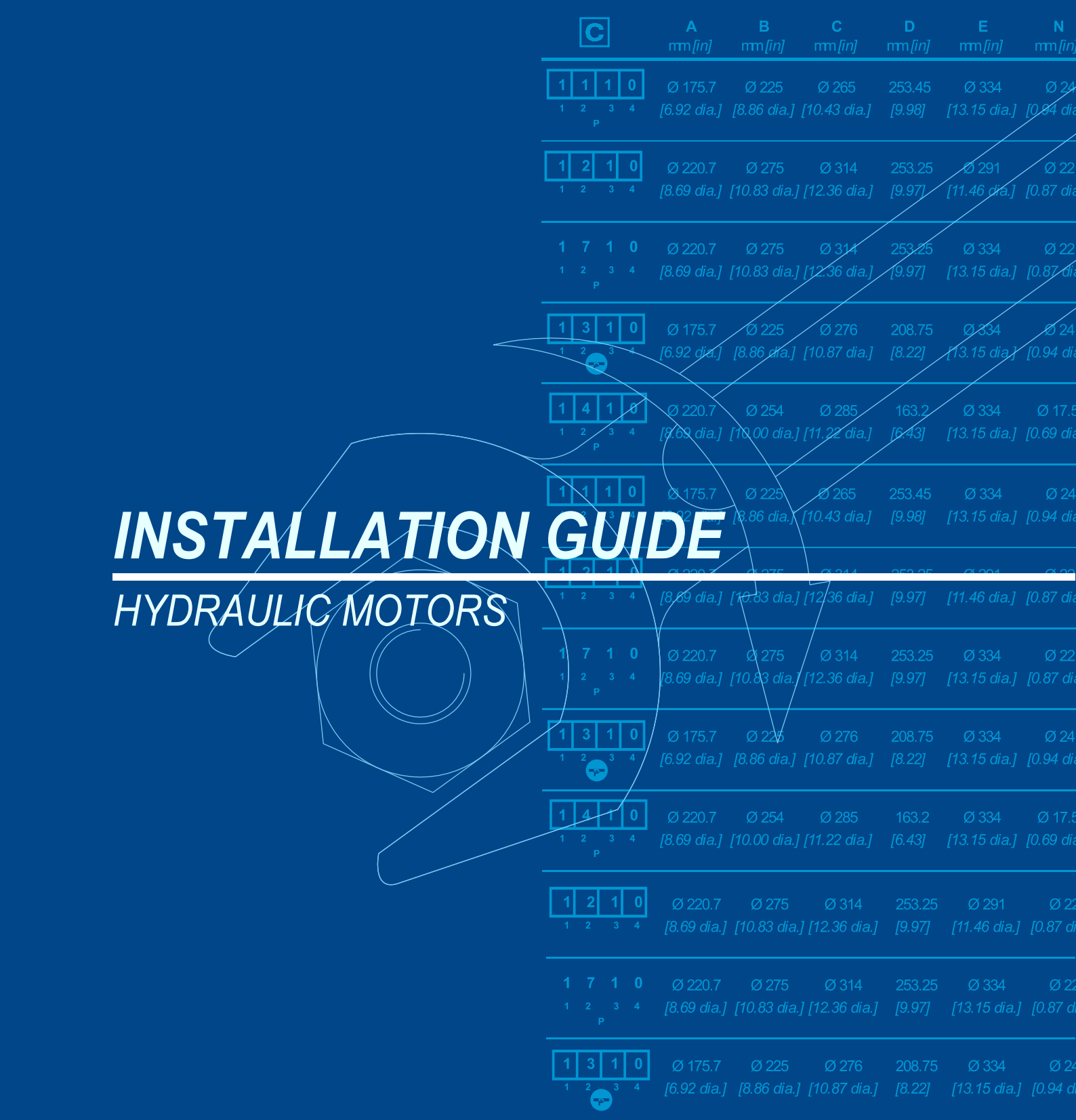


INSTALLATION GUIDE

HYDRAULIC MOTORS

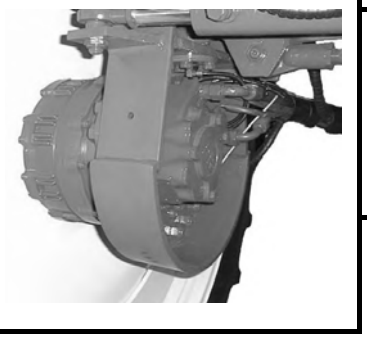
TECHNICAL CATALOG

POCLAIN HYDRAULICS





CONTENT



Forward:

This document is intended for installers of Poclain Hydraulics' products. It describes the technical properties of Poclain Hydraulics products and specifies their conditions for installation and startup that will assure their optimal operation.
This document includes important remarks concerning safety. They are displayed in the following manner:

Safety notice.

This document also includes instructions essential for the operation of this product along with general information. They are displayed in the following manner:

Essential instruction.

General information.

Recover used oil.

Warnings

Before Installation

Take all necessary safety precautions (people and machines) and comply with safety regulations in effect.

Confirm that mobile equipment is immobilized.

Confirm that the hydraulic systems' energy generator (motor) is stopped and electric power is disconnected.

Lay out a safety perimeter.

Do not perform work on a hydraulic system that is hot or under pressure (discharge the accumulators).

Oil that is hot or under pressure can cause serious burns and infection. Consult a physician in case of accident.

During Installation
Install the hydraulic system according to the specifications and processes appearing in this document.

Support the components using a lifting device whose capacity is adequate for attaching the components to the chassis.

During handling protect all sensitive surfaces from shocks (centerings, bolts, connectors, plugs, etc.).

Confirm that the components' centering and support surfaces on the chassis are clean (free of paint).

Never heat hydraulic fluid which can ignite at high temperature. Some solvents are also inflammable.

Do not smoke while working on the system.

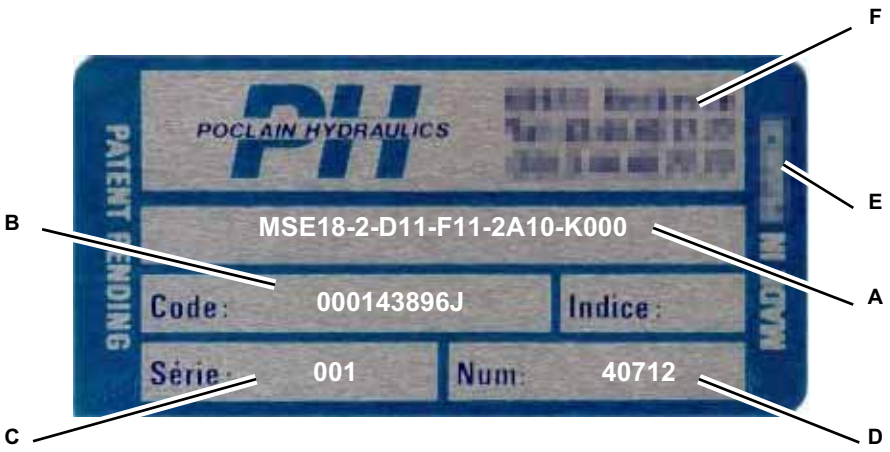
After Installation
Consult repair documents for system and component maintenance and repair instructions.

Do not over-size the safety valves.

Wearing in the motors is not necessary; full performance is reached after a few hours of operation.

OVERVIEW

Component Identification



A : Model code:
Ex. MSE18-2-D11-F11-2A10-K000
B : Code (Part number):
Ex. 000143896J
C : Series (Manufacturing number):
Ex. 001
D : Num (Chronological sequence number)
Ex. 40712
E : Country of Manufacture
F : Manufacturing location

The item code and sequence number must appear on each spare parts order.

Delivery

The motors are delivered:

In boxes.

Without oil.

Painted with primer.

With protected openings (Plastic/metallic plugs or plates with joints for the flanges, sealing them).

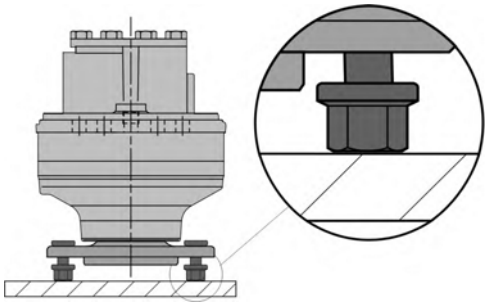
With protected attachment surfaces (these surfaces are never painted), they are covered with a thin film of varnish to limit any oxidation.

If the plugs are to remain in place while the motor is operating, the plastic plugs must be replaced by metal ones.

Storage

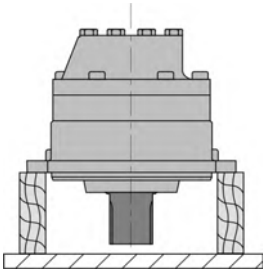
The motors are delivered in boxes. If they must be stored, leave them in the boxes.
If this is not possible, follow the recommendations below in order to avoid damage to sensitive parts.

Wheel motor
• On shaft



Bolts protected by nuts anchored to the head of the bolt.

Shaft motor
• On attachments



No contact with the shaft.

Storage Interval

Depending on the interval and storage conditions, it is necessary to protect the internal components of the hydraulic parts. These operations must be performed before storing components or before stopping use of the machine.

	Storage interval (months)			
Climate	3	6	12	24
Temperate	**A**	**B**	**C**	**C**
Tropical	**B**	**C**	**D**	**D**
Maritime	**C**	**D**	**D**	**D**

Legend
A - No specific precaution; only check the proper mounting of the plugs and covers.
B - Fill up with hydraulic fluid
C - Rinse with storage fluid
D - Fill up with storage fluid.

Open air storage areas must not be used. The motors must not be placed directly on the ground.

Watch out:
If a motor falls during handling, it will have to be reconditioned before it is used.

Paint

• Leave the bearing surfaces unpainted.
• Use paints compatible with the existing base coat.
• When applying paint, protect the shaft's lip seal. The paint could dry it and cause it to leak.
• The Poclain Hydraulics components (like any mechanical component) can rust. They must be effectively and regularly protected according to the environment where they are used. During installation of the motors, any trace of rust must be eliminated before painting the machine.

Primer Specifications

Number	Color	Brilliance ISO 2813	Saline mist ISO 9227	Adhesion ISO 2409	Hardness ASTM D3363
RAL 1004	Ochre yellow	5 - 10%	> 400 h	0	HB
RAL 7016	Grey	5 - 10%	> 400 h	0	HB
RAL 9005	Black	40%	> 400 h	0	HB

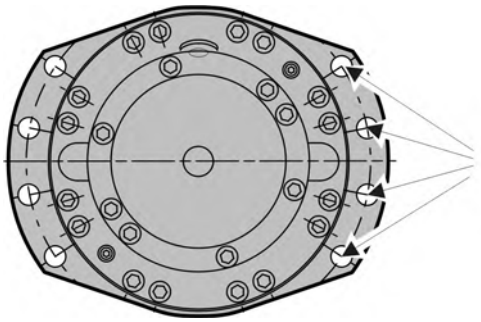
These specifications vary with the supplier, but meet these minima. For more information, consult your Poclain Hydraulic's application engineer.

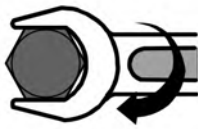
PRODUCTS

FIXATIONS

Attachment to the Chassis

Recommendations





The motor support surfaces must be clean (free of paint, grease, oxidation, etc.) in order for it to be properly mounted on the vehicle.

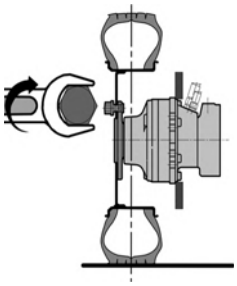
Port 1 (motor case drain) must be located at the highest point when the motor is mounted. If this is not possible, the shape of the hose run must assure the motor case remains full of oil. Care must be used to avoid a siphoning effect if the motor is unused for a long period of time.

Refer to the specifications given in the technical catalog.

Unless absolutely flat, the motor chassis fixations may break.

Attachments to the Shaft

Motor/Wheel Coupling



Rubbing the wheel rim on the bolts must absolutely be avoided, since it could damage the threads and that modifies the tightening conditions.

Refer to the specifications given in the technical catalog.

Bolts

During mounting, the bolts must be new to comply with the tightening torques. The bolts must neither be greased nor degreased.

Greasing or degreasing of bolts may affect locking conditions and cause damage.

Nuts

Care must be taken during rim mounting to avoid contact with the bolts since this could damage the threads and which can change the fastener torque condition.

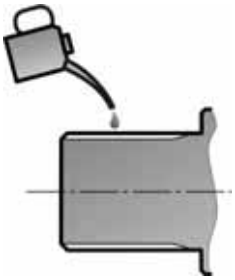
Take care to use nuts appropriate for the type of contact with the rim in order to obtain a proper mounting and tightening.

Use a torque wrench to comply with the predefined tightening torques.

Check the tightness of the wheel nuts:
- **after 40 km.**
- **after 100 km.**
- **periodically.**

Coupling by Splines

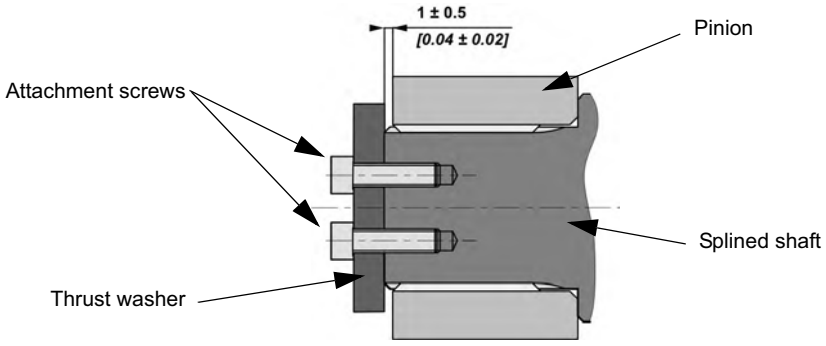
Before engaging the pinion on the shaft, the splines must be checked for damage.



