | (kg) | (N.m) |
| ► **Standard pump range** | | | | | | | | | | |
| TXV 40 | 0512950 0512955 | CW CCW | 40 | 400 | 420 | 225 | 3000 | 3000 | 26 | 34 |
| TXV 60 | 0512500 0512505 | CW CCW | 60 | 400 | 420 | 335 | 2600 | 3000 | 26 | 34 |
| TXV 75 | 0512510 0512515 | CW CCW | 75 | 400 | 420 | 420 | 2000 | 3000 | 26 | 34 |
| TXV 92 | 0512520 0512525 | CW CCW | 92 | 400 | 420 | 515 | 1900 | 3000 | 26 | 34 |
| TXV 120 | 0515700 0515705 | CW CCW | 120 | 380 | 400 | 675 | 2100 | 3000 | 26 | 34 |
| TXV 130 | 0515300 0515515 | CW CCW | 130 | 365 | 380 | 730 | 2100 | 3000 | 28,2 | 38,6 |
| TXV 150 | 0518600 0518605 | CW CCW | 150 | 310 | 330 | 840 | 2000 | 3000 | 28,2 | 38,6 |
| TXV 130 *indexable* | 0520300 | CW/CCW | 130 | 365 | 380 | 730 | 1750 | 3000 | 29,3 | 42 |
| TXV 150 *indexable* | 0525070 | CW/CCW | 150 | 310 | 330 | 840 | 1750 | 3000 | 29,3 | 42 |
| ► **With through shaft** | | | | | | | | | | |
| TXV 130 | 0518700 0518705 | CW CCW | 130 | 365 | 380 | 730 | 1900 | 3000 | 31,1 | 47,4 |

(1) TXV pumps can be set for smaller maximum displacements (see page 41).
(2) For a mechanical efficiency at 85%.
(3) Higher speed - at full displacement - possible depending on flow required : please contact us.
Viscosity affects maximum possible rotating speed. If viscosity > 400 cSt, please contact us to obtain corresponding speed possibilities.
*indexable* series: see pages 34 and 35.
(4) Value of the overhang torque of the only pump.

## ► Calculation of power to be supplied to the shaft as a function of flow and pressure

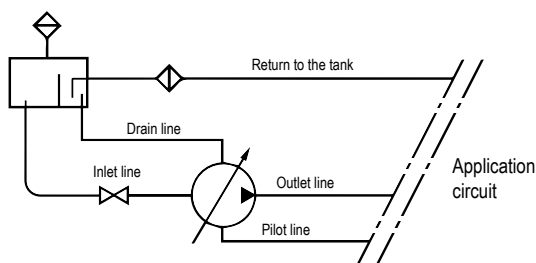$$\mathcal{P} = \frac{\Delta P \times Q}{600 \times \eta_{global}}$$

**Calculation of torque to determine PTO, as a function of the displacement and the pressure**

$$C = \frac{Cyl \times \Delta P}{62.8 \times \eta_{méca}}$$

Avec :

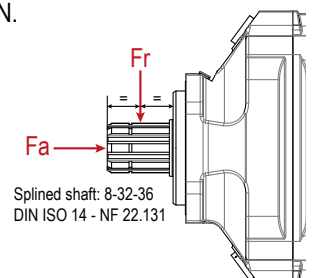| | | |
|---|---|---|
| $\mathcal{P}$ | = | Hydraulic power in kW |
| $\Delta P$ | = | Differential pressure in bar |
| Q | = | Flow in l/min |
| C | = | Torque in N.m |
| Cyl | = | Displacement in cc/rev |
| $\eta_{méca}$ | = | Mechanical efficiency |
| $\eta_{global}$ | = | Mechanical efficiency + volumetric efficiency |

