HANDLING, INSTALLATION, STARTUP MOTOR MANUAL

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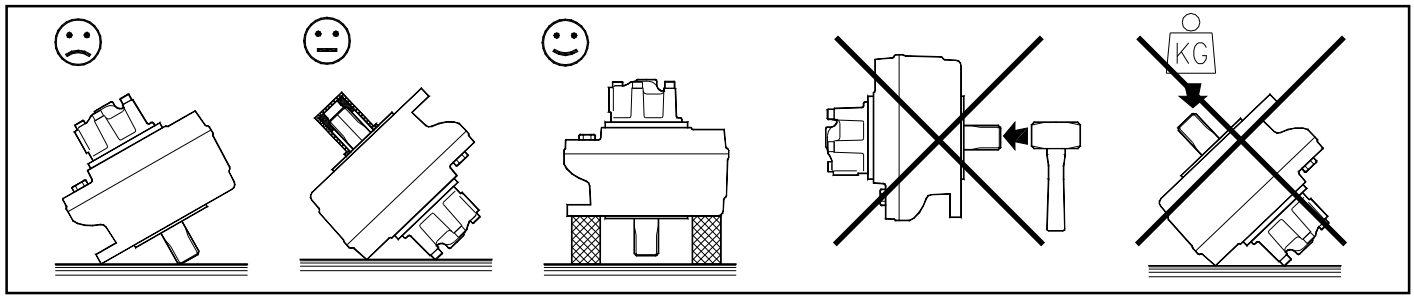
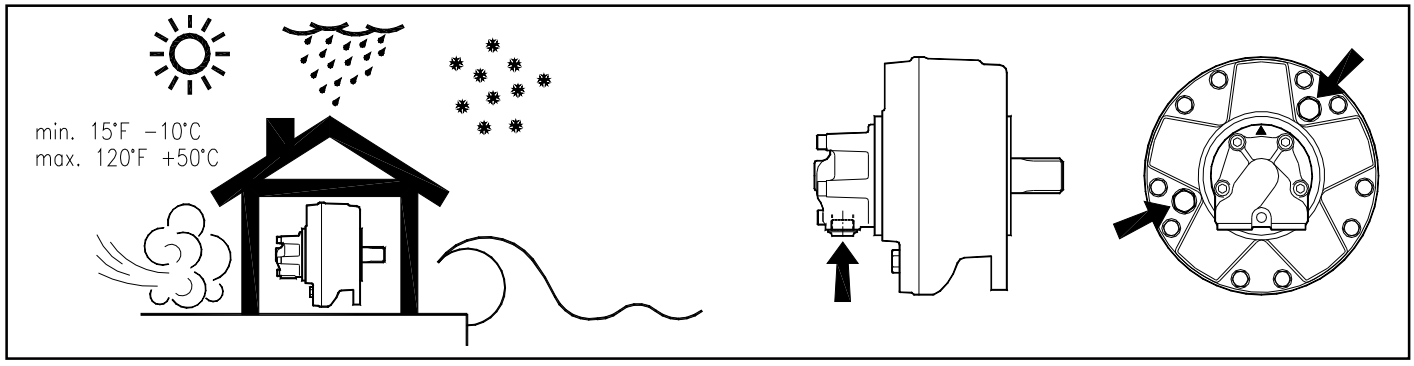
PACKING, HANDLING, TRANSPORTING AND STORING MOTORS



Make sure that the shaft of the motor is not loaded in any way and is protected from knocks.

Axial loads or shocks may easily damage the bearings inside the motor.
Knocks or contact with hard surfaces may damage the shaft or otherwise damage the motor.
-Cover the shaft with a protective layer or element (e.g. cover the shaft with tape, or use a tubular element or cover made of plastic or metal).
-Do not pack or store the motors with the shaft pointing downwards so that the weight of the motor is on the shaft.
-Pack the motors in closed crates or boxes so that they are immobilized inside the crate; do not wedge the shaft against any other surface.

