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1 Technical Data

1.1 Demand Specifications Water

Poor quality of the operating water may with time cause erosion, corrosion and/or operating problems. The water shall be treated to meet certain demands.

The following requirements are of fundamental importance:

1 Turbidity-free water, solids content <0.001% by volume.
   Max. particle size 50 µm.
   Deposits shall not be allowed to form in certain areas in the system.
2 Total hardness less than 180 mg CaCO$_3$ per litre, which corresponds to 10 °dH or 12.5 °E. Hard water may with time form deposits in the operating mechanism. The precipitation rate is accelerated with increased operating temperature and low discharge frequency. These effects become more severe the harder the water is.
3 Chloride content max. 100 ppm NaCl (equivalent to 60 mg Cl/l). Chloride ions contribute to corrosion on surfaces in contact with the operating water. Corrosion is a process that is accelerated by increased separating temperature, low pH, and high chloride ion concentration.
4 6.5 < pH < 9
   Bicarbonate content (HCO$_3$) min. 70mg HCO$_3$ per litre, which corresponds to 3.2 °dKH.

NOTE
Alfa Laval accepts no liability for consequences arising from unsatisfactorily purified operating water supplied by the customer.

1.2 Demand Specifications Air

Specific requirements regarding the quality of air

1 Pressure 500 – 700 kPa.
2 Free from oil, and solid particles larger than 0.01 mm.
3 Dry, with dew point min. 10 °C below ambient temperature.

NOTE
Electrical interconnections must be made by qualified electricians.
Mechanical interconnections must be made by qualified mechanical technicians.
### 1.3 System Data

<table>
<thead>
<tr>
<th>Media</th>
<th>Fuel oil and lube oils for diesel engines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed density, max.</td>
<td>991 kg/m³ at 15 °C</td>
</tr>
<tr>
<td>Viscosity, max.</td>
<td>50 cSt at 100 °C (600 cSt at 50 °C)</td>
</tr>
<tr>
<td>Pressure:</td>
<td></td>
</tr>
<tr>
<td>Oil inlet</td>
<td>Max. 4 bar</td>
</tr>
<tr>
<td>Oil outlet</td>
<td>Max. delivery height 2.5 bar</td>
</tr>
<tr>
<td>Sludge outlet from separator</td>
<td>open outlet</td>
</tr>
<tr>
<td>Water outlet</td>
<td>open outlet</td>
</tr>
<tr>
<td>Feed temperature, max.</td>
<td>100 °C</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
</tr>
<tr>
<td>Operating water pressure</td>
<td>Min. 2 bar, max. 6 bar</td>
</tr>
<tr>
<td>Operating water temp.</td>
<td>Min. +5 °C, max. +55 °C</td>
</tr>
<tr>
<td>Operating water density</td>
<td>Max. 1000 kg/m³</td>
</tr>
<tr>
<td>Operating water flow</td>
<td></td>
</tr>
<tr>
<td>to SV10: 8.0 l/m</td>
<td></td>
</tr>
<tr>
<td>to SV 15: 18 l/m</td>
<td></td>
</tr>
<tr>
<td>to SV 16: 0.9 l/m</td>
<td></td>
</tr>
<tr>
<td>Air quality</td>
<td></td>
</tr>
<tr>
<td>Air pressure</td>
<td>Min. 5 bar, max. 7 bar</td>
</tr>
<tr>
<td>Discharge volume</td>
<td>1.1 litre</td>
</tr>
<tr>
<td>Separator drain connection size</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>Mains supply voltage</td>
<td>3x400/440/480 V ± 10%</td>
</tr>
<tr>
<td>Power consumption, control voltage;</td>
<td></td>
</tr>
<tr>
<td>EPC supply voltage</td>
<td>230 V /110V/115 V/100V ± 10%, 10 A</td>
</tr>
<tr>
<td>Control voltage, operating</td>
<td>24 V AC</td>
</tr>
<tr>
<td>Frequency</td>
<td>50 or 60 Hz ± max. 5%</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Max. 55 °C</td>
</tr>
<tr>
<td>Control cabinet max. distance from unit</td>
<td>50 m</td>
</tr>
<tr>
<td>Storage time before use (with bowl removed)</td>
<td>6 months</td>
</tr>
<tr>
<td>Storage temp.</td>
<td>Min. +0 °C, max. +70 °C</td>
</tr>
<tr>
<td>Storage humidity</td>
<td>Relative humidity (RH) 10% – 95 % Non Condensing</td>
</tr>
<tr>
<td>Enclosure class</td>
<td>Min. IP 54</td>
</tr>
<tr>
<td>Service intervals:</td>
<td>Note! Regularly check connections. Tighten if necessary.</td>
</tr>
<tr>
<td>Separator</td>
<td>Inspection every 2000 hours or 3 months operation</td>
</tr>
<tr>
<td></td>
<td>Overhaul every 8000 hours or 12 months operation</td>
</tr>
</tbody>
</table>
### Separation System Planned Maintenance Kits

