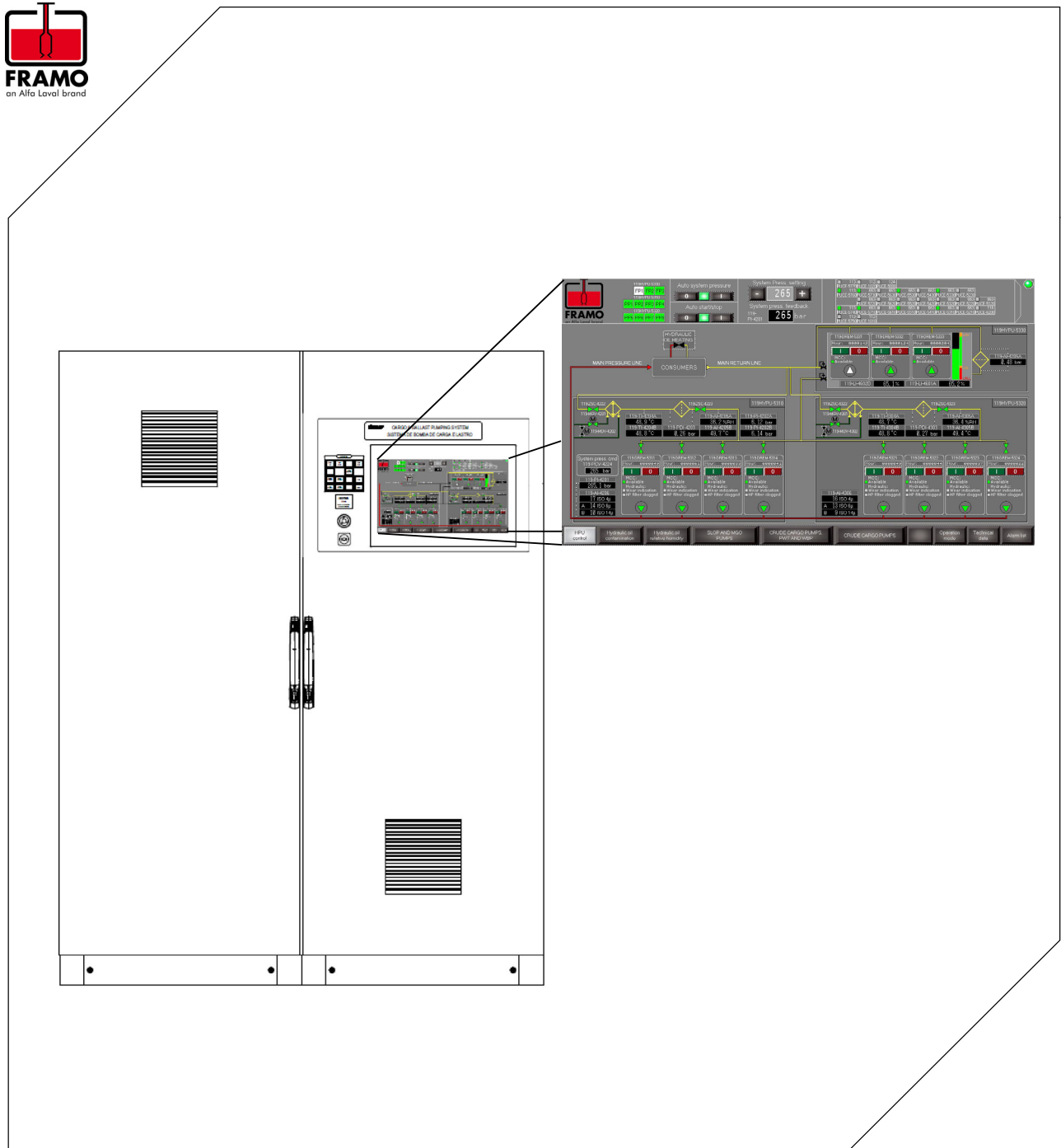


Framo

Framo Control Panel HMI

No. 0143-0867-4
01.11.2018/KVa

Instruction / Operation Manual





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1 Preface

The Framo system is built up as one system, comprising of HPU and pumps.

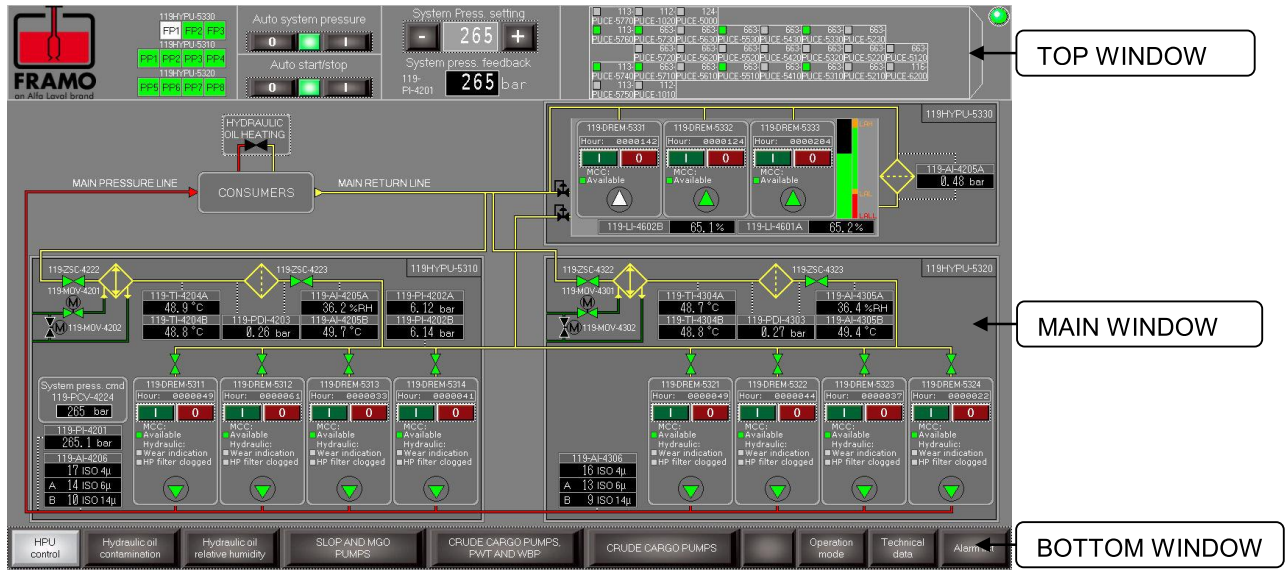
The main operator station is ICSS, however the system can also be operated locally from the Framo UCP.

The UCP is provided with a 19" color touch display HMI (human-machine interface) communicating with a PLC (Programmable Logic Controller), routing all command- and feedback signals.

ICSS communicates with the Framo UCP through redundant MODBUS TCP links.



2 Screen layout



The screen is divided into three windows:

Top window: Hydraulic system information, pump status.

