



FMS 375

Flush Mount Spider Control Panel

T200979-1

Operation Manual

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GENERAL



The FMS 375 Operation Panel is used to run a flush mount spider, such as the Varco FMS 375, and a power tong, such as the Farr KT13625, from a single hydraulic power unit, such as the Texas International diesel unit, the TF6L914, or the Texas International electric unit, the T1136E.

It does this by supplying hydraulic fluid to the slips as a priority. When the slip circuit is fully satisfied, it supplies hydraulic fluid to the tong circuit.

It also supplies two different pressures to slips: one for up and one for down. The slips up pressure is usually much less than the slips down pressure.

Texas International's T200979-1 FMS 375 Control Panel contains the valving necessary for directional and fluid circuit control, and an auxiliary pump and accumulators for maximum system stability.

Valves, the slip pressure gage, the control lever and fluid connections are in the upper box: the auxiliary pump, the air connection and the accumulators are in the lower box.

The unit is supplied adjusted to a slips up pressure of 700 psi, a slips down pressure of 1900 psi.

The unit is constructed of heavy steel plate and sheet, with internal components hard mounted.

As preset, the accumulators allow at least one up or down cycle of slip movement at full pressure if the hydraulic power unit ceases operation.

SPECIFICATIONS

Maximum input pressure - 3000 psi

Recommended input pressure - 2300 psi

Minimum input pressure - 300 psi more than slips down pressure

Power unit & tong pressure connections - 1-1/4" Snaptite 78 series disconnects

Power unit & tong return connections - 1-1/2" Snaptite 78 series disconnects

FMS connections - #12 Aeroquip FD45 series disconnects

Accumulator precharge - 1300 psi

Accumulator volume - 10 gallons

Preset slips up pressure - 700 psi

Preset slips down pressure - 1900 psi

Gages (visible) - Slip pressure (either up or down)

Lever operator - 2 position (up or down) with lock

Air supply required - 50 SCFM at 100 psi

Recommended hose size - 3/4" ID

Minimum hose size - 1/2" ID

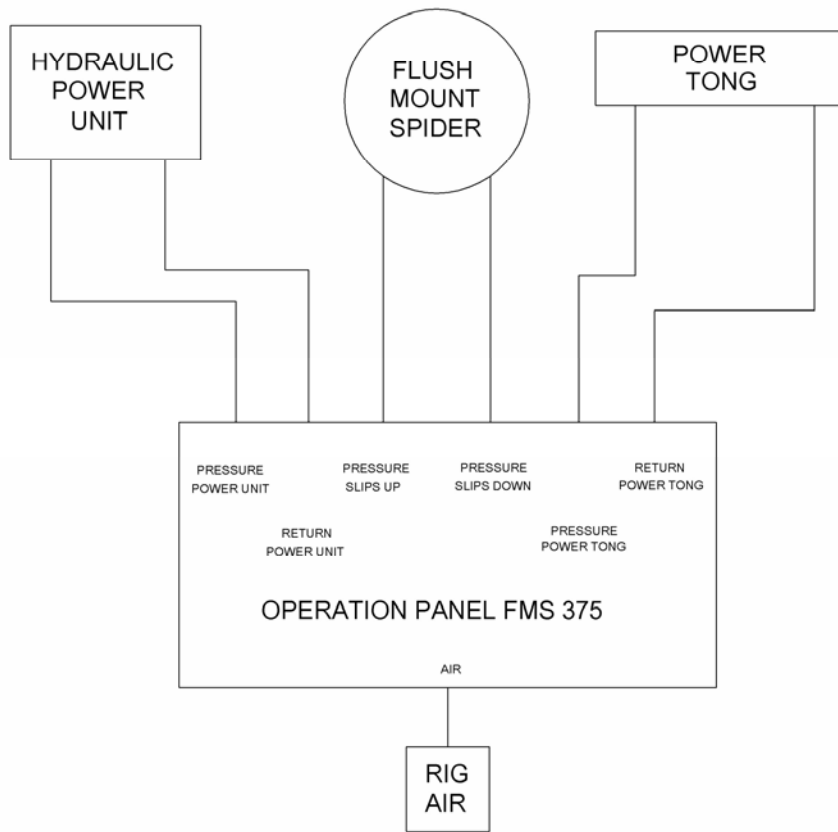
Disconnect type - 1/2" male standard industrial disconnect

