INSTRUCTION MANUAL 6MB BASIC VERSIONS

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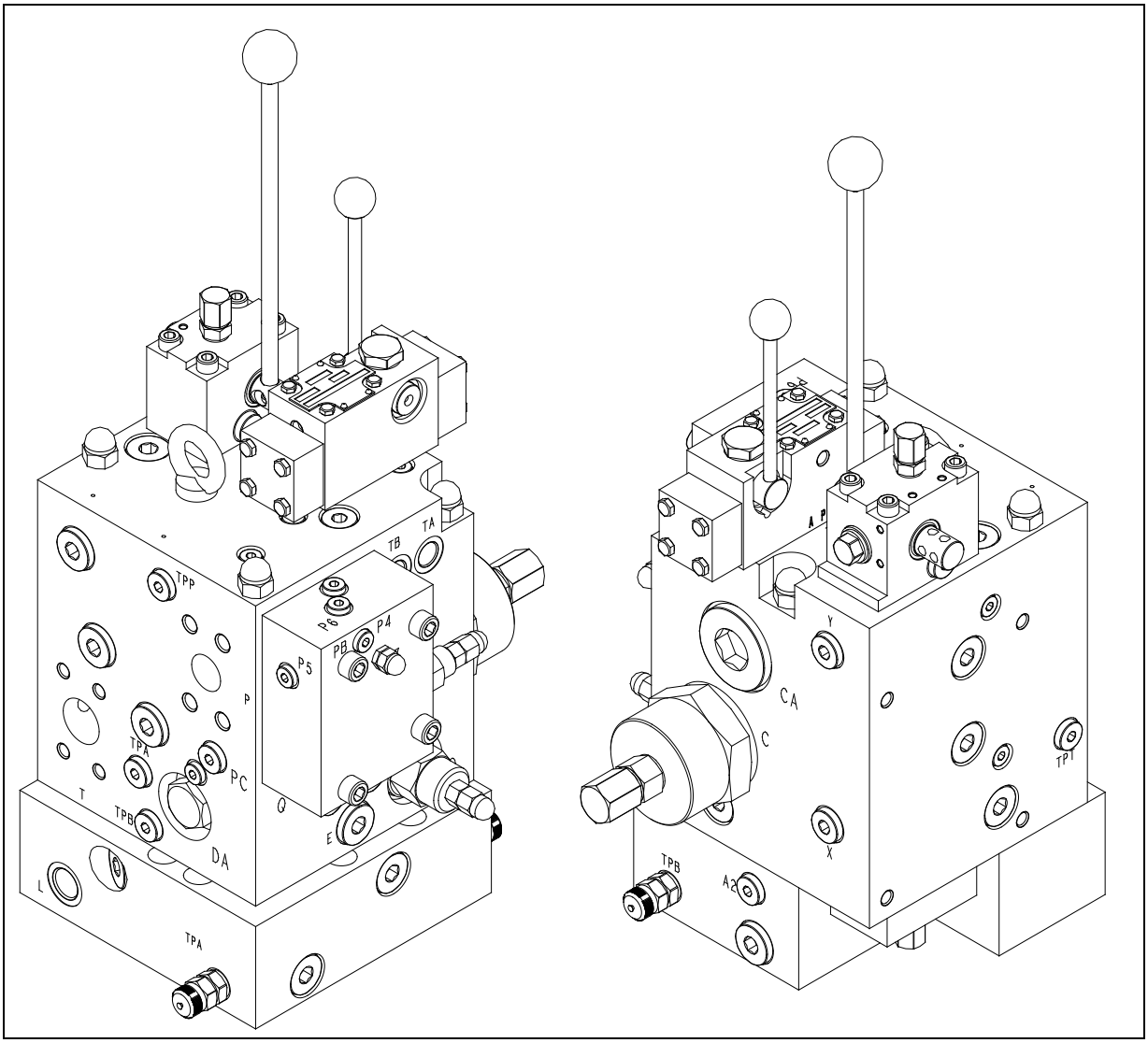


3D view of 6MB with two speed selector valve and adapter for motor mounting.

FEATURES

6MB modular unit is a complete unit for controlling of hydraulic driven winches. 6MB is designed for constant pressure systems/variable pump system. 6MB has excellent metering characteristic and is especially designed to withstand marine surroundings.

GENERAL DESCRIPTION

6MB modular unit include in basic version directional control valve (2), pressure compensation flow control system (P, PB, PA, PC and Z), free flow check valve (CA), load control (C and Q), pressure relief (D) and boosting DA. (See diagram page 5)