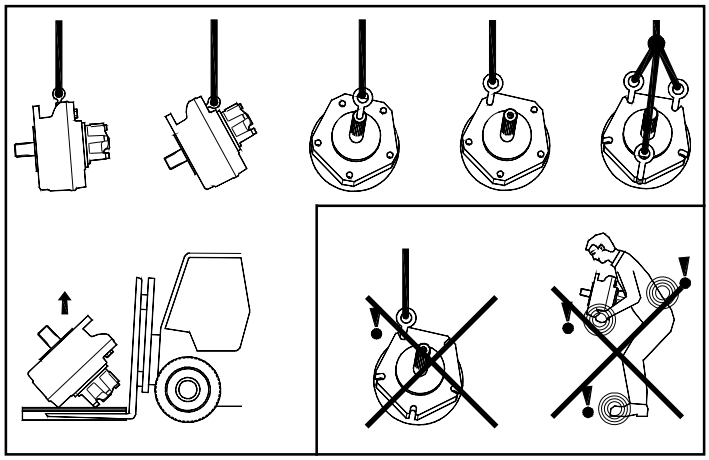


Make sure that all the oil supply, discharge, drainage or other motor ports are closed.

If the ports are not tightly sealed, dirt, water or other materials may penetrate inside the motor and possibly damage the working surfaces of the motor.
Rusting of the internal surfaces of the motor make the motor unusable; rust ruins the working surfaces and rust particles dislodged enter into the hydraulic circuit, contaminating the oil.
-Tightly close all ports using suitable plastic plugs or other system suitable for this purpose.
-Store the motors in a dry environment, protected from extreme temperatures and corrosive substances (e.g. salt).
-If the motor has to be stored for long periods or is exposed to unfavorable conditions during transport, completely fill the motor with hydraulic oil (fill motor casing as well as the cylinders and oil supply channels).

Observe safety precautions during handling.

The round shape of the motors means they roll if placed on sloping surfaces and their weight is such that they may cause serious injury to persons or damage to things during handling.
-Lift and move the motors using appropriate lifting and handling equipment, making sure the motors are not free to move unrestrained.
-Use eyebolts screwed into available holes in the motor flange, the motor cover, or eyebolt holes provided on the side of the motor.
-Do not handle the motors manually.