## ► Ideal installation



## ► Force on pump shaft

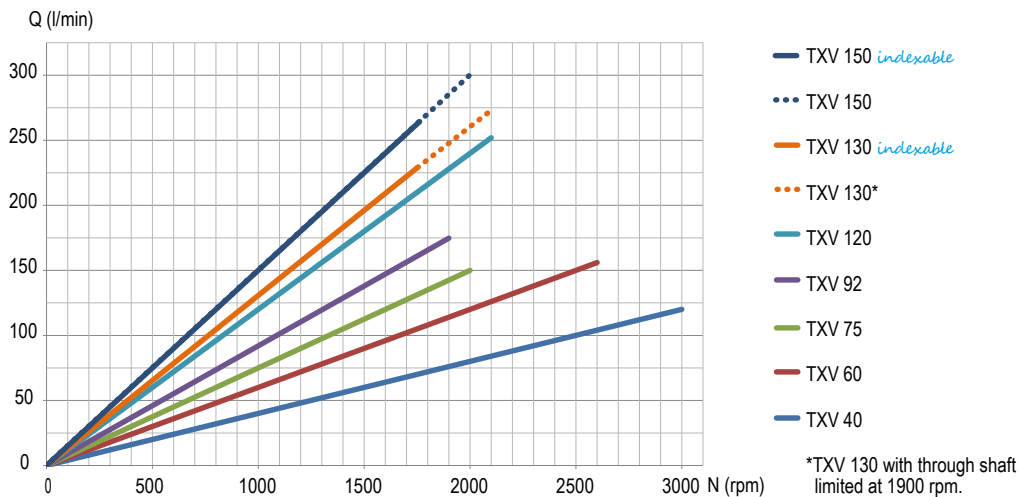Fr : Acceptable max. radial force = 3000 N
Fa : Acceptable axial force = 1600 N.



Splined shaft: 8-32-36
DIN ISO 14 - NF 22.131

► **Torque absorbed as a function of pump output pressure (with a mechanical efficiency considered at 85%)**

Torque (N.m)



- TXV 150 *indexable* / TXV 150
- TXV 130 *indexable* / TXV 130*
- TXV 120
- TXV 92
- TXV 75
- TXV 60
- TXV 40

\* TXV with through shaft
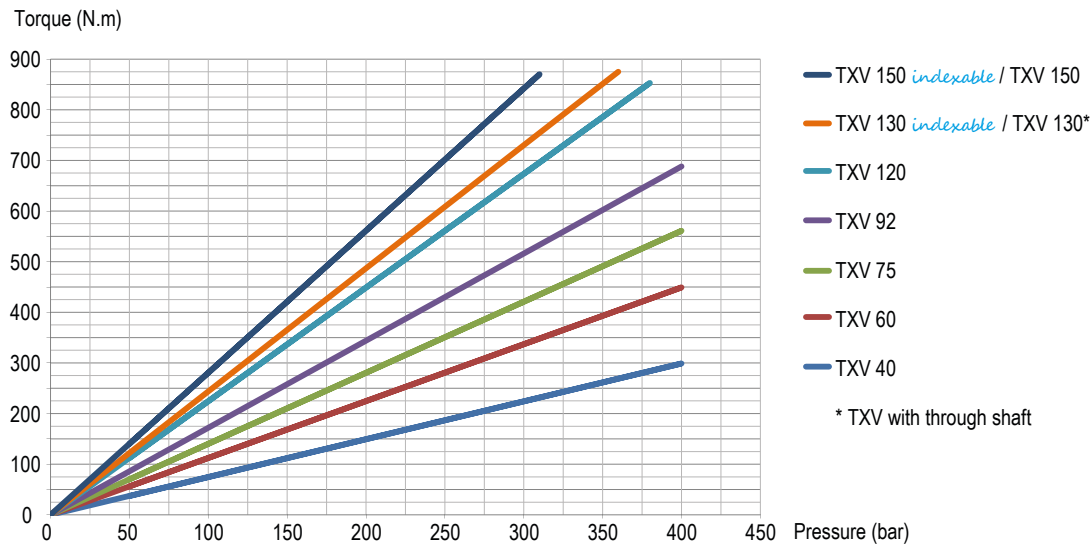
► **Flow as a function of rotating speed**