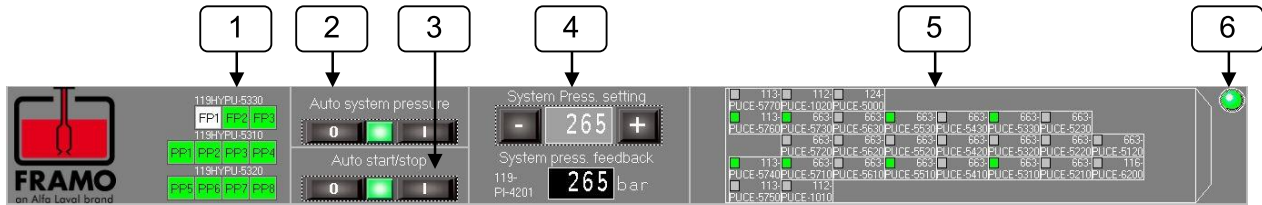
Main windows:

1. Monitoring and control of Hydraulic power unit (HPU).
2. Hydraulic oil contamination graph.
3. Hydraulic oil relative humidity graph.
4. Stop and MGO pump control
5. Crude cargo pumps, PWT and WBP control.
6. Crude cargo pumps control.
7. Operation mode selection.
8. Technical data.
9. Alarm list.

Bottom window: Selection of main windows.

The top and bottom windows are displayed continuously regardless of operator's selection of main windows.

3 Top window



- 1) Running status for hydraulic power packs and feed pumps.
- 2) Auto / manual system pressure command.
Regulates system pressure to 25 bar above the highest pressure feedback for hydraulic driven pumps.
- 3) Auto start / stop of power packs based on calculated oil flow required.
- 4) System pressure command and feedback. Increase/decrease command by ± 1 bar or numeric keypad input (pop-up by pressing the numeric field).
- 5) Location and running status of pumps.
- 6) Alarm lamp.

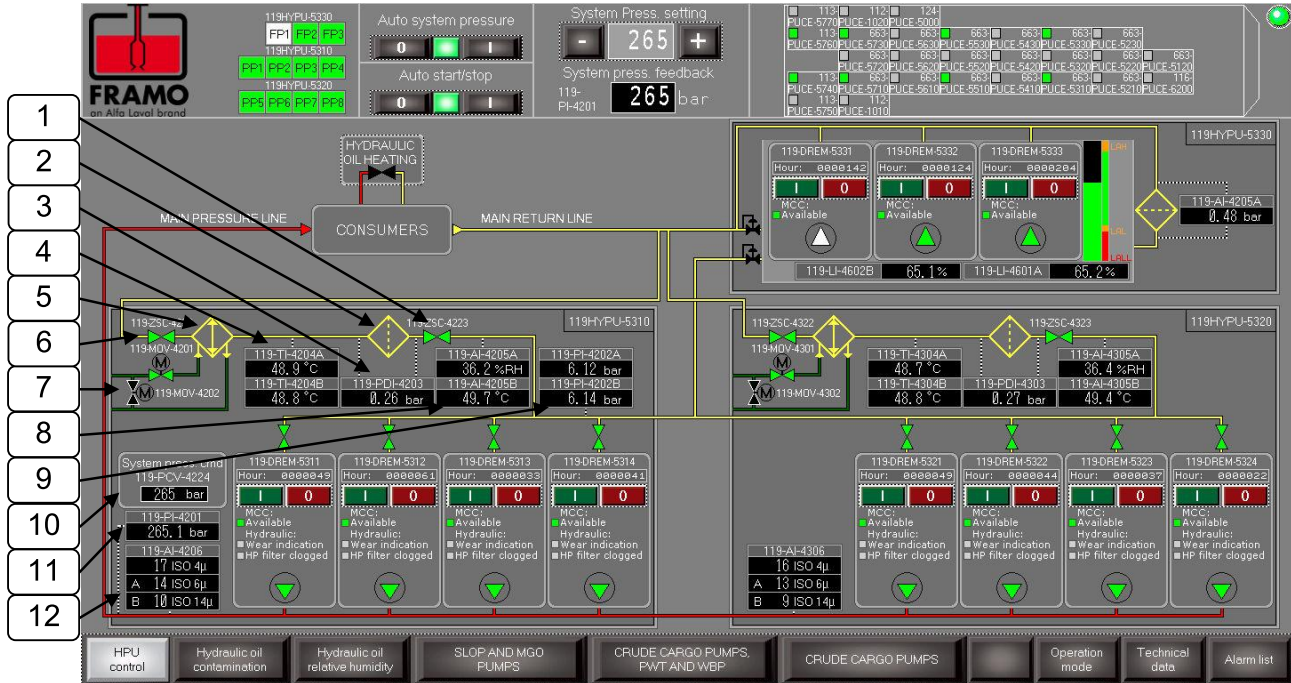


When the system is in remote mode (ICSS control), this message appears in the top window.

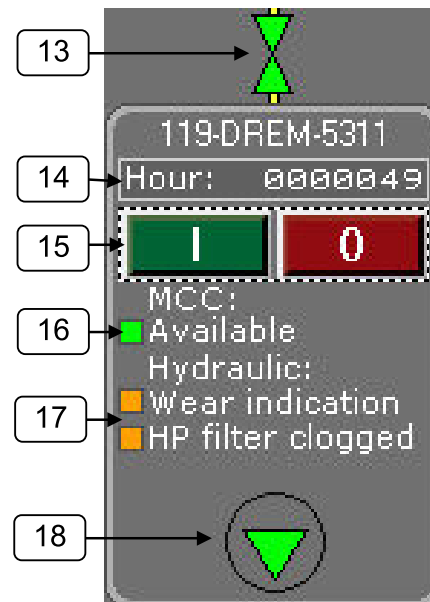


4 Main windows

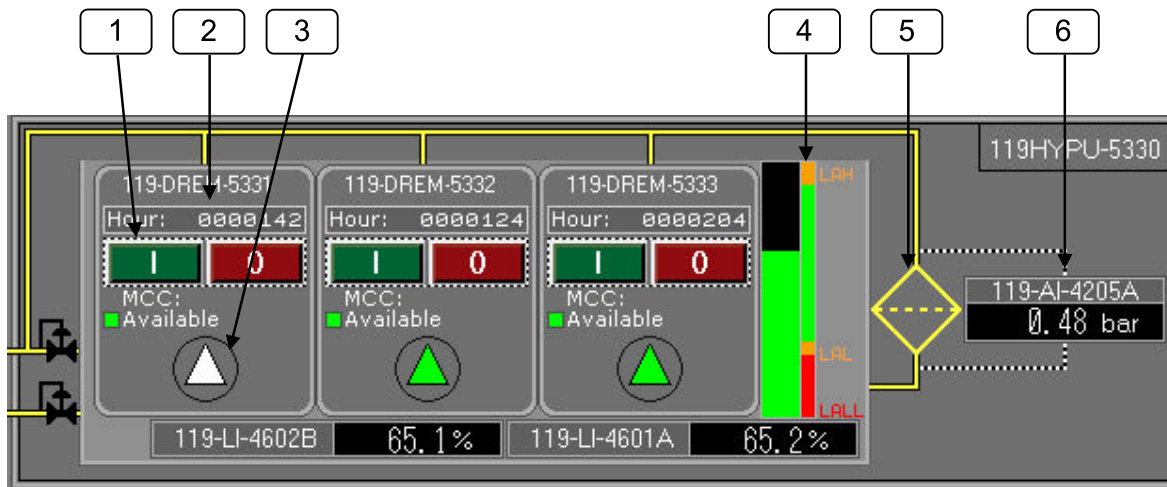
- 4.1 HPU Control



- 1) Return line valve status.
- 2) Hydraulic oil filter.
- 3) Hydraulic oil filter Δ pressure.
- 4) Hydraulic oil temperature.
- 5) Hydraulic oil cooler.
- 6) Return line valve status.
- 7) Cooling and bypass valves.
- 8) Hydraulic oil relative humidity.
- 9) Feed pressure.
- 10) System pressure command.
- 11) System pressure feedback.
- 12) Hydraulic oil contamination.
- 13) Suction valve status.
- 14) Power pack running hours.
- 15) Power pack start / stop.
- 16) Available from MCC.
- 17) Power pack hydraulic status.
- 18) Power pack status.

