

S-type Separation System



Parameter List

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Original instructions

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1 Parameter Setting

The parameters are set in the operator panel for the different separator systems, and for different conditions within the systems.

There are three parameter types: Installation, Process, and Factory Set parameters.

The parameters are initially set at installation. The process parameters can also be set as required during operation.

Parameters not in use are not displayed.

The parameter list in this booklet is valid for Separation Units (SU) and SA systems.

General principle

The 'ENTER' button is used to:

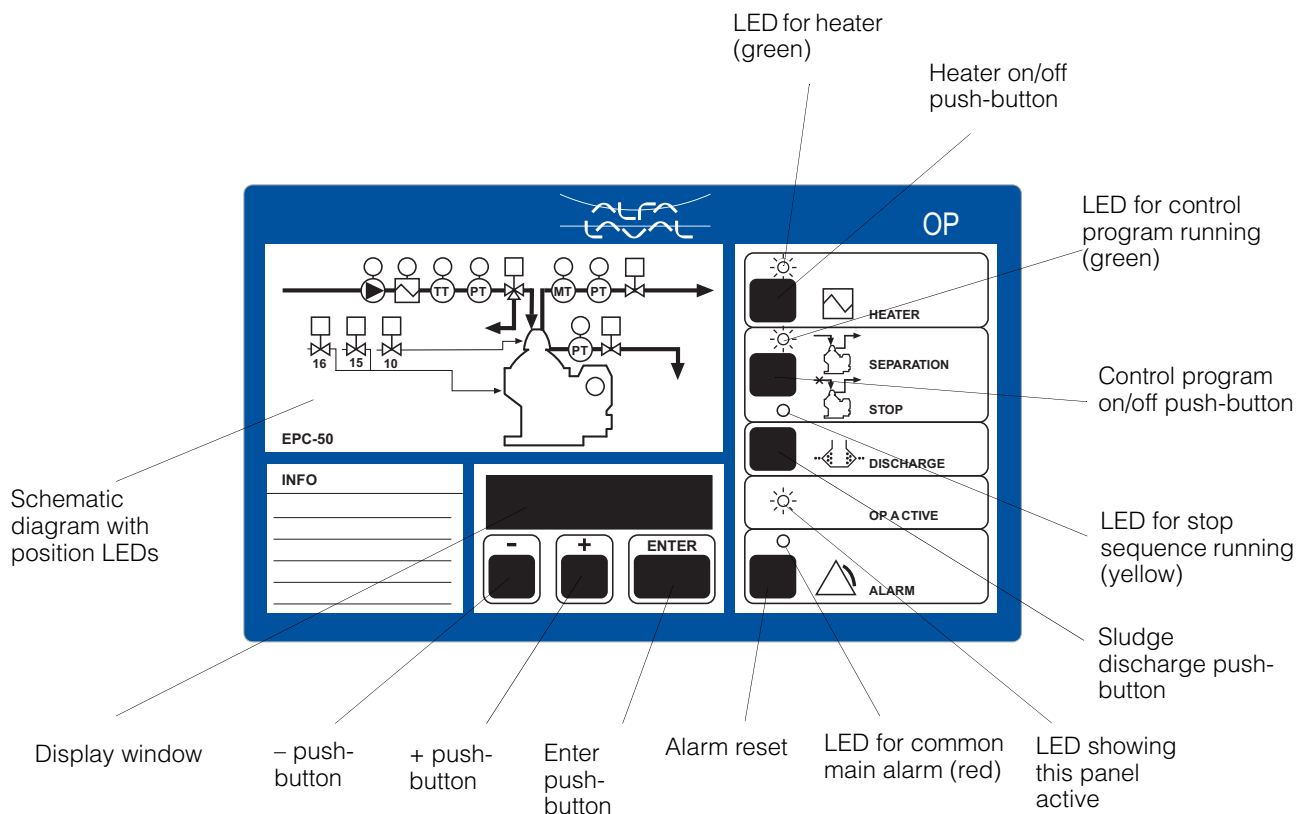
- enter into a parameter list
- enter into a parameter
- accept/store a new parameter value.

The '+' or the '-' buttons are used to change the value flashing in the display window.

To change parameters, proceed as follows:

- 1** Push the 'ENTER' button.
 'Time to discharge P1 60' is shown. 'P1' is the parameter, and '60' is the set value.
 The '1' of the 'P1' is flashing.
- 2** Push the '+' button until the number of the parameter you wish to program appears in the display window.
 The chosen parameter number is now flashing.
- 3** Push the 'ENTER' button.
 The chosen parameter number is now shown on the left side in the display. The parameter value is shown flashing on the right side of the display.