Lubricating the splines before mounting is recommend to make dismounting easier.

Tightening screws for splined connections

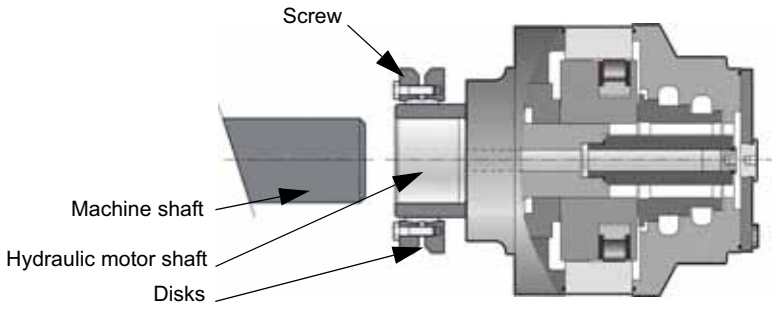
	Screw	Class
MS02/MSE02, MS05/MSE05, MS08/MSE08, MS11/MSE11	2 x M10	
MS18/MSE18, MS25	2 x M14	**8.8 10.9**
MS35, MS50, MS83, MS125	2 x M16	



Use a torque wrench to comply with the predefined tightening torques.

Shrink-Disk Coupling

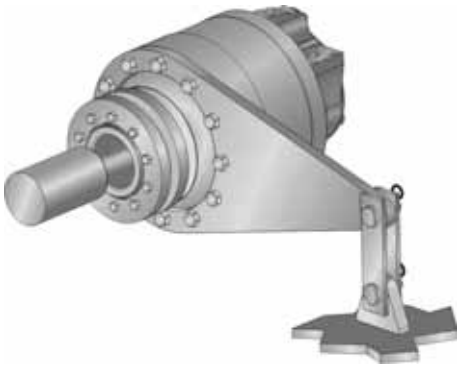
Introduction



For the properties and installation of shrink-discs, see the "Accessories" tab.

Connection by Torque Arm

Setting up and keeping the coupling in place can also be made easier with a torque arm that does not generate axial stress.



General conditions of industrial use

- Use at fixed (immobile) position for an extended lifetime (> 25000 hours). For example: winch, crusher, conveyor belt, etc.
- Power limited to 75% of the maximum power stated in the technical catalog.
- Maximum pressure at the motor input
  - 150 bar maximum for the motor
  - Irrigation of the casing required to control the hydraulic motor's temperature during progressive start-up and to renew the fluid during operation

Orientation

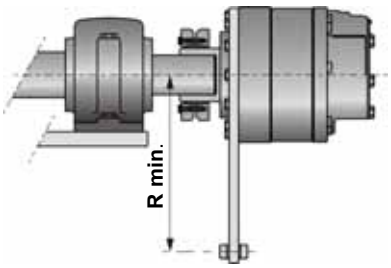
The motor is intended to operate in a horizontal position. It is essential for the motor's casing to be permanently filled with fluid.
For vertical mounting (shaft pointed upwards), it is imperative to provide and irrigation port on the bearing (option B).
Provide for access for connecting and disconnecting connections, and for purging the motors.
Provide for the appropriate means of handling components for mounting and removal.

Attachment to the Chassis
To avoid loading the bearing follow the instructions below.
The length of the counter torque arm must be at least equal to R min (see the table below)
The counter torque arm's reaction stress must be accounted for in the motor's attachment plan.

It is necessary to check that the combination of the stresses applied to the shaft is compatible with the loads allowed by the motor, and that the resulting life expectancies conform to the application specifications.

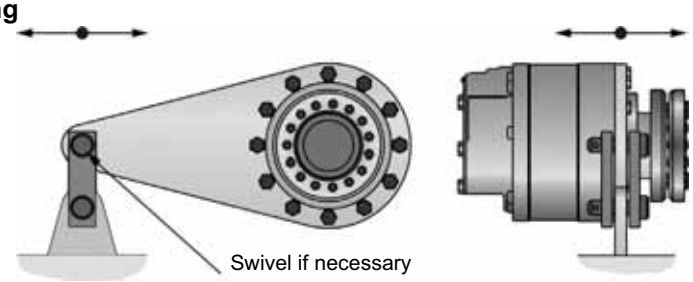
The resulting radial stress is the combination of the counter torque arms reaction and the combined weight of the motor and the counter torque arm.

	R min. mm *[in]*
MS35	500 *[19.68]*
MS50	600 *[23.62]*
MS83	800 *[31.5]*
MS125	800 *[31.5]*



Coupling of the Arm
In order to avoid parasitic stress due to defects in geometries and deformations, the end of the arm must still have two degrees of freedom.

Recommended Mounting



Start-up of the Hydraulic Motor
For applications that do not allow a gradual increase in the installations power and speed, the first start-up of the hydraulic motor must be done under the following conditions:
- Confirm that the hydraulic motor is in large displacement.
- Verify that the brake is released at the maximum break release pressure.
- Power the hydraulic motor in the two rotation directions, using the following conditions.
  - During 5 minutes: component supply pressure at 100 bar *[1,450 PSI]*, return pressure 80 *[1,160 PSI]*.
  - During 30 minutes: component supply pressure at 200 bar *[2,900 PSI]*, return pressure 180 bar *[2,610 PSI]*.
  - Reverse the component supply direction and repeat the cycle.
- *Bring the supply oil temperature to* 50 °C *[122 °F].*
- Confirm by a sweep of the hydraulic motor's casing that the cam's temperature does not exceed 90°C *[194 °F]* (temperature measured on the cam's periphery).
- Motor rotation speed should be within 20 to 50 % of the maximum catalogue speed so as not to exceed the catalogue component speed. Note that during counter pressure, both the motor-side and pump-side powers should be taken into consideration.

$$\mathbf{PT} = \mathbf{P_m} + \mathbf{P_p}$$

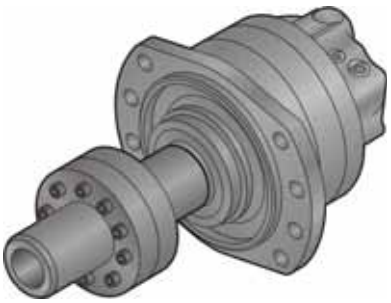
$$\mathbf{PT} = \frac{N \times C \times \mathbf{pe}}{600} + \frac{N \times C \times \mathbf{ps}}{600} = \frac{N \times Cyl}{600} \times (p_e + p_s)$$

PT Total power
Pm Motor power
Pp pump power
pe Input power
ps Output power
N N° of turns
C capacity

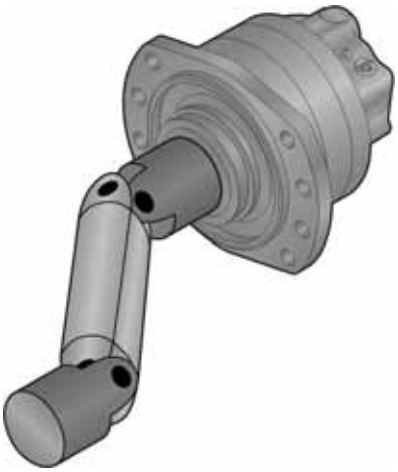
Other Means of Connection

The coupling can also be done with:

Flexible Coupling



Universal Joint



Chain

Straight Teeth Pinions

DRUM BRAKES

Extract from the KNOTT procedure (Ref: TM 4993)

Technical information 49/93

Automatic Adjuster for Hydraulic Servo Brakes Functional Characteristics and Mounting Instructions

1. Functional characteristics of hydraulic servo brakes

The functional principle of this brake is the application of the two brake shoes in the brake drum after expansion of the wheel cylinder, whereby one brake shoe (primary shoe) is driven in the sense of rotation of the brake drum, while the secondary shoe, determined by its floating suspension, rests against an upper fixed stop at the brake plate.
The resulting travel of the brake shoes is used to actuate the automatic adjuster.

2. Automatic adjuster

2.1 Function and working method
By means of an adjusting bolt ***1*** , the primary shoe pushes a sleeve ***2*** through a U-shaped bracket ***3***, which at the same time acts as the bearing bracket. This thrust movement causes the adjusting lever ***4*** to be actuated by means of an adjusting disc ***5*** and to migrate to the side as the result of transmission. As soon as the braking process and the associated movement of the brake shoes have finished, and the shoes have returned to their ideal position supported by the compression spring ***6*** which at the same time serves as a centering point, a toothed adjusting wheel ***7*** is rotated on as a result of engagement by the adjusting lever which is tensioned by compressed spring ***8*** and which is restored by the support of the compression spring ***6*** and the adjusting disc ***5*** . In this way, the adjusting bolt ***1***, in which the brake shoe is mounted, is unscrewed. This adjusting process per braking action is repeated until the sliding movement of the primary brake shoe is no longer sufficient to overcome a fixed clearance marked in the adjusting lever.
This set clearance ensures that the diameter of the brake remains constantly adjustable at a certain dimension.
The automatic adjustment function is equally effective for forward or reverse travel.

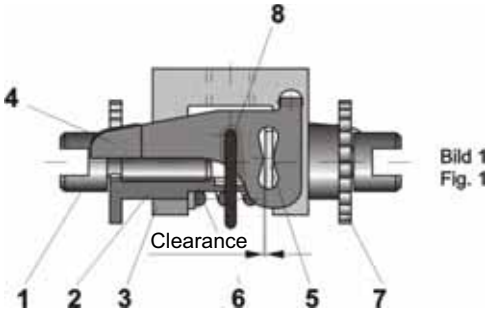


Bild 1
Fig. 1

Maintenance and setting instructions.

3. Maintenance

The automatic adjuster must be examined in the course of every periodic brake inspection by making a visual check for damaged components.
Note :
No repairs may be carried out on the automatic adjuster. If necessary, the entire adjuster unit must be exchanged. The adjuster is largely maintenance-free. All that is necessary is to lightly grease the thread of the adjusting bolt ***1*** when dismantling the brake shoes with a heat-resistant grease (at intervals of max. 500 hours). When soiled, the adjuster may only be cleaned using compressed air. Dismantling of individual components is not permissible! Do not readjust the brakes manually by turning the individual adjusting wheels **7**! Uneven adjusting may occur, due to limited access to the both adjusting wheels.

4. Setting specification :

Brake setting is essential when :
4.1 Renewing, removing or mounting the automatic adjuster.
4.2 Mounting new brake shoes and brake drums at all stages of repair.
4.3 Repair work on the brake, whereby the basic setting of the threaded bolts (Fig. 2) has been altered at the automatic adjuster.
Setting work, as well as checking of the clearance between the brake shoes and brake drum must be carried out when the brake is cold.
The driving and parking brake must always be adjusted together.

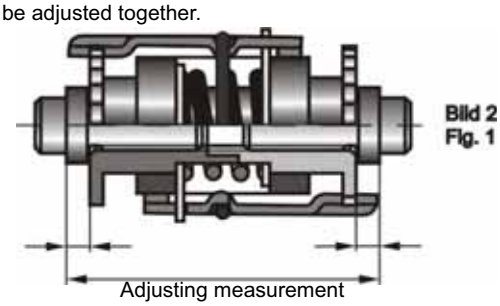


Bild 2
Fig. 1

5. Setting procedure :
During setting, the parking brake must be released i.e. the cables should not be tensioned.
5.1 Jack up the vehicle
5.2 Release the brake cables
5.3 Remove the brake drum

Caution :
With run-in brake drums, remember that when resetting the adjusting wheel, it is locked by the adjusting lever.
- Do not use force -
Carefully raise the adjusting lever using a screw driver or similar tool through the opening in the brake plate to permit the adjusting wheel to turn freely..
5.4 Adjust setting dimension "a" (see Fig. 2) in accordance with the following breakdown at adjusting screw ***1*** of the automatic adjuster.

Article no. of adjuster	Setting dimension " a "	Brake size
36113.01	54	160x35, 170x40, 200x50
36130.01/.02 36156.01/.02	60 60	200x40 203x60
35856.01/.02	79	203x60, 200x40
35878.01/.02	85	245x60, 300x55
35914.01/.02 35914.03/.04	79	228.5x50, 245x60, 250x55 230x50, 260,4x57, 267x64
35916.01/.02/.02	84/80	250x60, 270x60, 310x60
35959.01	85	
36160.01/.02/.03 36160.01/.02/.03 36165.01	100 100 100	315/325x80, 400x80 432x90, 432x102 270x60

Remark:
During this setting work, take care to ensure an even distance "b" of the adjusting screws ***1*** to the relevant adjusting wheel ***7***.
5.5 After checking the brake diameter, adjust this evenly at the two adjusting gears ***7*** if necessary as specified in the instructions.

Remark:
Precise adjustment of the relevant brake diameter is of decisive importance for the function of the automatic adjuster. An insufficiently high setting could result in damage to the adjuster.
5.6 Adjust the brake cables in such a way that the relevant brake diameter is not altered.