VALVE DESCRIPTION

Item 1 **Main block.**

Item 2 **Directional control valve 4/3.**

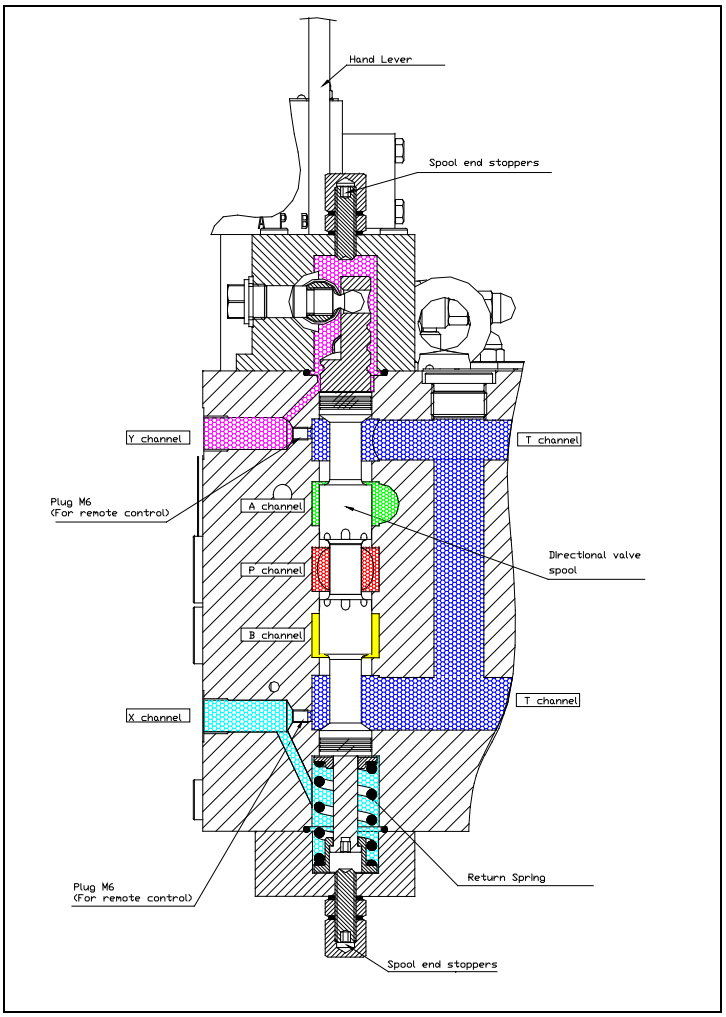
This is a three positions directional spool valve with hand lever. When activating the directional valve handle, the operator controls the direction and drive speed of the drum. Throttling grooves in the main spool open progressively for flow either to A or B port. The spool has adjustable end stoppers in both end covers for limiting of the spool stroke. A shorter travel of the spool will result in an increase of the pressure drop through the spool and an increase of maximum flow thought the valve.

Option code 37:

Directional valve is prepared to be hydraulically proportional remote controlled.

Option code L:

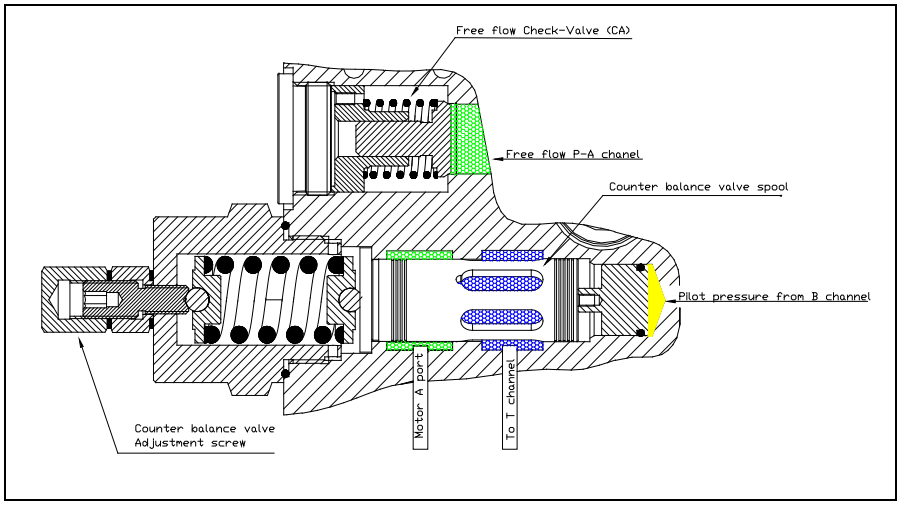
In neutral position, there is a manual controlled safety lock for locking the spool. This is a mechanical device for preventing operation of the directional valve unless the safety lock is manually released.



Section of main directional (2) valve of 6MB

Item C **Counterbalance valve A→T.**

The counter balance valve keeps the load under control during lowering operations. Throttling groves in the counter balance spool open progressively for flow from A→T port, and thus give a smooth lowering operation and low pressure rise with full flow. The counterbalance spool opens by a pilot pressure taken from line B.



*Section of Counter balance valve (C) and free flow check (CA) 6MB-****

Item Q **Adjustable throttling.**

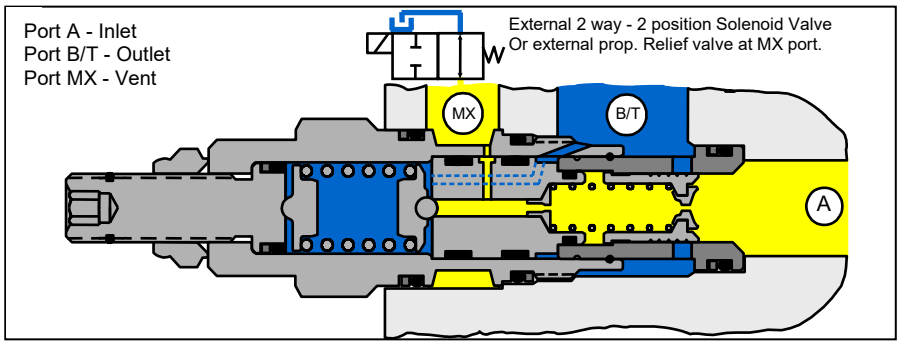
Throttling for the counter balance pilot channel. For dampening the counter balance valve if the valve is fluctuating.