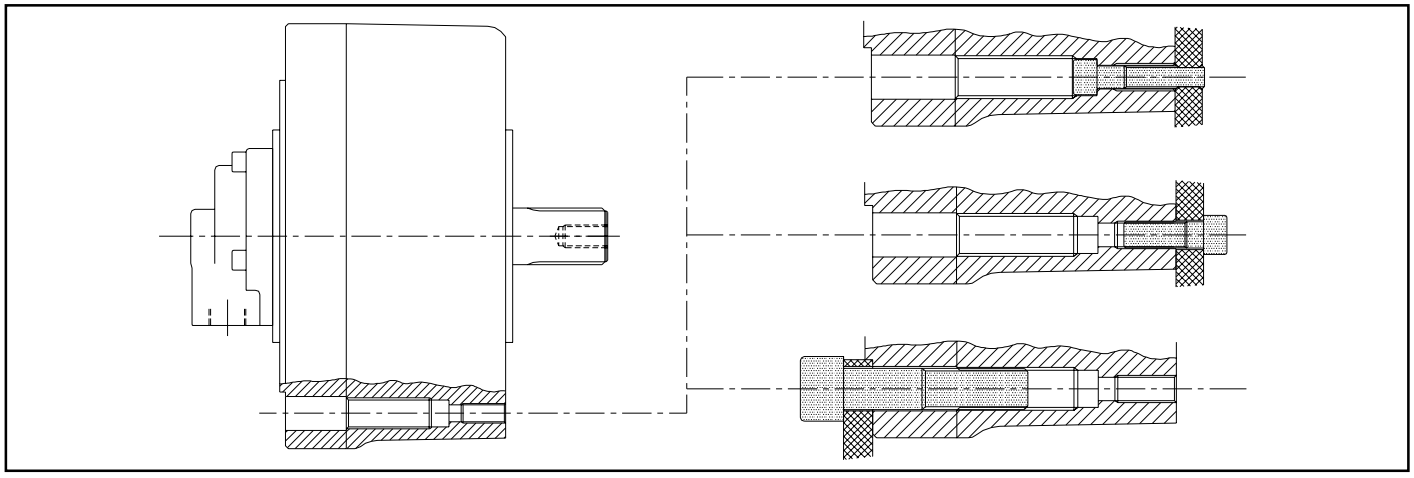
INSTALLATION

Before installing any motor ensure that it has not been damaged during transport. The design fo the GM-Series Motors enables a number of methods to be used to fix the motor to the chassis. NOTE: the thru bolt holes are not required for closing the motor body and cover. The diagram shows three possible methods for fixing the motor to a chassis.

1.) Bolt passing through motor from the distributor side screwed into a flange on the shaft side of the motor.

2.) Bolt passing through flange on the shaft side of the motor and screwed into the shaft side fillet of the motor.

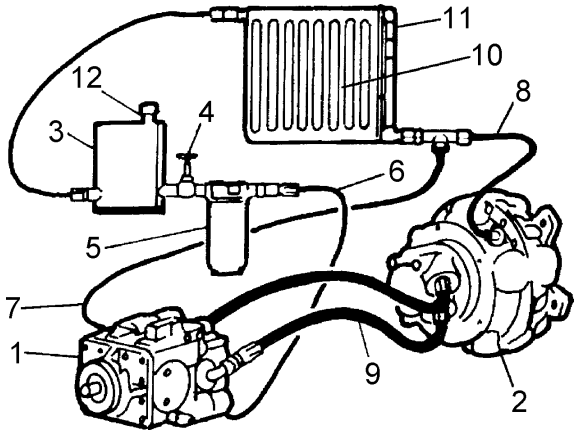
3.) Bolt passing through flange on the distributor side of the motor and screwed into the distributor side fillet of the motor.



NOTE: Installation type 1.) P05 and GM05 Series, with thru bolt M10, use washer size 10.5x18x2.

TYPICAL INSTALLATION OF A VARIABLE

1 Pump
2 Motor
3 Tank
4 Shut-off valve
5 Filter
6 Pump inlet
7 Pump drain
8 Motor drain
9 High pressure lines
10 Heat exchanger
11 By-pass
12 Tank filler cap