Remark:
The brake cables may not be pretensioned, as otherwise it is not possible to guarantee perfect function of the adjuster.
5.7 Mount the brake drum
5.8 Release hexagon bolt for fastening the automatic adjuster.
5.9 Actuate the brake several times to centre the brake shoes / the adjuster in the brake drum.
5.10 Afterwards tighten hexagonal screw with following tightening torque

Screw size	Type of fastening		
	Hexagon screw Grad 8.8 with washer and spring washer	Hexagon screw Grad 8.8 With NORD-LOCK washer	Safety screw Property Class 100 z.B. Verbus Ripp Kamax Ripp Durlok, Tensilock
M 8	23 + 5	27 + 5	42 + 5
M 10	45 + 5	53 + 5	80 + 5
M 12	80 + 10	90 + 10	140 + 10
M 12 x 1.5	85 + 10	100 + 10	150 + 15
M 14	110 + 15	120 + 20	225 + 20

5.11 Tighten the hand brake lever in accordance with the latch specification of the vehicle manufacturer. The wheels should be equally difficult to turn in this setting.

Caution!
Correction of wheels that turn with difficulty and irregularly may only be dome at the brake cables and not at the automatic adjuster.
5.12 Lower the vehicle
5.13 Carry out approximately 10 braking processes (not emergency braking) with a starting speed of around 10 km/h in forward/reverse travel, observing the braking characteristics of the vehicle. The automatic adjuster is then ideally set.
5.14 This setting procedure must always be carried out on all the vehicle's brakes.

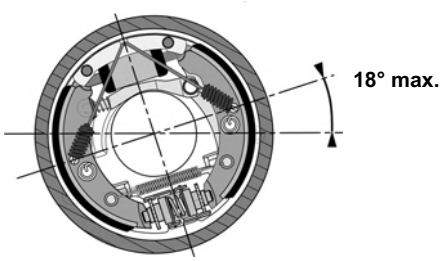
TM4993

Fluid

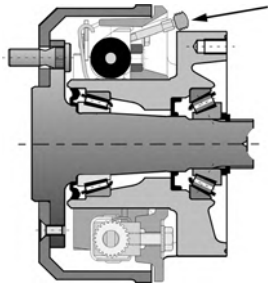
The hydraulic circuit for the drum brakes is separate from the motor's hydraulic circuit.
Verify the compatibility of the brake and the fluid.

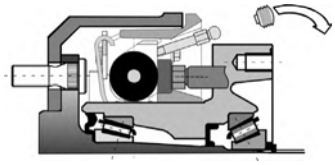
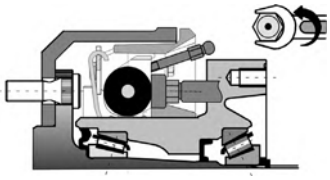
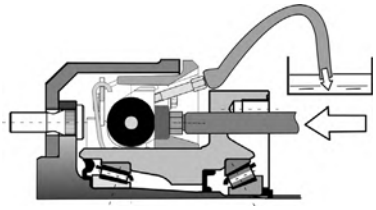
Drum

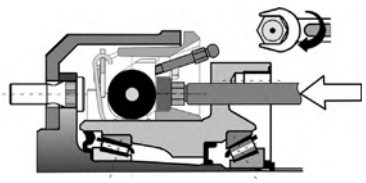
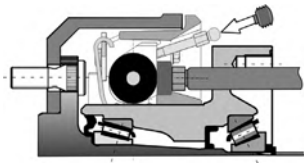
To facilitate purging drum-brake wheel cylinders, the motor may be attached to the chassis with an inclination.



Bleeding a Drum Brake Cylinder



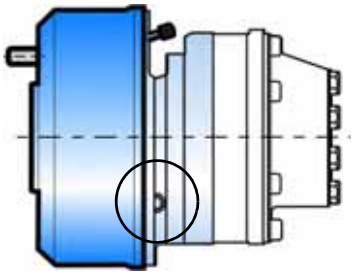
Step	1	2	3
Action	Remove the cover.	Loosen the bleed screw.	Add fluid until it flows out.
			

Step	4	5
Action	Tighten the bleed screw to 5 N-m.	Replace the cover.
		

The maximum braking torque can only be obtained after wearing in the brakes. Read the procedure below or consult your Poclain Hydraulics application engineer.

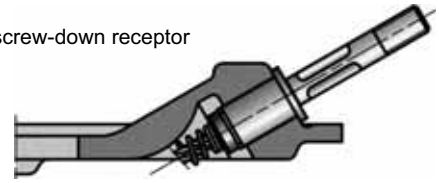
Use a torque wrench to comply with the predefined tightening torques.

Cable Placement
There are two types of attachments:



By hook

By screw-down receptor



Refer to the "Wheel Motor" and "Braking" tabs of the MS Motors' technical catalogs to find the brake cable's availability and attachment properties.

Pay attention to the localization of the brake cable's exit location (left or right).

Refer to the "Sales Code" tab of MS Motors' technical catalogs to find the location of the brake cable's exit.

Plan for a minimal play in the control cable in the motor's extreme positions (wheel swung to the bottom).

Adjusting the parking brake cable

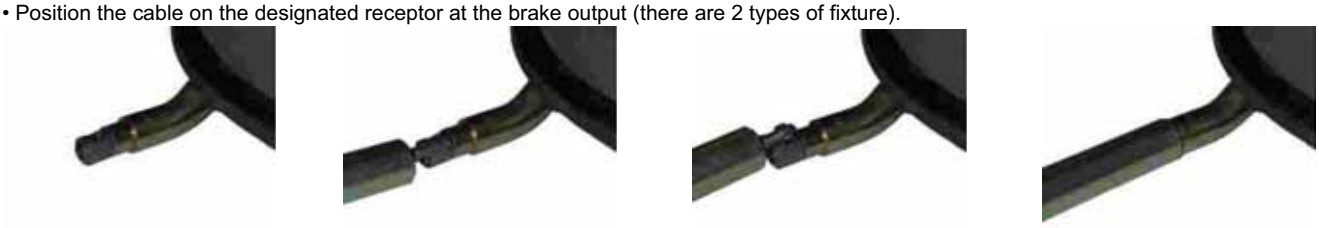
Installation of the parking brake cable must be carried out when the machine is either on chocks on level ground or on an assembly line.
The cable is connected to the control system.

Poclain Hydraulics recommends the use of a Knott brake cable.

• Dismantle the drum.
• Check that the jaws are centered correctly.
• Check that the diameter of the jaws corresponds correctly to the Knott recommendations

Brakes	Diameter of the jaws
250x40	249 +0.4/0
203x60	201.8 ±0.2
250x60	248.8 ±0.2
270x60	268.6 ±0.3
315x80	313.5 +0.7/-0.3
350x60	348.5 ±0.4
432x102	430 +0.5/0

• Position the cable on the designated receptor at the brake output (there are 2 types of fixture).

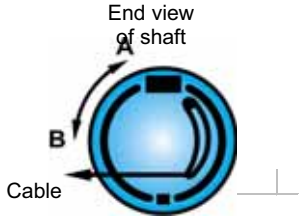


• Check that the brake lever of the vehicle is disengaged.
• Fix the bolt onto the end of the cable to tauten the brake cable until all the slack is caught up without moving the jaws.

If the jaws cannot freely return to their position, the functioning of the slack adjuster will be rendered ineffective.

• Check the braking nut (locknuts).
• Check the cable pull [traction] (Braking torque / Pull on the cable).

Brakes	250x40		203x60		250x60		270x60		315x80		350x60		432x102	
	N.m	N	N.m	N	N.m	N	N.m	N	N.m	N	N.m	N	N.m	N
A			2 000	987	2 000	548	1 500	482	5 000	1 362	5 000	1 135	10 000	1 844
B			2 000	1 148	2 000	567	1 500	541	5 000	1 605	5 000	1 309	10 000	2 133



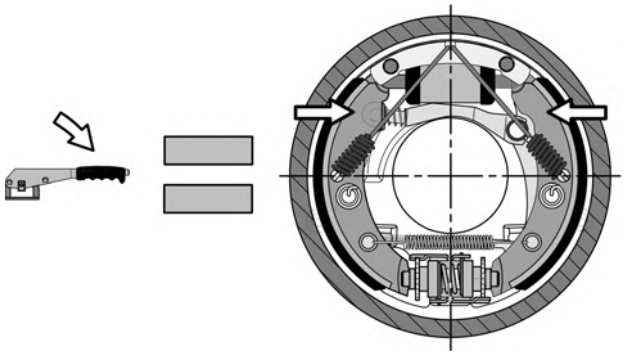
• Perform the parking brake tests using the lever.

When the hand-operated brake lever is disengaged, the jaws must return to the resting position and against the stop (wheel cylinder side) on the backing plate.

• Reinstall the drum.
• Test the parking brake on a slope.

For brakes with automatic wear adjustment, do not retighten the parking brake cable.

Parking Brake (drum brakes)



The legislation of some countries requires mobile engine manufacturers to define a procedure that indicates the conditions for servicing the brakes.

Stay within the maximum allowable stress on the cable in order to ensure effective action of the parking brake.

Refer to the "Brakes" tab in the MS Motors technical catalog to find the maximum allowable stress on the brake cable.

Wearing In

PROCEDURE FOR WEARING IN AND ADJUSTMENT FOR USE TO USE ON DRUM BRAKES

TO OBTAIN OPTIMUM PERFORMANCE (procedure for wearing in distributed by KNOTT).

Phase	Designation	N (rpm)	Type of Rotation	P/brake (Bar)	Tb (min)	T measured on drum skin	Comments
1	1 Wearing In	60	Continuous	5 bar 0 10 bar 0 15 bar 0 20 bar 0 20 bar 0 20 bar 0 20 bar	2 min 30 sec 2 min 30 sec 2 min 30 sec 5 min 30 sec 10 min 30 sec 10 min 30 sec 10 min	150° ± 10° C	**Closely track the drum temperature:** Do not exceed160° C *[320°F]* Adjust the pressure in the master cylinder to remain between 140° C *[284°F]* and 160° C *[320°F]*
2	Takeout play between fittings and drum (Automatically performed when the drum is moving)	60	Continuous	0 - 40 bar			**Adjustment procedure** The motor supply is measured at 200 bar *[2900 PSI]*. Brake and release 10 consecutive times 30 seconds apart.
3	Record retaining torque of set parking brake	0	Continuous	60 and 120 bar		20° ± 5° C	Let the parking brake cool to establish the curve.

BRAKE DEACTIVATION

This operation may be necessary when mounting the motor or in certain cases for moving a machine.
Brake deactivation will depend on the type and size of the motor. Refer to the table below:

For MS/MSE motors:

	MS02 MSE02	MSE03	MS05 MSE05	MS08 MSE08	MS11 MSE11	MS18 MSE18	MS25	MS35	MS50	MS83	MS125
F02	○										
F03	○	○									
FH3		○									
F04			○								
F05			○								
F08				○							
F12					○	○		○			
G12						○					
F19						○		○			
F26							○				
P35							○	○	○		
F42							○	○	○		
F50							○	○	○	○	
F83									○	○	○

For MK/MKE motors:

	MK04	MK05	MK09	MK12 MKE12	MK16	MK18 MKE18	MK23 MKE23	MK35	MK47
K04	○								
K05		◆							
F04		○							
F07		○							
F08			◆						
F12						○			
F19						○			
bearing				◆	◆		◆	◆	◆

For ML motors:

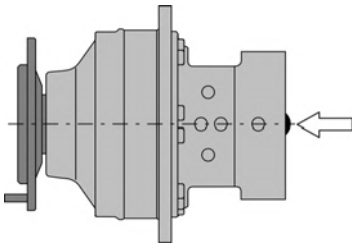
	ML06
	◆

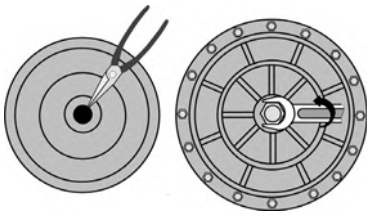
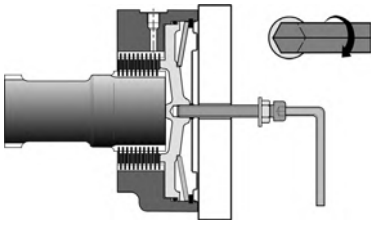
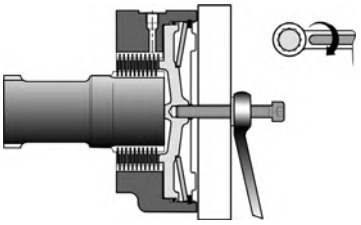
For ES / ESE motors:

	ESE02	ES05	ES08
	◆	◆	◆

Mechanical or hydraulic deactivation	Hydraulic deactivation only
○	◆

Mechanical brake deactivation



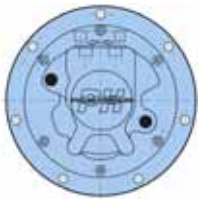
Step	1	2	3
Action	Remove and dispose of the rubber plug from the brake protector. Loosen the metallic plug. 	Tighten to the bottom of the threading without blocking the screw fitted with a nut and washer in the piston. 	Then tighten the nut until the motor shaft turns freely, while holding the screw. 

For an effective brake release, observe the conditions indicated in the technical catalog, braking tab.

