

## 5.0 NORMAL OPERATION

To prevent impurities from entering the hydraulic system, the system is also pressurized (2-6 bar) when not in operation. Depending on the installation, this is done by the jockey- or one feed pump. When reading this chapter, please be aware of the type installed in your system.

Circulation of hydraulic oil by the jockey- or feed pump to keep the hydraulic system pressurized, also gives a continuous air venting and filtration of the oil.

### 5.1 Start/ stop of power packs

5.1.1 Before starting the power packs, check the following:

- Hydraulic system tank oil level.
- That the cooling water pump for hydraulic oil cooler is running.
- That the ventilation fan for power packs is running.
- That necessary numbers of generators are running.
- That the potentiometer for system pressure is in minimum position.
- That the speed control valves for all consumers are in minimum position.

5.1.2 Start required number of power packs. Number of power packs running (oil delivery) should correspond to number of consumers to be operated (oil consumption). This to avoid too many power packs running at reduced capacity, causing increased running hours, wear and tear.

For automatic stop of power packs, see chapter 2.2.4.

**Note!** *If diesel hydraulic power packs are installed, running at low load condition should be limited.*

5.1.3 Set the system pressure to 15-25 bar above the highest consumer (hydraulic motor) if outdoor temperature is above 20°C. If the outdoor temperature is below 20°C, see 5.1.5

For automatic system pressure control, see chapter 2.2.5.

**Note!** *If the system pressure is set excessively higher than consumer (hydraulic motor) pressure, the surplus energy will change into heat and this loss of energy means waste of fuel.*

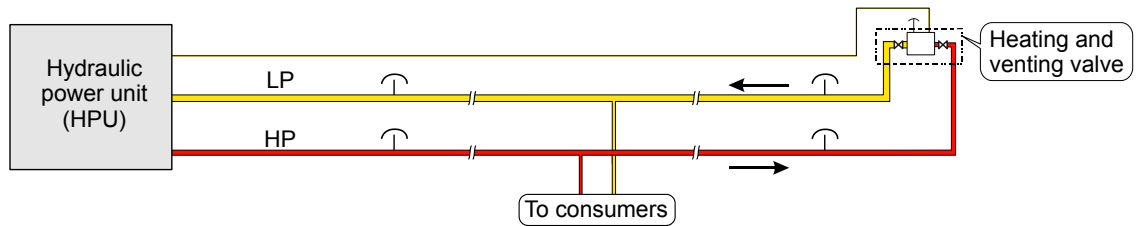
5.1.4 For operation of cargo pumps and other consumers, see separate instructions in chapter 8, section 1.

**Note!** *Never operate the system in a way that system pressure drops below 50 bar (only possible by starting too many consumers compared to the number of power packs running, if the hydraulic system adjustment is correct).*

*Fig. 1*

- 5.1.5 If the outdoor temperature is below 20°C, open the heating and venting valve for heating with only one power pack running at reduced hydraulic system pressure, refer to fig.1 and 2.

Operation of the heating and venting valve is remotely controlled from the control panel. (Manual override possible from system tank)



*Fig. 1*

Refer to chapter 2.2 for operating conditions.

