RecondOil Box

ROBX3100 series

Operator manual: English original

RecondOil®

skf.com

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About this document

This document provides a description of the components and functions of the RecondOil Box 3100 Series. It can be used as a reference for installing, configuring, operating, and maintaining the system.

NOTE!

The information and instructions in the manual are valid from software version 6.3.

NOTE!

Illustrations depict a variety of models, including optional components and functions. Instructions for optional components and functions do not apply to all models.

Audience

Installation technicians, operators and maintenance personnel who work with the system.

NOTE!

This document is intended for personnel who have completed training on the system. It is not a substitute for training. Contact SKF RecondOil AB if training is required.

Language

The original version of this document is written in English. Versions of the document in a language other than English are translated from the original.

Attention boxes

Attention boxes highlight safety and supplementary information. There are three categories of safety box, as well as boxes for notes and tips.

⚠ DANGER!

Danger indicates a risk of serious injury or death.

⚠ WARNING!

Warning indicates a risk of substantial injury.

⚠ CAUTION!

Caution indicates a risk of injury, material damage, or environmental impact.

NOTE!

Note text indicates essential supplementary information.

TIP!

Tip text indicates non-essential helpful information.

The following symbols are used in attention boxes throughout this manual:

Hazardous materials: Explosive

Hazardous materials: Health hazard

Hazardous materials: Toxicity

Mandatory action: Inspect before using


Mandatory action: Lock out and keep locked


Mandatory action: Read the documentation


Mandatory action: Remove power


Mandatory action: Tighten before using


Mandatory action: Use protective clothing


Mandatory action: Use protective eyewear


Mandatory action: Use protective footwear


Mandatory action: Use protective gloves


Prohibition: Do not use in an explosive atmosphere


Warning: Crushing hazard (hands)


Warning: Electrical hazard


Warning: Hazardous materials


Warning: Hot surfaces and contents


Warning: Pressurised components


Warning: Risk of explosion


Warning: Risk of fire


Warning: Slippery surfaces


Warning: Suspended load

Terms and abbreviations

These terms and abbreviations are used in this document.

Booster	The patented separation enhancer used in the oil filtration process.
Consumable	Any substance or material required by a process that must be regularly replenished or exchanged.
Container	A receptacle that can be removed and reinserted, as opposed to a housing, which is permanently connected to the system
Contaminated oil	Oil that has been rendered unusable in an industrial process.
DST	Double Separation Technology® A method of reconditioning lubricating oils that have been contaminated through use.
Equipment	The external infrastructure and/or machinery to which the system is connected.
HMI	**Human-Machine Interface** The HMI is a touchscreen display that allows the operator to control the system. Also called the display.
Insert	An assembly, normally consumable, that can be removed from a component for cleaning or exchange.
Housing	A component that contains subcomponents, and that is closed and sealed during normal operation.
Lockout	The process of removing power from a system, and ensuring that it cannot be accidentally restored. Also called Lock out / Tag out, or LOTO.
Operator	A person that is qualified to operate the system as detailed in this document.
PCB	**Printed Circuit Board** The system electronics and peripheral connectors.
Regenerated oil	Oil that has been processed in the system and returned to a useable state.
System	The RecondOil Box 3100 Series.

Safety

It is the responsibility of the operator to ensure that the instructions and recommendations in this section are followed, in addition to any local laws and regulations.

Safety precautions

These safety precautions must be followed at all times.

⚠ DANGER!

Electrical hazard. Risk of serious injury or death.

Electrical installation must be carried out by a qualified electrician.

Remove power to the system before carrying out any maintenance work and ensure it cannot be restored until work is complete.

The pre-installed power cable has a temperature tolerance of 60 °C. Take care to ensure that the cable does not come into contact with hot piping or other heated components.

⚠ DANGER!

Health & safety. Risk of serious injury or death.

Never attempt to operate the system while maintenance or service is being performed

Never attempt to operate the system while under the influence of any substance, including prescription medication, that may impair judgements or reactions

Do not operate in explosive atmospheres

⚠ WARNING!