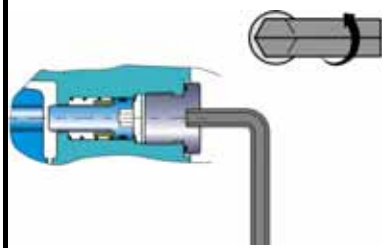
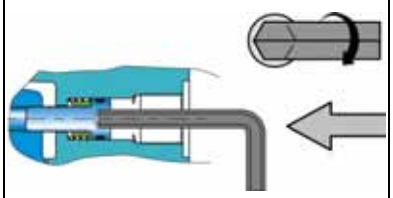
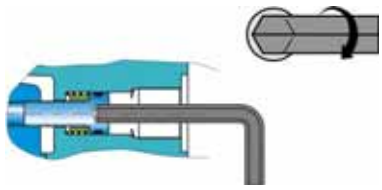
After releasing, insert a new rubber plug.

Immobilize the vehicle and do the brake release on a level surface. For a winch, place the load on the ground.

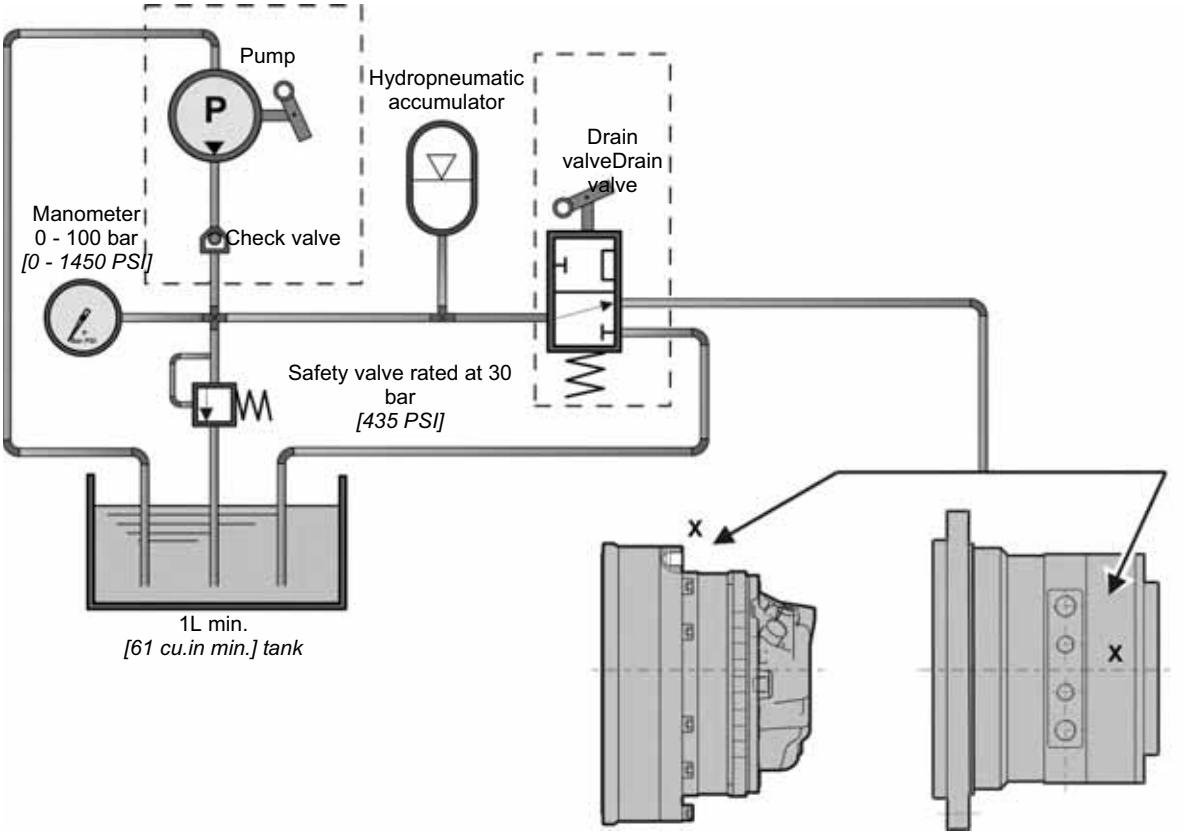
For MK 04 (Option 3):



The brakes should be mechanically deactivated alternately and gradually on the two screws.

Step	1	2	3
Action	Unscrew the mechanical stopper. 	.Press the screw spring so as to engage the brake piston internal threading. 	Now tighten the screw till the motor shaft turns freely. 

Hydraulic brake deactivation

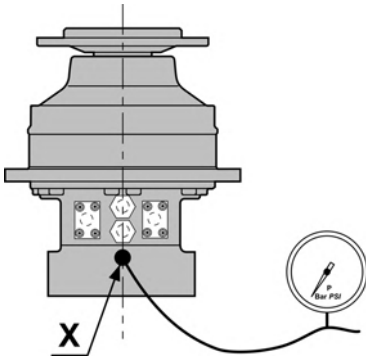
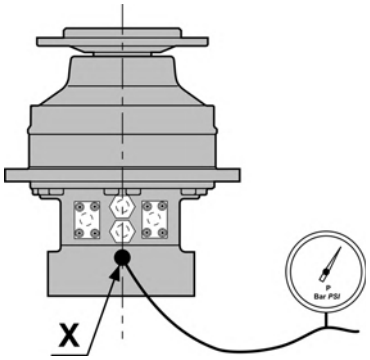


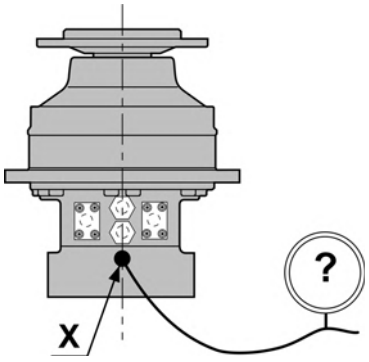
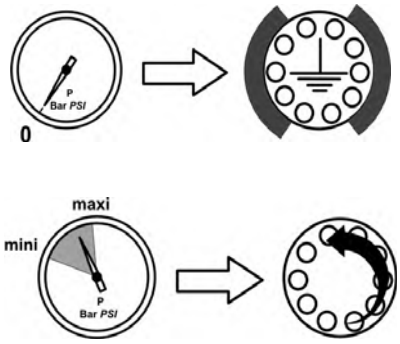
Brake Release Pressure

For a running engine, perform this test on a horizontal surface. For a winch, place the load on the ground.

Brake release pressure: min. : Refer to the corresponding catalogs.
max. : 30 bar *[426 PSI]*.

Refer to the technical catalogs to find the necessary volumes for the correct operation of the parking brakes.

Step	1	2
Action	Connect a manometer to the brake's supply port X. 	Progressively increase the brake's supply pressure up to its brake release pressure. 

Step	3	4
Action	Stop the supply to the brake. 	 Confirm that the residual brake release pressure is near zero. If it is close or even over the minimum brake release pressure, check: • the brake shaft seal, • the break release valve is often at fault.

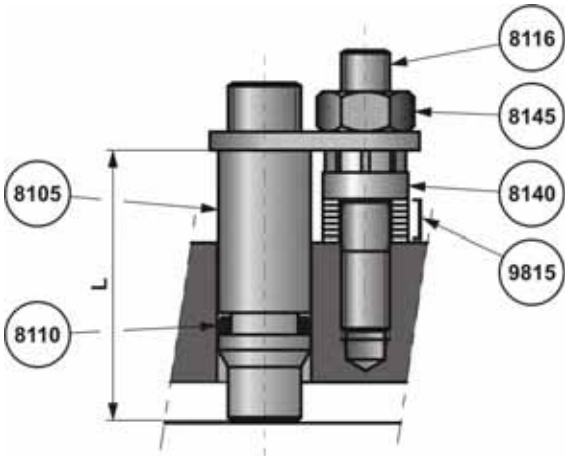
Do not run in multidisc brakes.

ACCESSORIES

Speed sensors TR and T4

Sensor	Commercial name	L mm	L *[in]*	Connections	Part number
TR	TR SENSOR 12-44	44	*[1.73]*	M12	A04996F
	TR SENSOR 12-53	53	*[2.09]*		A04997G
	TR SENSOR 12-62	62	*[2.44]*		A06266L
T4	T4 SENSOR 12-44	44	*[1.73]*		A22082C
	T4 SENSOR 12-53	53	*[2.09]*		A22083D
	T4 SENSOR 12-62	62	*[2.44]*		A22084E

Description



8105 = Sensor
8116 = Stud
8140 = Adjustment nut
8145 = Attachment nut
9815 = Shimming
8110 = Rubber Seal

Properties

Speed sensor	TR	T4
Maximum range	1.15 mm *[0.045"]*	
Supply voltage	8 - 32 V	8 - 30 V
Current consumption	20 mA max.	
Output type	- 1 push-pull square frequency signal - 1 push-pull direction signal - Maximum load current: 20 mA - Voltage at low state: < 1.5 V - Voltage at high state: > (power supply voltage - 3.5 V)	- 1 push-pull square frequency signal - Maximum load current: 20 mA - Voltage at low state: < 1.5 V - Voltage at high state: > (power supply voltage - 3.5 V)
Frequency range	0 to 15 kHz	
Operating temperature	- 40°C to + 125°C *[- 40°F to 257°F]*	
Protection rating	IP68	
Material	Stainless steel	

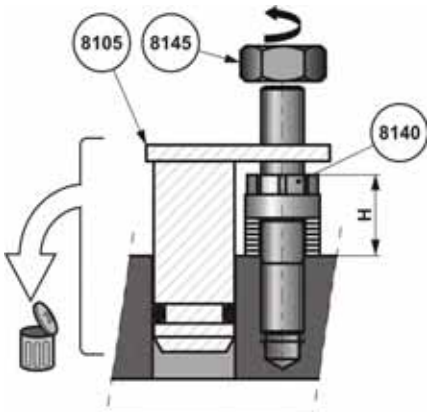
Mounting the Speed Sensors TR and T4 on motors predisposed to speed

In the case of motors predisposed to speed, the existing shutter needs to be removed and eliminated before installing the sensor and its attachment device.

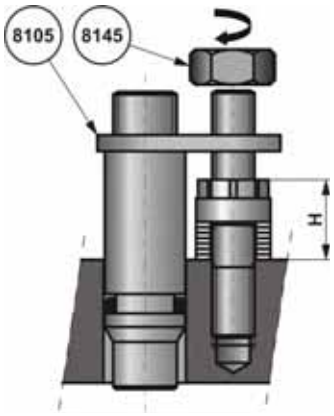
Disassembling the sensor assembly, absolutely must be done with the motor stopped (motor cold and no pressure in the motor casing). Provide a container to recover the oil when disassembling the sensor support.

- Completely unscrew the nut (8145).
- Remove and throw away the shutter (8105).

Height H is adjusted at the plant; never remove the nut (8140).



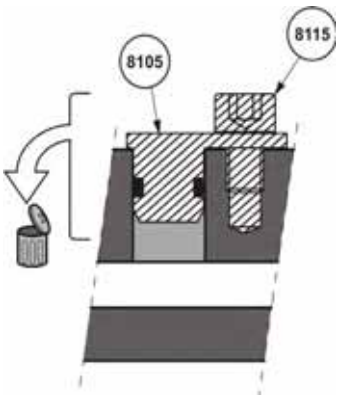
- Remove the plastic plug on the end of the sensor
- Insert the sensor (8105) in place of the shutter (8105)
- Thread on the nut (8145) and tighten it to the following torque: 15 ± 2 Nm *[11.06 ± 1.47 lb.ft]* .



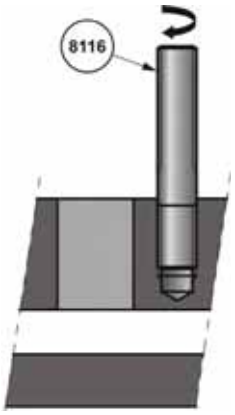
The potential mounting of speed sensors not supplied by Poclain Hydraulics must have been approved by our technical services.

Mounting the Speed Sensors TR and T4 on hydrobases

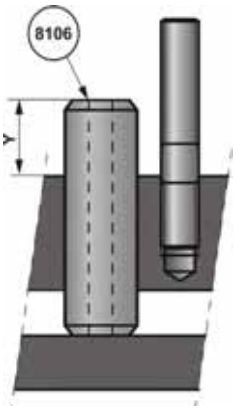
Shimming the sensor must be carried out after installing the hydrobase on the customer's bearing support.



• Remove the plug (8105) and its screw (8115).

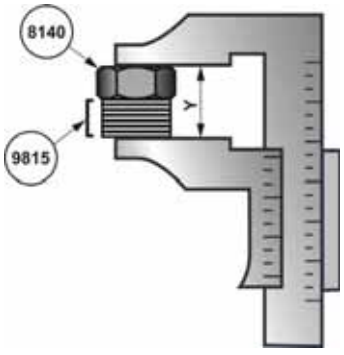


• Screw the stud (8116) in at a torque setting of 15 ± 2 Nm *[11.06 ± 1.47 ft-lb]*.



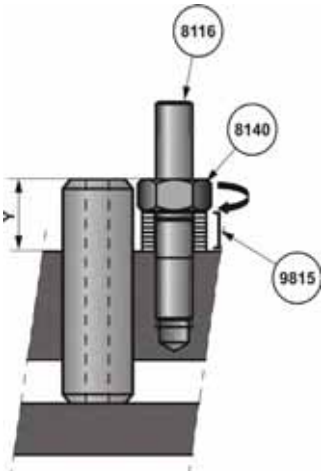
• Insert the dummy sensor (8106) into the port until it touches the cylinder block.

• Measure the distance Y ± 0.01.