PIPING AND PIPE CONNECTIONS

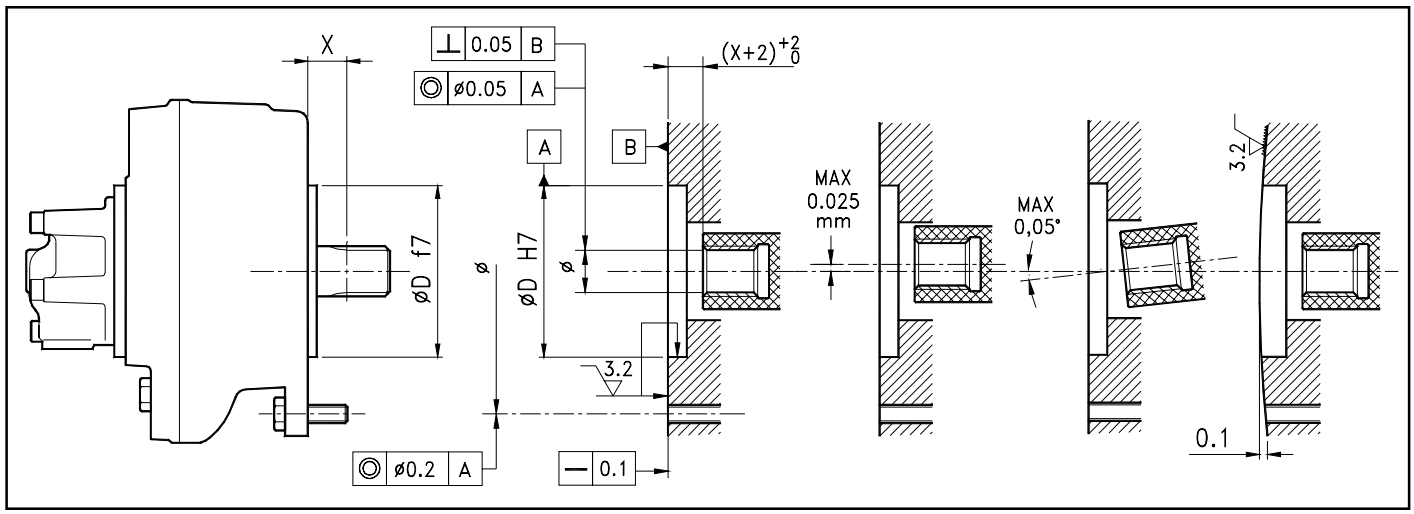
SAI recommends the use of high quality pipes and pipe connections for high pressure hydraulic applications.
Use only BSPP/GAS parallel thread connections; do not use tapered thread connections or water piping on all motor drain-lines. Follow manufacturer's recommendations for pipe sizing; do not use pipe sizes that are smaller than the port connections; to reduce the effects of oil compressibility use pipes with minimum length, minimum diameter and maximum rigidity; to reduce effects of pressure loss, avoid sharp corners, restrictions and high flow velocity.

PRESSURE LINES

SAI recommends the use of high quality flexible or rigid pressure pipelines. Follow pipe manufacturer's recommendations on appropriate sizes for different flow velocities, pressures and resistances. To minimize the effects of oil compressibility, pipelines should be kept to a minimum length, minimum diameter and maximum rigidity.

MOUNTING THE MOTOR

The motor must be mounted onto a rigid structure capable of withstanding the weight of the motor, the torque reaction forces and the vibrations during operation. The diagram below indicates the recommended tolerances of the mounting flange to which the motor is fixed.



DRAIN-LINE POSITIONING

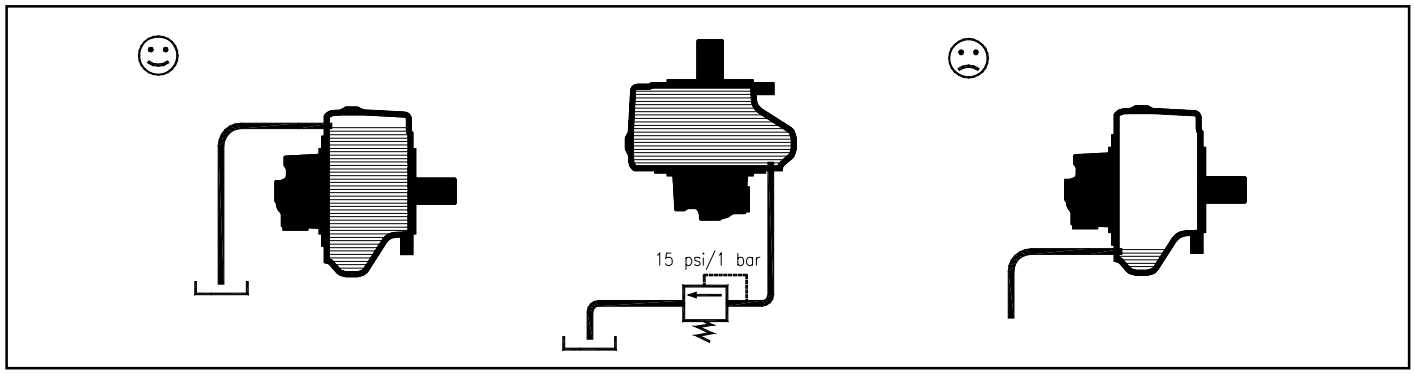
The drain-line must be positioned in such a way that there is always sufficient oil in the casing for the lubrication of the dynamic components in the motor.