Pressurized equipment. Risk of serious injury.

Ventilate equipment before carrying out maintenance work

⚠ WARNING!

Foreseeable misuse

Any usage outside the one stated in these instructions is strictly prohibited, particularly the usage: to supply, transport, or store hazardous substances and mixtures in accordance with annex I part 2-5 of the CLP regulation (EG 1272/2008) or HCS 29 CFR 1910.1200 marked with GHS01, GHS06, and GHS08 hazard pictograms shown:

⚠ CAUTION!

Hazardous substances. Risk of injury.

Dispose of waste according to local laws and regulations. See the Material Safety Data Sheet for details.

Use appropriate Personal Protective Equipment (PPE). See the Material Safety Data Sheet for details.

This product can expose you to substances - including lead, nickel, and formaldehyde - that are known to cause cancer. www.P65Warnings.ca.gov

⚠ CAUTION!

Hot surfaces. Risk of injury.

The temperature of oil in the system may exceed 60 °C. Component and piping surfaces may be hot. Exercise caution when draining or sampling oil.

⚠ CAUTION!

Health and safety. Risk of injury.

Always use protective gloves when transporting, installing, or moving the system

Beware of moving parts in the pump and motor during transport, installation, and commissioning

Always use the lifting points when lifting or moving the system. Always remove the optional legs and spill tray before moving the system. Be aware that the system's centre of gravity may be asymmetrical. The centre of gravity may shift due to residual liquid in the system.

Always ensure the system is ventilated or de-pressurised before maintenance

Inspect hoses and couplings at the system inlet and outlet on a regular basis, at a minimum annually

Be aware of potential oil leakage around the system at all times. Slippery surfaces increase the risk of slipping, tripping, and falling.

General safety instructions

⚠ CAUTION!

The operator must:

- have read and understood this document in its entirety
- follow local laws, regulations, and business practices
- exercise caution at all times
- ensure that the area around the system is kept clean and free from materials that could interfere with safe operation
- ensure the safety of other personnel with access to the system.

Monitoring pressure

The system is pressurized, and the following considerations are important from a safety aspect:

- All systems have an analogue pressure gauge on the primary filter housing and a flow transmitter
- Systems with digital control display the exact pressure and rate of flow in the HMI
- Pressure is controlled in several ways. In pressure mode, pressure is set in the configuration, normally to 3.5 bar. In addition, there is a pressure relief valve in each filter housing, and one in the sensor block.

Intended use

The system reconditions lubricating and hydraulic fluids that have been contaminated through use.

The system is operated according to the instructions described in this document, and within the parameters described in *Technical specifications*, **page 17**.

Using the system for any other purpose, or deviating from the parameters described, may result in material damage or personal injury.

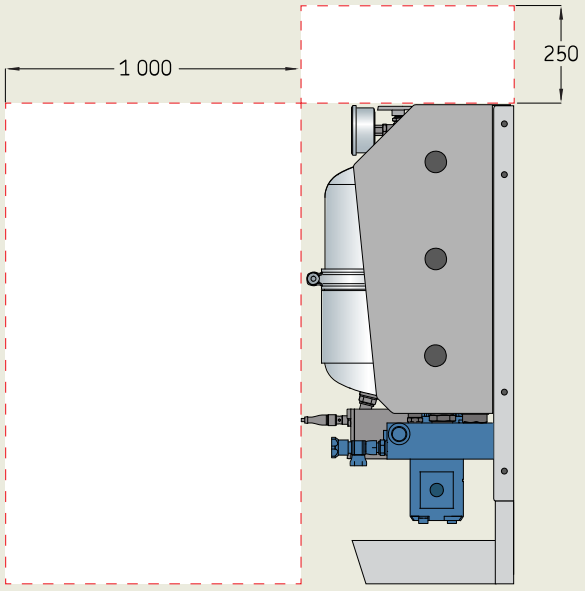
Foreseeable misuse

Using, or attempting to use, the system in the following ways may result in personal injury or material damage:

- Never use the system to process oils with a flashpoint under 60° C.
- Always remove the optional legs and spill tray before transporting the system.
- Never use the system outside the temperature and pressure ranges indicated in *Technical specifications*, **page 17**.
- Never process oils or lubricants that are not approved by SKF RecondOil AB.
- Never process explosive or flammable substances.
- Never use the system without an adequate pressure relief valve.
- Never remove, disconnect, modify, or disable safeguards or other protective and emergency equipment.
- Never install the system in a harmful or corrosive environment (such as high ozone pollution).
- Never install the system in an area with harmful radiation (such as ionizing radiation).
- Never install the system in an explosion protection zone.
- Never modify or convert any part of the system.
- Only use SKF-approved spare parts and accessories. Unauthorised parts and accessories present a risk to safety and functionality. The manufacturer declines responsibility for any injury, damage, or equipment failure caused by unauthorised parts.
- Never bypass fuses. Only use replacement fuses with the same type and rating.
- Never stand or climb on any part of the system.
- Never subject the system to twisting, shearing, or bending.
- Never clean system surfaces with water.
- Never clean the system with a steam jet or pressure washer.

Service area

Service area, wall-mounted model [mm]



The service area is the area around and above the system required for operation and maintenance. The operator is responsible for safety inside the service area.

The service area extends 1 000 mm in front of the system, and 250 mm above the filter housings. This applies on both sides of back-to-back models.

NOTE!

The service area applies to both sides of back-to-back models.

Personal protective equipment

Additional personal protective equipment may be required to operate the system, dependent on the properties of the fluids being processed. See the Material Safety Data Sheet for details.

The system does not produce noise emissions exceeding 70 dB during normal operation.

Only use protective gloves fulfilling EN ISO 21420:2020.

Lifecycle stages

The following letters are used to refer to various lifecycle stages of the system throughout this document:

- A: Transport
- B: Installation
- C: Commissioning
- D: Operation
- E: Cleaning
- F: Maintenance
- G: Fault repair
- H: Decommissioning
- K: Disposal

Residual risks

The following risks remain inherent in the system after safety measures have been applied:

Risk	Lifecycle stage*	Action
Personal injury or material damage due to falling items	A, B, C, G, H, K	Keep the service area free from unauthorised personnel. Only use lifting devices with sufficient capacity. Make sure no one is under suspended loads.
Personal injury or material damage due to failure to observe tightening torques	B, C, D, G	Observe any specified tightening torques. If no torques are specified, apply tightening torques according to the screw size characteristics for 8.8 screws. Only mount the system on surfaces with sufficient load-bearing capacity.

Risk	Lifecycle stage*	Action
Personal injury or material damage due to damaged electrical cabling	B, C, D, E, F, G, H	Check the cable is intact before first use, and at regular intervals. Do not mount the system so the cable is near/on moving parts or friction points. If this is unavoidable, take measures to protect the cable (e.g. spring coils or protective conduits).
Personal injury or material damage due to spillage or leakage	B, C, D, F, G, H, K	Always use safety glasses and protective gloves when working with an unsealed system. Exercise caution when connecting or disconnecting piping, and during system filling. Always use suitable hydraulic screw connections and piping suitable for use at the stated pressures. Do not mount piping near/on moving parts or friction points. If this is unavoidable, take measures to protect the piping (e.g. flexible lines, spring coils or protective conduits). For systems without a spill tray always use alternative spill protection. These risks are especially prevalent when filling the system, changing filters, bleeding the system, or sampling oil.

*See *Lifecycle stages*, **page 9**.

Warnings

These signs are displayed on the system:

Sign		Location	Notes
Warning: Electrical hazard		Under the control cabinet cover, on the power box.	Ensure that power is disconnected before opening or working with the power box.
Warning: Hot surfaces		Under the control cabinet cover, on the pump unit sensor block.	The temperature of the sensor block is representative of the temperature of the oil in the system. This warning applies to all exposed surfaces and piping.
Information: Earth protection (2)		One at the bottom of the control cabinet mounting plate. One on the lower right cover of the control cabinet.	Earth cables are attached here.