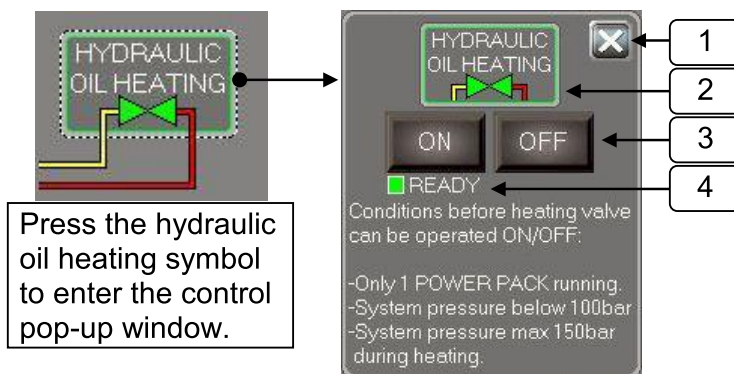


Feed pumps:



- 1) Feed pump control, start / stop.
- 2) Feed pump running hours
- 3) Feed pump status.
- 4) Hydraulic oil level.
- 5) Kidney filter.
- 6) Kidney filter Δ pressure.

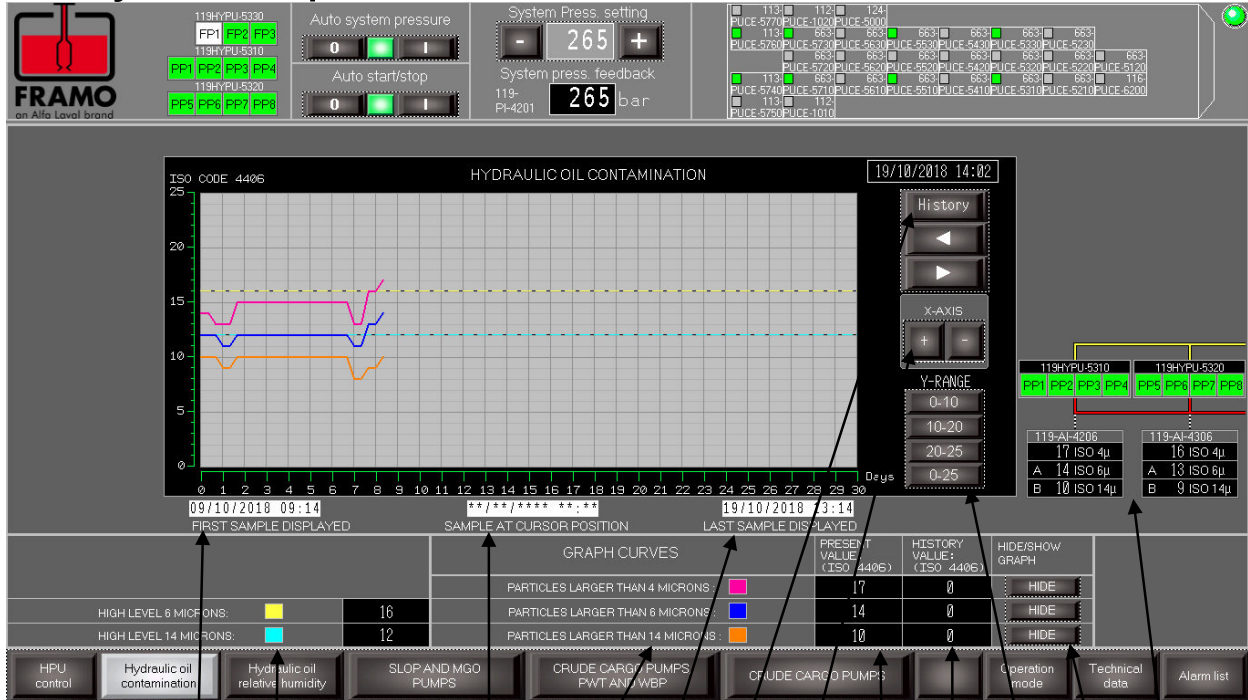
Heat mode:



- 1) Exit control pop-up window.
- 2) Hydraulic oil heating status.
- 3) Control heating, on / off.
- 4) Ready to activate hydraulic oil heating.