Item CA **Check-valve free flow P→A**

Bypassing the counter balance valve in Heave.

Item D **Pressure relief valve A→B**

The pilot operated pressure relief is connected between motor ports A→B to secure the hydraulic motor and limit the maximum pressure. The pressure relief valve has an internal vent port for remote control of decreased pressure in tension mode.



Item T **Directional control valve 4/2.**

This is a two position directional spool valve with detent. In most cases to be used for switching two-speed system in the hydraulic motor.

Item DA **Anticavitation check valve**
Boosting from T to B, to ensure that cavitation not occur. A certain flow must be applied to replace the internal leakage.

Generally about the pressure compensator system.

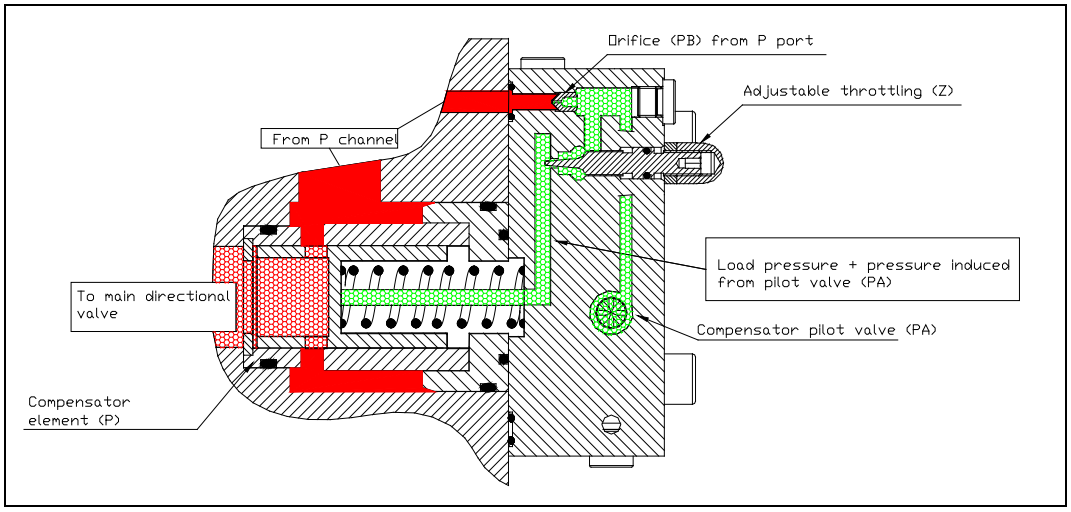
This is a load independent system, which means that a fixed spool stroke on the directional valve will give equal flow independent of the load at the motor/drum.

The main directional spool (2) in conjunction with pressure compensator flow control system (P, PA, PB, PC and Z), regulates proportional oil flow to either A (Heave rotation) or B (Lower rotation) by sensing the pressure either in A or B line through the shuttle valve (PC). When operating directional valve (2), the spool will open progressively to A or B. Pressure compensation element will maintain equal Δp across the directional valve. Maximum flow over the main directional valve is depending on the force induced on the pressure compensator element (P). This force is made up of a spring force in the compensator element item (P), and an adjustable spring force in the compensator pilot valve (PA) and the load pressure sensing in A or B via (PC). When setting is altered on the compensator pilot valve (PA), the flow will change.

When adjusting pressure relief valve PA, the Δp through the directional valve will alter, and thus maximum flow to the hydraulic motor

Item PC **Shuttle valve for the pressure compensator.**
Port V can be used for load sensing or in some applications for a hydraulically operated brake release valve.

Item P **Pressure compensator element.**
Normally open modulating element which act as a pressure compensator to maintain a constant pressure drop across the directional valve (together with PC, PB, PA and Z).



*Section of pressure compensator element (P) and Adjustable throttling (Z) of 6MB-****

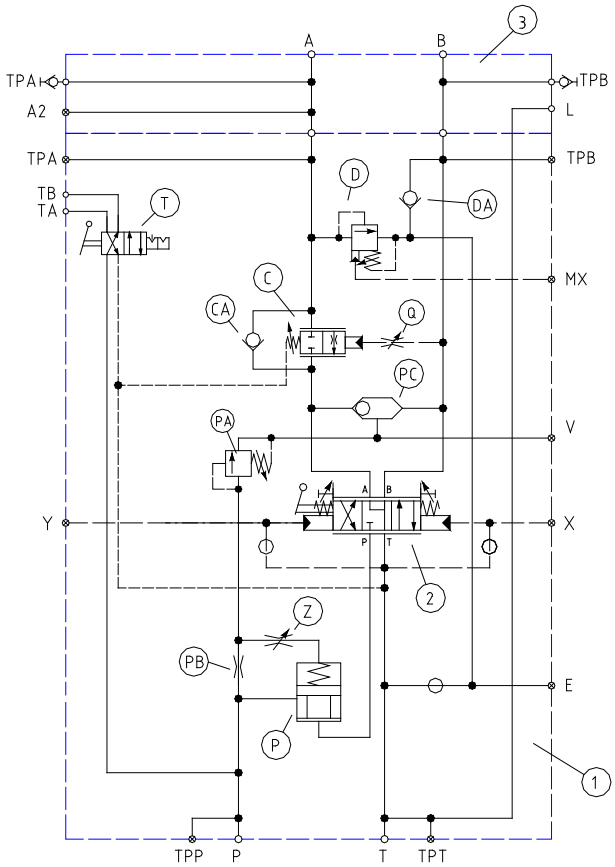
Item Z **Adjustable throttling.**
Adjustable throttle for the pressure compensator element, if the element is fluctuating.