Q (l/min)



- TXV 150 *indexable*
- TXV 150
- TXV 130 *indexable*
- TXV 130*
- TXV 120
- TXV 92
- TXV 75
- TXV 60
- TXV 40

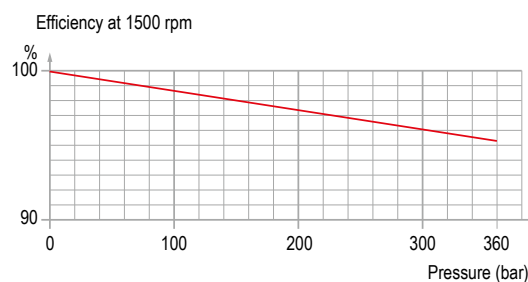*TXV 130 with through shaft limited at 1900 rpm.

⚠ **Attention: the TXV indexables pumps are limited at 1750 rpm maximum.**

Flow as a function of speed, with pump in maximum displacement position and oil level in tank above the pump.

These graphs are the results of testwork done in HYDRO LEDUC R&D laboratory, on a specific test bench with a mineral hydraulic fluid ISO VG46 at 25°C (~100 cSt) - disregarding the volumetric efficiency.
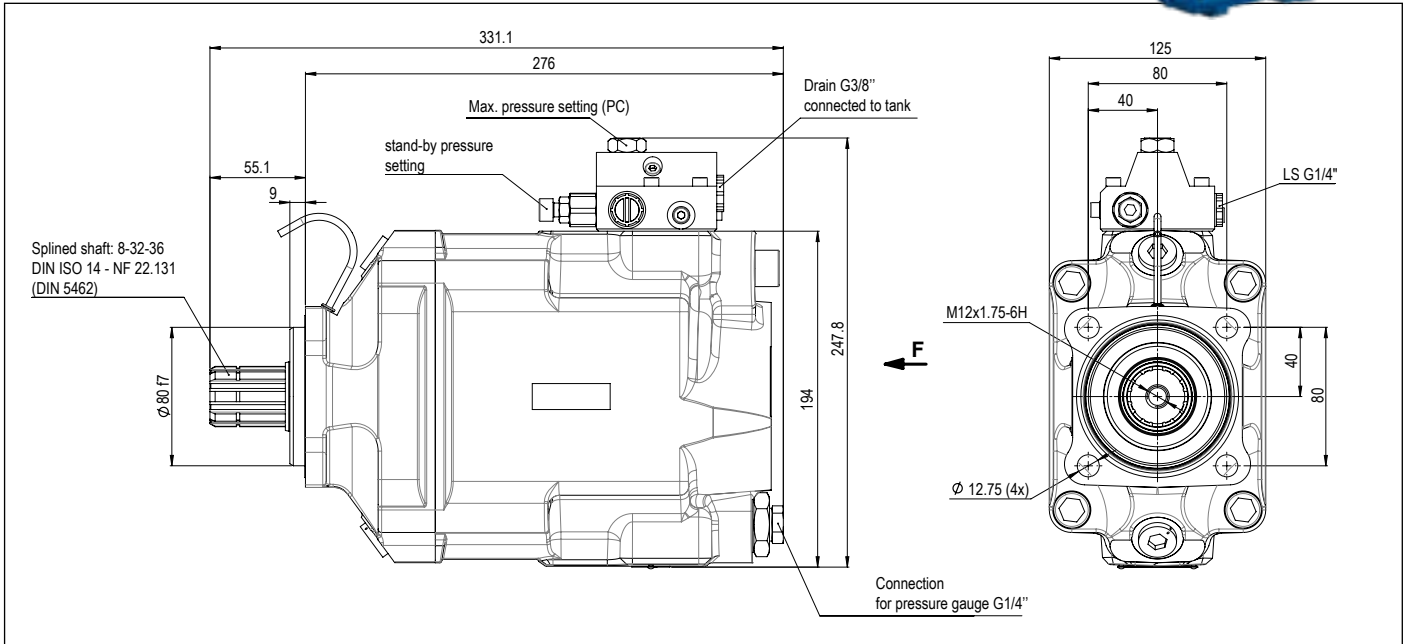
► **Volumetric efficiency**