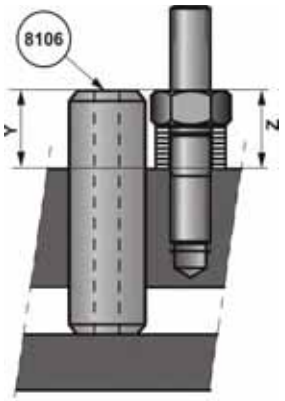


• Add the number of shims (9815) required to the thickness of the nut (8140) to attain the Y measurement.

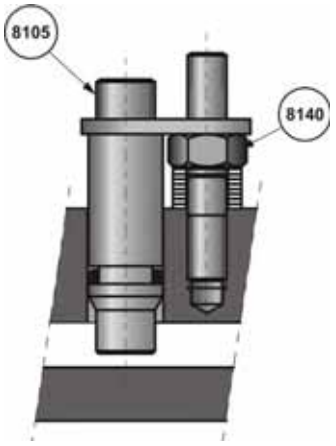
- Stack the shims (9815) and screw the nut (8140) onto the stud (8116).
- Tighten the nut (8140) down to a torque setting of 15 ± 2 Nm *[11.06 ± 1.47 ft-lb]*.



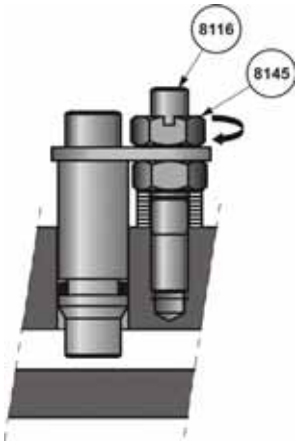
- Check the shimming:
  - Measure the Z dimension.
    . If Y - Z is equal to 0 ± 0.1 then go to the next step.
    . If Y - Z differs from 0 ± 0.1 then do the installation procedure again.



- Remove the dummy sensor (8106).
- Insert the sensor (8105) until it rests on the nut (8140).



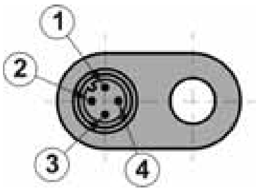
- Set the pre-glued nut (8145) onto the stud (8116).
- Tighten the pre-glued nut (8145) down to a torque setting of 15 ± 2 Nm *[11.06 ± 1.47 ft-lb]*.



Carry out this procedure after every hydrobase or bearing support part change, so that the sensor is correctly located.

Connection of the speed sensor

Remove the plastic plug on the connector.



Pin number	Function	
	TR	T4
1	Power supply	
2	Direction signal	Not present
3	Earth	
4	Square frequency signal	

For the connection of connectors, please refer to the connection table and the general cabling plan contained in the installation brochure for your transmission.

Connector Kit for Connection of Speed Sensors TR and T4

Sales Code	Item Code	
ELEC-CABLE-M12-180°-5000	A07468S	
ELEC-CABLE-M12-90°-5000	A04999J	

Connector Mounting

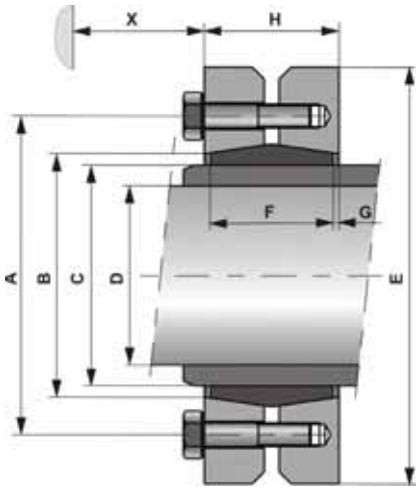
Securely hand tighten the cable's ring to sensor connector M12.

Pin number	Color
1	Brown
2	White
3	Blue
4	Black

Installation of the Poclain Hydraulics cable provides a protection rating of IP68.

Shrink-Disk

Properties



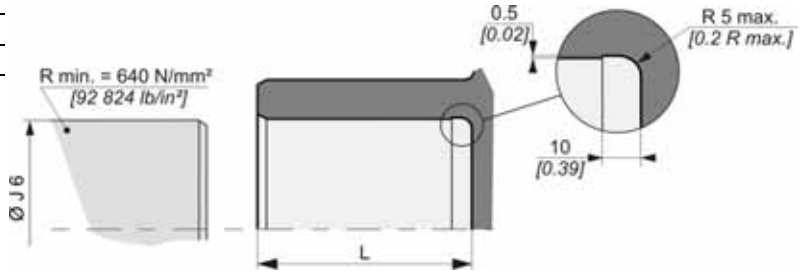
H & G = These values are advisable before tightening.
M = Torque transmittable by the shrink-disks.
X = Provide sufficient clearance for the torque wrench.

		D mm *[in]*	C mm *[in]*	M Nm *[lb.ft]*	A mm *[in]*	B mm *[in]*	E mm *[in]*	F mm *[in]*	G mm *[in]*	H mm *[in]*		Nm *[lb.ft]*	kg *[lb]*
Standard Series	MS35	105 *[4.134]*	140 *[5.512]*	20 100 *[14 825]*	175 *[6.889]*	146 *[5.748]*	230 *[9.055]*	46 *[1.81]*	7 *[0.276]*	60 *[2.362]*	10 x M12 x 45	100 *[74]*	10 *[22]*
	MS50	115 *[4.257]*	155 *[6.102]*	28 000 *[20 651]*	192 *[7.559]*	165 *[6.496]*	265 *[10.433]*	50 *[1.97]*	7 *[0.276]*	64 *[2.519]*	12 x M12 x 50	100 *[74]*	15 *[33]*
	MS83	140 *[5.512]*	185 *[7.283]*	60 000 *[44 254]*	236 *[9.291]*	195 *[7.677]*	330 *[12.992]*	71 *[2.795]*	7.5 *[0.295}*	86 *[3.386]*	10 x M16 x 65	250 *[184]*	37 *[82]*
	MS125	155 *[6.102]*	200 *[7.874]*	84 000 *[61 955]*	246 *[9.685]*	210 *[8.268]*	350 *[13.779]*	71 *[2.795]*	7.5 *[0.295}*	86 *[3.386]*	12 x M16 x 65	250 *[184]*	41 *[90]*
Heavy Series	MS35	105 *[4.134]*	140 *[5.512]*	27 200 *[20 062]*	175 *[6.889]*	144 *[5.669]*	230 *[9.055]*	60 *[2.362]*	7 *[0.276]*	74 *[2.913]*	12 x M12 x 55	100 *[74]*	13 *[29]*
	MS50	115 *[4.257]*	155 *[6.102]*	36 400 *[26 847]*	192 *[7.559]*	164 *[6.457]*	265 *[10.433]*	66 *[2.598]*	7 *[0.276]*	80 *[3.150]*	15 x M12 x 60	100 *[74]*	20 *[44]*
	MS83	140 *[5.512]*	185 *[7.283]*	77 000 *[56 792]*	236 *[9.291]*	194 *[7.637]*	330 *[12.992]*	92 *[3.622]*	10 *[0.394]*	112 *[4.409]*	14 x 16 x 80	250 *[184]*	47 *[104]*
	MS125	155 *[6.102]*	200 *[7.874]*	109 200 *[80 542]*	246 *[9.685]*	204 *[8.031]*	350 *[13.779]*	92 *[3.622]*	10 *[0.394]*	112 *[4.409]*	15 x M16 x 80	250 *[184]*	50 *[110]*

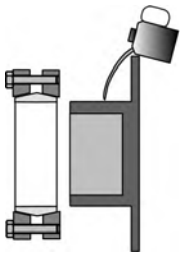
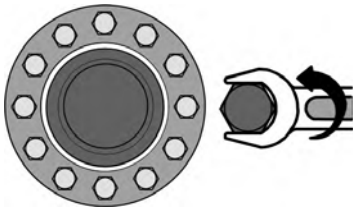
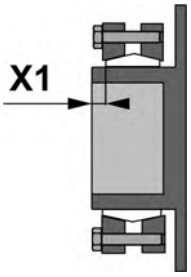
		Transmittable torque Nm *[lb.ft]*	Part number
Standard Series	MS35	20 100 *[14 825]*	005638973T
	MS50	28 000 *[20 652]*	005638975V
	MS83	60 000 *[44 254]*	005638976W
	MS125	84 000 *[61 955]*	005638978Z
Heavy Series	MS35	27 200 *[20 062]*	005638972S
	MS50	36 400 *[26 847]*	005638974U
	MS83	77 000 *[56 792]*	005638970Q
	MS125	109 200 *[80 542]*	005638977X

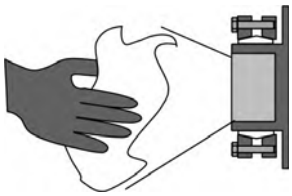
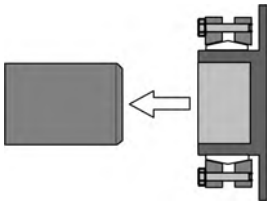
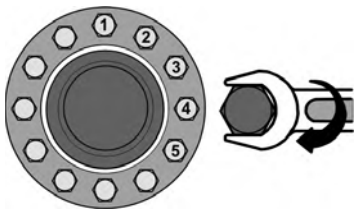
Assembly instructions

	Ø J 6	L
MS35	105	95
MS50	115	105
MS83	140	140
MS125	155	140



Shrink-Disk Installation

Step	1	2	3
Action	Lubricate the range of the ring on the shaft. 	Loosen the screws to allow the ring to rotate. 	Place the shrink disk on the shaft and then check its position on the shaft (X1). 

Step	4	5	6
Action	Confirm that the shaft's bore and the corresponding range of the shaft to be driven are degreased. 	Mount the motor on the shaft to be driven. 	Successively tighten the screws proceeding with progressive tightening; the disks must remain parallel. 

Motors	X1 mm *[in]*
MS35	12,5 *[0,492]*
MS50	14,5 *[0,571]*
MS83	19,0 *[0,748]*
MS125	19,0 *[0,748]*

Use a torque wrench to comply with the predefined tightening torques.

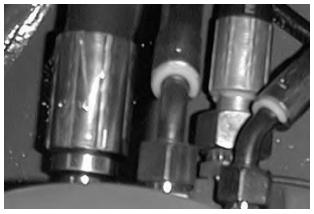
CIRCUITS

Checking Connections

Piping and Connections
The different components of the hydraulic circuit (tank, pumps, distributors, filters, sinks, etc.) are connected together by rigid piping or flexible hoses.

Two types of connections:

Screwed Connections



Clamped

Comply with the connection directions given by the manufacturers for each part: function and marking of the ports, types of connections, diameters, types of lines (flexible or rigid), etc.

Rigid Tubes
For high-pressure pipes, only use unwelded cold-drawn steel pipes.

Take the following precautions for making up the tubes:
- After arranging the length by cutting, cold bending and crimping, the tubes must be carefully deburred, rinsed with oil and blown before connection.
- The tubes having been welded or bent also have to be scraped (solution based on sulfuric acid) then rinsed with oil and neutralized (solution based on sodium hydroxide).
- The connections, clamps, threaded plugs, etc. must be deburred and cleaned before assembly.
- If assembly is not done immediately, seal the ports with plugs.

The tubes must not be subject to bending forces while the clamps that attach them are being tightened.

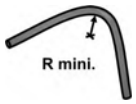
Flexible Tubes
Only use flexible tubes with crimped ends.

As needed protect them with armor.

Avoid contacts likely to break down the flexible tubes.

Avoid kinks.

Observe the minimum radius of curvature..



Fluid speed (data for information)
Aspiration pump: < 1 m/s *[3.28 ft/s]*
Low-pressure return (LP): < 4m/s *[13.12 ft/s]*
High-pressure branch (HP): < 7 m/s *[22.97 ft/s]*

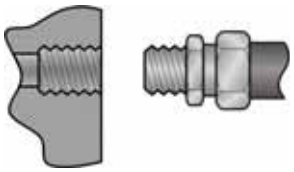
Connections

Sizing

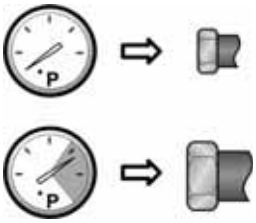
The drainage of the hydraulic motors' casings must be sized adequately to limit the casing pressure in conformance with the specification's of the manufacturers of these components.

The tube's interior diameter must be greater than or equal to the diameter of the connection openings of the components.

Connection



Check the compatibility of the types of connections between the tubes and the motor's ports. If they are not compatible, use intermediate connections that allow bridging this incompatibility.

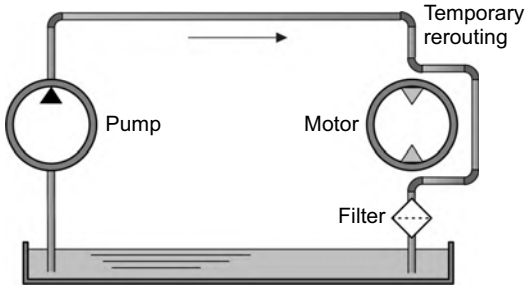


Confirm that the connection class and operating pressure are fully adequate.

In the motor technical catalog.

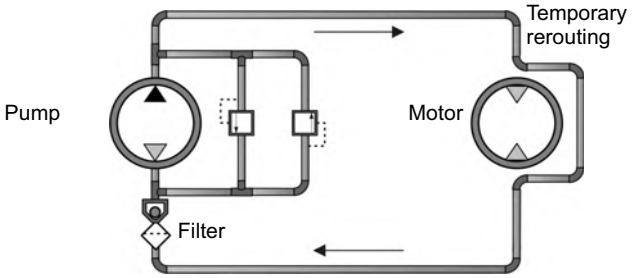
Rinsing the Circuit

Before putting the installation to use, perform a complete rinsing of the hydraulic circuit to remove all the impurities that could accumulate while connecting components.
The filters must be equipped with a system that allows checking the filters state (clogging indicator).



