



FMS 375
Flush Mount Spider Control Panel
T200301
Operation Manual

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GENERAL

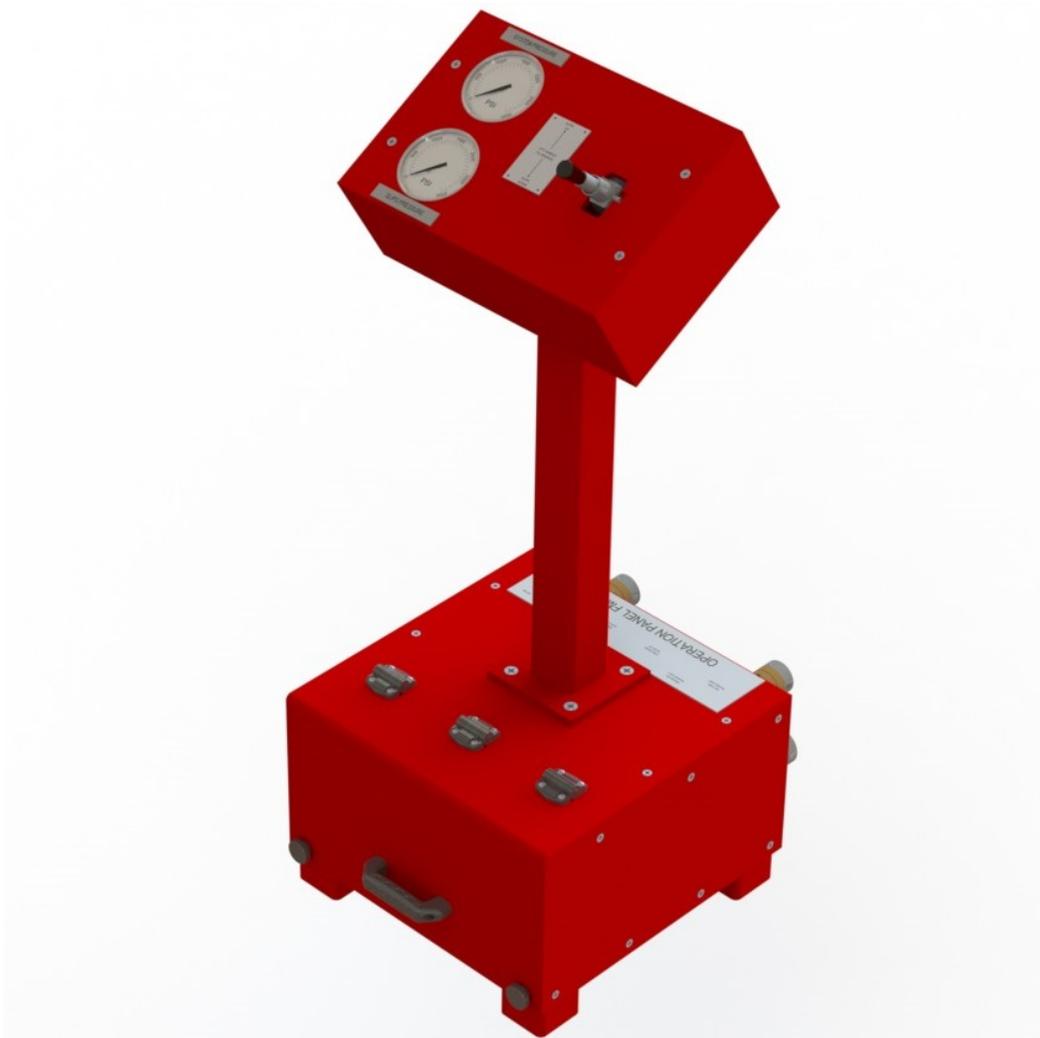


Figure 1: FMS Control Panel

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

The FMS Control Panel supplies hydraulic fluid to the slips as a priority. When the slip circuit is fully satisfied, it supplies hydraulic fluid to the tong circuit.

Texas International's FMS 375 Control Panel encloses the valving required for directional and fluid circuit control. The valves are contained in a single manifold block. The manifold and stainless steel plumbing connecting the main pressure and return lines are contained in the lower box. The control lever and pressure gauges are in the upper box. These are connected to the manifold in the lower box by hydraulic hoses

that run inside the column. The lever has a locking handle to keep system in the desired operation mode.

The control panel is set to “slips up” pressure of 900 psi, a “slips down” pressure of 2000 psi.

The unit’s frame is formed by a welded structure of angle iron and steel plates bolted to it for easy maintenance access and troubleshooting. The box door is attached to the top plate with hinges. The door can be opened and closed by using the handle attached to the door. The door is held shut with thumb screws so it can be easily opened for adjustments.