Efficiency at 1500 rpm
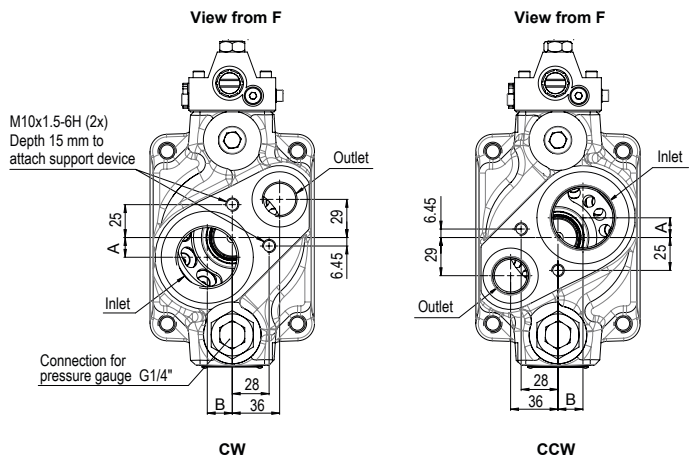
## TXV 40 TO 120

Splined shaft: 8-32-36
DIN ISO 14 - NF 22.131
(DIN 5462)

Max. pressure setting (PC)

stand-by pressure setting

Drain G3/8'' connected to tank

Ø 80 f7

55.1

9

331.1

276

247.8

194

125

80

40

LS G1/4"

M12x1.75-6H

Ø 12.75 (4x)

40

80

F

Connection for pressure gauge G1/4''

Dimensions in mm.

## ► TXV connections

| Pump reference | Outlet | Inlet | A | B |
|---|---|---|---|---|
| | (Ø) | (Ø) | (mm) | (mm) |
| TXV 40 to 92 | G 3/4" | G 1"1/2 | 15 | 19 |
| TXV 120 | G 1" | | 6 | 23.57 |

**View from F**

M10x1.5-6H (2x)
Depth 15 mm to attach support device

Outlet

Inlet

25

6.45

29

A

Connection for pressure gauge G1/4"