<table>
<thead>
<tr>
<th>Hours</th>
<th>Period</th>
<th>Separator</th>
<th>Ancillary Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4000</td>
<td>6 months</td>
<td>Inspection</td>
<td></td>
</tr>
<tr>
<td>12000</td>
<td>18 months</td>
<td>Overhaul</td>
<td></td>
</tr>
<tr>
<td>24000</td>
<td>3 years</td>
<td>Overhaul</td>
<td></td>
</tr>
<tr>
<td>As necessary</td>
<td></td>
<td></td>
<td>Repair (components)</td>
</tr>
<tr>
<td>With delivery</td>
<td></td>
<td>Inspection</td>
<td>Tools</td>
</tr>
</tbody>
</table>


2 Drawings

2.1 Flow Chart
2.2 Drawings

2.2.1 P 605 Separator Mounting Drawing, DIN

Ref. 576840 Rev. 2
2.2.2 P 605 Separator with Sludge Removal Kit Mounting Drawing, DIN

Connections

| A | Flange DN25-PN16-DIN2633 |
| B | Water pipe connection ISO-G 1/2 size |
| C | Water pipe connection ISO-G 1/4 size |
| D | Air pipe connection ISO-G 1/4 size |
| E | Ventilation pipe 2" size |
| F | Internal flexible connection (enclosed with Alfa Laval delivery) |

- - - Not included in Alfa Laval delivery
= = = Optional Alfa Laval delivery

201 Oil inlet
206 Water for seal and displacement
209 Oil recirculation to tank
220 Clean oil outlet
221 Water outlet
222 Sludge outlet
371 Operating water - see 1.1 Demand Specification Water. Pressure 200-600 kPa (2-6 bar). Temp. min +5°C, max. +55°C
372 Opening water
373 Closing water
501 Operating air: pressure 500-700 kPa (5-7 bar).
540 Ventilation
709 Mains supply: 3x230/400/440/480/575/690 V AC
799 EPC supply voltage: 230, 110/115V or 100V AC

Connections:

- Flange DN25-PN16-DIN2633
- Water pipe connection ISO-G 1/2 size
- Water pipe connection ISO-G 1/4 size
- Air pipe connection ISO-G 1/4 size
- Ventilation pipe 2" size
- Internal flexible connection (enclosed with Alfa Laval delivery)

Not included in Alfa Laval delivery
Optional Alfa Laval delivery

Operating water - see 1.1 Demand Specification Water. Pressure 200-600 kPa (2-6 bar). Temp. min +5°C, max. +55°C
Opening water
Closing water
Operating air: pressure 500-700 kPa (5-7 bar).
Ventilation
Mains supply: 3x230/400/440/480/575/690 V AC
EPC supply voltage: 230, 110/115V or 100V AC
2.2.3 P 605 Separator Mounting Drawing, JIS

Ref. 576841 Rev. 2
### 2.2.4 P 605 Separator with Sludge Removal Kit Mounting Drawing, JIS

<table>
<thead>
<tr>
<th>Connections</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange JIS 25A 10K</td>
<td>ISO G 1/2 size</td>
<td>ISO G 1/4 size</td>
<td>Internal flexible connection (enclosed with Alfa Laval delivery)</td>
<td>Not included in Alfa Laval delivery</td>
<td>Optional Alfa Laval delivery</td>
</tr>
</tbody>
</table>

#### Demand Specification
- **Water Pressure**: 200-600 kPa (2-6 bar)
- **Temp.**: min. +5°C, max. +55°C

#### Connections
- Oil inlet
- Oil accumulation to tank
- Water outlet
- Sludge discharge outlet
- Operating water - see 1.1
- Demand Specification Water Temp. mm. +5°C, max. +55°C
- Operating pressure: 700 kPa (5-7 bar)
- Ventilation