Emergency stop

In case of emergency, immediately remove power to the system by unplugging the electrical cord from the mains or switching off the circuit breaker as applicable.

NOTE!

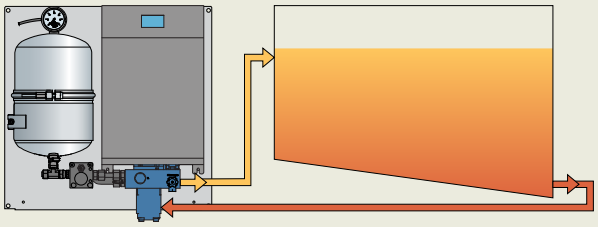
When restarting after an emergency stop, the auto-start configuration will determine which mode the system will start up in. See *Start and stop production*, **page 35**.

System overview

The RecondOil Box 3100 Series removes water and impurities from lubricating and hydraulic fluids that have been contaminated through use.
The standard system is wall-mounted and features a control cabinet with electronics, a pump and motor, the system inlet and outlet, and a primary filter housing with a pressure gauge. Optional components increase capacity and provide alternative functionality.

Oil filtration process

Process schematic



The RecondOil Box 3100 Series takes oil directly from the customer process, cleans it, and returns it in a closed loop. The system is designed to be isolated from the customer control process, and will not affect the operation of external machinery.

The oil filtration process makes maintenance simple and cost-effective. The quality of the oil used in your process will be improved, with a consistent level of cleanliness. This will reduce the risk of equipment failure and breaks in production, and contribute to reduced oil consumption.

Follow the instructions in this manual to optimize process performance.

System naming convention

The system uses the following naming convention to designate model types:

ROBX31 a b ccc / dd e / f

where:

- **a:** denotes the number of filter housings from 1 to 8
- **b:** denotes the oil intake method used
- **c:** denotes optional accessories and/or functions
- **d:** denotes motor effect
- **e:** denotes pump flow capacity
- **f:** denotes miscellaneous variations.

The oil intake designations are:

- 0: Direct intake with pressure-relief valve
- 1: Direct intake
- 2: Direct intake with non-return valve
- 3: Air-driven pump
- 4: Unused
- 5: Electric pump

The optional designations are:

- D: Digital control system. Required for use of DST-activated filters.
- V: Visual flow detection only, no control system.
- L: Standing legs
- M: Mobile (trolley-mounted)
- S: Spill tray

NOTE!

Not all combinations are applicable.

The standard model has one housing, an electric intake pump with the lowest flow rate, and no optional accessories, so the model name is ROBX3115D/17S.

Other examples:

- ROBX3155DSL/17M/B: Five filter housings, electric pump intake, digital control system, spill tray, standing legs, medium pump flow rate, and filter housings compactly mounted back-to-back
- ROBX3115DSM/17S: One filter housing, electric pump intake, digital flow control, a spill tray, mounted on a mobile trolley, and small pump flow rate

Standard components

This document describes both standard and optional components and functions of the system. The following components are standard on all models. All other components are optional.

The standard system comprises:

- One filter housing (primary)
- One standard depth filter (plus one for each additional optional housing)
- Control cabinet, with 1.6 m electrical cable (no plug)
- 3G/4G modem with pre-installed SIM card
- Electrical intake pump
- Flow transmitter
- Pressure transmitter
- Plate for wall mounting
- Documentation (Quick start guide & safety booklet, Commissioning report).

Delivery

Upon delivery of the system:

- Document receipt of the system before unpacking and installing.
- Check the shipment for transport damage. If damage is discovered, immediately document and report it to the forwarding agent. Do not discard of any packaging materials until issues are resolved.
- Compare the contents of the shipment with the shipping manifest. Immediately report any discrepancies to the forwarding agent.