28

36

B

**CW**

**View from F**

Inlet

6.45

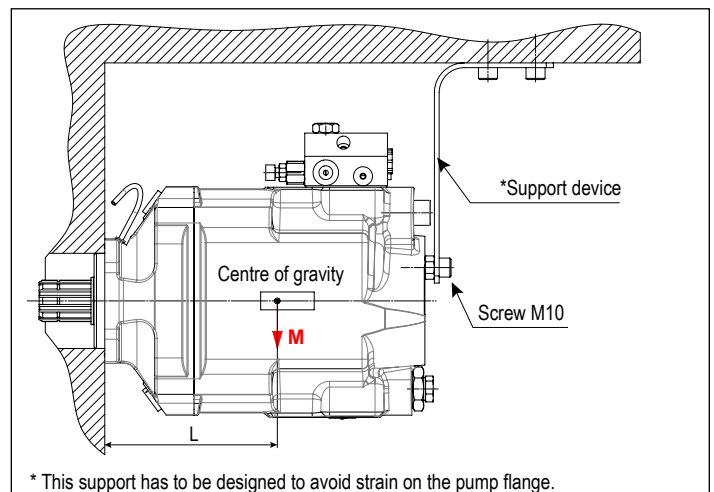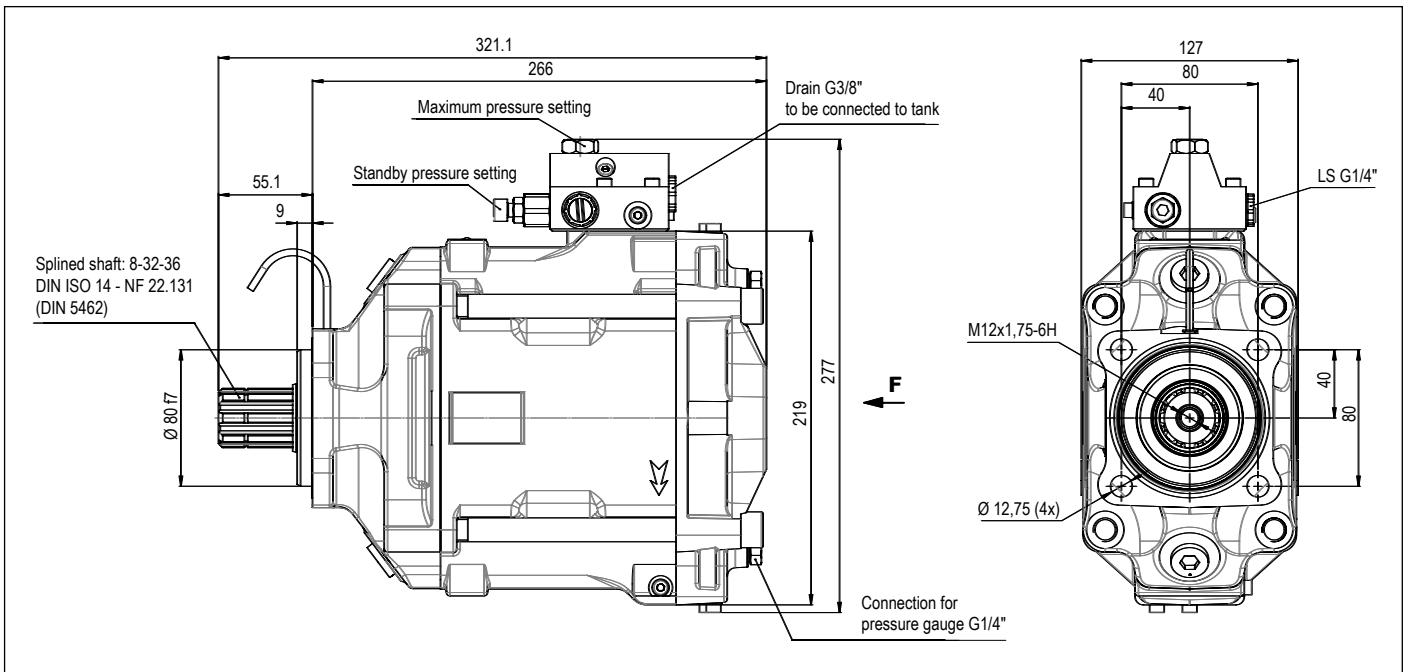29