#### Connections Details
- Flange JIS 25A 10K
- ISO G 1/2 size
- Internal flexible connection (enclosed with Alfa Laval delivery)
- Not included in Alfa Laval delivery
- Optional Alfa Laval delivery

**Ref. 578193 Rev. 0**
2.2.5 P 605 Separator Basic Size Drawing

Connection 201 and 220 turnable 90°
All connections to be installed non-loaded and flexible
Maximum vertical displacement at the solid phase outlet connection during operation ± 10 mm
Maximum horizontal displacement at the inlet/outlet connections during operation ± 20 mm
All dimensions are nominal. Reservation for individual deviations due to tolerances.

Ref. 565297 Rev. 2
2.2.6 P 605 Separator Foundation Drawing

- Min. lifting capacity required when doing service: 300 kg
- Max. height of largest component incl. lifting tool:
- Recommended free floor space for unloading when doing service:
- No fixed installation within this area
- Centre of gravity (complete machine)
- Vertical force not exceeding 5 kN/foot
- Horizontal force not exceeding 7 kN/foot
- Total static load max. 4 kN

Ref. 548711 Rev. 2
2.2.7 Valve Block Water Dimension Drawing

Ref. 1765927 Rev. 9
2.2.8 Control Unit EPC 50 Dimension Drawing

Technical Data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>Max. 55 °C</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 65</td>
</tr>
<tr>
<td>Material in cabinet</td>
<td>Sheet steel</td>
</tr>
<tr>
<td>Power supply</td>
<td>100, 115, or 230 V AC 50/60 Hz</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>24 V AC 50/60 Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>70 VA (+200 VA for I/O)</td>
</tr>
<tr>
<td>Weight</td>
<td>19 kg</td>
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</tbody>
</table>

Ref. 568304
2.2.9 Starter Dimension Drawing

**Technical Data**

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
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<tbody>
<tr>
<td>Mains supply</td>
<td>3x230, 400, 440, 480, 575, 690 V AC Max fuse 40 A</td>
</tr>
<tr>
<td>Current ranges</td>
<td>Acc. to order (for separator 2.5 – 16 A and for pump 0.4 – 10 A)</td>
</tr>
<tr>
<td>Power supply to EPC</td>
<td>230 V, 300 VA</td>
</tr>
<tr>
<td>Weight</td>
<td>25 – 30 kg</td>
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</table>
2.3 **Electrical System Layout**
### 2.4 Electrical Diagrams

#### 2.4.1 Cable List

<table>
<thead>
<tr>
<th>No.</th>
<th>Type</th>
<th>Connection point A</th>
<th>Instruction</th>
<th>Connection point B</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Power cables (currents according to order)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>MPRXCX</td>
<td>3x4</td>
<td>Mains supply</td>
<td>Starter</td>
<td>Fuse 20 A</td>
</tr>
<tr>
<td>1</td>
<td>MPRXCX</td>
<td>3x10</td>
<td>Mains supply</td>
<td>Starter</td>
<td>Fuse 35 A</td>
</tr>
<tr>
<td>2</td>
<td>MPRXCX</td>
<td>2x1.5</td>
<td>Starter</td>
<td>EPC 50</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>MPRXCX</td>
<td>3x1.5</td>
<td>Starter</td>
<td>Separator motor</td>
<td>2.5 – 6.3 A</td>
</tr>
<tr>
<td>3</td>
<td>MPRXCX</td>
<td>3x2.5</td>
<td>Starter</td>
<td>Separator motor</td>
<td>6.3 – 16 A</td>
</tr>
<tr>
<td>71</td>
<td>MPRXCX</td>
<td>2x1.5</td>
<td>Starter</td>
<td>Separator motor</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>MPRXCX</td>
<td>3x1.5</td>
<td>Starter</td>
<td>Feed pump</td>
<td>0.4 – 6.3 A</td>
</tr>
<tr>
<td>4</td>
<td>MPRXCX</td>
<td>3x2.5</td>
<td>Starter</td>
<td>Feed pump</td>
<td>6.3 – 10 A</td>
</tr>
<tr>
<td>72</td>
<td>MPRXCX</td>
<td>2x1.5</td>
<td>Starter</td>
<td>Feed pump</td>
<td></td>
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</table>