Rated tong flow - 52 gpm

Box construction - MIG welded steel

Dimensions - 56" long X 25-1/2" wide X 30-1/2" high

Weight - 1015 pounds



FMS 375 PANEL CONNECTIONS

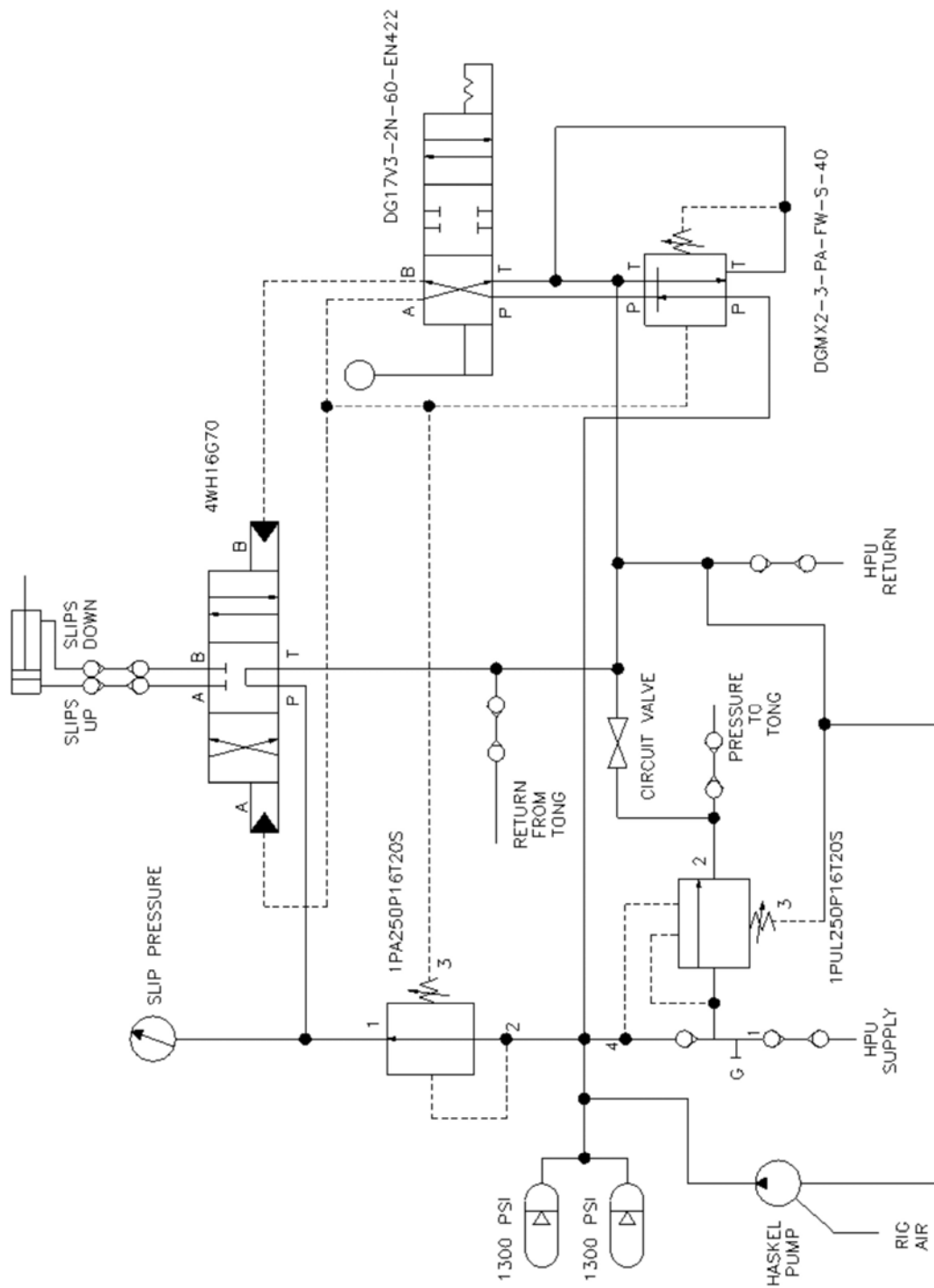
The panel has Snaptite 78 series disconnects for the power unit and tong connections, and Aeroquip FD45 disconnects for the flush mount spider connections.