25

A

Outlet

28

36

B

**CCW**

## ► Support device

In cases where it is necessary to use a support device (overhang torque) for the pump, this must be fixed to the same part which the pump is mounted on.
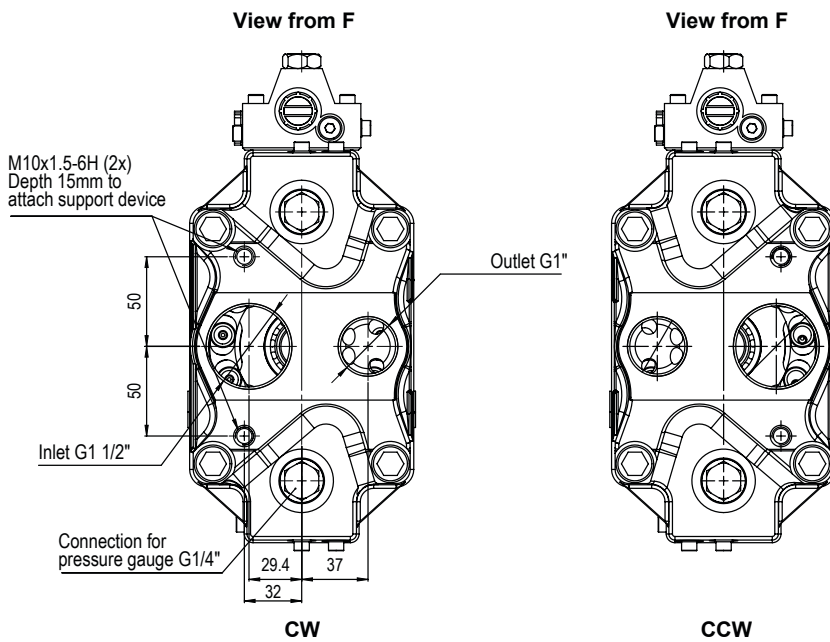
## ► Mass and position of centre of gravity

| Pump type | L (mm) | Weight (kg) | Overhang torque (N.m) |
|---|---|---|---|
| TXV 40 à 92 | 130 | 26 | 34 |
| TXV 120 | 130 | 26 | 34 |
| TXV 130 et TXV 150 | 128 | 28.2 | 38.6 |
| TXV 130 et TXV 150 *indexable* | 128 | 29.3 | 42 |
| TXV 130 with through shaft | 152.6 | 31.1 | 47.4 |
| TXV 130 constant torque | 143 | 28.3 | 40 |

*Support device

Centre of gravity

M

Screw M10

L

* This support has to be designed to avoid strain on the pump flange.

## TXV 150



321.1
266
55.1
9

Maximum pressure setting
Standby pressure setting

Drain G3/8"
to be connected to tank

Splined shaft: 8-32-36
DIN ISO 14 - NF 22.131
(DIN 5462)

Ø 80 f7

277
219

F

Connection for
pressure gauge G1/4"

127
80
40

LS G1/4"

M12x1,75-6H

40
80

Ø 12,75 (4x)

Dimensions in mm.

**View from F**

M10x1.5-6H (2x)
Depth 15mm to
attach support device

Outlet G1"

50
50

Inlet G1 1/2"

Connection for
pressure gauge G1/4"