Conventions

IMPORTANT SYMBOL IDENTIFICATION	
	WARNING to Operators / Users
	CAUTION to Operators / Users
	NOTIFICATION to Operators / Users

Safety

Texas International’s equipment is used and installed in controlled rig environments involving hazardous operations and situations.

All personnel performing installation, operations, repair or maintenance on this panel or connected tools must have knowledge of rig procedure. All crew in the vicinity of operations should be trained on rig safety and tool operation. Crew must have been instructed for safe use of this control panel, as well as the FMS and Power Tong.

SPECIFICATIONS

Maximum input pressure - 2500 psi

Recommended input pressure - 2300 psi

Minimum input pressure - 300 psi more than slips down pressure

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

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

FMS connections - #12 Aeroquip FD45 series disconnects

Preset slips up pressure - 900 psi

Preset slips down pressure - 2000 psi

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

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

Rated tong flow - 52 gpm

Box construction - MIG welded steel

Dimensions - 18.5" x 18.5" x 47"

Weight - 275 pounds

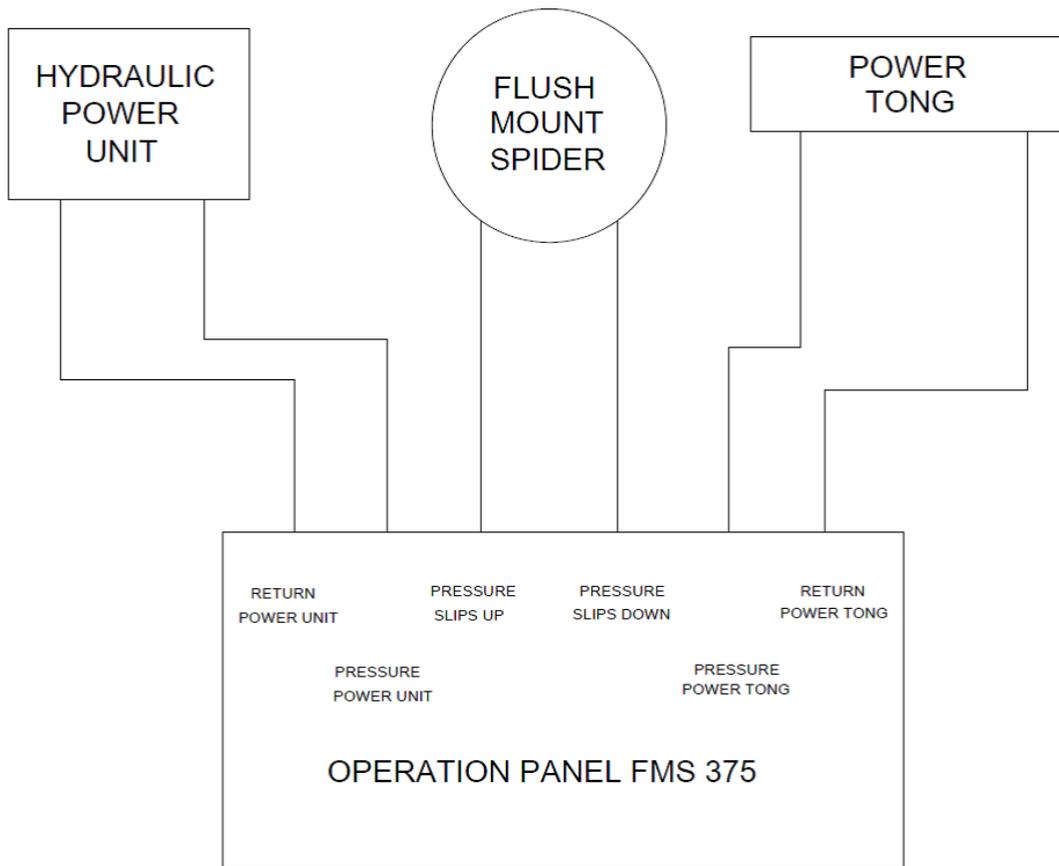


Figure 2: FMS 375 Panel Connections

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

Hose sizes are 1" for pressure lines, and 1-1/4" for return lines to minimize pressure drop.