Ref. 571356 Rev. 1
<table>
<thead>
<tr>
<th>No.</th>
<th>Type</th>
<th>Connection point A</th>
<th>Instruction</th>
<th>Connection point B</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>11</td>
<td>RFE-HF</td>
<td>1x2x0.75</td>
<td>EPC 50</td>
<td></td>
<td>SV1</td>
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<td>14</td>
<td>RFE-HF</td>
<td>1x2x0.75</td>
<td>EPC 50</td>
<td></td>
<td>SV10</td>
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<tr>
<td>15</td>
<td>RFE-HF</td>
<td>1x2x0.75</td>
<td>EPC 50</td>
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<td>SV15</td>
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<tr>
<td>16</td>
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<td>EPC 50</td>
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<td>SV16</td>
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<tr>
<td>17</td>
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<td>1x2x0.75</td>
<td>EPC 50</td>
<td>SSC</td>
<td>PT1</td>
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<tr>
<td>18</td>
<td>RFE-HF</td>
<td>1x2x0.75</td>
<td>EPC 50</td>
<td>SSC</td>
<td>PT4</td>
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<tr>
<td>22</td>
<td>RFE-HF</td>
<td>1x2x0.75</td>
<td>EPC 50</td>
<td></td>
<td>SUM Alarm</td>
</tr>
<tr>
<td>23</td>
<td>RFE-HF</td>
<td>4x2x0.75</td>
<td>EPC 50</td>
<td>SSC</td>
<td>TT1/TT2</td>
</tr>
<tr>
<td>50</td>
<td>RFE-HF</td>
<td>4x2x0.75</td>
<td>EPC 50</td>
<td></td>
<td>Starter</td>
</tr>
<tr>
<td>51</td>
<td>RFE-HF</td>
<td>4x2x0.75</td>
<td>EPC 50</td>
<td></td>
<td>Starter</td>
</tr>
<tr>
<td>52</td>
<td>RFE-HF</td>
<td>1x4x0.75</td>
<td>EPC 50</td>
<td></td>
<td>Starter</td>
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</table>

**Options (as ordered)**

<table>
<thead>
<tr>
<th>No.</th>
<th>Type</th>
<th>(PVC 5GO.75)</th>
<th>Starter</th>
<th>Instruction</th>
<th>Connection point B</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>RFE-HF</td>
<td></td>
<td>Starter</td>
<td>SS, Sep.Switch</td>
<td></td>
<td>Included in separator switch</td>
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<tr>
<td>30</td>
<td>RFE-HF</td>
<td>1 x4x0.75</td>
<td>EPC 50</td>
<td></td>
<td></td>
<td>YS, Vibr.Switch</td>
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<tr>
<td>31</td>
<td>RFE-HF</td>
<td>1 x4x0.75</td>
<td>EPC 50</td>
<td>SSC+EMC</td>
<td></td>
<td>Rem. OP Unit</td>
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<tr>
<td>32</td>
<td>RFE-HF</td>
<td>1 x4x0.75</td>
<td>EPC 50</td>
<td></td>
<td>SSC+EMC</td>
<td>Rem. Temp. al.</td>
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<tr>
<td>33</td>
<td>MPRX CX</td>
<td>5x1.5</td>
<td>EPC 50</td>
<td></td>
<td></td>
<td>Rem. Start/stop</td>
</tr>
<tr>
<td>34</td>
<td>RFE-HF</td>
<td>1 x4x0.75</td>
<td>EPC 50</td>
<td>SSC+EMC</td>
<td></td>
<td>Comm. Module</td>
</tr>
<tr>
<td>35</td>
<td>RFE-HF</td>
<td>1 x4x0.75</td>
<td>Starter</td>
<td></td>
<td></td>
<td>GS, Valve Switch</td>
</tr>
<tr>
<td>36</td>
<td>RFE-HF</td>
<td>1 x2x0.75</td>
<td>EPC 50</td>
<td></td>
<td></td>
<td>LS, Sludge Level</td>
</tr>
<tr>
<td>37</td>
<td>RFE-HF</td>
<td>1 x2x0.75</td>
<td>EPC 50</td>
<td></td>
<td></td>
<td>SV6, Sol. Valve For pneumatic sludge pump</td>
</tr>
<tr>
<td>38</td>
<td>MPRX CX</td>
<td>4x1.5</td>
<td>EPC 50</td>
<td></td>
<td></td>
<td>Syst.Emergency 1)</td>
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<tr>
<td>40</td>
<td>RFE-HF</td>
<td>4x2x0.75</td>
<td>EPC 50</td>
<td></td>
<td></td>
<td>Power Unit</td>
</tr>
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<td>45</td>
<td>RFE-HF</td>
<td>1 x2x0.75</td>
<td>Starter</td>
<td></td>
<td></td>
<td>Power Unit</td>
</tr>
<tr>
<td>41</td>
<td>RFE-HF</td>
<td>1 x4x0.75</td>
<td>EPC 50</td>
<td></td>
<td></td>
<td>Steam Reg. Val</td>
</tr>
<tr>
<td>44</td>
<td>RFE-HF</td>
<td>1 x2x0.75</td>
<td>EPC 50</td>
<td></td>
<td></td>
<td>Shut-off Valve</td>
</tr>
</tbody>
</table>