For an Open Circuit
The circuit's return filter can be used to collect these impurities (change the cartridge **SEVERAL** times if necessary) or temporarily interpose before the tank a filter without 10µm absolute bypass appropriate for the return circuit's flow-rate.

For a Closed Circuit
On the high-pressure return branch, place a 10µm absolute filter, without bypass, appropriate to the flow rate. This filter will be placed near each pump, before the exchange and security blocks (see adjacent drawing).



- In any case, also place a temporary bypass circuit near the ports of each hydraulic motor to isolate the circuit.
- Change the filter cartridge (open circuit) or temporarily remove the filter before putting into use.

Checking after Rinsing

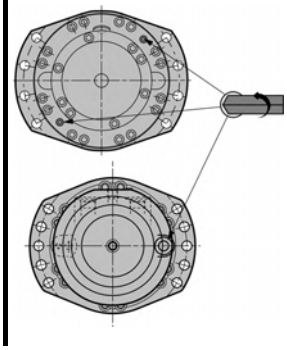
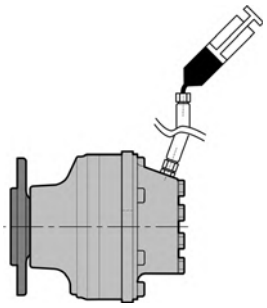
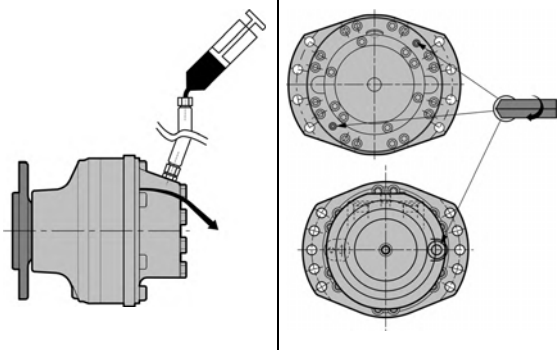
Check the hydraulic fluid level in the tank and potentially top it off with a filling group.

For a Closed Circuit
- Set the high-pressure valve(s).
- Check the exchange valve pressure setting and the exchange flow.
- Check the feed-valve pressure setting located on the pump.
- Confirm that the receivers are not driven when the pump control system in a neutral position.

Casing

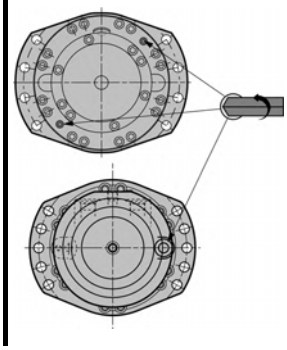
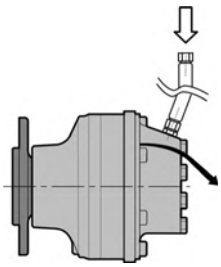
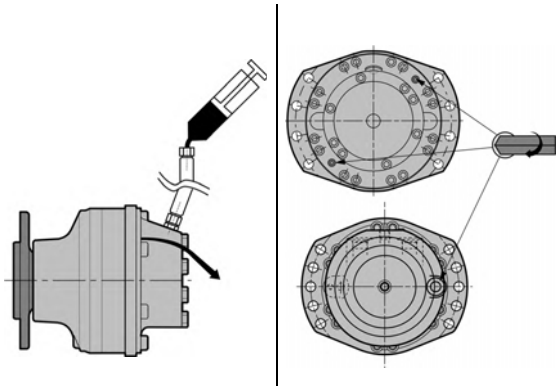
Filling the Casing

It is MANDATORY to perform this operation before motor start-up.

Step	1	2	3
ActionAction	Loosen the highest bleed screw (or the drainage ports for the MS03 and MK04 motors).	Fill with new oil using a syringe.	Retighten the bleed screw to 5 Nm [3.69 lb.fr] when the liquid flows from it.
			

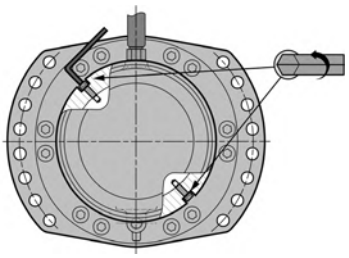
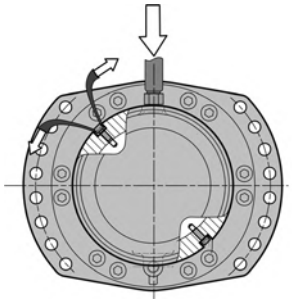
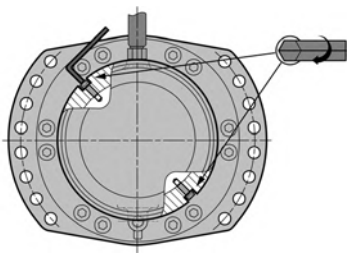
Verify the attachments, tubing and reservoir level.

Bleed the Casing

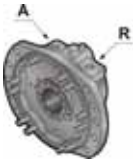
Step	1	2	3
Action	Loosen the bleed screws.	Supply with fluid.	Stop the supply and retighten bleed screw to 5 Nm [3.69 lb.fr] when the liquid stops flowing.
			

Brake bleed

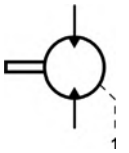
Static Multi-Disk Brakes
The fluid used for the static braking is the same as for the operation of the motor

Step	1	2	3
	Loosen the bleed screw.	Supply with fluid just until it flows from the bleed screw.	Retighten the bleed screw.
Action			Fluid 	

The fluid used for operating the motor may also be used for static braking

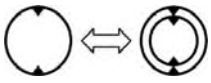


Motor supply (ports A and R, R and L, or A1, A2 and R)
Can be implemented with either:
- Unwelded, cold drawn, steel tubes.
- Flexible tubes.



Drainage (ports 1 and/or 2)
Use rigid low-pressure pipes or flexible tubes to avoid pinching the flexible. The tube should have an inner diameter that will allow for rapid piston output without generating excess overpressure (3 bar [43 psi]). The amount of oil to be evacuated is around 10% of the total capacity in case of freewheeling circuits.

Brake Control
- Port X: static multidisk brakes.
- Port XT: drum brake.
  The control is implemented with flexible tubes having a minimum interior diameter of 8 mm [0.31 in], to obtain the correct response time.
- Port XD: dynamic braking.

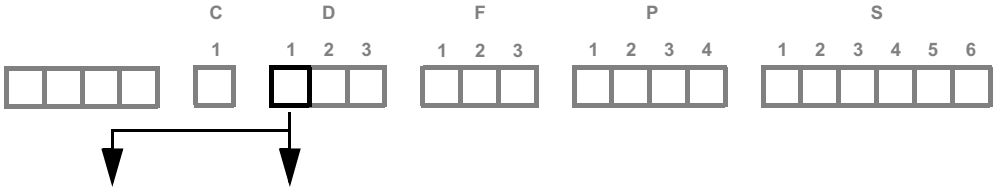


Selection slide valve control (Ports Y, Y1 or Y2)
The pressure for movement of the selection slide valve is between 12 bar minimum and 30 bar maximum.

Rinse the brakes pilot circuit before connection.

Do not put either a check valve or a poppet valve on the pilot line.

Determining motor rotation direction

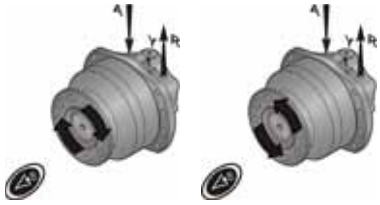


Single-cylinder motor

1

- This motor has no preferred direction of operation.
- Reversing the fluid flow direction will reverse motor rotation direction.

Two-cylinder asymmetrical motor



D
E
F

G
H
J

- This motor has a preferred direction of rotation for small capacity
- Motor fluid is always supplied in the direction of A.
- Reversing the fluid flow direction will reverse motor rotation direction.

Two-cylinder symmetrical motor

A
B
C

- This motor has no preferred direction of operation.
- Reversing the fluid flow direction will reverse motor rotation direction.

Twinlock motor

D
E
F

G
H
J

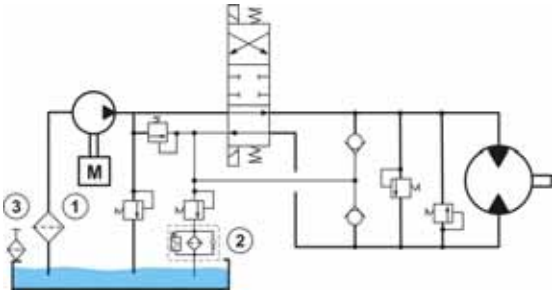
- This motor has a preferred rotation direction.
- Motor fluid is generally supplied in the direction of A1-A2. It is also possible to change its direction towards R (contact Poclain Hydraulics for further information).
- Reversing the fluid flow direction will reverse motor rotation direction.

Decontamination and Filtration

The life of hydraulic components is lengthened when the contamination level is low.

Industrial Circuit
The hydraulic fluid must be maintained at ISO standard 4406 - 1999 decontamination level 18/16/13 (class 7 from NAS 1638) using a filter.

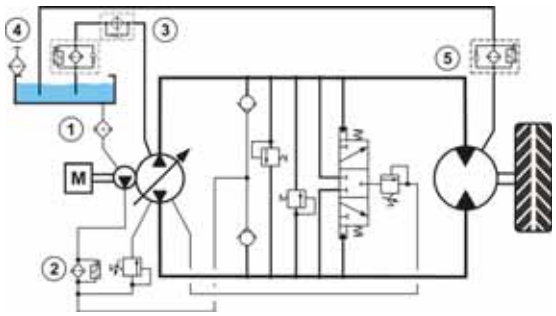
Exemple :



Data for information only:
1 - A 120 µm strainer on the intake line.
2 - A $ß_{20}$ > 100 filter with a clogging indicator on the return line.
3 - A breather on the 10 µm absolute tank.

Closed Circuit
The hydraulic fluid must be maintained at ISO-standard 4406 - 1999 decontamination level 20/18/15 or better (class 9 or better from NAS 1638) using a filter in the closed circuit's power loop.

Exemple :



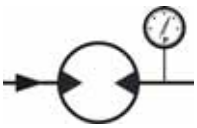
Data for information only:
1 - A 120 µm strainer on the intake line.
2 - A $ß_{10}$ > 100 low-pressure filter with a clogging indicator with no bypass valve on the output from the booster pump.
3 - A low-pressure filter with a clogging indicator and a $ß_{10}$ > 100 bypass valve for mobile hydraulics on the pump's drain line after the refrigerant.
4 - A breather on the 10 µm absolute tank.
5 - Optionally, a magnetic or low-pressure filter on the hydraulic motors' drain line.

• The level of cleanliness required by a system depends on the level required by the most sensitive component (e.g.: servo valve).
• Determination of the cleanliness of the fluid can only be done after rinsing all the components in the system.
• Fluid samples must be taken from the power loop of the system.

New fluid is generally of lower quality than our requirements. Poclain Hydraulics asks its customers to fill or adjust the levels in the reservoirs in a clean environment using a pump and filter.

Consult manufacturer's instructions for components (filters, pumps, valves, etc.).

For more information, Poclain Hydraulics offers training in hydraulic systems.
Go to www.Poclain-Hydraulics.com



Closed Circuit
On the low pressure side of the loop, pressure must be kept between 15 and 30 bar max. *[217.5 and 435 PSI]*.
Open loop circuit:
Cavitation (0 bar *[0 PSI]*) is strictly forbidden on either high pressure port. Depending on the application, the minimum low pressure must be kept between 5 and 20 bar *[71.5 and 209 PSI]*.

Consult your Poclain Hydraulics application engineer.

Pressure
- To verify pressure levels, connect manometers.
- 0 - 4 bar *[0 - 58 PSI]* (undamped manometer) on the drainage pipe near the motor (pipes 1 or 2).
- 0 - 50 bar *[0 - 725 PSI]* on each of the motor's pilot pipes (Port Y).
- 0 - 200 bar *[0 - 1450 PSI]* on the control piping of each break release (port X), of the drum brake (port XT) and dynamic brake (port XD)
- 0 - 600 bar *[0 - 8700 PSI]* on each motor supply pipe (ports L and R or A and R, or A1, A2 and R).

Tank
The tank's position must assure a minimal pressure at the pump's input that satisfies the value prescribed by the pump manufacturer.

The capacity depends on the displacement of the pumps drawing from the reservoir.
- In a closed circuit, the reservoir must have a capacity from 1 to 1.5 times the flow rate of the pumps drawing from in.
- In an open circuit, the capacity must be at least equal to 3 times the pump's flow rate.

OILS

Fluid Selection

General Recommendations
Poclain hydraulics recommends the use of hydraulic fluids defined by the ISO 12380 and ISO 6743-4 standards.
For temperate climates, the following types are recommended.
- HM 46 or HM 48 for fixed installations.
- HV 46 or HV 68 for mobile installations.
- HEES 46 for mobile installations.

These specifications correspond to category 91H of the CETOP standard, parts 1, 2 and 3 of the DIN 51524 standard, and grades VG32, VG 46 and VG68 of the ISO 6743-4 standards.

It is also possible to use ATF, HD, HFB, HFC or HFD type hydraulic fluid upon Poclain Hydraulics specific approval of the components' operating conditions.