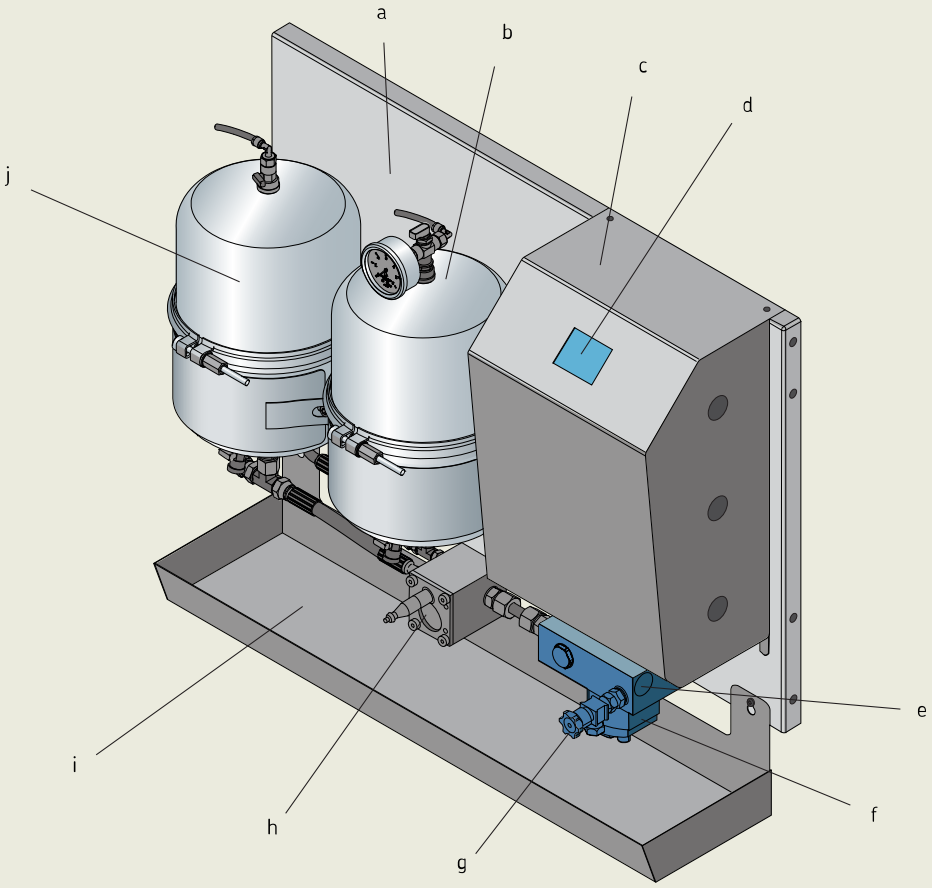
Storage

The following conditions are recommended when storing the system:

- If the system is stored before first use, do not remove it from the original packaging.
- Store indoors, in a dry, vibration-free, dust-free environment at room temperature.
- Do not store in a corrosive or harmful environment (for example exposed to UV radiation or ozone).
- Protect against pests such as insects or rodents.
- Protect against condensation caused by temperature fluctuations.
- For long-term storage, or if the system must be stored in an unsuitable environment, consider using anti-corrosion measures such as VCP.

Major components

Major components



- **a.** Mounting panel
- **b.** Primary filter housing
- **c.** Control cabinet
- **d.** HMI, see *Operator interface*, **page 29**.
- **e.** Oil outlet (to equipment)
- **f.** Oil inlet (from equipment)
- **g.** Sampling valve
- **h.** Flow transmitter
- **i.** Spill tray
- **j.** Secondary filter housing

Control cabinet

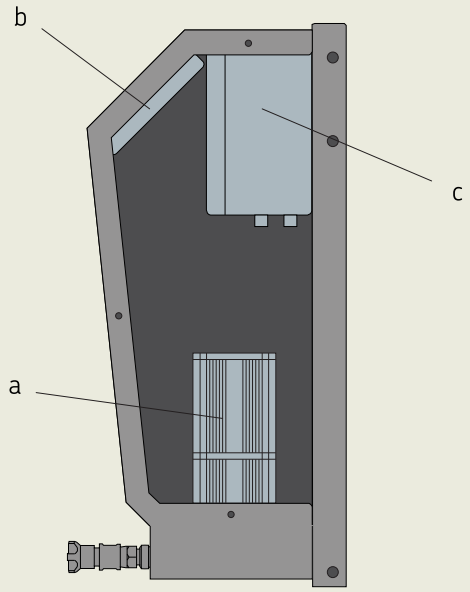
The control cabinet contains system electronics, including the HMI and optional sensors. The system inlet and outlet and the sampling valve are located at the base of the cabinet.