- 4.2 Hydraulic oil particle counter

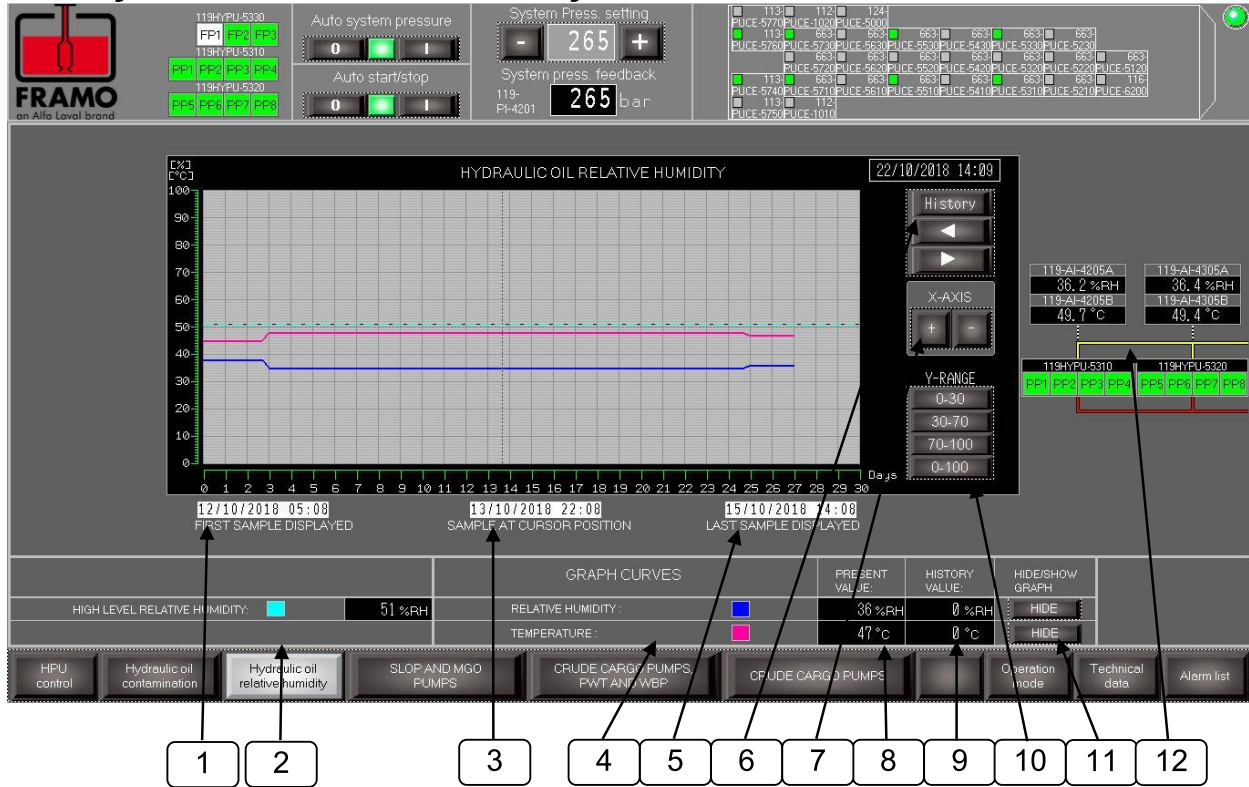


- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

The graph shows the last 30 days of operating time. Earlier trend data can be displayed in "History mode". Graph is updated only during operation of HPU, once an hour. X-axis can be zoomed, 0-3.75 days to 0-30 days.

- 1) Time and date for first sampling shown in graph.
- 2) Alarm limits.
- 3) Time and date for cursor (When in historic mode).
- 4) Graph colors.
- 5) Time and date for present sampling shown in graph.
- 6) Chang to historical mode.
- 7) Zoom X-axis.
- 8) Present numeric value (graph data).
- 9) Historical numeric value (when in historic mode).
- 10) Zoom Y-axis.
- 11) Hide graphs.
- 12) Present value HPU A and HPU B.

- 4.3 Hydraulic oil relative humidity

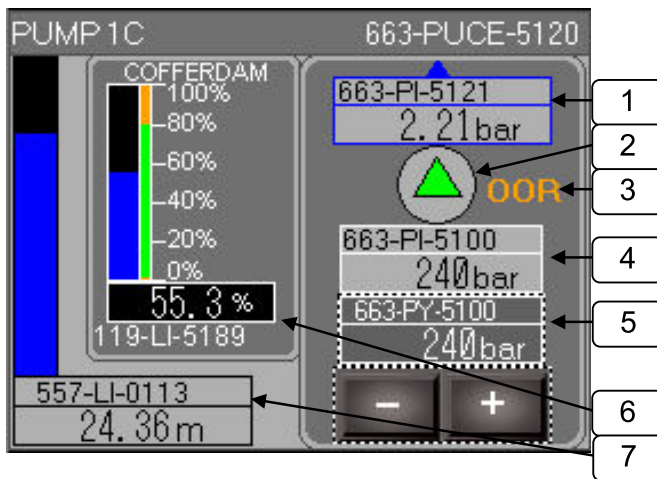
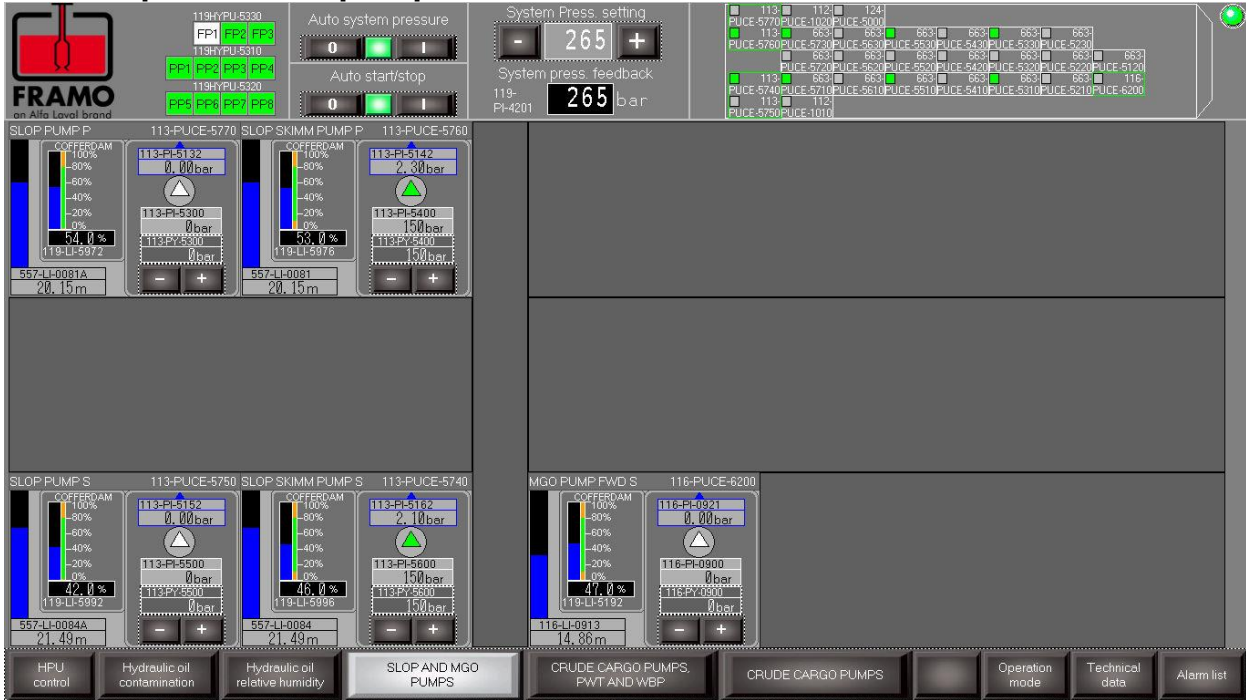


The graph shows the last 30 days of operating time. Earlier trend data can be displayed in “History mode”. Graph is updated only during operation of HPU, once an hour. X-axis can be zoomed, 0-3.75 days to 0-30 days.

- 1) Time and date for first sampling shown in graph.
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- 6) Chang to historical mode.
- 7) Zoom X-axis.
- 8) Present numeric value (graph data).
- 9) Historical numeric value (when in historic mode).
- 10) Zoom Y-axis.
- 11) Hide graphs.
- 12) Present value HPU A and HPU B.