## Operation temperature for Framo systems

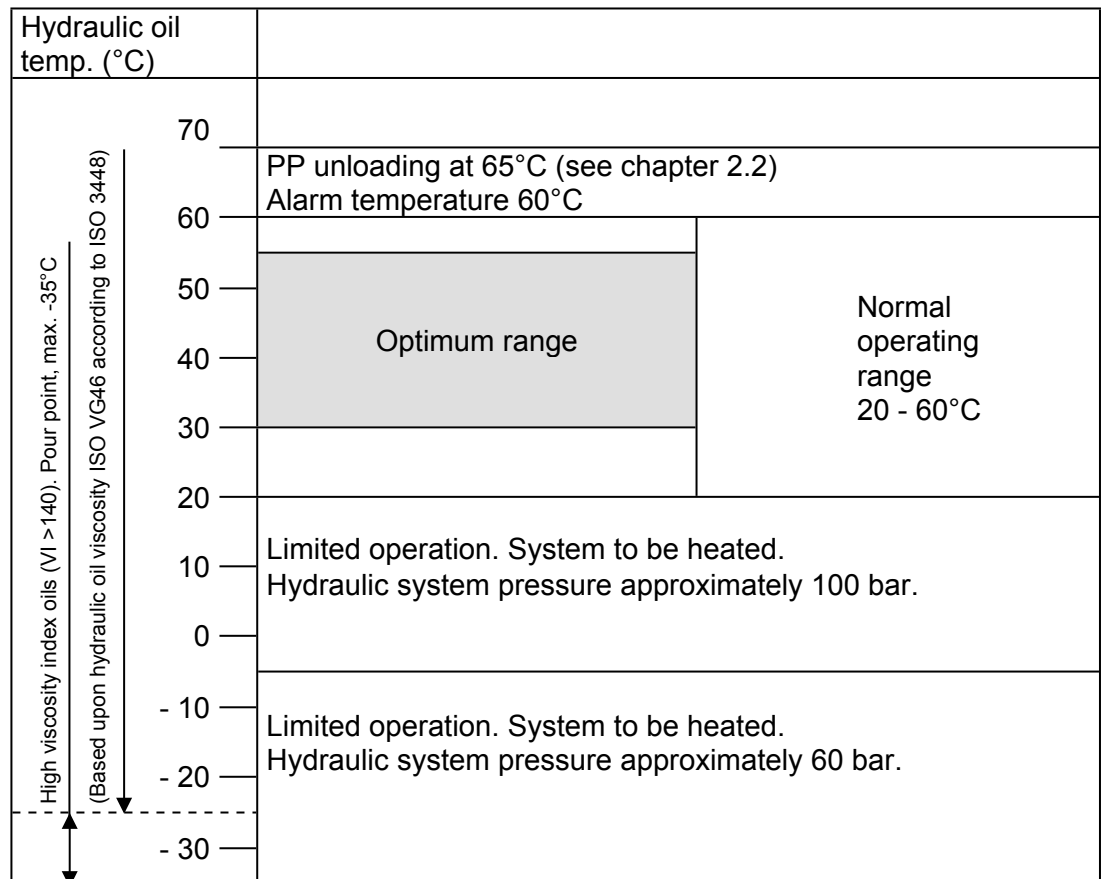


Fig. 2

5.1.6 After operation of the system is completed and the power packs are not to be used, the system should be stopped in the following sequence:

- Reduce the hydraulic system pressure to minimum.
- Stop the power packs.

**Note!** *Always leave the jockey- or one feed pump running to keep the hydraulic system pressurized. All valves in main return line and ball valves in front of the cargo pumps and other consumers must be open, unless required closed for service.*

## 5.2 Emergency stop

It is important that emergency stop buttons are used in emergency only and not for operational stop of the system. An emergency stop stresses the system, and should be avoided.

The following conditions lead to shut-down of the system:

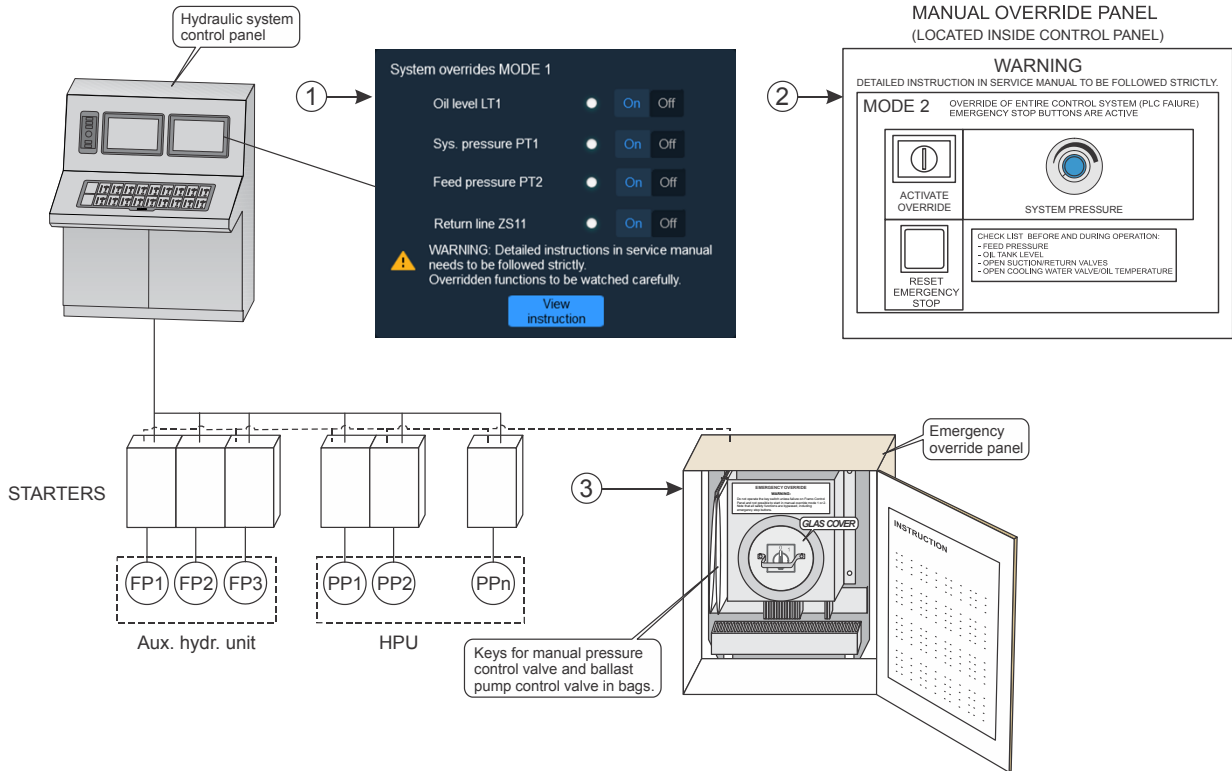
- Low low oil level in tank.
- Closed valve in return line.
- Low feed pressure (depending on the installation).