Standardized designations for the fluids
- **HM :** Mineral fluids having specific antioxidant, anticorrosion and antiwear properties (HLP equivalent to DIN 51524 parts 1 and 2).
- **HV :** HM mineral fluids providing improved temperature and viscosity properties (DIN 51524 part 3).
- **HEES :**Biodegradable fluids based on organic esters.

It is also possible to use a fluid that meets the biodegradability criteria and is compatible in the event of accidental food contact. The BIOHYDRAN FG 46 fluid designed by the company Total has undergone testing of its properties and performance on our test benches. Since this type of fluid has not yet been categorized, it is the responsibility of machine manufacturers to validate its compatibility with all of the components used in order to guarantee that the intended functions will be fulfilled (specifically the brakes' hold on a slope and emergency braking) and this for the desired life time of all equipment items.

For biodegradable fluids, consult your Poclain Hydraulics' application engineer.

Class32 (ISO VG 32) : Viscosity of 32 cSt at 40°C.
Class46 (ISO VG 46) : Viscosity of 46 cSt at 40°C.
Class68 (ISO VG 68) : Viscosity of 68 cSt at 40°C.

During operation, the temperature of the motors must be between 0°C *[32°F]* and 80°C *[176°F]*; the minimum and maximum temperatures may be exceeded momentarily by ± 20°C *[± 68°F]* for a duration of less than 30 minutes.
The viscosity must always be between 9 and 500 cSt, otherwise check over the cooling system, the design, or the oil rating.
For all applications outside these limits, please consult with your Poclain Hydraulics application engineer.

Extract of the NF ISO 11 158 Standard

Tests	Test Methods or Standards	HM Category Viscosity Grade 22	32	46	68	100	Units
Kinematic viscosity at 40°	ISO 3104	19.8 24.2	28.8 35.2	41.4 50.6	61.2 74.8	90 110	mm² / s
Minimum viscosity index (a)	ISO 2909	-	-	-	-	-	1
Acidity index, maximum (b)	ISO 6618	(c)	(c)	(c)	(c)	(c)	mg KOH / g
Water context, maximum	ASTM D 1744 DIN 51777-1 DIN 51777-2 (d)	500	500	500	500	500	mg / kg
Flash point Cleveland in open-cup, min.	ISO 2592	140	160	180	180	180	°C
Foaming at 24°C, max. 93°C, max.	ISO 6247	150/0 75/0	150/0 75/0	150/0 75/0	150/0 75/0	150/0 75/0	ml
Deaeration at 50°C, maximum	ISO 9120	5	5	10	13	21	min
Copper blade corrosion at 100°C, 3 h maximum	ISO 2160	2	2	2	2	2	Grading
Anti-rust power, method A	ISO 7120	Pass	Pass	Pass	Pass	Pass	
Anti-wear property, FZG A/8, 3/90, minimum	DIN 51354-2	(e)	10	10	10	10	Deterioration Level
Flow point, maximum	ISO 3016	-18	-15	-12	-12	-12	°C
Aptitude to separate from water: Time needed to obtain 3 ml of emulsion at 54°C, max.	ISO 6614	30	30	30	30		min

Tests	Test Methods or Standards	HV Category Viscosity Grade 22	32	46	68	100	Units
Kinematic viscosity at 40°	ISO 3104	19.8 24.2	28.8 35.2	41.4 50.6	61.2 74.8	90 110	mm² / s
Minimum viscosity index (a)	ISO 2909	130	130	130	130	130	1
Acidity index, maximum (b)	ISO 6618	(c)	(c)	(c)	(c)	(c)	mg KOH / g
Water context, maximum	ASTM D 1744 DIN 51777-1 DIN 51777-2 (d)	500	500	500	500	500	mg / kg
Flash point Cleveland in open-cup, min.	ISO 2592	140	160	180	180	180	°C
Foaming at 24°C, max. 93°C, max.	ISO 6247	150/0 75/0	150/0 75/0	150/0 75/0	150/0 75/0	150/0 75/0	ml
Deaeration at 50°C, maximum	ISO 9120	7	7	12	12	20	
Copper blade corrosion at 100°C, 3 h maximum	ISO 2160	2	2	2	2	2	Grading
Anti-rust power, method A	ISO 7120	Pass	Pass	Pass	Pass	Pass	
Anti-wear property, FZG A/8, 3/90, minimum	DIN 51354-2	(e)	10	10	10	10	Deterioration Level
Flow point, maximum	ISO 3016	-42	-36	-36	-30	-21	°C
Aptitude to separate from water: Time needed to obtain 3 ml of emulsion at 54°C, max.	ISO 6614	(c)	(c)	(c)	(c)	(c)	

(a) These limits should only be taken into consideration for fluids made from hydrocracked or hydro-isomerized mineral oils.
(b) Both base fluids and additives contrubute to the initial acidity index.
(c) The behavior criteria or the values of properties must be the subject of negotiation between the supplier and the end user.
(d) The DIN 51777-2 standard applies in cases where interference caused by certain chemical compounds must be avoided. Free bases, oxidizing or reducing agents, mercaptans, some nitrogenous products or other products that react with iodine interfere.
(e) Not applicable to ISO 22 viscosity grade.

Extract of the ISO 15 380 Standard

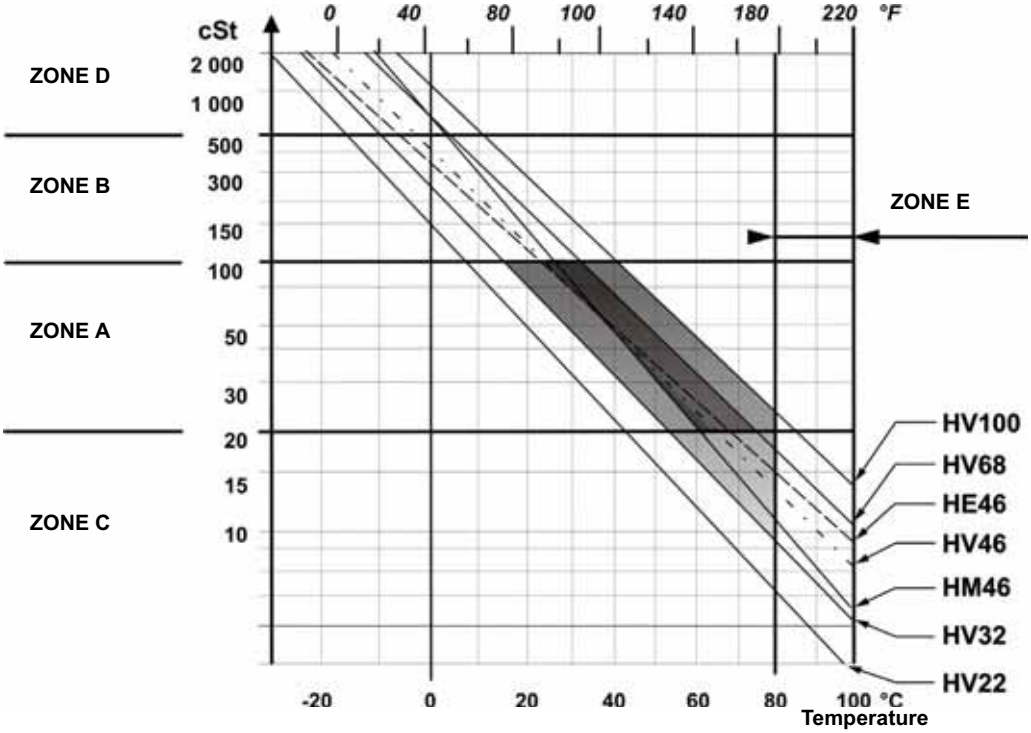
Tests	Test Methods or Standards	HM Category Viscosity Grade 22	32	46	68	Units
Kinematic viscosity at 40°	ISO 3104	19.8 24.2	28.8 35.2	41.4 50.6	61.2 74.8	mm² / s
Minimum viscosity index (a)	ISO 2909	-	-	-	-	
Acidity index, maximum (b)	ISO 6618	(c)	(c)	(c)	(c)	mg KOH / g
Water context, maximum	ASTM D 1744 DIN 51777-1 DIN 51777-2 (d)	1000	1000	1000	1000	mg / kg
Flash point Cleveland in open-cup, min.	ISO 2592	165	175	185	195	°C
Foaming at 24°C, max. 93°C, max.	ISO 6247	150/0 75/0	150/0 75/0	150/0 75/0	150/0 75/0	ml
Deaeration at 50°C, maximum	ISO 9120	7	7	10	10	min
Copper blade corrosion at 100°C, 3 h maximum	ISO 2160	2	2	2	2	Grading
Anti-rust power, method A	ISO 7120	Pass	Pass	Pass	Pass	
Anti-wear property, FZG A/8, 3/90, minimum	DIN 51354-2	(e)	10	10	10	Deterioration Level
Flow point, maximum	ISO 3016	-21	-18	-15	-12	°C
Aptitude to separate from water: Time needed to obtain 3 ml of emulsion at 54°C, max.	ISO 6614	(c)	(c)	(c)	(c)	min

Tests	Test Methods or Standards	HV Category Viscosity Grade 22	32	46	68	Units
Kinematic viscosity at 40°	ISO 3104	19.8 24.2	28.8 35.2	41.4 50.6	61.2 74.8	mm² / s
Minimum viscosity index (a)	ISO 2909	-	-	-	-	1
Acidity index, maximum (b)	ISO 6618	(c)	(c)	(c)	(c)	mg KOH / g
Water context, maximum	ASTM D 1744 DIN 51777-1 DIN 51777-2 (d)	1000	1000	1000	1000	mg / kg
Flash point Cleveland in open-cup, min.	ISO 2592	165	175	185	195	°C
Foaming at 24°C, max. 93°C, max.	ISO 6247	150/0 75/0	150/0 75/0	150/0 75/0	150/0 75/0	ml
Deaeration at 50°C, maximum	ISO 9120	7	7	10	10	min
Copper blade corrosion at 100°C, 3 h maximum	ISO 2160	2	2	2	2	Grading
Anti-rust power, method A	ISO 7120	Pass	Pass	Pass	Pass	
Anti-wear property, FZG A/8, 3/90, minimum	DIN 51354-2	(e)	10	10	10	Deterioration Level
Flow point, maximum	ISO 3016	(c)	(c)	(c)	(c)	°C
Aptitude to separate from water: Time needed to obtain 3 ml of emulsion at 54°C, max.	ISO 6614	(c)	(c)	(c)	(c)	min

(a) These limits should only be taken into consideration for fluids made from hydrocracked or hydro-isomerized mineral oils.
(b) Both base fluids and additives contrubute to the initial acidity index.
(c) The behavior criteria or the values of properties must be the subject of negotiation between the supplier and the end user.
(d) The DIN 51777-2 standard applies in cases where interference caused by certain chemical compounds must be avoided. Free bases, oxidizing or reducing agents, mercaptans, some nitrogenous products or other products that react with iodine interfere.
(e) Not applicable to ISO 22 viscosity grade.

Temperature and Viscosity

The best performance is obtained by havng the system operate in the regimes shaded gray.



Zone A	Zone of maximum efficiency. In this zone, temperature variations have a weak effect on the response time, efficiency and life expectancy of the components. Poclain Hydraulics components can operate at all speeds, pressures and powers specified in their technical documentation.
Zone B	High speeds can lead to vibrations and drops in mechanical efficiency. The booster pump can cavitate if the intake conditions are too tight but without risk for the system as long as the pump remains boosted. The Poclain Hydraulics components can operate at the pressures specified in their documentation but it is not advisable to use the pumps at full displacement. In a translation circuit, a rapid rise in the pump speed from zone B is allowed, but ordering the translation when the temperature has reached zone A is recommended.
Zone C	The efficiency is less and the use of effective antiwear additives is required. The Poclain hydraulics components can temporarily operate at a power under 20 to 50% of that stated in the technical documentation, or during 20% of the operating time at the stated power.
Zone D	The stated restrictions for zone B likewise apply to zone D. Further, the pumps must startup at low speed and no displacement. They must not be used in their normal operating conditions as long as the booster pressure has not stabilized and the hydraulic fluid temperature in the reservoir has not come up to zone B.
Zone E	The efficiency is reduced and the risk of wear on the pump and hydraulic fluid is increased. The system can operate in zone E at low-pressure and during short periods. The temperature of the hydraulic fluid in the power circuit must not be more than 10°C above the temperature of the hydraulic fluid in the reservoir, and must not be more than 20°C warmer than the hydraulic fluid in the components' cases.

Water content

The ISO 12922 standard calls for a water content ≤ 0.05%.

Poclain Hydraulics components tolerate up to 0.1%.

Checking Water Content

Visual Inspection
• The oil appears cloudy once it has a water concentration greater than or equal to 1%.

We suggest two possible verification methods:

1- Quick Elementary Check

• The “crackle test.”

Step	1	2	3
Action	Make a small cup using household aluminum foil.	Put a drop of oil to test in the bottom of the cup.	Heat it by placing it over a flame using tongs.

Step	4	
Action		If bubbles appear, the water content of the fluid exceeds 0.05%.
		If bubbles do not appear, the water content in the fluid is less than 0.05%.

2- Laboratory analysis
To determine the exact water content of the fluid, we recommend a laboratory analysis.

Poclain Hydraulics performs laboratory analyses of water content in fluids. Contact us for further information.

STARTUP

It is extremely important to follow this procedure along with the specific instructions provided by the manufacturer of each component during the startup of a new or reconditioned system.

The specific installation instructions for each Poclain Hydraulics component appear in the technical catalog prepared by Poclain Hydraulics.