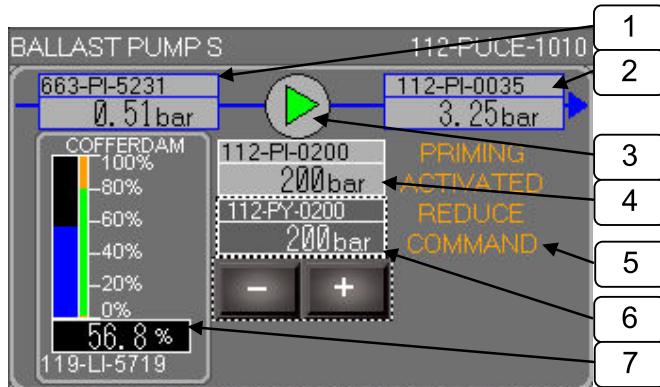
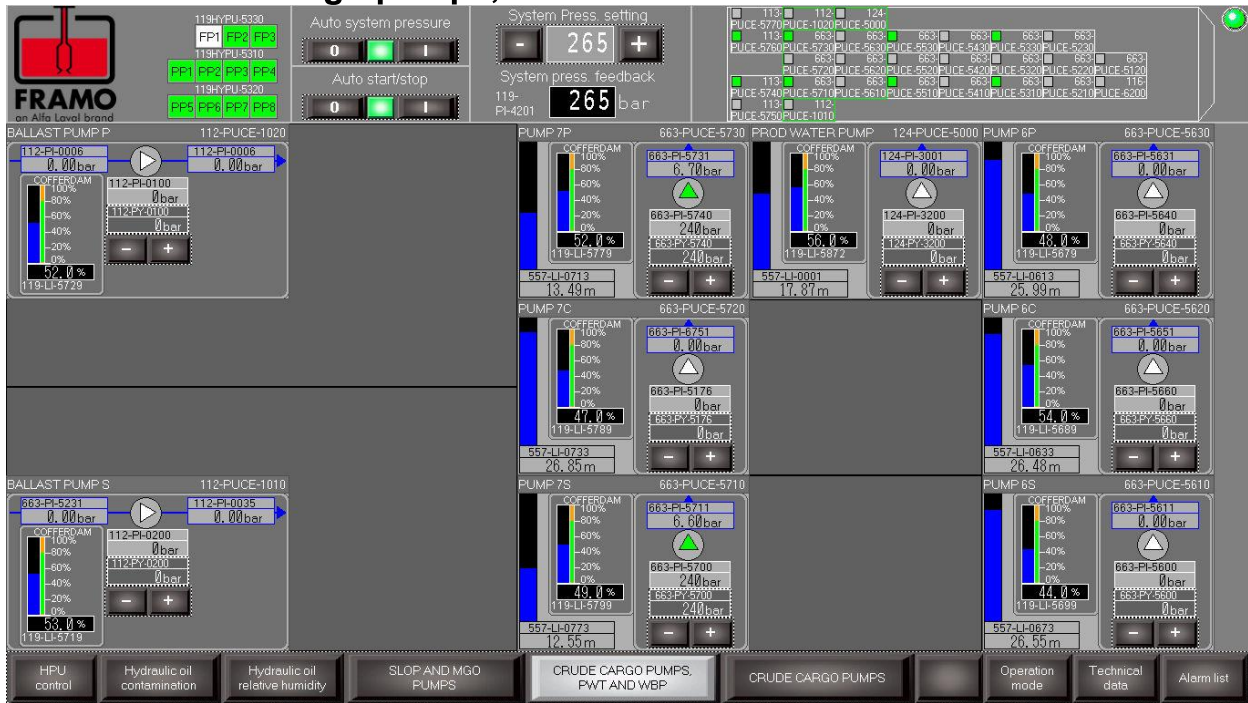
- 4.4 Slop and MGO pumps



- 1) Pump discharge pressure.
- 2) Pump status.
- 3) Out of range operation warning.
- 4) Pump hydraulic feedback.
- 5) Pump hydraulic command. Increase/decrease command by ± 1 bar or numeric keypad input (pop-up by pressing the numeric field).
- 6) Cofferdam level monitoring.
- 7) Tank level.



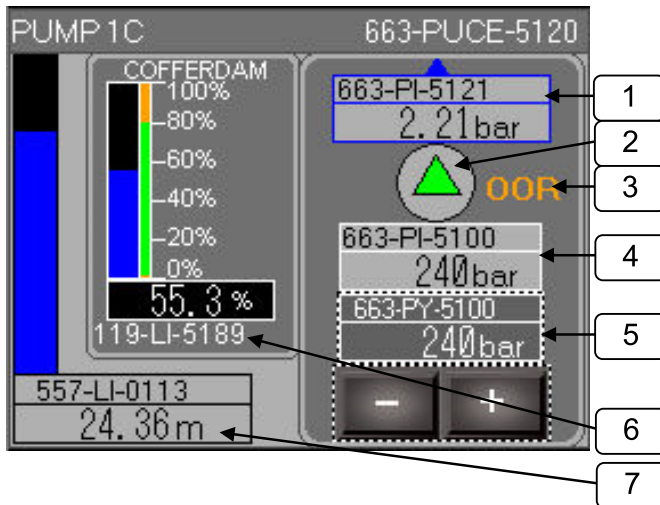
- 4.5 Crude cargo pumps, PWT and WBP



- 1) Pump suction pressure.
- 2) Pump discharge pressure.
- 3) Pump status.
- 4) Pump hydraulic feedback.
- 5) Priming activated info.
- 6) Pump hydraulic command. Increase/decrease command by ± 1 bar or numeric keypad input (pop-up by pressing the numeric field).
- 7) Cofferdam level monitoring.



- 4.6 Crude cargo pumps



- 1) Pump discharge pressure.
- 2) Pump status.
- 3) Out of range operation warning.
- 4) Pump hydraulic feedback.
- 5) Pump hydraulic command. Increase/decrease command by ± 1 bar or numeric keypad input (pop-up by pressing the numeric field).
- 6) Cofferdam level monitoring.
- 7) Tank level.