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

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



Caution: Always connect hoses to correct ports. Ensure hoses are fully connected before operation

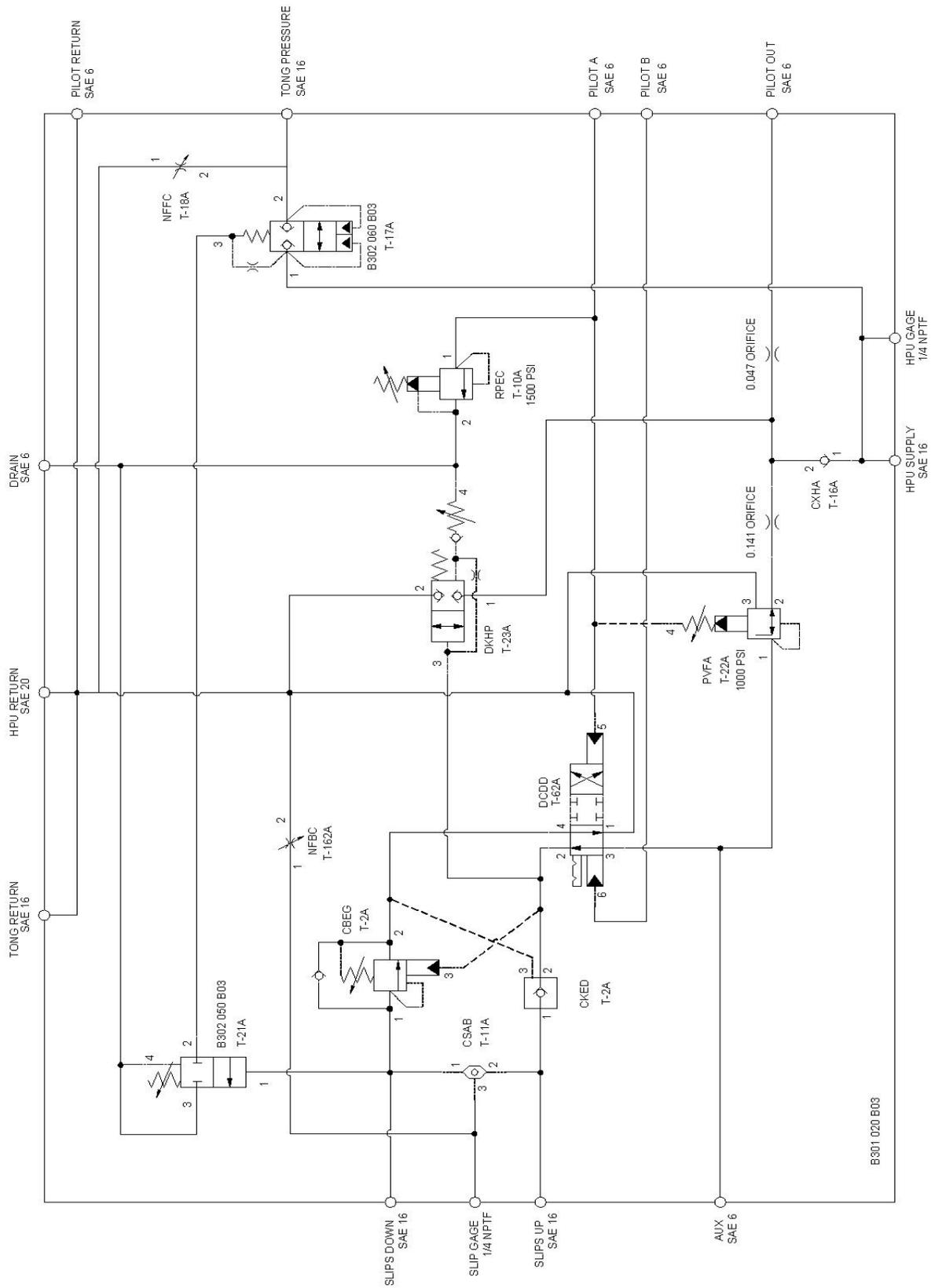


Figure 3: FMS 375 Control Panel Manifold Diagram

TECHNICAL DESCRIPTION OF OPERATION

Refer to the control panel circuit diagram.

This is a priority hydraulic circuit. System pressure is provided by a hydraulic power unit, which uses a fixed displacement gear pump powered by a diesel engine. A lever actuated directional control valve is used to switch the system from slips up to slips down. Pilot lines A, B, P, and T connect the directional valve DCDD to the control valve. Primary function of the system is to supply pressure to the slips.

“Slips up” pressure is controlled by the logic valve, DKHP. It is preset at 900 psi. While in the slips up setting, the pressure is not available to the power tong circuit.

“Slips down” pressure is controlled by the directional valve, B302-050-B03. Once the preset pressure is reached at port 1 of this valve, logic valve B302-060-B03 will open. When this valve opens, full system pressure will be directed to the power tong.