- 4** Push the '+' or '-' button to change the parameter value.
- 5** Push the 'ENTER' button. The new value is stored.
 The parameter number is now flashing.
- 6** Push the '+' or '-' button to go to the next parameter to be changed.
- 7** To leave the list, push the '+' and the '-' buttons at the same time. The display shows 'Standst.' or, when in operation, the trigger value to the left, and time remaining to discharge on the right.



The following lists are available for viewing from a menu in the EPC-50 control unit:

- Install (parameters)
- Factory (parameters)
- Alarms
- Test

For detailed information see each list.

To open the menu and select a list, proceed as follows:

- 1** Push the 'ENTER' button. The process parameter list is now open.
- 2** Push the '+' button until 'End' is displayed.
- 3** Push the 'ENTER' button and the '+' button at the same time. 'Install' will show flashing on the display.
- 4** Use the '+' button to select a list.
- 5** Use the 'Enter' button to enter into the selected list.
- 6** To leave the list, push the '+' and the '-' buttons at the same time.
- 7** To leave the menu, press the '+' button repeatedly until 'Exit' is displayed. Push the 'ENTER' button.

2 Installation Parameters

The installation parameters must be set before the initial start-up and before process parameters are set. These parameters rarely need to be adjusted again. If a new parameter value is to be stored, it is necessary to go through the whole list, and confirm at the end.

NOTE

Alfa Laval cannot be held responsible for injuries and damage caused by usage of parameter values which are not in proximity to the factory values set by Alfa Laval.

Parameter	Factory set value	Plant set value	Range	Description
In 1	en		en = English de = German es = Spanish fr = French It = Italian pt = Portuguese fi = Finnish se = Swedish	Language. All information displayed on the operators panel is shown in the selected language.
In 3	Alcap		Alcap	Separator type
In 4	836		811, 816 200, 820, 821, 825, 826 300, 830, 831, 835, 836 400, 840, 841, 845, 846 500, 850, 851, 855, 856 600, 860, 861, 865, 866 700, 870, 871, 875, 876 800, 880, 881, 885, 886	Separator size Parameters depending on separator size are set automatically according to the value in In 4
In 5	1		1 – 9 If more than one EPC on same Sattbus	Separator identity If more than one separator system is connected to the internal Sattbus communication, each system must be given its own identity (1 or 2 or 3 etc.).

Parameter	Factory set value	Plant set value	Range	Description
In 6	Yes		No Yes	Speed sensor
In 7	No		No Yes	Vibration sensor
In 8	No		No Yes	OP remote
In 9	Yes		No Yes	Water transducer
In 15	No		No Yes	Sludge pump used
In 16	No		No Yes	I/O expansion board used
In 17	°C		°C °F	Celsius or Fahrenheit
In 18	No		No (no heater) El. (electrical heater) Steam (steam heater)	Heater type
In 19	16		7, 8, 14, 16, 22, 24, 36, 40, 50, 56, 65, 72, 86, 96, 98, 100, 110, 112, 126, 128, 130, 144 kw	El heater size Activated when El. is selected in In 18
In 20	120		0 – 999 seconds	Steam-valve run time Activated when Steam is selected in In 18

Parameter	Factory set value	Plant set value	Range	Description
In 22	15		0 – 30 seconds	Alarm delay time
In 23	15		0 – 240 seconds	Change-over valve V1 temp. alarm delay Prevents false alarm due to any fluctuations in temperature caused by valve actions.
In 24	No		No Yes	Change-over valve V1 action at extra alarm When the extra alarm input is used, action at alarm can be none (No) or feed off (Yes).
In 25	Yes		No Yes	Power fail alarm used If this alarm is not required, set the parameter to 'No*.'
In 26	No		No ExtPC = Fieldbus I-Net = Internet	Type of computer communication board used
In 27	0		0 – 255	Internet IP address, part 1
In 28	0		0 – 255	Internet IP address, part 2
In 29	0		0 – 255	Internet IP address, part 3
In 30	0		0 – 255	Internet IP address, part 4
In 31	No		No Yes	Feed pump controlled Feed pump has to be connected by EPC when running in auto mode.
In 32	m ³ /h		m ³ /h USG/h	Flow rate in m ³ /h per hour or US gallons per hour. The feed flow measurement, based on inlet pressure, can be displayed in one of these ways.

3 Process Parameters

The process parameters can be adjusted easily and as often as required, even during operation, to meet changes in the operating conditions, e.g. time between sludge discharges, oil temperature, alarm points.