1) Cable cannot be longer than 25 meter to avoid voltage drop.

Ref. 571356 Rev. 1
Other equivalent and approved cables may be used.

Cable areas are calculated with correction factor 0.7.

Cables used are Shipboard Cables, designed according to IEC 92-3.

Flame retardant according to IEC 332-3/A.

Halogen-free according to IEC 754-1

Code designations for cables obtainable through cable producers Helkama, Finland, and Acatel, France.

Where SSC is indicated it should be a Signal Shielded Cable with the shield properly connected to earth as shown in the electrical drawings.

For other connections, an armoured cable may be used provided the armour is connected to earth, as shown in the electrical drawings, and gives sufficient EMI protection. Copper wire armouring is normally used.
2.4.2 Interconnection Diagram, Starter

Mains supply
3x230, 400, 440, 480, 575 or 690 V AC
Select correct voltage on transformer T8

Separator motor

Space heater 230 VAC
Separator motor optional

Contactor response, separator
Potential free contacts, max. 250 V 0.5 A

Feed pump motor optional

Space heater 230 VAC
Separator motor optional

Contactor response, separator
Potential free contacts, max. 250 V 0.5 A

Systems emergency stop
(Control voltage off)

Power supply to EPC 50 (Sheet 5)
230 V AC, 50/60 Hz

Ref. 571072 Rev. 1 Sheet 1
2.4.3 Interconnection Diagram, Starter, cont.

* = Replaces jumper in terminals
** = Internal connections

To EPC 50 (sheet 5)

Separator interlock switch
optional

Separator emergency stop
(optional, external)

Sludge valve interlock switch
optional

Remote stop
Feed pump
Remote start

Feed pump interlock

Heater interlock
Potential free contact, max. 250 V 0.5 A
(Feed pump running = contact closed)
Tripped motor circuit breakers (optional)
Potential free NC contacts, max. 250 V 0.5 A
Emergency Shut Down (ESD) signal (optional)
Emergency Shut Down (ESD) feedback (optional)

To EPC 50 (sheet 3)
2.4.4 Interconnection Diagram, Transmitters

- **XS 1**
  - Vibration switch
  - Optional

- Remote OP unit
  - * Termination jumper. Only at sattbus end units.

- Temp. sensor, 2xPT 100

- **TT 1** (Alarm)

- **TT 2** (Control)

- **PT1**

- **PT4**

- From Starter (Sheet 2)

- **LS**
  - Level Switch
  - Sludge Tank (Optional)

---

Ref. 571072 Rev. 1 Sheet 3
2.4.5 Interconnection Diagram, Solenoid Valves

Signal to alarm panel. Pot. free contact, opens at alarm
Max. 50 V AC/DC, 1.0 A

SV6
Solenoid valve for control of Pneumatic Sludge Pump (Optional)

SV1
Oil feed

SV10
Water seal

SV15
Opening water

SV16
Closing water

Ref. 571072 Rev. 1 Sheet 4
2.4.6 Interconnection Diagram, Solenoid Valves cont.

- Systems emergency stop (Control voltage off)
- Jumper at 100 V AC
- Jumper at 110/115 V AC
- Jumpers at 230 V AC
- Connections for alternative voltages
- From starter (sheet 1)
- From starter (sheet 2)
- From starter (sheet 2)
2.4.7 Interconnection Diagram, Optional Equipment

Remote alarm indication
High temp. indication
Low temp. indication
Pot. free contacts
Max. 50 V AC/DC, 1.0 A
Contact closes at alarm.