After a shut-down the error must be located and repaired before restart.

For restart:           Reset system. Refill oil if necessary in accordance with normal procedures. Vent the system thoroughly and start up in accordance with normal procedures.

## 5.3 Manual/ Emergency override

In case of control system failure, following override functions are provided:



**Note!** *These panels must be used in critical situations only. Serious damage to equipment and personnel injuries may occur by improper use, and acceptance by authorized personnel must therefore be given before using the manual override functions. Verify cause of shut down and decide which override function to be used.*

- ① **Mode 1** overrides individual automatic shut down functions. Individual active shutdown function can be overridden at the Framo cargo control panel located in CCR (Cargo Control room). At the Framo HMI, select "Settings" -> "Manual override". Manual override may be used when malfunction of a sensor, loose termination etc. causes automatic shut down of the hydraulic system. For example if the hydraulic oil tank level sensor is indicating shutdown level, but it has been verified that the actual oil level is within normal limits.
- ② **Mode 2** overrides all shut down functions except manual emergency stop function. It is engaged by a key switch, and may be used in case of PLC failure. Require healthy power supply, emergency stop push buttons with related EEx relays, override relays and wiring between control panel and starters. For override of cargo pumps and other pumps, see separate instruction for pump remote control valves in chapter 8, section 1.
- ③ **The emergency override panel** overrides the entire control system and the manual emergency stop function. It must only be used for emergency operation of ballast pumps if Mode 2 has been tried without success. The panel is normally located close to the starters.

For operation, see separate instruction, chapter 8.1. The operation procedure is also located inside the panel.

## 5.3.1 OPERATING PROCEDURES FOR MANUAL OVERRIDE

### Mode 1

- Open the control cabinet door for access to the manual override panel.
- Operate the push button corresponding to the function that must be overridden.  
*The shut-down or alarm indicating lamp for the selected function will start flickering, and the manual override lamp will light steadily.*
- Start and operate the system according to normal procedure.
- Check the overridden functions at regular intervals before- and during operation.  
When for example the oil level shut down function is overridden, the tank level must be watched manually.  
It is recommended to locate a warning sign locally at the overridden sensor.

The system will automatically be reset to normal mode one hour after an override function has been activated if no power packs have been started in the meantime. It will also be automatically reset to normal mode after stopping all power packs, (operator must reinitiate before restarting is possible if the failure remains). Additionally it is possible to reset manually to normal mode by activating the reset button for 5 seconds, but only if no power packs are running.

*After operation, the failure must be corrected immediately.*

### Mode 2

- Open the control cabinet door for access to the manual override panel.
- Activate the Mode 2 key switch. *Manual override lamp will light steadily.*
- Set system pressure command/potentiometer on control panel to minimum.
- Start two of the feed pumps locally on starter.
- Start required number of power packs locally on the starters.
- Set desired system pressure by means of the potentiometer on control panel.
- Operate consumers.
- If it is necessary to start more power packs, reduce system pressure to minimum before start. Alternatively the hydraulic pump unloading valve can be manually operated locally according to procedure no. 1400-0534-4, chapter 2.3. (separate instruction in chapter 8, section 1)

Checks to be performed at regular intervals before- and during operation:

- Visual inspection of hydraulic system tank oil level.
- Visual inspection of critical valve's position, i.e. before oil cooler, after main filter and local service valves for power packs in operation.
- Verification of cooling water supply and hydraulic oil temperature.

**Note!** *The failure must be corrected immediately after operation to avoid unnecessary use of this very critical mode. PLC failure must be reported to Framo Services immediately.*