NOTE

Regularly check the condition of the bowl. If there is no noticeable amount of hard sludge in the sludge space, the discharge interval may be increased by 30 minutes at a time. The total discharge interval must not exceed three times the factory set value in order to avoid an uneven build-up of sludge.

Parameter	Factory set value	Plant set value	Range	Description
Pr 1	120		1 – 300 minutes	Time to discharge
Pr 2	HF380		MDO = Marine Diesel Oil GO = Gas Oil IFxxx = Intermediate Fuel Oil HFxxx = Heavy Fuel Oil LO TP = Lubricating Oil for Trunk Piston Engines LO CH = Lubricating Oil for Cross Head Engines	Oil type (xxx represents viscosity in Cst at 50 °C)
Pr 3	OPloc		OPloc = Local OP in control OPrem = Remote OP Rmind = Remind using Sattbus ExtPC = Extern Computer Board RemSw = Remote switches	Control location OPloc is standard. OPrem, ExtPC and RemSW are shown only when installed.
Pr 4	On		On Stb.	Alcap On/Standby MT-50 function disabled when in standby (Stb.). Discharge every 15 minutes (overrides Pr1). No displacement water added.
Pr 5	0.0		0.0 = Not used 0.1 to 10.0x1000 hours	Countdown service timer Action is to be taken when the timer reaches 0.

Parameter	Factory set value	Plant set value	Range	Description
Pr 6	0		0 = service time elapsed 1 – 9 = Service text 1...9	Type of service When service timer Pr5 reaches 0, an alarm is given and a message shown
Pr 7	0		Information 1 = timers shown 2 = Service mode	Keys to special functions used by service engineer When Pr7 is set to 1 during normal operation, the actual timer is displayed if the '+' button is pressed once.
Pr 10	3.0		0.0 – 6.0 bar 0.0 = oil pressure sensor disabled	High oil pressure limit (cleaned oil outlet)
Pr 11	1.0		0.0 – 6.0 bar	Low oil pressure limit
Pr 12	5.5		0.0 – 6.0 bar 0.0 = water pressure sensor disabled	High water pressure limit (water outlet)
Pr 13	0.2		0.0 – 6.0 bar	Low water pressure limit
Pr 14	3.0		0.0 – 6.0 bar 0.0 = feed pressure sensor disabled	High feed pressure limit
Pr 15	0.20		0.00 – 6.00 bar	Low feed pressure limit Low pressure indicates insufficient flow. The low pressure limit must be higher than any static pressure and lower than normal pressure.
Pr 16	105 °C		0 – 115 °C or 0 – 255 °F 0 = Temp sensor disabled	HFO/LO high temp. limit
Pr 17	85 °C		0 – 115 °C or 0 – 255 °F	HFO/LO low temp. limit

Parameter	Factory set value	Plant set value	Range	Description
Pr 18	95 °C		0 – 110 °C or 0 – 240 °F 0 = Temp sensor disabled	HFO/LO setpoint ¹⁾ Setpoint for feed temperature is valid only when a temperature controller is installed in the EPC.
Pr 19	40 °C		0 – 115 °C or 0 – 255 °F	DO high temp. limit
Pr 20	20 °C		0 – 115 °C or 0 – 255 °F	DO low temp. limit
Pr 21	30 °C		0 – 110 °C or 0 – 240 °F	DO setpoint ¹⁾ Setpoint for feed temperature is valid only when a temperature controller is installed in the EPC.
Pr 22	40		10 – 500 %	P-constant ¹⁾ Preset value based on experience with Alfa Laval Heatpac heaters.
Pr 23	1.2		0.1 – 10.0 minutes	I-constant ¹⁾ Preset value based on experience with Alfa Laval Heatpac heaters.
Pr 24	0		0 – 9 0 = disabled	Heater control location To be set when more than one EPC temperature controller can be used for one heater.
Pr 25	2		0 – 240 seconds	Sludge tank alarm delay (during Ti 68)
Pr 40	60		0 – 100 discharges	Test of sludge in bowl
Pr 41	15		0 – 100 %	Max. decrease of displacement water

¹⁾ Parameter appears only when heater board installed.