Remote operation
Remote mode selected
(output 24 V AC)
Sep. status indication
(output 24 V AC)
Separation Start/Stop

Note
Jumper X71:1 to X71:3 to avoid false alarm when not used.

Data communication

Ref. 571072 Rev. 1 Sheet 6
2.4.8 Circuit Diagram, Power Circuits

Ref. 571073 Rev. 1 Sheet 1
2.4.9 Circuit Diagram, Separator Starter and Feed Pump
2.4.10 Circuit Diagram, ESD-relay and Trip Contacts (optional)
3  Remote Supervision

**NOTE**

It is possible to supervise the Purifier System from a remote position. It is, however, not possible to operate the Purifier System from a remote position.

**Connection to steering system via PROFIBUS or MODBUS fieldbus systems.**

PROFIBUS or MODBUS communication protocol can be used to connect an EPC 50 Control Unit to a central steering system. The EPC 50 Control Unit uses a PROFIBUS DP or MODBUS RTU. Every node, or EPC 50 Control Unit, on the bus has a unique address, and can use 200 bytes for data exchange. An interface board is needed to connect an EPC 50 Control Unit to the respective fieldbus system. This is mounted on the I/O card.

Remote fieldbus connection for EPC 50 Control Unit is for use in those cases where the user wants access to data and operation information from the control cabinet, and supervision and/or remote control from his own steering system.
<table>
<thead>
<tr>
<th>Alternative</th>
<th>PROFIBUS</th>
<th>MODBUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>User interface</td>
<td>To be arranged by customer.</td>
<td>To be arranged by customer.</td>
</tr>
<tr>
<td>Cable</td>
<td>Cable for PROFIBUS aquired and installed by customer.</td>
<td>Cable for MODBUS aquired and installed by customer.</td>
</tr>
<tr>
<td>Manual</td>
<td>Hardware and software instructions exist.</td>
<td>Hardware and software instructions exist.</td>
</tr>
<tr>
<td>Board</td>
<td>Part no. 31830-6559-1</td>
<td>Part no. 31830-6558-1</td>
</tr>
</tbody>
</table>
4 Specifications

4.1 Cables

Cable Identification
All cables are marked to simplify identification and fault finding.

Specifications
The following specifications apply to cables connected to and from Alfa Laval equipment. Follow the instructions given in the cable list. Examples of cable types that can be used:

- Steel armoured cable.

- Copper armoured cable with a separate earth core.

- Steel armoured and shielded signal cable; pair twisted or parallel.

- Shielded signal cable; pair twisted or parallel.
4.2 **Cable Routing**

### Recommendations

Power cables carry the power supply to motors, heaters, etc. Any distance between signal and power cables reduces electrical noise transfer.

Examples of recommended routing of various cable types.

- Power cables and signal cables routed on a cable rack should be separated.
- Sattbus cables should be routed away from power cables.

If the space is limited, cables can be routed in tubes.

![Power Cables and Signal Cable Routing](image)

### 4.3 Oil, Water, Steam, and Condensate Piping

For piping to and from Alfa Laval equipment, see the specifications below.

**Specifications**

- The correct pipe size must be used in the oil system.
- The number of bends in the oil pipes must be minimized.
- The suction height must be as low as possible.
- The oil feed pump must be a displacement type pump.
- The pump must be positioned close to the oil tank.
- The heater must be installed close to the purifier unit to maintain correct feed oil temperature.
- The recirculation line should be connected either directly to the settling tank (HFO) or to the oil outlet line from the separator (LO).
- The oil outlet line from the separator must be connected to the system tank for lube oil, or the service tank for fuel oil.
4.4 Ambient Temperature Limitation

**Specification**

Leading classification societies state in their regulations for engine room equipment that the maximum ambient temperature permissible is $+55^\circ C$. To meet this regulation, it is essential that electrical and electronic components have good ventilation, and temperature control.

4.5 Sludge Tank

- Sludge tank volume per Purifier System should cover approximately up to 2 days storage at a discharge interval of 2 hours (for discharge volumes see technical data).
- A manhole should be installed for inspection and cleaning.
- The tank should be fitted with a sounding pipe.
- The tank floor, or most of it, should have a slope of minimum 15°.
- The sludge outlet pump connection should be positioned in the lowest part of the tank.
- A high level alarm switch, connected to the sludge pump, should be installed.
- A heating coil should be used to keep the sludge warm and fluid while being pumped out.
- Tank ventilation must follow the classification rules for evacuation of gases.
- There should be a ventilation pipe to fresh air.
- The ventilation pipe should be straight. If this is not possible, any bends must be gradual.
- The ventilation pipe must not extend below the tank top.
- A sludge tank with partition walls must have ventilation pipes in all compartments, or cutouts in the upper edge, to allow vapours to travel through the tank.
The number of ventilation pipes, and their minimum dimension, depend on the size and number of separators connected to the same tank. See table below.