Item PB **Nozzle**
Maintain flow to by pass compensator pilot valve PA.

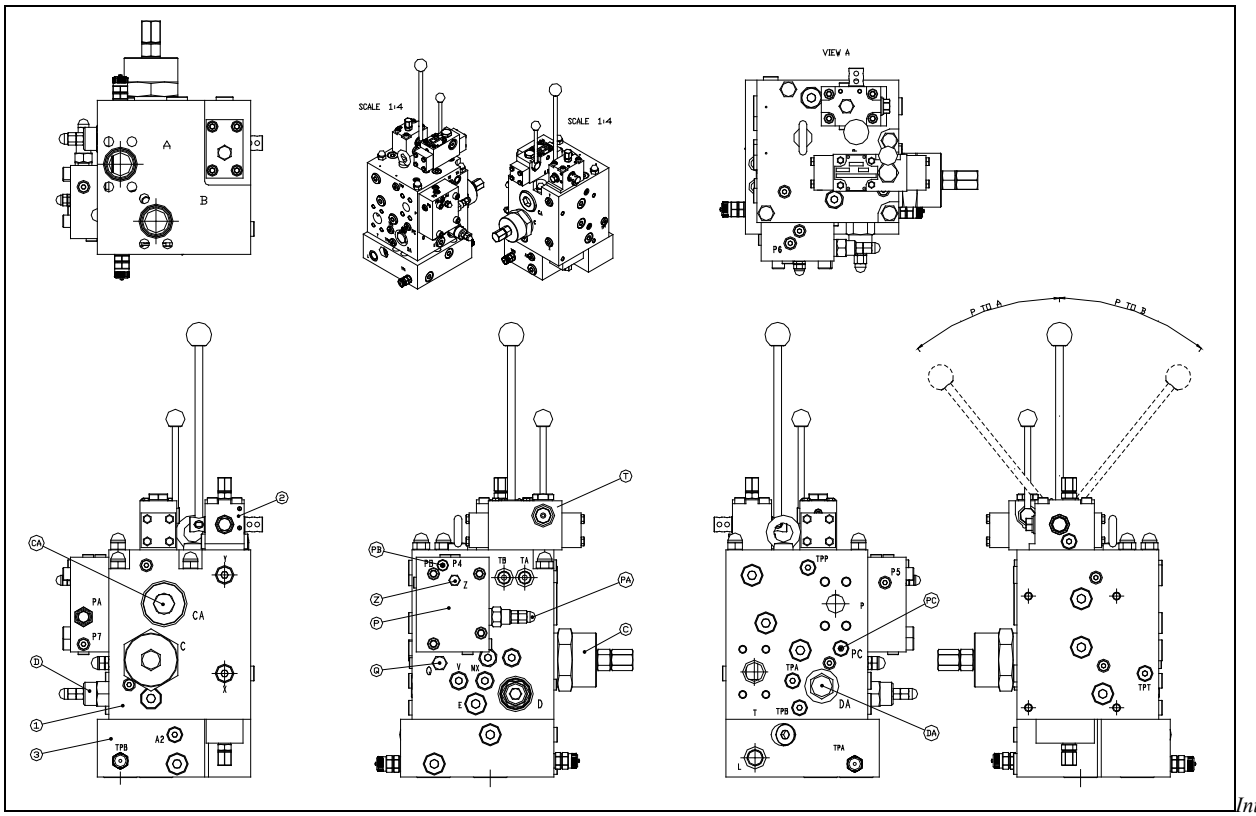
Item PA **Compensator pilot valve.**

The spring on the compensator is rather weak. Therefore, pressure created by an adjustable pressure relief valve is added to the spring force.

ADJUSTMENT PROCEDURE



*Hydraulic diagram of 6MB-***-1-2C-T-* (Manual operated version, with two-speed selector valve and adapter for motor mounting)*



*Internal valve placement on 6MB-***-**-2C-T-* (Shown version, with two-speed selector valve and adapter for motor mounting)*

AS Hydranor has performed a complete function and pressure test before shipment, to ensure that every unit fulfil its given specification.

PREPARATION BEFORE ADJUSTMENT

- Check that all connections to be properly connected and according to existing drawings.
- Operate the directional valve (2) and run motor unloaded in both directions until air is evacuated and system is preheated.

ADJUSTMENT OF COUNTER BALANCE VALVE (C)

Factory preset to 40 bar.

- Connect pressure gauge in port TPB.
- Loosen cap nut and nut for the counter balance valve adjusting screw.
- Switch directional valve to lower. Do not have full deflection on the handle, but adjust with minimum flow.
- Turn adjusting screw clockwise to increase opening pressure for the counter balance valve.
  Turn adjusting screw counter clockwise to decrease opening pressure for the counter balance valve.
  Minimum recommended opening pressure is 35 bar. Counter balance opens when the motor start to rotate.
  Complete adjustment range is 4¾ turns.
- Tighten nut and cap nut.
- Disconnect pressure gauge in TPB.