4 Factory Set Parameters

Parameter	Factory set value	Plant set value	Range	Description
Fa 3	See table on page 22		0.1 – 99.99 litre	Conditioning water volume to be fed after discharge
Fa 6	0.2		0.0 – 9.9 bar	PT4 pressure increase or decrease. (Test during Ti 59, Ti 64, Ti 70, Ti 71, Ti 82) Signal that the bowl is filled.
Fa 10	See table on page 22		0 – 14000 rpm 0 = sensor disabled Is set depending on separator size	High speed
Fa 11	See table on page 22		0 – 14000 rpm Is set depending on separator size	Low speed
Fa 12	300		0 – 2000 rpm	Speed decrease during discharge
Fa 16	See table on page 22		0.0 – 2.5 0.0 = sensor disabled	Shutdown limit for separator spindle amplitude
Fa 17	See table on page 22		0.0 – 2.5	Vibration alarm prewarning
Fa 18	0.5		0.0 – 2.5	Vibration sensor adjustment zero point. Zero point should be within $1.5 \pm \text{Fa 18}$
Fa 20	3.0 if Pr 2 = fuel oil 0.6 if Pr 2 = lube oil		0.01 – 10.0 pF	Alcap trigger factor This is the amplification factor for the transducer signal so that the proper trigger range is achieved.
Fa 21	100		0 – 250 %	Trigger limit HFO
Fa 22	100		0 – 250 %	Trigger limit LO/DO
Fa 23	110 if Pr 2 = fuel oil 85 if Pr 2 = TPLO 78 if Pr 2 = CHLO		0 – 999.9 pF 0 = water transducer disabled	Alarm limit for high water transducer value.

Parameter	Factory set value	Plant set value	Range	Description
Fa 24	70		0 – 999.9 pF	Alarm limit for low water transducer value
Fa 25	25		0 – 250 seconds	Pulse time for open drain valve
Fa 26	5		0 – 30 seconds	Drain pause time. With the valve closed, the system waits for the result of the draining.
Fa 27	70		0 – 100 %	The limit below which the trigger value must be to interrupt draining.
Fa 28	5		0 – 20	Limit for number of HFO drainings. If the trigger value has not fallen below the value of Fa 27 after Fa 28, an alarm is given.
Fa 29	5		0 – 40 0 = disabled	Test of water transducer trigger signal every x discharge. (x = 0 – 100)
Fa 30	250		0 – 900 %	Trigger level during Ti 64, Ti 65, Ti71, Ti72
Fa 31	2		0 – 4 0 = No reduction 1 = Reduction after every trigg 2 = Reduction after 2 consecutive triggs 3 = Reduction after 2 triggs within 3 discharges 4 = Reduction after 2 triggs within 4 discharges	Reduction of Ti 72 due to trigger signals during Ti 64, Ti 65.

Parameter	Factory set value	Plant set value	Range	Description
Fa 32	1.0		0.0 – 1.0	Reduction of Ti 72 in DO mode. Timer Ti 72 is reduced by Fa 32
Fa 33	2		0 – 10	Limit for number of LO drainings. If a higher no. of drainings than Fa 33 takes place within one separation period (Ti 68), an alarm will be given.
Fa 34	+0.00		-2.00 – +2.00 0 = -2.00 200 = 0.00 400 = +2.00	HFO temperature adjustment, MT 50 Temperature compensation for the water transducer, HFO mode. ¹⁾
Fa 35	+0.00		-2.00 – +2.00 0 = -2.00 200 = 0.00 400 = +2.00	LO temperature adjustment, MT 50 Temperature compensation for the water transducer, LO mode. ¹⁾
Fa 36	+0.00		-2.00 – +2.00 0 = -2.00 200 = 0.00 400 = +2.00	DO temperature adjustment, MT 50 Temperature compensation for the water transducer, DO mode. ¹⁾
Fa 37	20		0 – 100	Flush water every x disch.
Fa 38	0.0		0.0 – 0.5 seconds	SRV response time
Fa 41	5		1 – 30 minutes	Closing water pulse time Time between closing water pulses

¹⁾ The transducer value can be influenced by temperature variations. This can be compensated for by using this parameter. Proceed as follows:

Note the transducer value. N.B. The transducer value must be steady (no water in oil) in order to do this test.

At normal stable running temperature, decrease the temperature by 10 °C.

At stable new temperature, read the temperature and transducer value.

Example:

Temperature decrease = 10 °C

Transducer value change = + 1 (from 82.6 to 83.6)

Since the transducer value increased, this must be compensated by making Fa34 negative.