Oversize power unit and tong hose sizes are 1-1/4" for pressure lines, and 1-1/2" for return lines so as to minimize pressure drop.

As the flow to the flush mount spider is much less, typically 3/4" lines are used.

The rig air connection is a 1/2" male standard industrial disconnect.

Connections are labeled on the top surface of the top box.



FMS 375 CONTROL PANEL CIRCUIT DIAGRAM

TECHNICAL DESCRIPTION OF OPERATION

Refer to the control panel circuit diagram.

Fluid entering the panel goes to the priority valve, the 1PUL250P16T20S. This valve controls the pressure that must be provided to the slip circuit before the tong circuit receives fluid. This is the main system pressure adjustment. If it is set very low there will be little pressure available for the slips. If it is set very high there will be no fluid available for the tong. The valve has an adjustment range of 441 psi to 3087 psi. It is preset to 2000 psi. In a system without an accumulator this valve would oscillate between maintaining pressure on the slips and supplying the tong about once a second depending on downstream leakage.

At the slips outlet of the priority valve there is a check valve preventing reverse flow. From there it goes to the main pressure reducing valve, the 1PA250P16T20S. This valve sets the minimum pressure supplied to the slip circuit (slips up pressure), which is when the B side of the 4WH16G70 main four-way valve is selected. It is settable from 147 to 3087 psi. Downstream of that valve is the main four way valve and the pressure gage so slip pressure may be read.

Also connected to the slips outlet of the priority valve are two five gallon accumulators charged to 1300 psi and the outlet of an AW-25 Haskel air/fluid pump. The inlet of the Haskel is supplied by the return line to the hydraulic power unit. Air supply to the Haskel is through a regulator preset to 75 psi. As the AW-25 has a 29:1 fluid/air ratio, the stall output is 2175 psi. In use, the pressure is typically 1950 psi, depending on how quickly the slips are cycled.

The accumulators and the Haskel pump stabilize the priority valve and as preset can supply fluid to close or open the slips should the hydraulic power unit drop out.

The slips outlet of the priority valve also supplies a second pressure reducing valve, the DGMX2-3-PA-FW-S-40. This second pressure reducing valve supplies the DG17V3-2N-60-EN422 manual four way valve. Its purpose is not to reduce the applied pilot pressure, but to increase the pressure setting

of the main pressure reducing valve when the A side of the main four way valve (slips down) is selected.

The circuit valve simply bypasses tong circuit output to the hydraulic power unit return line. It is almost always closed, the exception being when you want to run the slips only, with no tong connected, on an open circuit hydraulic power unit.

SETUP

1. Locate the panel convenient to the driller and where hoses can be connected easily and be of minimum length.
2. Route hoses so as to minimize the chances of their being cut or damaged or acting as tripping hazards during normal operations.
3. Short hoses are better as long as bends and kinks are avoided.
4. Run an air hose from rig air to the quick disconnect on the lower box. The rig end should have a shut off valve on it. The hose should be at least 1/2" ID and preferably 3/4" ID.