<table>
<thead>
<tr>
<th>Type</th>
<th>1 system</th>
<th>2 systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA 605</td>
<td>1 x Ø70 mm</td>
<td>1 x Ø100 mm</td>
</tr>
</tbody>
</table>
4.6 Sludge Piping

Specification

- The sludge pipe from the separator to the sludge tank should be vertical. If a vertical pipe is not possible, the deviation (A) from the vertical line must not exceed 30°.

Note

An extended sludge pipe will obstruct ventilation and create back pressure that could cause separator problems.
If more than one separator is connected to the same sludge tank, a butterfly valve should be installed in each sludge pipe.

**NOTE**

If a butterfly valve is not used, the bowl and the operating system may be affected.

- If a butterfly valve is used, it should be equipped with an interlocking switch (connected to the separator starter) to prevent the separator from being started when the valve is not fully open.
5 Commissioning and Initial Start

5.1 Completion Check List

It is essential before starting up the separation system that all units are in good operating condition and that all pipelines and control equipment are properly connected to assure correct operation.

Use this check list as a guide for completing the system installation:

**WARNING**

**Breakdown hazard**

Check that the power frequency is in agreement with the machine plate. If incorrect, resulting overspeed may cause breakdown.

1 Check that transport seals are removed from all pipes.

2 Use flushing filters to prevent pipe work debris from being pumped into the separation system.

**NOTE**

The flushing filters must be removed after initial flushing.

3 Check that all separators are in proper working condition. Follow the manufacturer’s instructions.

4 Make sure that separators are lubricated in accordance with instructions.

**NOTE**

Make sure that the spindle bearings are prelubricated.

5 Separators are delivered without oil in the oil sump. For information on oil filling and oil type, see the Service Manual booklet.
NOTE
Too much, or too little oil may result in damage to separator bearings. Neglecting an oil change may result in damage to separator bearings.

6 Power on.

7 Check that the separator rotation direction corresponds with the arrow on the frame by doing a quick start/stop (1–2 seconds) and looking at the motor fan rotation.

CAUTION
If power cables have been installed incorrectly, the separator will rotate in reverse, and vital rotating parts can unscrew.

8 Check the pump function and direction.
5.2 Initial Start-up

Use this check list for initial system start up:

1 Check that there is oil in the feed oil tank.

2 Check water and air supply. See “System Data” on page 6.

3 Check power supplies to the control unit and that the voltage is in accordance with data in “System Data” on page 6.

4 Check all parameter settings in the control unit. See Installation Parameters in the Parameter List booklet.

NOTE
The Control Unit is supplied with standard configuration parameters. You may have to make some changes to suit your installation.

5 Start the separation system as described in the Operating Instructions booklet.

6 Start up step by step, checking that the machine and units function properly.

7 Establish system pressures.

The delivery height pressure is the pressure in the oil pipe work down stream from the separation system, due to the pipe bends and the height (head) to the cleaned oil tank. If the cleaned oil tank is below the separation system the delivery height pressure may be very low. The oil paring disc pressure will have to be greater than the delivery height pressure for any oil to flow.

Proceed as follows:

- Ensure the valves in the oil system are in the correct positions.
- The oil should be at separation temperature.

Cont.
- Ensure that V5 is closed.
- Fully open the back pressure regulating valve RV4.
- The shut off valve V4 should be open.
- Open SV15 for 3 seconds to prime the operating slide.
- Open SV16 for 15 seconds to close the bowl.
- Open SV10 for 30 seconds to put water into the bowl.
- Feed oil to the separator at the normal flow rate by opening SV1.
- Note the pressure in the oil outlet PT4, both on the pressure gauge and in the EPC50 display. This pressure is P min.
- Gradually close the back pressure regulating valve RV4. The pressure on PT4 will increase. The water pressure (PT5) decreases slightly as the paring tube moves inwards. The water pressure will suddenly drop when oil passes from the oil paring chamber to the water paring chamber. Note the pressure of PT4 both on the pressure gauge and in the EPC50 display. This pressure is P max.
- Open RV4.
- Stop the oil feed to the separator and note the pressure in the oil outlet. This is the delivery height pressure P del.
- Stop the heater.
- Stop the separator.
- Stop the feed pump when the heater has cooled.
5.2.1 Calculating Operating Pressure