Fa 34 = $(1.0 \times 10) / 10 \text{ °C} = - 1.0$

Parameter	Factory set value	Plant set value	Range	Description
Fa 42	No		No Yes	V4 activated in Ti 64 To get a faster pressure response when oil feed fills the bowl (see Ti 64) valve V4 could be closed = Yes.
Fa 43	1.00		0.00 – 2.00	The flow indicated on the controller can be adjusted.
Fa 44	See table on page 22		0 – 15 seconds	Delay for close of V4 at leak test. Automatically adjusted during test. (Ti 66)
Fa 45	See table on page 22		0 – 15 seconds	Delay of PT4 pressure reference value registration during the automatic adjustment of pressure range for leakage test (see Ti 66).
Fa 46	1.0		0 – 4 bar	Acceptable PT4 decrease during leakage test Alarm for leaking bowl if the pressure decreases more than Fa 46 during leakage test.
Fa 47	3.0		0 – 4 bar	PT4 high limit during leakage test
Fa 48	1.0		0 – 4 bar	PT4 low limit during leakage test
Fa 49	5		0 – 10	Max. no. of leakage tests to establish the test pressure within high-low limits.

NOTE

For parameters Fa 90 – Fa 95, see page 21.

Timer Sequence Parameters (separation start, sludge discharge, stop)

Parameters for timers are listed under Factory, but are called 'Ti'.

When expected feedback from a timer is given, the timer is interrupted and the next timer starts.

If feedback is not received within the preset time, an alarm is given.

Timers for start are 50 - 59.

Timers for operation are 60 - 69.

Timers for discharge are 70 - 79.

Timers for stop are 80 - 89.

Timers 50, 51, 52 and 87 are intended for the 'fully automatic' system (Auto mode) with pump and heater controlled by EPC 50.

If pump and heater are started independent of EPC and Alfa Laval starter, X6:4 - X40 must be connected to a free closing contact at the external pump contactor. Increasing temperature is the only process condition needed for timers 51 and 52. The program skips directly to timer 55 when not 'fully automatic'.

Parameter	Factory set value	Plant set value	Range	Description
Ti 50	60		2 – 300 seconds	Feed pump on
Ti 51	15		0 – 30 seconds	Feed pressure feedback
Ti 52	4		0 – 60 minutes	Separator start-up (Speed feedback) Speed above low limit (Fa 11) expected. Condition of belt, coupling, motor bearings, height adjustment, and speed sensor supervised.
Ti 53	15		0 – 60 minutes	Heater on (temp. feedback) Temperature above low limit (Pr 17, Pr 20) expected to confirm that the heater works normally.
Ti 55	0		0 – 30 minutes 0 = no standby	Max. time for 'Standby' mode. During 'Standby' mode, the system is waiting for an order to start the process sequence. The process sequence is started with a push of the start button. When Ti 55 = 0 the process starts without delay.
Ti 56	3.0		0.1 – 5.0 seconds	Discharge if Ti 59 has expired after alarm.
Ti 57	15		0 – 30 seconds	Pause = Draining of operating system
Ti 58	See table on page 22		0 – 60 seconds	Close bowl

Parameter	Factory set value	Plant set value	Range	Description
Ti 59	170		0 – 300 seconds	<p>Water flow rate calibration</p> <p>At start three questions are displayed:</p> <ul style="list-style-type: none"> • Bowl dismantled? • Assembled according to manual? • Bowl cleaned? <p>When the answer to the third question is Yes, calibration of the water flow rate through SV 10 takes place. SV 10 is open until pressure in the water outlet increases (Fa 6). The water volume is defined for each separator size. Based on this and the time taken to fill the bowl, the EPC calculates the water flowrate.</p> <p>When the answer is No, this means that stored calibration data will be used and consequently the program performs Ti 63.</p>
Ti 60	See table on page 22		0.1 – 30.0 seconds	<p>Discharge</p> <ul style="list-style-type: none"> – when starting, the operating system needs some extra water to support the operating slide before closing the bowl. (This is not a proper discharge, since the bowl is empty), – after a power failure to prevent a period between discharges greater than Pr 1.
Ti 61	15		0 – 30 seconds	Pause = Draining of operating system
Ti 62	See table on page 22		0 – 60 seconds	Close bowl

Parameter	Factory set value	Plant set value	Range	Description
Ti 63	120		Seconds, calculated	Conditioning water added Based on the calibration of the water flow rate, the EPC calculates the time to which Ti 63 is set, so that the correct volume of conditioning water is added to the bowl. Data concerning the bowl is activated when size of separator is chosen (In 4). The preset value is just for start. After the calculation, the correct value for Ti 63 is set automatically.
Ti 64	60		0 – 60 seconds	Oil feed on. Max 60 secs.
Ti 65	15		0 – 30 seconds	Water transducer pulse control time Test of the signal from the water transducer. If this shows water in the oil, the displacement time prior to next discharge will be reduced.
Ti 66	See table on page 22		0 – 30 seconds	Bowl leakage check (See also Fa 44 – 49)
Ti 67	60		0 – 300 seconds	Time for stabilisation of the transducer signal. When the time has elapsed the EPC stores the actual transducer value as a reference for changes in water content.