ADJUSTMENT OF THROTTLING (Q) FOR THE COUNTER BALANCE VALVE

Factory preset to ½ turn from closed position.

Note: Be sure that the throttle valve is not in max position, this will cause that the counter balance valve will not open. When throttle valve is in max, adjustment screw is turned completely clockwise.

When lowering it can occur that the counter balance valve will knock if the dampening (Q) is not correct adjusted. When adjusting at the throttle valve (Q) the reaction of the counterbalance valve will change.

If having fluctuation:

- Loosen cap nut and nut for the throttle valve (Q).
- Switch directional valve to lower.
- Turn screw clockwise to increase dampening.
- Turn screw counter clockwise to decrease dampening.
  Recommended adjustment is ½-¾ from closed position.
  Turn adjustment screw to achieve satisfactory stability.
- Tighten nut and cap nut for item (Q).

ADJUSTMENT OF PRESSURE RELIEF VALVE (D)

Factory preset to min, in not pressure setting is preset in the order.

- Connect pressure gauge in port TPA.
- Block the motor.
- Loosen cap nut and nut for the relief valve adjusting screw (D).
- Switch directional valve to Heave. Do not have full deflection on the handle, but adjust with minimum flow.
- Turn adjusting screw clockwise to increase pressure setting for the pressure relief valve (D).
  Turn adjusting screw counter clockwise to decrease pressure setting for the pressure relief valve (D).
  Complete adjustment range is 5 turns.
- Tighten nut and cap nut for item (D).

ADJUSTMENT OF MAX FLOW

- Loosen cap nut and nut for the adjustable spring on relief valve (PA).
- Switch directional valve to Heave, and move the operator handle in full deflection.
- Turn adjusting screw clockwise on the relief valve (PA) to increase the flow, and thus increase force induced on the pressure compensator element.
  Turn adjusting screw counter clockwise on the relief valve (PA) to decrease the flow.
  Complete adjustment range is 5 turns.
- Tighten nut and cap nut for item (PA).

  If the flow is still too high after adjusted PA to min, it is possible to lower the flow further by adjusting the spool end stoppers for the directional valve. When spool deflection is decreasing, pressure drop will increase over the directional valve. Be aware that handle deflection will decrease correspondingly when adjusting the end stoppers.

- Loosen cap nuts and nuts for the spool end stoppers in both end covers.
- Turn adjusting screw clockwise for decrease of the flow in both directions.
- Tighten nuts and cap nuts for the spool end stopper.

ADJUSTMENT OF THROTTLING (Z) FOR THE COMPENSATOR ELEMENT (P)

Factory preset to 2 turn from closed position.

Note: Be sure that the throttle valve (Z) is not in max position clockwise, which means that the throttle valve item Z is completely closed.

There is a throttle valve at the load sensing pilot channel item Z, for dampening of possible pressure compensator element (P) knocking.

If having fluctuation:

- Loosen cap nut and nut for the throttle valve (Z).
- Switch directional valve (2).
- Turn screw clockwise to increase dampening.
- Turn screw counter clockwise to decrease dampening.
  Turn adjustment screw to achieve satisfactory stability.
  Be aware that when changing dampening Z, reaction time of the handle will correspondingly alter.
- Tighten nut and cap nut for item (Z).

TECHNICAL DATA

Description	Symbol	Unit	Value			
Flow (Δp 32 bar)	Q_{max}	l/min	6MB-200	6MB-320	6MB-450	6MB-650
Flow area		l/min	125-240	200-320	300-500	450-650
Max. operating pressure in ports P, A and B	P_{max}	bar	315			
Recommended max. pressure in port T. See Note 1.	T_{max}	bar	20			
Directional valve pilot pressure	P	bar	5-20			
Weight basic version	m	kg	6MB-200/320		6MB-450/650	
			56		96	
Hydraulic fluid			Mineral oils for hydraulic system			
Viscosity range:	v	m^2/s	10 to 350 (cST)			
Viscosity index:	VI	> 120				
Filtration, recommended filter with β 20 ≥ 100		Class 9 according to NAS 1638, 18/15 according to ISO 4406				
Fluid temperature range:	T		-20°C to + 70°C			
Ambient temperature range	T		-20°C to + 50°C			
Standard Body Material			EN-GJS-400-15 (GGG 40)			
Standard O-rings			Nitrile shore 70			