The control cabinet is connected to the primary filter housing. Optional components such as switches and sensors are installed under the cabinet cover.

Internal components

The following components are located inside the control cabinet.

Control cabinet, internal side view

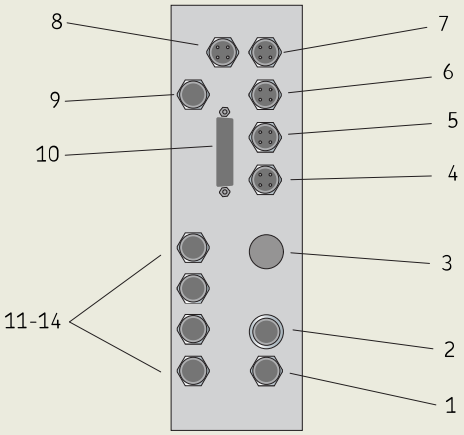


a. Motor
b. Display unit
c. PCB assembly, see *Ports and connections*, **page 14**.

Ports and connections

The following ports and connections are located on the underside of the PCB assembly.

Ports and connections

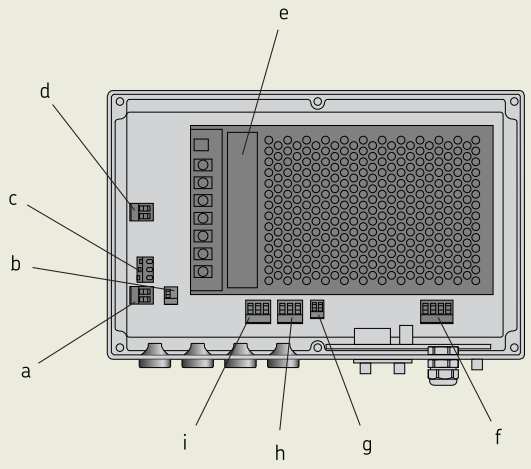


1. Incoming power supply
2. Earthing
3. 24 VDC on/off switch
4. Drip tray NPN/PNP (M12 5P F)
5. Flow transmitter (M12 5P F)
6. AI 4-20 mA CH 2-3 (M12 5P F)
7. AI 4-20 mA CH 4-5 (M12 5P F)
8. AI 4-20 mA CH 1 - pressure (M12 5P F)
9. Pump (M16)
10. D-sub to display unit
11. Signal exchange port, reserved (M16)
12. Signal exchange port, reserved (M16)
13. Signal exchange port, reserved (M16)
14. Signal exchange port, reserved (M16)

PCB assembly (v3)

The PCB assembly contains the system electronics, power input, and peripheral ports and connections.

PCB



a. X1
b. Fuse F2
c. X2
d. X3
e. Power supply unit
f. X4
g. X5
h. X6
i. X7

The IO ports are used as follows:

X1 & X2, Power in	X1 is for the live (brown) and neutral (blue) cables. X2 is for the earth (yellow/green).
X3, Heater	Not used.
X4, Pump motor	The cables are (from left to right as shown) green, yellow, black, and red.
X5, Interlock/external stop	When +24 VDC and 0 VDC is supplied to terminal X5 the pump stops immediately. The contact is separated and isolated from the internal power supply.
X6, Alarm output	No active alarm AND pump ON (or in the event of a power loss) = contact between COM-NC. Active alarm OR pump OFF = contact between COM-NO.

	Potential-free relay output, 230 VAC.
X7, In operation	Pump OFF = contact between COM-NC.
	Pump ON = contact between COM-NO.
	Potential free relay output, 230 VAC.

NOTE!