Parameter	Factory set value	Plant set value	Range	Description
Ti 68	120 (= Pr1)		1 – 300 minutes	Time between discharges. This is the same as Pr 1. If one is changed, the other one is automatically changed. During Ti 68 the water transducer supervises changes of the water content in the clean oil. If the trigger value is greater than 100, the drain valve (V5) opens. For details see Fa 25–28.
Ti 70	15		0 – 30 seconds	Oil feed off. Oil outlet pressure below low limit (Pr 11) expected.
Ti 71	20		0 – 120 seconds	Displacement of oil. During Ti 71, V4 is closed until increasing pressure is sensed, indicating displacement water has entered the bowl.
Ti 72	150		Seconds, calculated (max. 300 seconds)	Displacement water (SV 10).
Ti 73	10		0 – 30 seconds	Opening of the drain valve to wash out any oil from the paring tube and piping.
Ti 74	3.0		0.1 – 5.0 seconds	Discharge

Parameter	Factory set value	Plant set value	Range	Description
Ti 75	15		0 – 30 seconds	<p>Pause = Draining of operating system</p> <p>Discharge feedback (as shown by decreased speed, Fa 11).</p> <p>If the speed sensor is out of order/ disabled, feedback is automatically taken over by timer Ti 64. (If time close to 0 there was no discharge).</p> <p>Draining of operating system takes place during Ti 75.</p> <p>After Ti 75, the program returns to Ti 62, provided stop is not ordered.</p> <p>If however any value or timer influencing the water calibration has been changed, the program returns to Ti 58.</p> <p>When stop is ordered the discharge precedes the stop sequence.</p>
Ti 81	See table on page 22		0 – 60 seconds	Close bowl
Ti 82	150		Seconds, calculated	<p>Heater off.</p> <p>Addition of water until 80% of bowl volume, or increased pressure is sensed in the oil outlet (Fa 6). This is to keep the bowl filled during stop sequence.</p>
Ti 83	10		0 – 30 seconds	Opening of the drain valve to wash out any oil from the paring tube and the pipe.
Ti 85	5		0 – 30 minutes	<p>Temperature decrease</p> <p>The EPC switches the separator motor off.</p> <p>Decreasing oil feed temperature greater than 5 °C expected.</p> <p>If Ti 85 = 0, no temperature control.</p>

Parameter	Factory set value	Plant set value	Range	Description
Ti 86	3		0 – 30 minutes	Decreasing speed expected (Fa11).
Ti 87	60		0 – 300 seconds	Pump off In Auto mode, the EPC switches the feed pump off. By doing so after switching off the separator, further oil is fed to the heater (which is already switched off) to help cooling.
Ti 89	30		30 – 60 minutes	The EPC is waiting for zero speed. As long as the separator is rotating at a speed greater than 6 revs/min. (1 puls/ rev.), the speed is displayed alternating with 'Stop.' Speed less than 6 revs/min. is displayed as 0. When speed 0 has been displayed for 1 minute (alternating with 'Stop'), 'Standst.' will be displayed.
Fa 90	---		0 – 9999 days	Set runtime. See chapter 4 <i>Change of Circuit Board</i> in the <i>Service Manual</i> booklet.
Fa 91	50		0 – 99 °C 0 – 210 °F	Break point, cold start. The temperature up to which gain factor Fa92 is active. Above this temperature normal gain (Pr 22) is active.
Fa 92	40		1 – 100 %	Gain factor, cold start This factor is used to increase the normal P-band (Pr 22) when temperature is below that defined in Fa 91. Ex. Normal P-band = 30, Fa 92 = 40 gives an actual P-band below Fa 91 of $0.40 \times 30 = 12$.

Parameter	Factory set value	Plant set value	Range	Description
Fa 93	SBSU		SBSU (Sattbus on RS232) ASCII (ASCII protocol) PRINT (Printer output)	Communication type
Fa 94	9.6		1.2, 2.4, 4.8, 9.6, 19.2, or 38.4 (4.8 = 4800)	Serial communication Baudrate channel A
Fa 95	No		No Odd Even	Communication parity channel A
Fa 96	3.0 if Pr 2 = fuel oil 0.6 if Pr 2 = lube oil		0.1 – 10.0 pF	Alcap trigger range during discharge