The air supply **does not** need an oiler.

5. The FMS 375 Operation Panel can be used with either an open center or closed center power unit. Both the Texas International TF6L914 diesel and T1136E electric power units are open center. Normally it's "plug and play", however, if an open center power unit is used and no tong is connected, **the circuit valve must be opened**. It is otherwise normally always closed. See the "Adjustments" section of this manual for how to do this.

If an open center power unit is used, the connected tong **must be open center**.

6. Insure the hydraulic power unit relief setting is 2000 to 2500 psi. More is better as long as it's within the safe operating limits of the hydraulic power unit.

OPERATION

1. Turn on the hydraulic power supply. This **must** be done before step 2 or the Haskel pump can be damaged.

2. Turn on the air supply to the FMS 375 Control Panel. The Haskel pump will begin operating. It is normal for the speed of the Haskel pump to vary: fast when first started or the available slip pressure is low, slowing or even stopping when the available slip pressure is high.

3. Visually verify there are no leaks.

4. Check the up and down slip pressures by moving the operating lever to the slips up and slips down positions. Wait for the slip movement to stop before checking the pressure. Make sure "SLIPS UP" is up and "SLIPS DOWN" is down. Reverse the connections at the spider if it is not.

5. Slips up pressure should not exceed 1000 psi unless the flush mount spider manufacturer recommends a higher pressure. It is preset at 700 psi.

Slips down pressure can't be more than the main control panel system pressure, or hydraulic power unit pressure minus about 300 psi. It is preset at 1900 psi.

Adjust these pressures **only if necessary**. See the "Adjustments" section of this manual.

6. Cycle the slips up and down a few times, and operate the tong unloaded and in high gear for a few minutes to clear any air out of the system. (This is only necessary when fluid connections have been broken.)



6. Move the operating lever to the "SLIPS UP" position to raise the slips and to the "SLIPS DOWN" position to lower the slips. Do not leave the lever in the middle: it must always be either up or down.

7. Operate the tong only when the slips are not moving. Attempting to operate the tong while the slips are moving can cause erratic tong operation.

8. Before shutting down the hydraulic power unit, shut off the air supply to the Operation Panel. This must be done before step 9 to avoid damage to the Haskel pump.