- 4.7 Operation mode

- 4.7.1 Operating mode security level

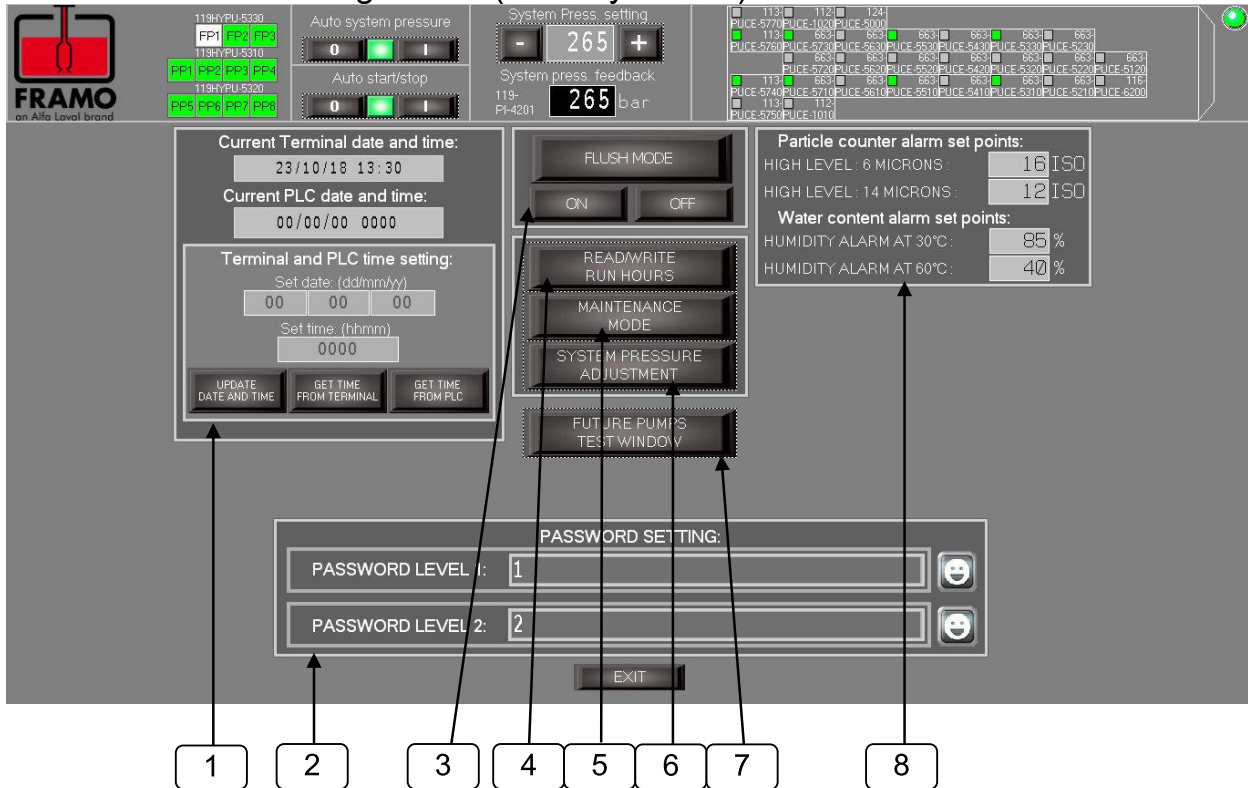


When security level is changed, the popup in header window disappear.





4.7.2 Configuration (security level 2)



- 1) Manually setting of new time and date. Press input field to enter new value, or select time from terminal or PLC. During normal operation, time will be automatically synchronized with ICSS time.
- 2) Press input field to enter new password for security level 1 and 2.
- 3) Activate / deactivate flush mode.
- 4) Press to enter read write run hours window.
- 5) Press to enter maintenance mode window.
- 6) Press to enter system pressure adjustment window.
- 7) Press to enter future pumps test window. (Only to be used for signal testing.)
- 8) Particle counter and water content alarm set point. Press input field to enter new value.



4.7.3 Read / write run hours (security level 2)

EDIT RUN HOURS.
ENTER NEW VALUE THEN
PRESS "WRITE" BUTTON
TO CHANGE RUN HOUR.
THE OPERATION IS
NOT REVERSIBLE!

READWRITE
RUN HOURS HPU

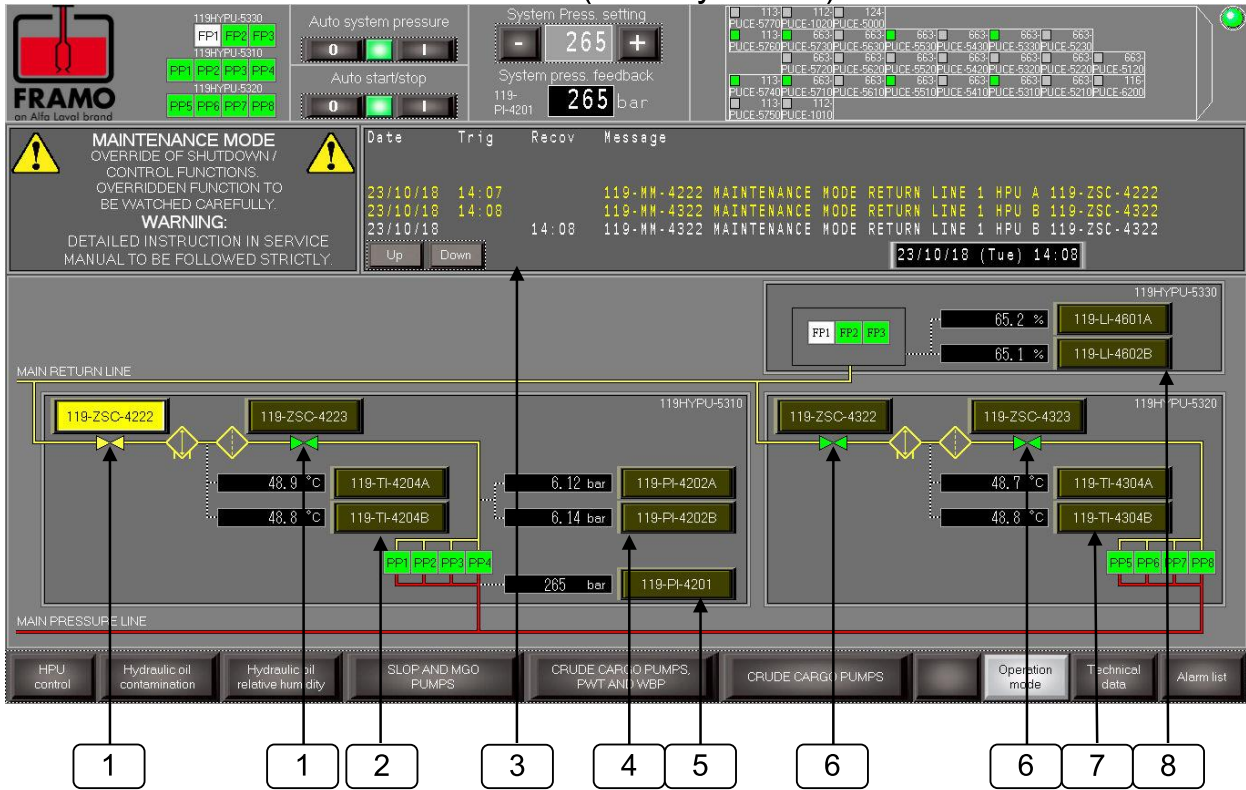
PUMPS	Run hours:
663-PUCE-5120	0000024
663-PUCE-5310	0000021
663-PUCE-5320	0000011
663-PUCE-5330	0000025
663-PUCE-5510	0000023
663-PUCE-5520	0000014
663-PUCE-5530	0000018
663-PUCE-5710	0000004
663-PUCE-5720	0000012
663-PUCE-5730	0000014
112-PUCE-1010	0000019
113-PUCE-5740	0000021
113-PUCE-5750	0000027
116-PUCE-6200	0000017
663-PUCE-5210	0000008
663-PUCE-5220	0000009
663-PUCE-5230	0000022
663-PUCE-5410	0000012
663-PUCE-5420	0000014
663-PUCE-5430	0000013
663-PUCE-5610	0000007
663-PUCE-5620	0000011
663-PUCE-5630	0000014
112-PUCE-1020	0000012
113-PUCE-5760	0000017
113-PUCE-5770	0000019
124-PUCE-5000	0000011

1 2 3 4

- 1) Press numeric field to enter new value.
- 2) Press to write new value to hour counter
- 3) Hour counter value.
- 4) Read / write run hours HPU.

This operation is not reversible! The function is only to be used to set the correct hour counter value after PLC software update or changing of equipment.

4.7.4 Maintenance mode (security level 2)



- 1) Maintenance mode valve position return line HPU A.
- 2) Maintenance mode hydraulic oil temperature HPU A.
- 3) Event log for maintenance mode.
- 4) Maintenance mode hydraulic feed pressure.
- 5) Maintenance mode system pressure.
- 6) Maintenance mode valve position return line HPU B
- 7) Maintenance mode hydraulic oil temperature HPU B.
- 8) Maintenance mode hydraulic oil level.