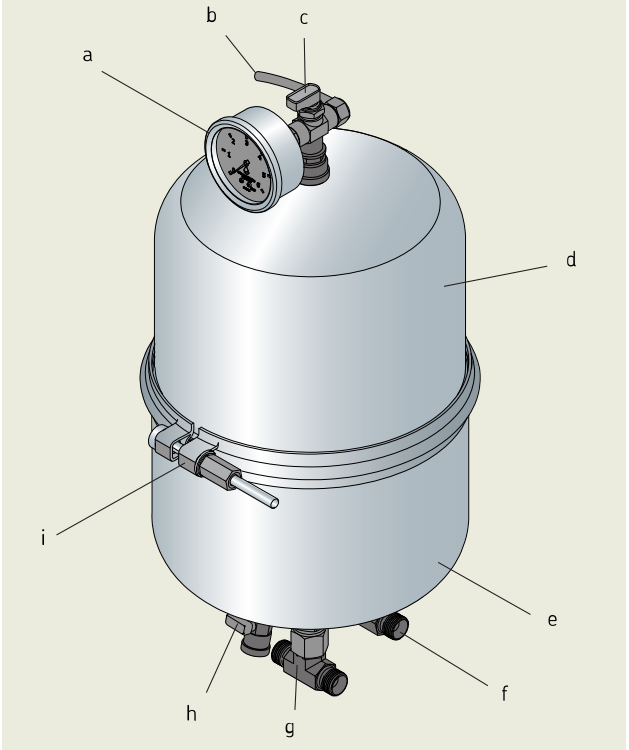
These are the only available IO ports, the other ports on the PCB are reserved and should not be tampered with.

Filter housings

The system has one primary filter housing, with secondary housings to increase capacity. Housings are attached to the system mounting plate with a metal sleeve, and connected to one another in parallel. The removable upper housing is secured to the lower housing with a clamp and an O-ring seal. Each housing contains a filter insert.

Primary housing

Primary filter housing

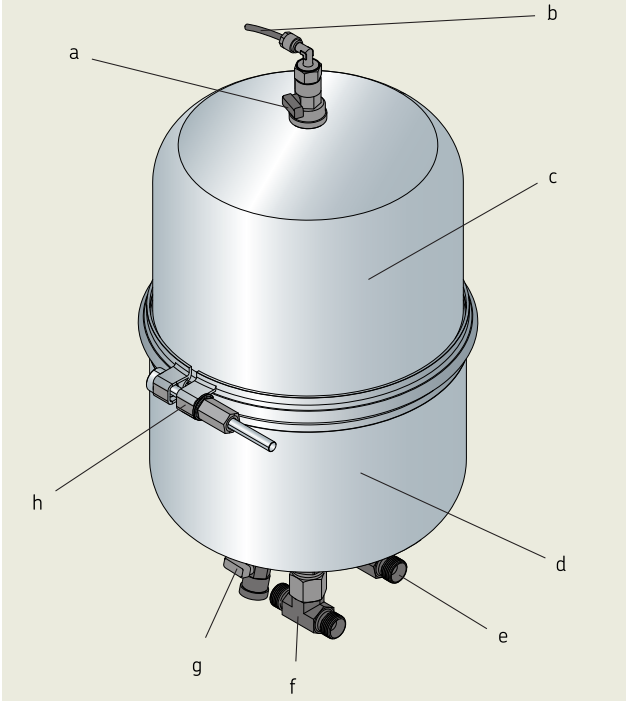


- **a.** Pressure gauge
- **b.** Bleed outlet
- **c.** Three-way valve
- **d.** Upper housing
- **e.** Lower housing
- **f.** Housing inlet
- **g.** Housing outlet
- **h.** Drainage valve
- **i.** Housing clamp

The primary filter housing has a three-way valve, a pressure gauge, and a drainage valve. The three-way valve can be opened to the pressure gauge only, to the bleed outlet only, or to both.