- Calculate the normal back pressure level during operation as follows:

\[
\frac{P_{\text{min}} + P_{\text{max}}}{2} = P_{\text{normal}}
\]

- Calculate the value for low pressure alarm setting (Pr 11) as follows:

\[
\frac{P_{\text{min}} + P_{\text{normal}}}{2} = P_{\text{low press.}}
\]

- Calculate the value for high pressure alarm setting (Pr 10) as follows:

\[
\frac{P_{\text{normal}} + P_{\text{max}}}{2} = P_{\text{high press.}}
\]

Adjust the back pressure to \( P_{\text{normal}} \)

Set Pr 11 to give alarm at pressure decreasing below the \( P_{\text{low press.}} \) value.

Set Pr 10 to give alarm at pressure increasing above the \( P_{\text{high press.}} \) value.
6 Shut-down and Storage

Storage before Installation
If the separation system is stored before installation, the following safeguards must be taken:

<table>
<thead>
<tr>
<th>Storage period</th>
<th>&lt; 6 months</th>
<th>&gt; 6 months</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protect from dust, dirt, water, etc.</td>
<td>x</td>
<td>x</td>
<td>This chapter</td>
</tr>
<tr>
<td>Protect with anti-rust oil</td>
<td>x</td>
<td>x</td>
<td>This chapter</td>
</tr>
<tr>
<td>Inspection</td>
<td>x</td>
<td>x</td>
<td>Service manual</td>
</tr>
<tr>
<td>Overhaul</td>
<td></td>
<td>x</td>
<td>Service manual</td>
</tr>
</tbody>
</table>

6.1 Shut-down after Use
If the separation system is going to be shut down for a period of time, the following safeguards must be taken:

<table>
<thead>
<tr>
<th>Shut-down period</th>
<th>&lt; 3 months (stand-by)</th>
<th>3 – 12 months</th>
<th>&gt; 12 months</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove bowl</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Dismantling and Assembly in the Service Manual</td>
</tr>
<tr>
<td>Protect from dust, dirt, water, etc.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>This chapter</td>
</tr>
<tr>
<td>Protect with anti-rust oil</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>This chapter</td>
</tr>
<tr>
<td>Inspection</td>
<td>x</td>
<td></td>
<td>x</td>
<td>Service manual</td>
</tr>
<tr>
<td>Overhaul</td>
<td></td>
<td></td>
<td>x</td>
<td>Service manual</td>
</tr>
</tbody>
</table>
6.2 Protection and Storage

All system equipment, both the separator and the ancillary equipment, must be stored indoors at 5 – 55°C, if not delivered in water-resistant box for outdoor storage.

If there is a risk for condensation of water, the equipment must be protected by ventilation and heating above dew point.

The following protection products are recommended:

- Anti-rust oil with long lasting effective treatment for external surfaces. The oil should prevent corrosion attacks and give a waxy surface.
- Anti-rust oil (Dinitrol 40 or equivalent) thin and lubricating for inside protection. It gives a lubricating transparent oil film.
- Solvent, e.g. white spirit, to remove the anti-rust oil after the shut-down.
- If the storage time exceeds 12 months, the equipment must be inspected every 6 months and, if necessary, the protection be renewed.

Rubber Parts

- Gaskets, O-rings and other rubber parts should not be stored for more than two years. After this time, they should be replaced.

Separator

Dismantle the separator bowl and take out the O-rings. Clean the bowl with oil and reassemble without the O-rings. Place in a plastic bag with silica dessicant bags and seal the plastic bag.

Grease the spindle.
Valves, Pipes and Similar Equipment

- Components like valves need to be cleaned with solvent and treated with anti-rust oil (type 112).
- Water pipes should be drained and treated with anti-rust oil (type 112).
- Articles made of rubber or plastics (e.g. seals) must not be treated with anti-rust oil.

6.3 Reassembly and Start up

- Clean away the anti-rust oil with white spirit.
- Remove the silica gel bags from all units.
- Follow all relevant instructions in the Service Manual and Operating Instructions.