Parameters depending on separator size

Separator size	Fa3	Fa10	Fa11	Fa16	Fa17	Fa44	Fa45
S 811, S 816, S 200, S 821, S 826	0.16	13.300	11.000	0.30	0.20	2	5
S 820, S 825, S 300, S 830, S 831, S 835, S 836	0.3	11.000	9.900	0.30	0.20	2	5
S 400, S 840, S 841, S 845, S 846	0.4	9.600	8.600	0.50	0.30	4	5
S 500, S 850, S 851, S 855, S 856	0.7	8.300	7.400	0.50	0.30	6	10
S 600, S 860, S 861, S 865, S 866	0.9	7.800	6.400	0.50	0.30	8	10
S 700, S 870, S 871, S 875, S 876	1.5	6.700	5.500	0.50	0.30	10	10
S 800, S 880, S 881, S 885, S 886	2.5	5.800	4.700	0.50	0.30	10	10

Separator size	Ti58	Ti60	Ti62	Ti66	Ti81	Ti89
S 811, S 816, S 200, S 821, S 826	15	10	15	10	15	30
S 820, S 825, S 300, S 830, S 831, S 835, S 836	15	10	15	10	15	30
S 400, S 840, S 841, S 845, S 846	15	10	15	20	15	30
S 500, S 850, S 851, S 855, S 856	15	10	15	20	15	40
S 600, S 860, S 861, S 865, S 866	25	15	25	25	25	45
S 700, S 870, S 871, S 875, S 876	35	25	35	30	35	45
S 800, S 880, S 881, S 885, S 886	60	25	60	30	60	60

5 Sequence Diagram

Activity	Autostart					Start								Separation				
	Ti50	Ti51	Ti52	Ti53	Ti55	Ti58	Ti59	Ti56	Ti57	Ti60	Ti61	Ti62	Ti63	Ti64	Ti65	Ti66	Ti67	Ti68
Feed pump motor on	1)																	
Flow stabilized																		
Separator motor on	1)																	
Heater on temp. increase	1))																	
Heater max. start time	1)																	
Discharge, SV15	12)																	
Drain of operating water	12)																	
Closing water, SV16	2)																	
Calibration of water flow rate SV 10	1)																	
Conditioning water SV 10																		
Feed on V1																		
Oil outlet closed, V4	1)																	
Leak test																		
Ref. time																		
Separation																		
Drain of water; V5	3)																	
Feed off																		
Displacement water SV 10																		
Water SV10																		
Optional sludge pump	11) 10)																	

- 1) Interrupted by feedback signal
- 2) Pulse 1 sec. every 5 min.
- 3) Activated when needed
- 4) Interrupted by decreasing temperature
- 5) Interrupted by decreasing speed
- 6) Interrupted by pump off feedback
- 7) Interrupted by 0-speed during 1 min.
- 8) Interrupted by calculated time or trigger signal
- 9) 1 sec. pulse at 4000 rpm
- 10) 5 sec. every 30 minutes
- 11) 15 sec. only
- 12) Only activated if Ti59 time elapsed



Note! This diagram is valid for normal operation only. See the flow chart on page 30 for a more detailed sequence description.

Discharge													Stop							Activity
Ti70	Ti68	Ti71	Ti72	Ti73	Ti74	Ti75	Ti62	Ti63	Ti64	Ti65	Ti66	Ti67	Ti81	Ti82	Ti83	Ti85	Ti86	Ti87	Ti89	
																4)	5)	6)	7)	Feed pump motor on
																				Flow stabilized
																				Separator motor on
																				Heater on temp. increase
																				Heater max. start time
																				Discharge, SV15
																				Drain of operating water
	2)															9)				Closing water, SV16
																				Calibration of water flow rate SV 10
																				Conditioning water SV 10
																				Feed on V1
		1)							1)					1)						Oil outlet closed, V4
																				Leak test
																				Ref. time
																				Separation
	3)																			Drain of water; V5
1)		1)	8)																	Feed off
														1)						Displacement water SV 10
																				Water SV10
	10)						11)	If 'Stop' after Ti62 skip to Ti81												Optional sludge pump

Flow rates for S811, S816, S200, S821, S826

Flow rates for S820, S825, S300, S830, S831, S835, S836, S400, S840, S841, S 845, S846