If the motor is installed with the shaft in a horizontal position, the drain-line should be connected to the uppermost drain-line port.

If the motor is installed with the shaft pointing downwards, the drain-line can be connected to either of the two drain-line ports.

If the motor is installed with the shaft pointing upwards, the motor casing has to be entirely filled with oil before being installed and the drain-line connected in such a way that no air can enter into the motor casing so causing the front bearing to run dry. This is especially important if the motor operates at very low speeds or remains inactive for long periods. For alternative systems, contact your SAI representative.

The drain-line should be of a diameter corresponding to the size of the drain line port and flow must not be obstructed by sharp corners, restrictions, etc.

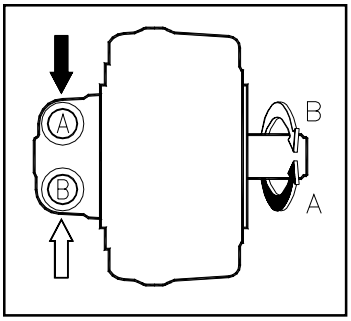


DIRECTION OF SHAFT ROTATION

All motors are bidirectional.

The direction of shaft rotation is determined by the direction of oil flow.

Standard motors are supplied so that flow entering in port A causes the shaft to rotate clockwise (as seen from the shaft side of the motor). Flow entering port B causes anticlockwise rotation. To invert the direction of rotation of the shaft, invert the direction of the flow, or invert port A and port B tube connections, or invert the phase of the distributor (see motor order codes, see the maintenance manual or contact SAI).



HYDRAULIC FLUIDS

For the choice of hydraulic fluid SAI recommends the use of high quality mineral-based hydraulic oil, containing anti-wear, anti-foaming, anti-oxidation and extreme pressure additives.

Allowable oil temperature range: 0°F to 175°F (-20°C to 80°C)
Operating viscosity range: optimal 40 cSt to 60 cSt
allowable 20 cSt to 150 cSt

Choice of hydraulic oil should be made so that the viscosity is within the given range at its normal operating temperature.

Recommeded hydraulic oils:

Temperature	TEXACO	B.P.	ESSO	SHELL	MOBIL	ISO rating
70 - 100°F	RANDO	HLP 32	NUTO H32	TELLUS 37	DTE 24	32
100 - 120°F	RANDO HD46	HLP 46	NUTO H46	TELLUS 46	DTE 25	46
120 - 140°F	RANDO HD68	HLP 68	NUTO H68	TELLUS 68	DTE 26	68
140 - 160°F	RANDO HD100	HLP 100	NUTO H100	TELLUS 100	DTE 26	100

FILTRATION

SAI recommends max. 25 μm filters, preferrably 10 μm. Clean oil and therefore efficient filters are essential for the correct functioning of all the components in the hydraulic system. The efficiency of the filters is impaired by the gradual accumulation of particles intercepted and filters should be regulary changed. Special attention is required when the hydraulic system is first put into operation or when any of the components are replaced or have become worn through use. The relative efficiency of a filter may be measured, for example, by taking regular readings of the pressure drop across the filter. Follow filter manufacturer's recommendations for filter element lifetimes and cleaning or replacement.

START UP

Before connecting any tubes ensure that they are clean, any excess material that could work loose should be removed. There should not be any oxidation of surfaces that come into contact with the oil. Make sure the motor casing is filled with oil. Before starting work, the hydraulic circuit should be purged of air. This can be achieved by running the motor without load for 10-20 minutes, during which time checks should be made for oil leaks. During the first few hours of working under load checks should be made for leakages from connections and ensure that all components remain firmly fixed to their supports. The motors are factory tested and do not require a wear in period.