For duplicated transmitters (A/B):

One transmitter in maintenance mode, will transfer functions from transmitter in maintenance mode, to the other transmitter. Both transmitters in maintenance mode, will override trip and alarm functions controlled by the transmitters.

Maintenance mode is indicated with flashing yellow numeric display or symbol and message in the alarm list.



4.7.5 System pressure adjustment (security level 2)

The screenshot displays the HMI interface for system pressure adjustment. At the top, there are controls for 'Auto system pressure' and 'System Press. setting' (265 bar). A 'WARNING' banner is present. The main section shows 'SYSTEM PRESSURE ADJUSTMENT MODE' with 'ON' and 'OFF' buttons, and a 'System pressure adjustment factor (750 - 1500 %)' set to 1165. Below this, there are temperature and pressure feedback displays for various components. A bottom navigation bar includes 'HPU control', 'Hydraulic oil contamination', 'Hydraulic oil relative humidity', 'SLOP AND MGO PUMPS', 'CRUDE CARGO PUMPS, PWT AND WBP', 'CRUDE CARGO PUMPS', 'Operation mode', 'Technical data', and 'Alarm list'. Four numbered callouts (1-4) point to specific elements:

- 1) System pressure feedback and command value.
- 2) Hydraulic oil temperature.
- 3) System pressure adjustment mode on / off.
- 4) System pressure adjustment factor. Press numeric field to enter new value

This operation is only to be set by qualified personnel, and according to Framo adjustment procedure. The function is only to be used to set the correct system pressure value after PLC software update or changing of equipment.



- 4.8 Technical data



FRAMO
an Alfa Laval brand

119HY-PU-5330
FP1 FP2 FP3
119HY-PU-5310
FP1 FP2 FP3 FP4
119HY-PU-5320
FP5 FP6 FP7 FP8

Auto system pressure
0 I
Auto start/stop
0 I

System Press. setting
- 265 +
System press. feedback
119-PI-4201 265 bar

113 112 124
PUCE-5770 PUCE-1020 PUCE-5000
113 663 663 663 663 663 663 663
PUCE-5760 PUCE-5730 PUCE-5630 PUCE-5530 PUCE-5330 PUCE-5030
663 663 663 663 663 663 663 663
PUCE-5720 PUCE-5620 PUCE-5520 PUCE-5420 PUCE-5320 PUCE-5220 PUCE-5120
113 663 663 663 663 663 663 116
PUCE-5740 PUCE-5710 PUCE-5610 PUCE-5510 PUCE-5410 PUCE-5310 PUCE-5210 PUCE-5200
113 113
PUCE-5750 PUCE-1010

Hydraulic oil consumers

Consumers	Design Capacity				Hydraulic data	
	m ³ /h	mlc	kg/dm ³	cSt	l/min	bar
19 of Submerged Cargo Crude Pumps SD350	1300	150	0,934	200	1803	260
1 of Submerged Produced Water Pump SD350	1000	120	1,133	1	1462	221
1 of Submerged Slop Pump SD250	600	150	1,025	1	829	260
1 of Submerged Slop Pump SD200	350	150	1,025	1	602	242
2 of Submerged Slop Skimming Pump SD100	50	50	0,934	200	59	162
1 of Submerged MGO Pump SD100	55	160	0,890	6	130	221
2 of Submerged Ballast Pumps SB400	1500	45	1,025	1,07	730	234
1 of Portable Pump TK150	300	50	1,000	1	206	225

Offloading Condition:
Hydraulic oil supply
 6 of Electric hydraulic power packs 1000kW (6 x 1722 l/min) = 10332 l/min / 295 bar
 2 of Electric hydraulic power packs 500kW (2 x 861 l/min) = 1722 l/min / 295 bar
 Total hydraulic oil supply: = 12054 l/min / 295 bar

Simultaneous operation (design)
 6 of Cargo Crude Pumps SD350 (6 x 1803 l/min) = 10818 l/min / 260 bar
 Total hydraulic oil consumption: = 10818 l/min / 260 bar

HPU control

Hydraulic oil contamination

Hydraulic oil relative humidity

SLOP AND MGO PUMPS

CRUDE CARGO PUMPS, PWT AND WEP

CRUDE CARGO PUMPS

Operation mode

Technical data

Alarm list



- 4.9 Alarm list

Active alarm mode: Only active alarms displayed in the list

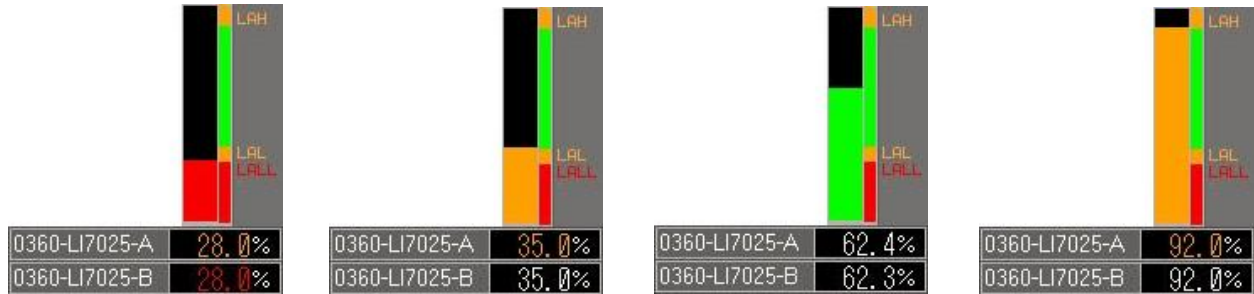
Date	Trig	Ack	Elapsed time	Message
29/10/18	10:29	10:30	0:00:00	663-SXA-5101 TRIPPED BY SAFETY SYSTEM PUMP 1C, 663-PUCE-5120
29/10/18	10:28	10:30	0:00:00	119-MM-4304B MAINTENANCE MODE OIL TEMP 2 HPU B 119-TT-4304B
29/10/18	10:28	10:30	0:00:00	119-LIAH-5399 COFFERDAM LEVEL HIGH PUMP 3C, 663-PUCE-5320
29/10/18	10:28	10:30	0:00:00	119-LIAH-5399 COFFERDAM LEVEL HIGH PUMP 3S, 663-PUCE-5310
29/10/18	10:27	10:30	0:00:00	119-ZI-4213B WEAR INDICATION POWER PACK 119-DREM-5313 PUMP B
29/10/18	10:27	10:30	0:00:00	119-ZI-4213A WEAR INDICATION POWER PACK 119-DREM-5313 PUMP A
29/10/18	10:27	10:31	0:00:00	119-ZSC-4220B SUCTION LINE CLOSED POWER PACK 119-DREM-5313 PUMP B
29/10/18	10:27	10:31	0:00:00	119-ZSC-4220A SUCTION LINE CLOSED POWER PACK 119-DREM-5313 PUMP A

Historical alarm mode: Both active and historical alarms displayed in the list.