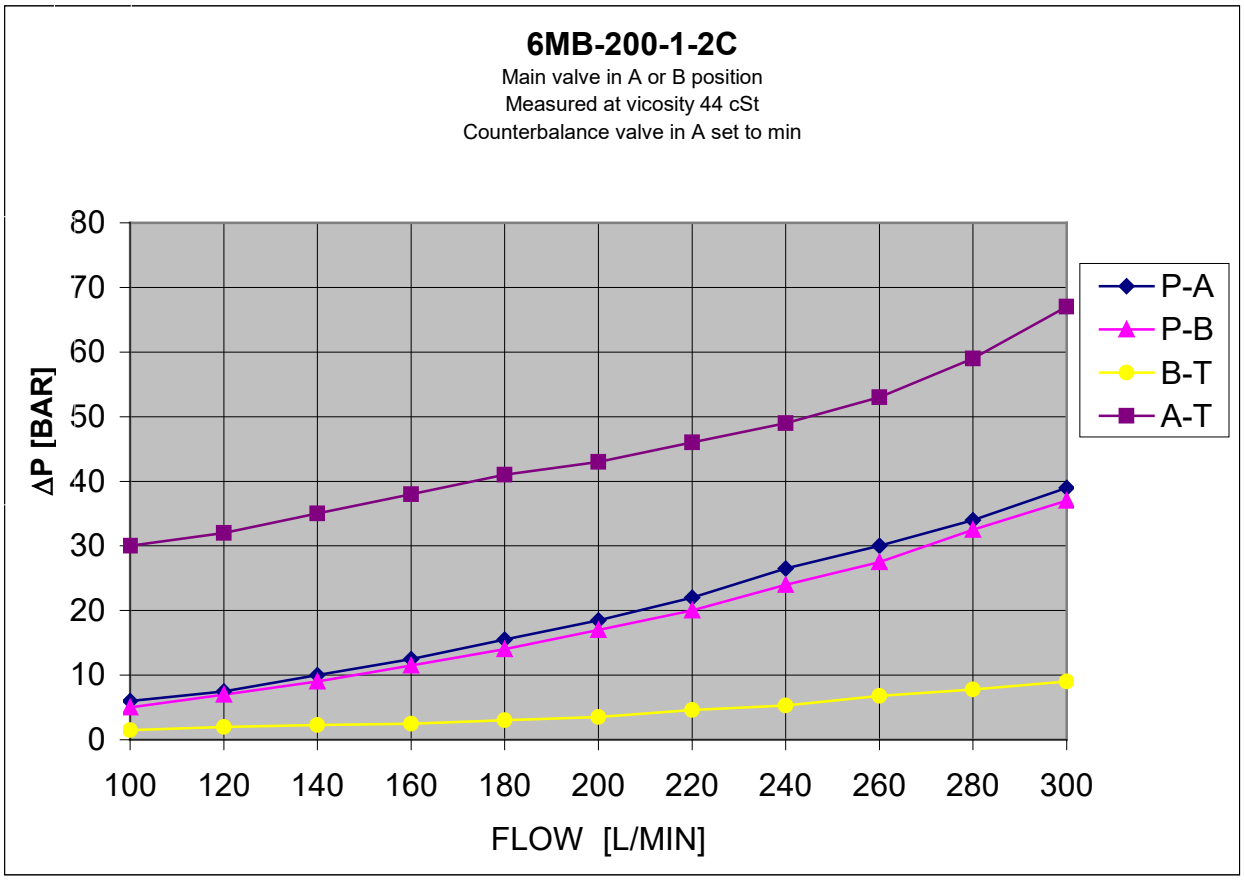
Note1: Be aware that pressure on the tank port T is direct additive to valve setting for pressure relief valve item D, counterbalance valve item C, and pressure reducing valve item R (If selected option R). Pressure peaks in T port can influence on the stability of the system, particular proportional remote control of main directional valve.

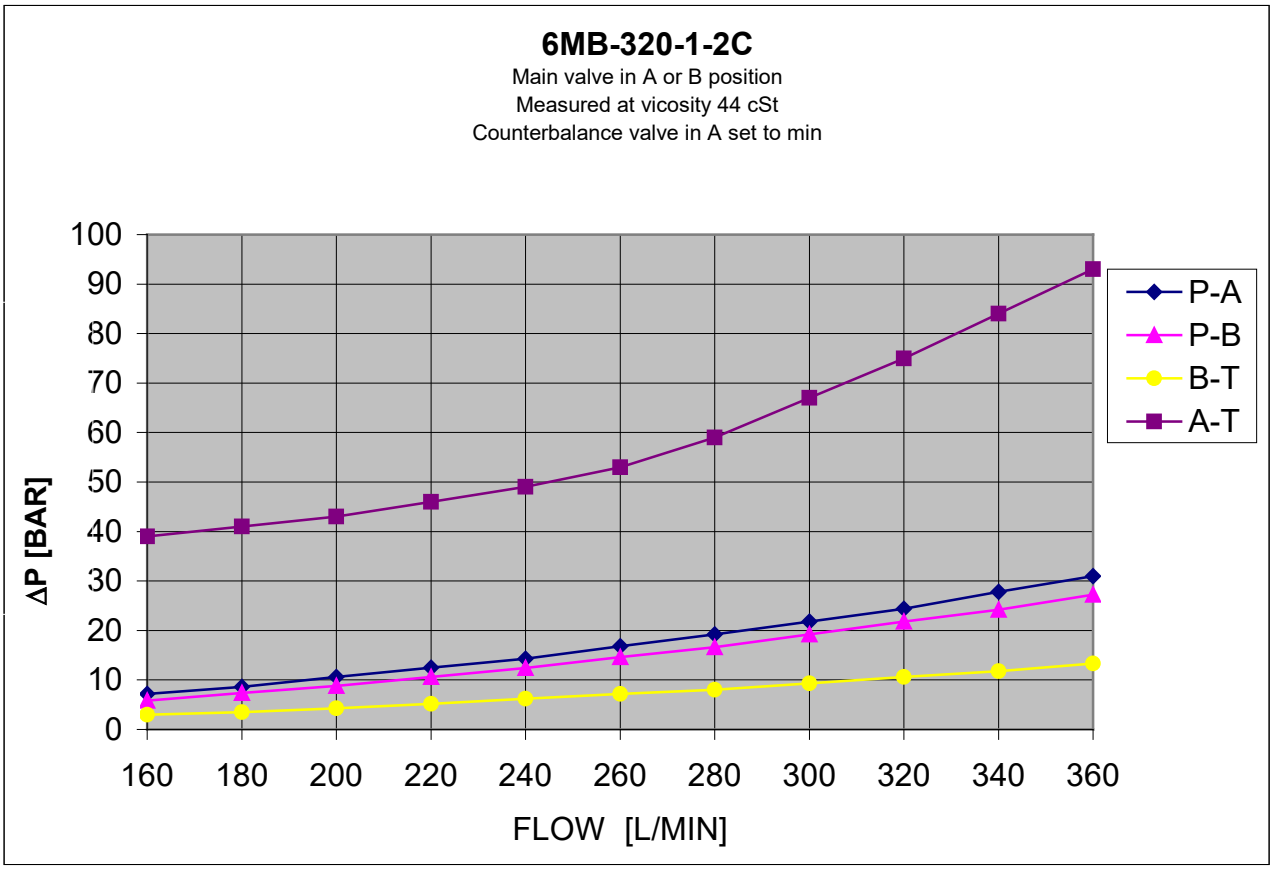
Interfaces:

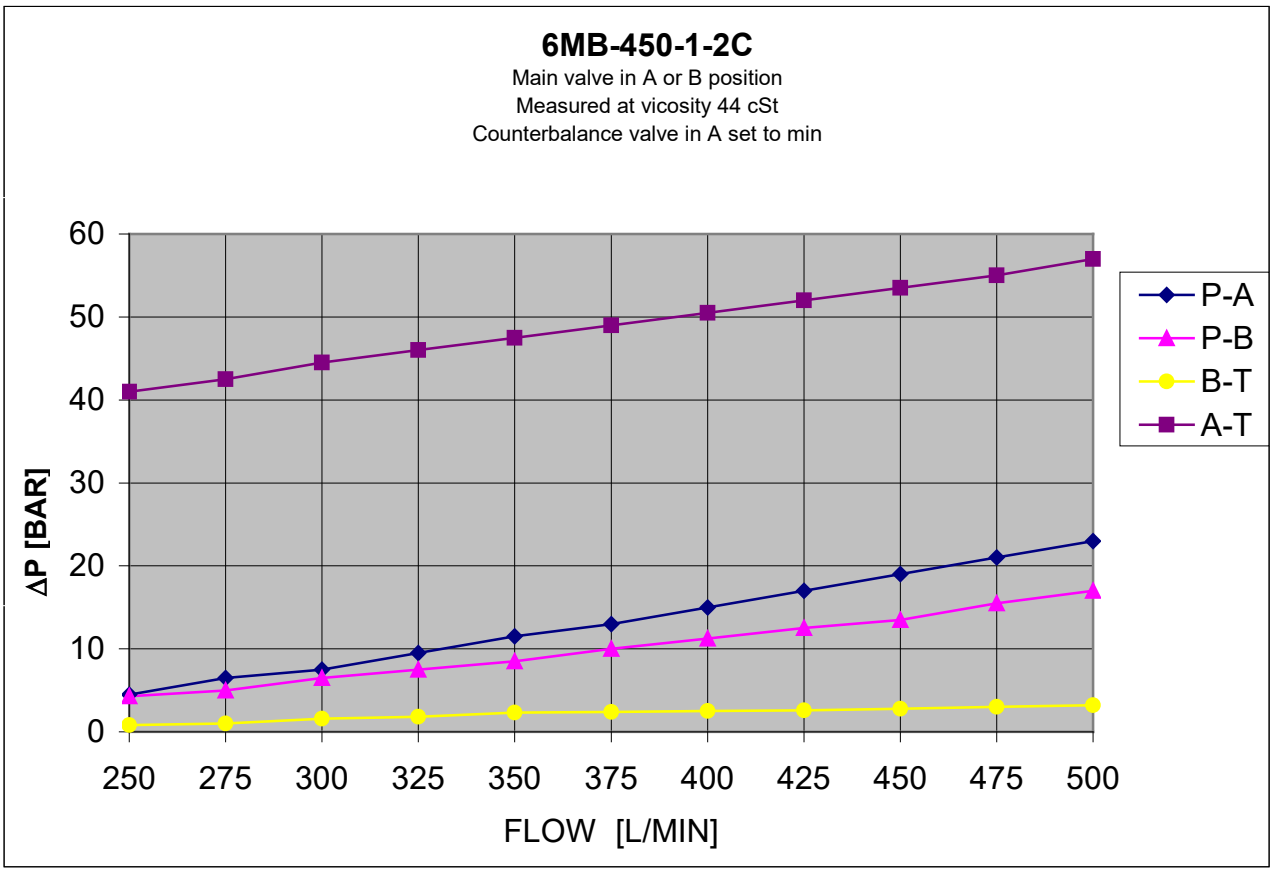
Connections		
Ports	**Dimensions 6MB-200/320**	**Dimensions 6MB-450/650**
P, A and B	1" SAE 6000	1½" SAE 6000
T	1¼" SAE 3000	2" SAE 3000
MX, V, X, Y, TA, TB	⅜" BSPP	⅜" BSPP
E	½" BSPP	¾" BSPP
L (When having adapter for direct motor mounting)	½" BSPP	½" BSPP
TPP, TPT, TPA and TPB	¼" BSPP	¼" BSPP