The pressure reducing valve, PVFA, and the pressure relief valve, RPEC, control the tong induced pressure. This ensures excess pressure from the tong does not get applied to the slips. PVFA is set to match slips up pressure. HPU diesel engine throttle will drop to near idle when full pressure is directed to the tong. The leakage should be brought to a minimum by the counterbalance valve, CBEG. Once slips down system pressure drops to 85% of the preset pressure, B302-050-B03 will trigger the logic valve. Pressure will flow back to supply pressure to “slips down”, and will trigger the logic valve again once “slips down” achieves preset pressure.



Note: In “slips down” condition, pressure on slips should never drop below 85% or preset pressure. Pressure loss on slips down (between CBEG Port 1 and the Slips cylinders) should be minimal.



Note: If secondary function (power tong) is not utilized, needle valve, NFFC, should be fully open

SETUP

1. Locate the panel on flat ground convenient to the driller and where hoses can be connected easily and be of minimum length.
2. Connect hose couplings. Route hoses so as to minimize their chances of being cut or damaged or become a tripping hazard during normal operations.
3. Short hoses are better as long as bends and kinks are avoided.
4. 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 instructions on how to do this.

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

OPERATION

1. Begin in “slips up” position. Turn on the hydraulic power supply.
2. Visually verify there are no leaks.
3. 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.
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 900 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 2000 psi.



Caution: 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.)



Figure 4: Top Panel

7. Move the operating lever to the "SLIPS UP" position to raise the slips and to the "SLIPS DOWN" position to lower the slips.
8. 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.
9. Shut down the hydraulic power unit.

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.