Date	Trig	Ack	Recov	Elapsed time	Message
29/10/18	10:29	10:31	10:30	0:00:21	119-ZSC-4319B SUCTION LINE CLOSED POWER PACK 119-DREM-5322 PUMP B
29/10/18	10:29	10:31	10:30	0:00:27	119-ZSC-4319A SUCTION LINE CLOSED POWER PACK 119-DREM-5322 PUMP A
29/10/18	10:29	10:31	10:30	0:00:33	119-ZSC-4318B SUCTION LINE CLOSED POWER PACK 119-DREM-5321 PUMP B
29/10/18	10:29	10:31	10:29	0:00:01	119-ZSC-4318A SUCTION LINE CLOSED POWER PACK 119-DREM-5321 PUMP A
29/10/18	10:29	10:31	10:29	0:00:01	119-ZSC-4221 SUCTION LINE CLOSED POWER PACK 119-DREM-5314
29/10/18	10:29	10:30		0:00:00	663-SXA-5101 TRIPPED BY SAFETY SYSTEM PUMP 1C, 663-PUCE-5120
29/10/18	10:28	10:30		0:00:00	119-MM-4304B MAINTENANCE MODE OIL TEMP 2 HPU B 119-TT-4304B
29/10/18	10:28	10:30		0:00:00	119-LIAH-5399 COFFERDAM LEVEL HIGH PUMP 3C, 663-PUCE-5320
29/10/18	10:28	10:30		0:00:00	119-LIAH-5399 COFFERDAM LEVEL HIGH PUMP 3S, 663-PUCE-5310
29/10/18	10:27	10:30		0:00:00	119-ZI-4213B WEAR INDICATION POWER PACK 119-DREM-5313 PUMP B
29/10/18	10:27	10:30		0:00:00	119-ZI-4213A WEAR INDICATION POWER PACK 119-DREM-5313 PUMP A
29/10/18	10:27	10:31		0:00:00	119-ZSC-4220B SUCTION LINE CLOSED POWER PACK 119-DREM-5313 PUMP B
29/10/18	10:27	10:31		0:00:00	119-ZSC-4220A SUCTION LINE CLOSED POWER PACK 119-DREM-5313 PUMP A

5 Operation and symbol Details

- 5.1 Hydraulic oil tank level



Oil level low low.
*Flashing red.

Oil level low.
*Steady orange.

Normal state.
*Green bar and white numeric.

Oil level high.
*Steady orange.

- 5.2 Valves



Valve open.
*Green



Valve closed.
*Red



Valve maintenance mode
*Flashing yellow

- 5.3 Power pack symbol



Power pack standby.
*White



Power pack running.
*Steady green when loaded.
*Flashing green when unloaded.



Power pack trip.
*Flashing red



- 5.4 Hydraulic oil cooling and bypass valves



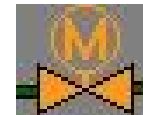
Open
*Green



Closed
*Black



Not open
Not closed
*Blue



Failure
*Flashing orange

- 5.5 Hydraulic oil filter



Normal state.
*Yellow.



Failure state.
*Flashing orange.
-Filter clogged.



- 5.6 Numeric value display

			
Normal state. * White	Warning alarm. * Flashing orange.	Trip alarm. * Flashing red.	Manual override. * Flashing yellow.

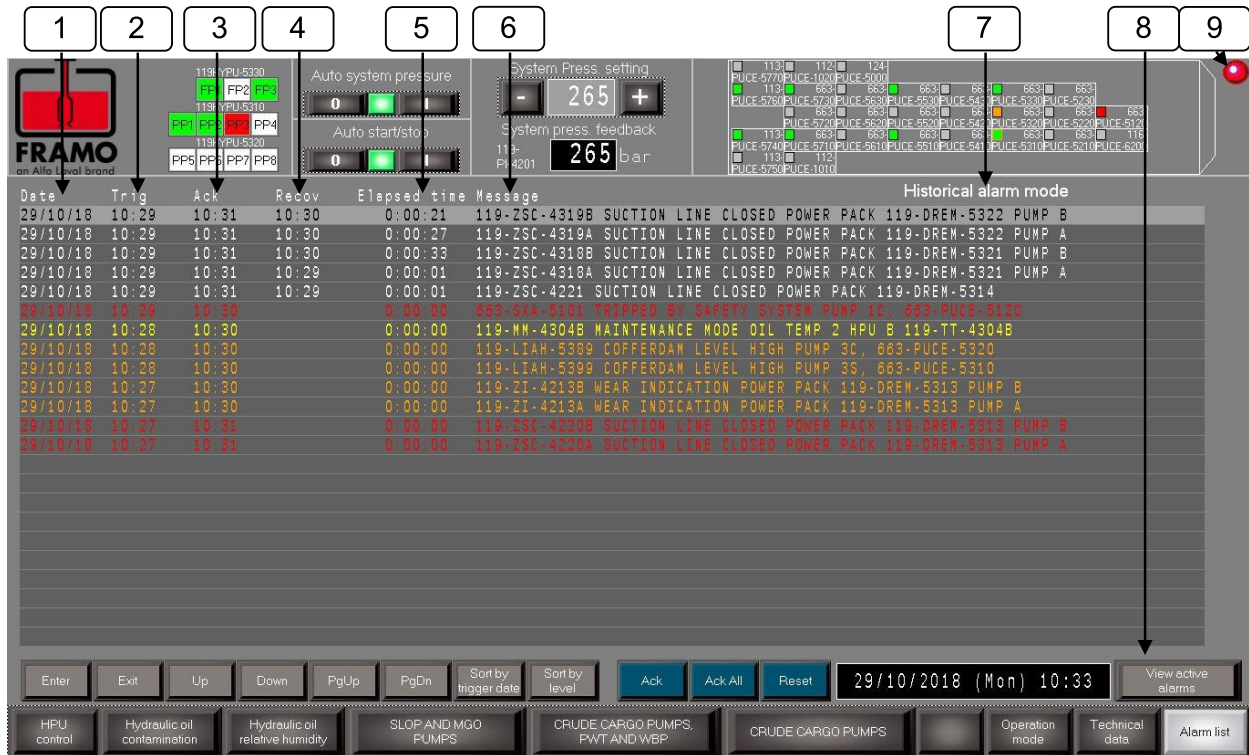
- 5.7 Pump symbol

				Pump standby
Pump standby. * White / gray.	Pump running. * Green.	Pump trip. * Flashing red	Pump warning. * Flashing orange.	Pump running



- 5.8 Alarm list

When an alarm appears in the system, the text on the alarm list button and the alarm lamp in the right top window are flashing red, until the alarm is acknowledged.



- 1) Date when the alarm was initiated
- 2) Time when the alarm was initiated
- 3) Time when the alarm was acknowledged.
- 4) Time when the alarm was recovered.
- 5) Elapsed time before alarm was recovered.
- 6) Alarm description.
- 7) Alarm list mode. (Active / Historical)
- 8) Switch between active and historical mode.
- 9) Alarm lamp, green if no alarm, red if alarm, flashing red if unaccepted alarm

Warning alarm triggered *flashing orange
 Shutdown alarm triggered *flashing red
 Maintenance mode enabled *flashing yellow

Warning alarm acknowledge *steady orange
 Shutdown alarm acknowledge *steady red
 Maintenance mode acknowledge *steady yellow

Recovered alarms *steady white

To navigate the alarm list, the operator first has to access the list by pressing "ENTER".