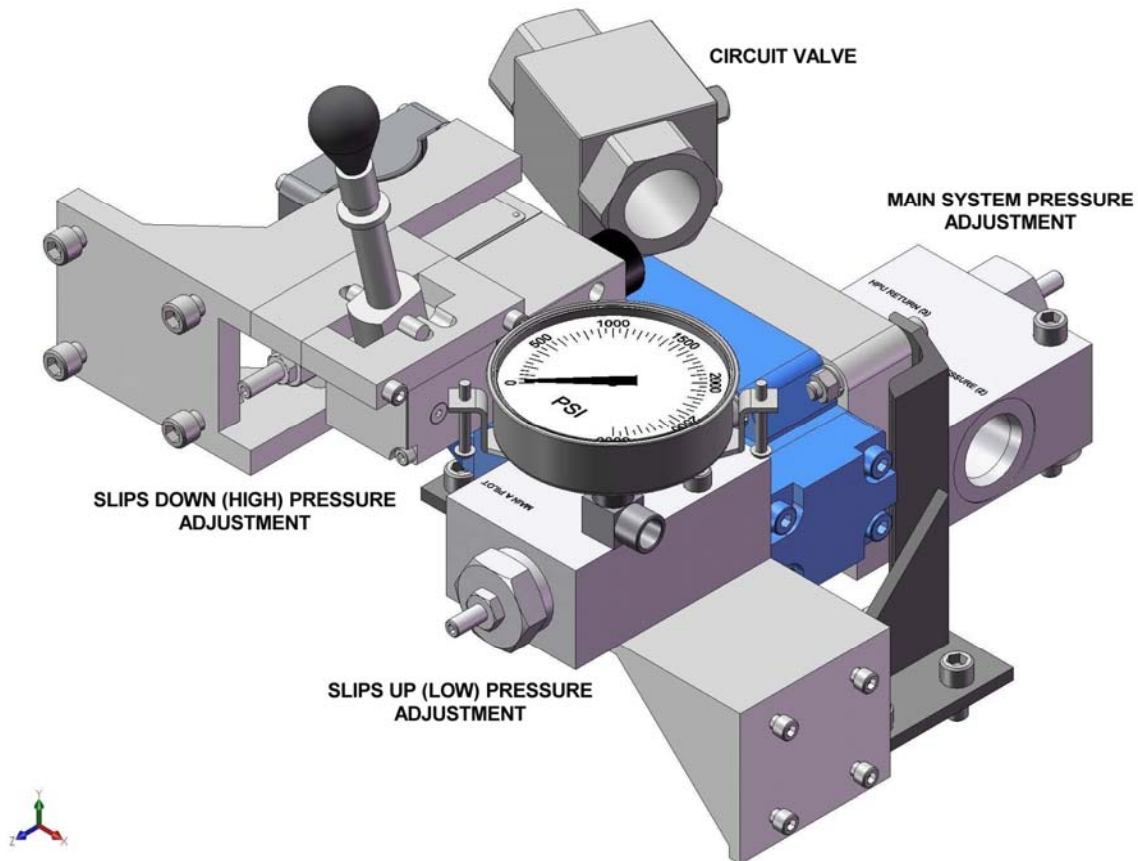
9. Shut down the hydraulic power unit.

10. Cycle the slips up and down to bleed off accumulator pressure until the slips stop moving.

The accumulators are like a compressed spring. Bleeding off the stored pressure is an essential safety measure.

ADJUSTMENT

Adjustment of the system should **only** be done when operation requires it. If done improperly you can make the system inoperable and/or unstable.



This is a view under the top cover of the top box. Plumbing is not shown. Remove the two 1/4" bolts holding the top down and lift the lid on its hinges to access the circuit valve and the main system pressure adjustment. Slips up and slips down pressures may be accessed from outside the box through holes in the box below the operation lever.

Adjustment (except the circuit valve) is done with the hydraulic power unit operating and the air turned on to the operation panel.

Circuit valve - this is left in the closed position for almost every combination of hydraulic power supplies and equipment. The only time it should be opened is when operating the spider by itself without a tong

connected, using an open center power unit. It is a 1/4 turn ball valve and requires a 9/16" open end wrench to turn it.

Slips down (high) pressure adjustment - this requires a deep socket to loosen the lock nut and a 5/32 Allen wrench to turn the adjusting screw. Turning clockwise raises the pressure, counterclockwise lowers the pressure. You won't be able to go higher than the main system pressure or lower than the slips up (low) pressure setting.

Slips up (low) pressure adjustment - this requires a deep socket to loosen the lock nut and a 5/32 Allen wrench to turn the adjusting screw. Turning clockwise raises the pressure, counterclockwise lowers the pressure. Changing this setting will affect the high pressure setting as well so readjust that as necessary after adjusting this.

Main system pressure adjustment - this requires a deep socket to loosen the lock nut and a 5/32 Allen wrench to turn the adjusting screw. Turning clockwise raises the pressure, counterclockwise lowers the pressure. If it is set too high or the hydraulic power unit relief is set too low the tong will not operate. To adjust, back it all the way out, turn it in until the tong just stops working, and back it out 1/4 turn.

Not shown above is one further adjustment, which is the air pressure supplied to the Haskel pump, which maintains accumulator pressure and stabilizes the system. There is a regulator inside the lower box set to 75 psi. The only reason to change it would be when slip down pressures exceeding 2000 psi were desired.

Contact Texas International before attempting to adjust the air pressure.