Flow rates for S500, S850, S851, S855, S856, S600, S860, S861, S865, S866

Flow rates for S700, S870, S871, S875, S876

Flow rates for S800, S880, S881, S885, S886


SV10: 0.9 l/m
SV15: 11.0 l/m
SV16: 2.8 l/m


SV10: 1.6 l/m
SV15: 11 l/m
SV16: 2.8 l/m



SV10: 5.5 l/m
SV15: 11 l/m
SV16: 2.8 l/m

SV10: 11 l/m
SV15: 11 l/m
SV16: 2.8 l/m

SV10: 15 l/m
SV15: 11 l/m
SV16: 2.8 l/m

	Timer	Action	 Alarms
Separation	Ti 64 = 60 sec. V 1, (V 4 automatic selection)	Feed on to separator	‘Oil backpressure PT4 – LOW’ Alarm is given if no pressure response in oil outlet within Ti 64.
	Ti 65 = 15 sec. V 1	Test of water content in oil outlet If traces of water are detected in the oil outlet, the time for displacement (Ti 72) will be reduced before next discharge. After calibration start, the oil outlet pipe is filled with oil and the system now skips to Ti 70 to perform a discharge. Ti 72 max 90 sec interrupted by transducer response.	
	Ti 66 = See table chapter 4. V 4	Bowl leaking test With the feed off and the oil outlet closed, a decreasing pressure indicates that the bowl is leaking. In order to find a suitable pressure range (1 – 2 bar) for test, Ti 65 and Ti 66 may be repeated (see Fa 49).	‘OIL LEAKING FROM BOWL’ Alarm is given if the pressure falls by more than 1.0 bar.
	Ti 67 = 60 sec. V1	Reference time After the process has stabilized, the transducer (MT 50) reference value is stored.	
	Ti 68 = 120 min. V1 (V5)	Separation. When necessary, the drain valve (V5) in the water outlet opens for a short while. The trigger value is then checked during a few seconds. Draining stops when the trigger value is lower than 70. Draining can continue max. 5 openings. After 5 openings, skip to Ti 74.	‘Water drain - INSUFFICIENT’ During separation all necessary functions are supervised. Alarm given if more than 5 openings and trigger value not less than 70.

	Timer	Action	 Alarms
Discharge	Ti 70 = 15 sec.	Feed off. Oil outlet pressure decreases.	'OIL PRESSURE PT4 HIGH DURING Ti70'. Alarm given if no pressure feedback.
	Ti 68 = 120 min. V1 (V5)	Separation. When necessary, the drain valve (V5) in the water outlet opens for a short while. The trigger value is then checked during a few seconds. Draining stops when the trigger value is lower than 70. Draining can continue max. 5 openings. After 5 openings, skip to Ti 74.	'Water drain - INSUFFICIENT' During separation all necessary functions are supervised. Alarm given if more than 5 openings and trigger value not less than 70.
	Ti 71 = 20 sec. V4, SV10	Displacement water. Oil outlet pressure increase more than 0.5 bar indicates that water is fed. The timer is then interrupted.	'NO PT4 PRESSURE FEEDBACK DURING Ti71'. Alarm given if no pressure feedback. Max. 15 sec.
	Ti 72 = 0 – 150 sec. SV10	Displacement water.	Max. to calibrated value.
	Ti 73 = 10 sec V5	Water pumped out through the water outlet to wash out any remaining oil. Sludge pump in operation.	
	Ti 74 = 3 sec. SV15	Discharge.	
	Ti 75 = 15 sec.	Discharge feedback and draining of operating system After 'bowl cleaned' at start, the program continues with Ti 58 – 68. Once Ti 68 has elapsed, the program skips from Ti 75 to Ti 62 after every discharge, or to Ti 81 if stop is ordered.	'Discharge feedback – ERROR'. Alarm is given if bowl speed after discharge is not below Fa 11 minus Fa 12.
	Ti 62 to 67 repeated. or Ti 81		

	Timer	Action	 Alarms
Stop 	Ti 81 = See table chapter 4. SV16	Bowl closing	
	Ti 82 = 150 sec. V4, SV10 Heater off	Water to the bowl. Timer interrupted when 80% of bowl volume is filled, or when pressure in oil outlet is increased by more than 0.2 bar.	Max. 300 sec.
	Ti 83 = 10 sec V5	Water pumped out through the water outlet to wash out any remaining oil from the paring tube and pipes.	
	Ti 85 = 5 min. Separator motor off	Waiting for oil feed temp. decrease. Timer is interrupted when temp. decrease below low limit.	‘Temperature - NOT DECREASING’ If temp. not decreased within Ti 85.
	Ti 86 = 3 min.	Waiting for speed decrease. Time for cooling of heater	‘Bowl speed – HIGH xxxxx’ If speed not decreased within timer.
	Ti 87 = 60 sec. Feed pump off	Timer is interrupted by pump off feedback.	
	Ti 89 = 30 – 60 min.	Waiting for zero speed When speed = 0, timer is interrupted and ‘Standst’ is indicated.	Max. 60 min.