Following these procedures avoids possible damage of the components that could happen if the system were not correctly purged before startup.

Component Installation
Verify that the components' installation meets the recommendations established by their respective manufacturers. Those concerning Poclain Hydraulics components appear in the technical documentation published by Poclain Hydraulics.

Orientation of Components
The hydraulic components must be oriented so that their case's drain port is located in a way that the required hydraulic fluid level is insured in all circumstances.

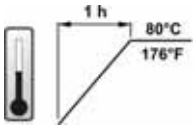
Poclain Hydraulics motors do not need to be broken in (except for drum brakes). In order to get optimum performance/efficiency, follow the procedure given below for the first 50 hours:

- Limit operational speed to a maximum of 50% of the maximum speed given in the catalogue.
- Limit operating power to a maximum of 50% of the maximum power given in the catalogue.
- Ensure a gradual increase of load.

No-load operations (on a base for e.g.) is strictly prohibited. A speed of 10% of that indicated in the catalogue is permitted for a few minutes in order to check the proper function of the machine (motor rotation direction, leak detection, SmartDrive™ adjustments, brake tests, etc.).

Any extreme condition testing performed outside of these conditions will invalidate Poclain Hydraulics' guarantee on the components.

Listen for noises.



Verify that component temperature, especially that of the motor casings increases gradually and stabilizes after an hour of operation. Proper cooling should lower this temperature to below 80° C.

Check that the braking efficiency of the machine (including hydrostatic, emergency and parking brakes) corresponds to specifications and follows applicable legislation.

Check components and connections for seal tightness.

Perform regular routine checks for seal tightness and connections. Before a prolonged period of stoppage (as in the case of seasonal use), bleed motors to remove air cushions that may have formed during operation.

CHECK LIST (à titre indicatif)SUGGESTED CHECK LIST
BEFORE START UP (END OF CHAIN)

Motor Part Number (a):	
Machine Designation:	**Date:** / /

The immediate vicinity of the machine should be declared a security zone. Observe all regulations regarding personnel safety.

			Correct operation	Incorrect operation
Oil	Tank	Level		
	Properties	Water content		
	Circuit	Filling component casing		
		Opening of cutoff devices		
		Purge of entire circuit		
		Viscosity		
Attachment	Chassis	All attachment parts present		
		Bevelled edge present		
	Coupling	All attachment parts present		
		Tightening done to prescribed torque		
Connection	Seal Tightness			
	Mechanical	(brake cable)		
	Electrical			
Brake	Static	Hydraulic connection		
		Purge		
	Dynamic	Hydraulic connection		
		Purge		
	Combined	Hydraulic connection		
		Static purge		
	Intake pump			
Rinsing	Rinsing time			
	Used filter			

AFTER START UP (CHAIN EXIT)

			Correct operation	Incorrect operation
Oil	Tank	Level		
	Properties	Temperature		
	Circuit	Purge of entire circuit		
Connection	Seal Tightness	Component		
Brake	Static	Purge		
		Brake tests		
	Dynamic	Purge		
		Wearing in		
	Combined	Static purge		
		Dynamic Purge		
Pressure	Casing			
	High pressure supply			
	Low pressure return			
	Control			
	Static brakes			
	Dynamic brakes			
	Charge			

TIGHTENING TORQUES

Quality Class of Different Wrenches

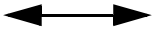
Accuracy Class	Accuracy	Manual Portable	Motorized Portable		Hardware: Motorized Fixed	
D	± 50 %	Hand wrench	Simple impact wrench	Sliding sleeve screwdriver		
C	± 20 %	Simple release torque wrench	Simple screwdriver with pneumatic display	Simple screwdriver with electric setting	Simple pneumatic motor	
			Stored energy impact wrench	Wrench with angle return setting		
B	± 10 %	Auto. release and rearming torque wrench	Wrench with angle return to release		Hydraulic screwdriver	Pulsation motor
		Dial torque wrench with direct read			Torque control pneumatic motor	
A	≤ ± 5 %	Electronic torque wrench			Electric screwdriver	Two speed motor
					Electronically synchronized motor	

Attachment

Recommended tightening for the INBUS screw according to DIN 912, DIN 7984 and W233.

	Screws and Bolts	Nominal Dimension	Quality Class 8,8 N.m *[lb.ft]*	10,9 N.m *[lb.ft]*	12,9 N.m *[lb.ft]*
Normal Spaced Threads	C HC	M6	10 *[7]*	14 *[10]*	17 *[13]*
		M8	24 *[18]*	35 *[26]*	41 *[30]*
		M10	49 *[36]*	69 *[51]*	83 *[61]*
		M12	86 *[63]*	120 *[89]*	145 *[107]*
		M14	135 *[100]*	190 *[140]*	230 *[170]*
		M16	210 *[155]*	295 *[218]*	355 *[262]*
		M18	290 *[214]*	405 *[299]*	485 *[358]*
		M20	410 *[303]*	580 *[428]*	690 *[509]*
		M22	550 *[406]*	780 *[576]*	930 *[686]*
		M24	710 *[524]*	1000 *[738]*	1200 *[886]*
Fine spaced threads	C HC	M6 x 0.75	11 *[8]*	15 *[11]*	18 *[13]*
		M8 x 1	26 *[19]*	36 *[27]*	43 *[32]*
		M10 x 1.25	52 *[38]*	73 *[54]*	88 *[65]*
		M12 x 1.25	95 *[70]*	135 *[100]*	160 *[118]*
		M12 x 1.5	90 *[66]*	125 *[92]*	150 *[111]*
		M14 x 1.5	150 *[111]*	210 *[155]*	250 *[185]*
		M16 x 1.5	225 *[166]*	315 *[232]*	380 *[280]*
		M18 x 1.5	325 *[240]*	460 *[339]*	550 *[406]*
		M20 x 1.5	460 *[339]*	640 *[472]*	770 *[568]*
		M22 x 1.5	510 *[376]*	860 *[635]*	1050 *[775]*
		M24 x 2	780 *[576]*	1100 *[812]*	1300 *[959]*

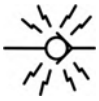
Connection

Connectors	Nominal Dimension	Tightening Torque
		
		N.m *[lb.ft]*
	M10 x 1	45 *[33]*
	M12 x 1	45 *[33]*
	M12 x 1.5	45 *[33]*
	M14 x 1.5	45 *[33]*
	M16 x 1.5	60 *[44]*
	M18 x 1.5	70 *[52]*
	M22 x 1.5	100 *[74]*
	M27 x 2	200 *[148]*
	DN19 M10 PN400	55 *[41]*
	DN25 M12 PN400	60 *[44]*
	Ø 13	30 *[22]*
	Ø 17	55 *[41]*
	Ø 21 (BP)	100 *[74]*
	Ø 21 (HP)	160 *[118]*
	Ø 27	200 *[148]*
	1"1/16 - 12 UNF	170 *[125]*
	3/4" - 16 UNF	70 *[52]*
	7/8" - 14 UNF	100 *[74]*

(BP) : Low Pressure
(HP) : High Pressure

DIAGN

ANOMALIES AT

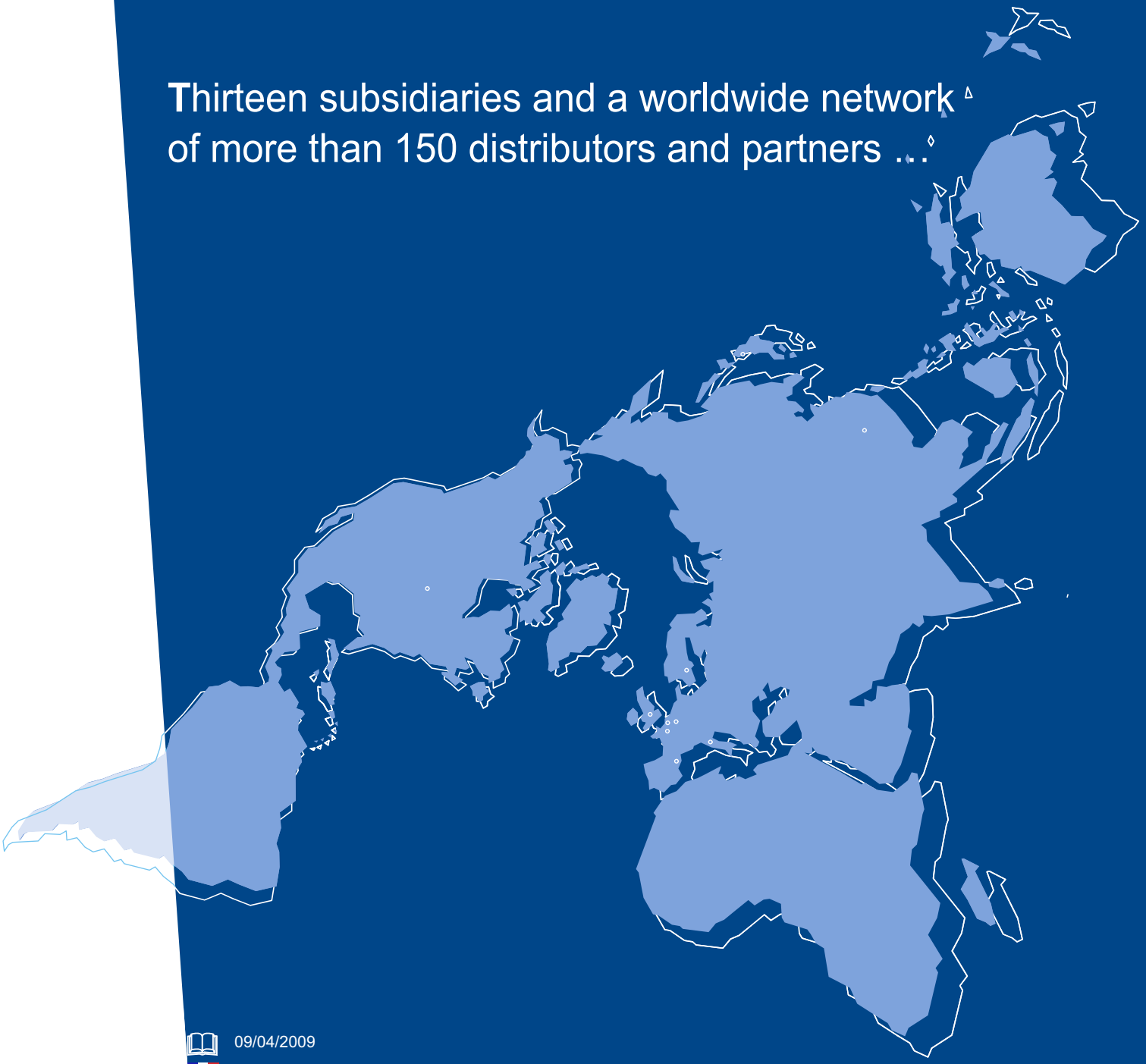
NATURE OF DEFECTIVE OPERATION		PRINCIPAL CAUSES	
	**EXCESSIVE NOISES**		Noisy motor
			Noisy safety valve
	**EXCESSIVE HEAT OF UNITS**		Increase hydraulic fluid temperature
	**POOR FLOW OF HYDRAULIC FLUID**		No flow
			Flow too slow
			Excessive flow
	**INCORRECT PRESSUE INSUFFICIENT TORQUE**		Pressure too low
			Irregular pressure
			Pressure too high

OSTIC

0 KILOMETERS

SECONDARY CAUSES	SOLUTIONS
	See notice corresponding to component
Pressure setting too close to the operating pressure or the pressure setting of another valve	Set pressure to a correct value.
Poppet and seat worn	Repair or replace
Cooling system (or control) insufficient or defective.	Review the cooling system.
Insufficient volume of hydraulic fluid.	Review the level or dimensions of the tank.
Throttling of the hydraulic fluid.	Check the pressure settings of the valves; check that the pressure is in the intended limits.
Loss of load in the circuit	Review the temperature and diameter of the pipes, and verify the proper flow of hydraulic fluid in the tubes and flexible hoses.
Hydraulic fluid too viscous, contaminated or poor quality.	Change the hydraulic fluid.
No flow near the pump.	See the instructions for the corresponding pump.
Distributor mounted in a bad position.	Check the installation, check the electrovavles' electric circuit
All of the flow passing by the safety valve (foreign body under the poppet)	Set to a correct value or recondition.
Flow regulator misadjusted.	Set to a correct value
Safety valve set to too low a pressure.	Set to a correct value
External leaks in the circuit.	Retighten the connectors
Hydraulic fluid viscosity too high.	Verify the properties of the hydraulic fluid.
Poor operation of the pump or receivers.	See the corresponding instructions.
Flow regulator misadjusted.	Set to a correct value
Misoperation of the pump.	See the corresponding instruction.
Pressure drop after an overload of the receivers.	Set to a correct value
Pressure reduction valve set to too low a pressure.	Set to a correct value
Excessive external leakage.	Retighten the connections
Pressure reduction valve worn or damaged.	Restore or replace.
Air present in the hydraulic fluid.	Retighten the connections
Worn safety valve.	Restore or replace.
Worn pumps or receivers.	Restore or replace.
Contaminated hydraulic fluid.	Replace the hydraulic fluid and change the filters.
Pressure reduction or discharge valve misadjusted.	Set to a correct value
Used or damaged valves.	Restore or replace.
Poor operation of the pump.	See the repair instructions.

Thirteen subsidiaries and a worldwide network of more than 150 distributors and partners ...



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801 478 127K

801 478 197L

801 578 110M

801 578 122A

801 578 134N

POCLAIN HYDRAULICS

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