29.4    37
32

**CW**
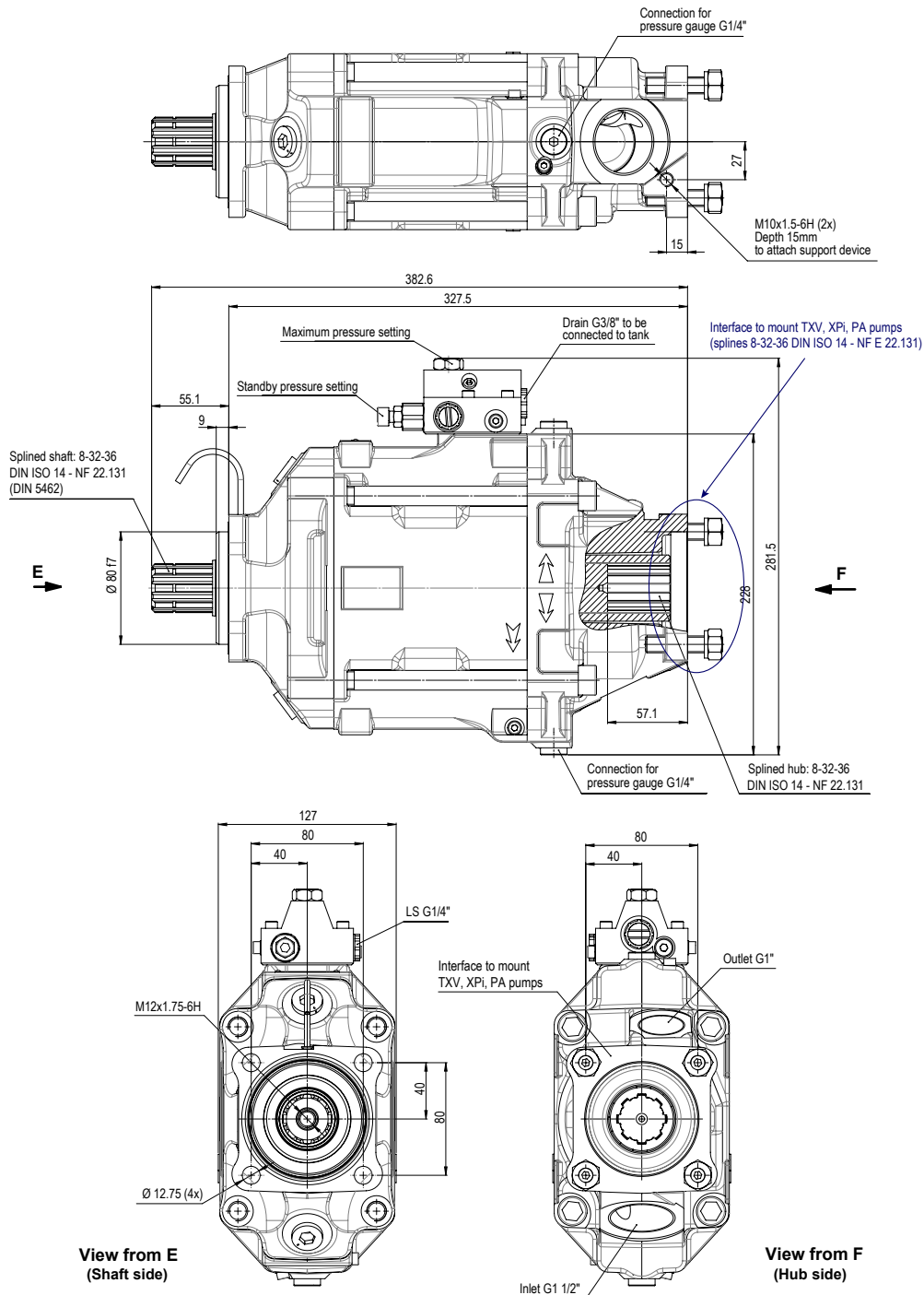
**View from F**

**CCW**

## TXV 130 THROUGH SHAFT PUMP

The TXV 130 pump exists in a "through shaft" version.