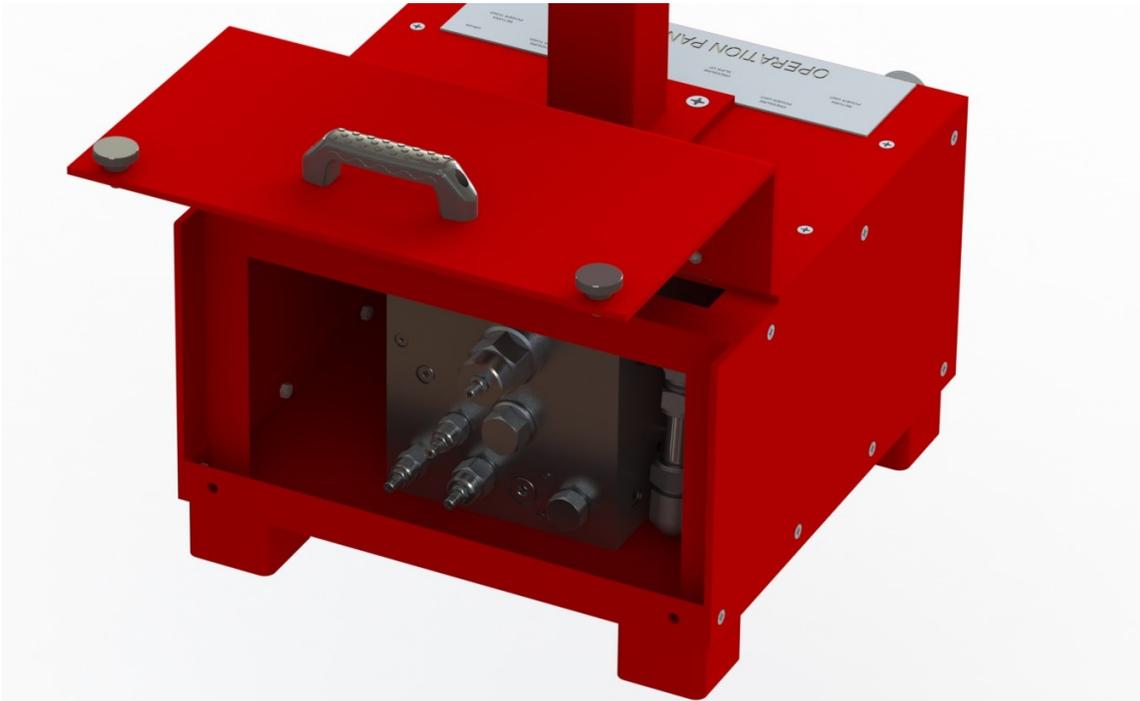


Figure 5: FMS with Door Opened

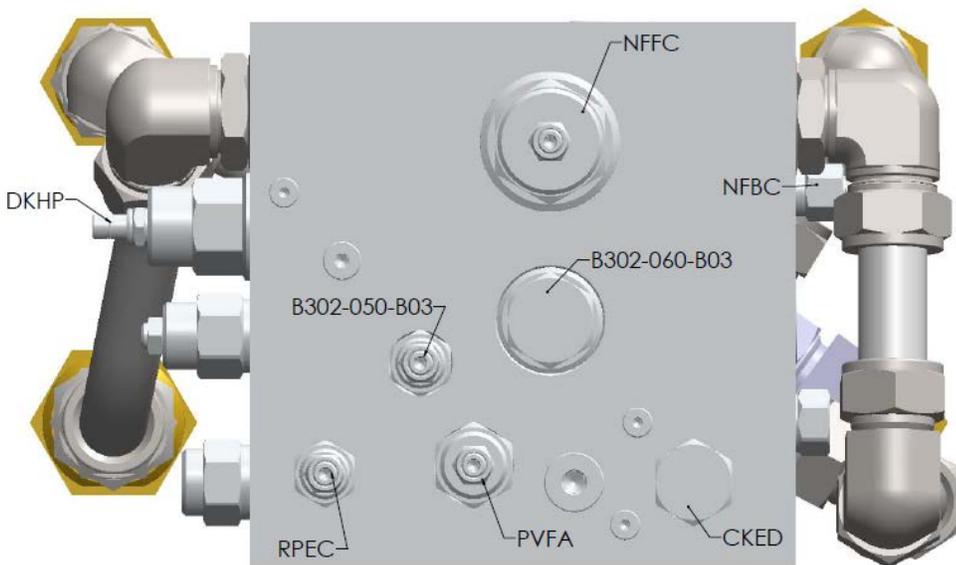


Figure 6: FMS Manifold Labeled

Figure 5 shows how the panel opens. Figure 6 shows the face of the manifold that is accessible underneath the hatch. Hydraulic hoses are not shown. Unscrew and lift the

lid on its hinges to access the circuit valve and the main system pressure adjustment. This face of the manifold contains the valves NFFC, B302-050-B03, B302-060-B03, RPEC, and PVFA as labeled in Figure 6.

Adjustment (except the needle valve) is done with the hydraulic power unit operating. All valves are adjusted in a similar manner. A 5/32 Allen wrench is used; clockwise rotation will increase pressure, counterclockwise rotation will decrease pressure. Adjustment valves can be locked to prevent changes. A 5/16 hex nut can be tightened to lock valve.

Needle valve (NFFC) – This valve 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 normally locked to prevent opening. 5 turns will transition from fully closed to fully open.

Slips up (low) pressure adjustment – “Slips up” pressure is locked at the preset 900 psi. This valve (DKHP) is located on the side; therefore the side panel would first need to be removed. Slips up should not be raised above 1000 psi. Relief valve PVFA should match DKHP. If DKHP is raised, PVFA must be compensated. If lowered, PVFA can be left unadjusted.

Slips down (high) pressure adjustment – B302-050-B03 controls slips down pressure. The pressure relief valve RPEC will have to be adjusted at the same time. The rate at which the system will drop to 85% and ramp back to 100% depends on these valves.



If B302-050-B03 is set too low, the system drop will decrease but rate will increase. If RPEC is set too low, slips down pressure may not be achieved



Note: Pressure readings are more accurate when adjusting these valves while system is in “slips up” position.

Bleeding the system- Needle valve NFBC is used to empty the system. It will remain closed while control panel is in use.

Maintenance

Do not operate on control panel while in use. Disengage connections and bleed system pressure before performing work on panel.

The FMS Control Panel is built of components that require little maintenance, i.e. stainless steel fittings and tubes. The following tables provide summary for maintenance requirements.

Daily Inspection

1. Check external hoses and fittings for leaks or damage
2. Check internal manifold, fittings, hoses, and tubing for leaks.

Monthly Inspection

1. Check internal connections. Tighten fittings if necessary.
2. Clean the inside of control panel.

Yearly Inspection

1. Check pressure gauges and control lever for function.



Caution: Disconnect lines and empty system pressure with valve NFBC before removing components

Troubleshooting

Many problems can arise by improper setup. Prior to troubleshooting the control panel, it is best to perform some routine checks.

- Check that the power unit is supplying correct pressure to system.
- Check for leaks at connections for tong, power unit, and slips.
- Check that all quick connects are properly secured

Storage and Transportation

Texas International's FMS 375 Control Panel should remain upright at all times. The control panel should remain palletized when being located. To lift the control panel, secure straps around the column. This should only be done to lift the control panel on a pallet.



Warning: Never lift or move the control panel while connected.

**Every Company has to have a Toolbox
at Texas International Oilfield Tools.**

We provide the tools to fuel the world!