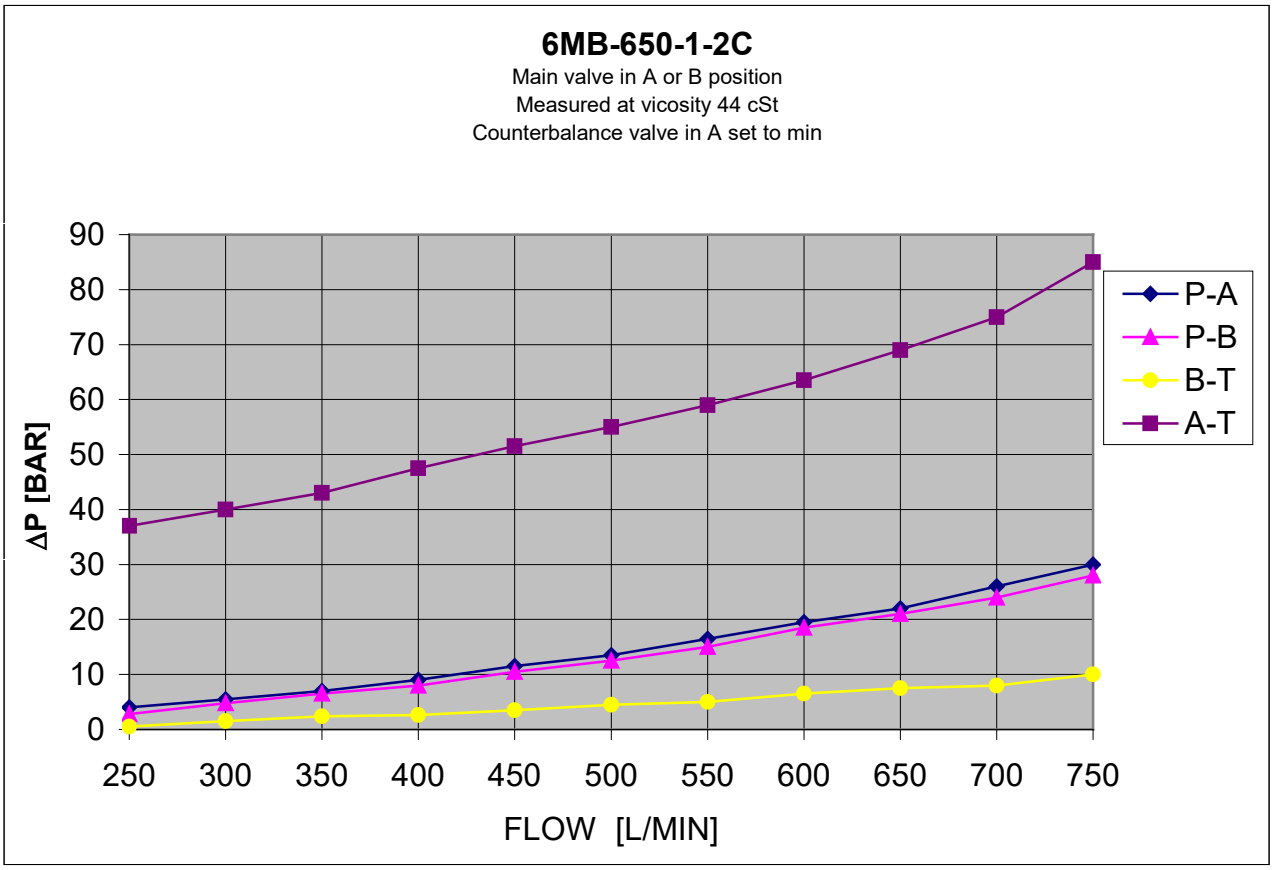
Mouthing Screws:	4 off M 10 (Thread depth 17 mm)

PRESSURE DROP 6MB




6MB-320-1-2C
Main valve in A or B position
Measured at vicosity 44 cSt
Counterbalance valve in A set to min
ΔP [BAR]
100
90
80
70
60
50
40
30
20
10
0
160
180
200
220
240
260
280
300
320
340
360
FLOW [L/MIN]
P-A
P-B
B-T
A-T


6MB-450-1-2C
Main valve in A or B position
Measured at vicosity 44 cSt
Counterbalance valve in A set to min
ΔP [BAR]
60
50
40
30
20
10
0
250
275
300
325
350
375
400
425
450
475
500
FLOW [L/MIN]
P-A
P-B
B-T
A-T



OPERATION PROCEDURE

Normal operation:

- *If two-speed:*
  Switch the two-speed directional valve item T to correct position.
- *If manual control safety lock:*
  Release manually the safety locks, by pulling out the locking pin L. The locking pin is secured by a stainless steel chain.
- Move the operating handle carefully to required direction and speed. Directional valve will immediately return to neutral position if the operator release the handle.
- *If manual control safety lock:*
- When finished, put the locking pin back to its closed position.

MAINTENANCE

Check the 6MB Modular Unit for proper function.
Visual check the 6MB Modular Unit, and if required, paint unpainted areas.

CAUTION: Do not paint the hand levers shaft seals.

STORAGE

If longer storage than 6 months is expected, the valve must be kept in a dry room free from dust. Sudden large temperature variations must be avoided. For storage longer than one year, the valve must be filled with inhibition oil. Before use check all visible seals and flush with clean oil.