With side porting for inlet and output, this "through shaft" TXV 130 configuration means any LEDUC TXV pump, or fixed displacement XPⅈ
or PA pump, can be mounted on the back.
The maximum displacement of the "through shaft" TXV 130 can be factory set, on request, between 60 and 130 cc/rev.
It is important to check that maximum torque to be transmitted by the shaft of the "through shaft" TXV 130 does not exceed 900 N.m.
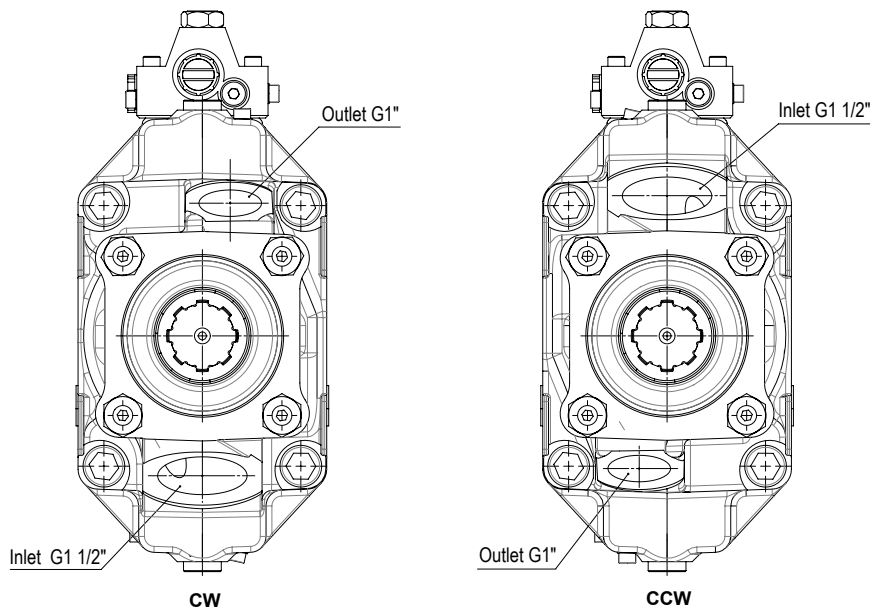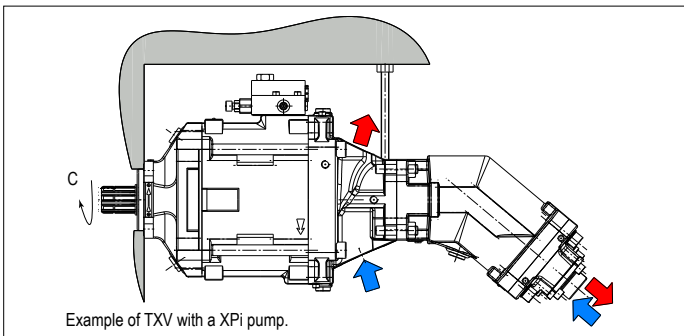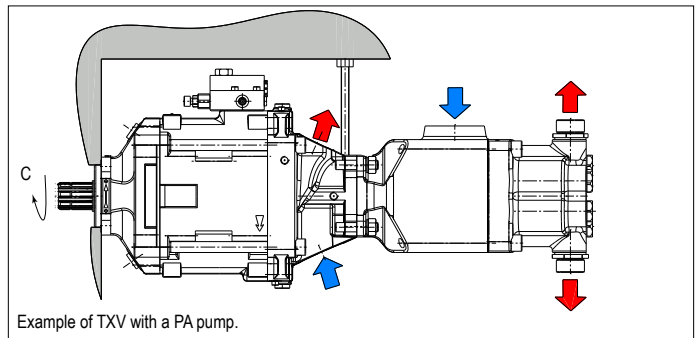


Dimensions in mm.

## TXV 130 THROUGH SHAFT PUMP

**View from F (see p.30)**



Outlet G1"

Inlet G1 1/2"

Inlet  G1 1/2"

Outlet G1"

**CW**

**CCW**

### ► Support device

The support device for the pump must be fixed to the same part which the pump is mounted on (see diagram below) and has to be designed to avoid strain on the pump flange.



Support device

C

Example of two TXV pumps.



C

Example of TXV with a PA pump.



C

Example of TXV with a XPi pump.
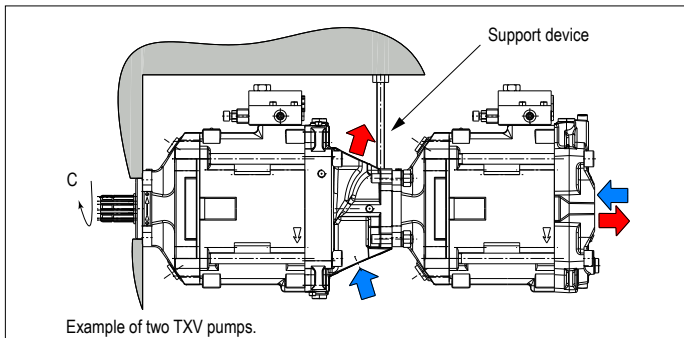
**Maximum torque transferable by the shaft of the pump driven by the PTO:**

**C** = 900 N.m

That is, the sum of torque for both pumps must be < 900 N.m.

TXV series

*Please consult our Technical Department for advice regarding your installations.*