Secondary housing

Secondary filter housing

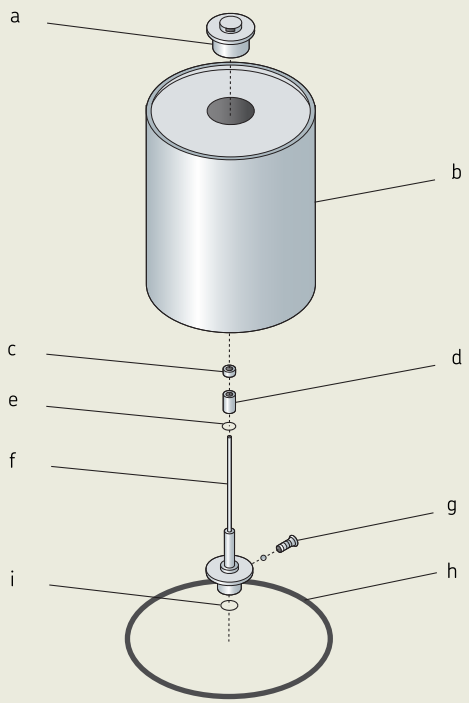


- **a.** Bleed valve
- **b.** Bleed outlet
- **c.** Upper housing
- **d.** Lower housing
- **e.** Housing inlet
- **f.** Housing outlet
- **g.** Drainage valve
- **h.** Housing clamp

Secondary housings are identical to the primary housing, but they have no pressure gauge. They are connected to the primary housing in parallel.

Housing - internal

Internal components



- **a.** Filter insert locking nut
- **b.** Filter insert
- **c.** Sintered filter locking nut
- **d.** Sintered filter
- **e.** Spindle O-ring (upper)
- **f.** Spindle
- **g.** Relief valve
- **h.** Housing O-ring
- **i.** Spindle O-ring (lower)

The internal components for primary and secondary housings are identical.

Filter insert tags

Filter inserts are delivered with a tag.

The tag is hung on the top valve of each filter housing to indicate which type of insert is in use. See *Consumables*, **page 46**.

Flow transmitter

The flow transmitter is an oval gear meter with a transparent acrylic cover.

The transmitter is located just before the system outlet, and gives a visual representation of real-time flow.

Spill tray

The spill tray is a container that runs under the entire length of the system to collect leakages.

The spill tray has no drainage valve. It must be removed to empty. See *Empty the spill tray*, **page 37**.

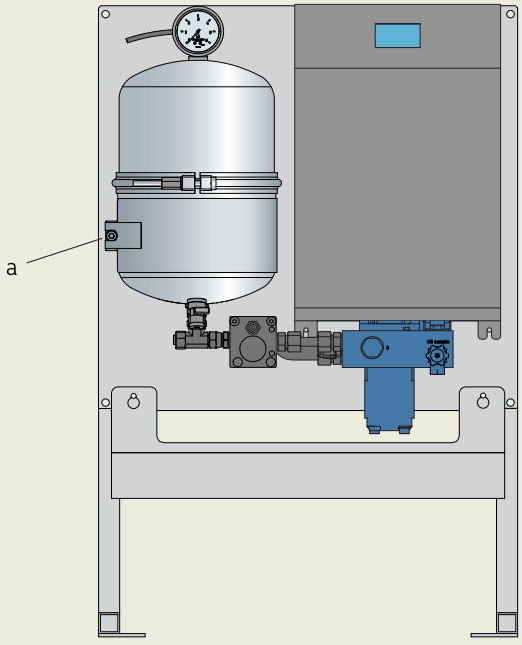
An optional level sensor is available to monitor the spill level.

System information

The system information is displayed on the machine plate, located on the left hand side of **the filter housing furthest to the left** of the control housing. The machine plate displays the type, model and serial number of the system, as well as the year of manufacture and the CE mark.

The following image shows the location of the machine plate (a) on a system with one filter housing:

Machine plate location



TIP!

Always provide the system serial number when contacting SKF RecondOil AB for service or support.

Technical specifications

The optimal configuration of the system - the number of housings, pump capacity, and filter type, as well the need for optional components such as a pre-strainer or additional sensors - is determined by a variety of factors including the oil type and viscosity, contamination level, process volume and temperature, and the relative positions of the system and the process equipment.

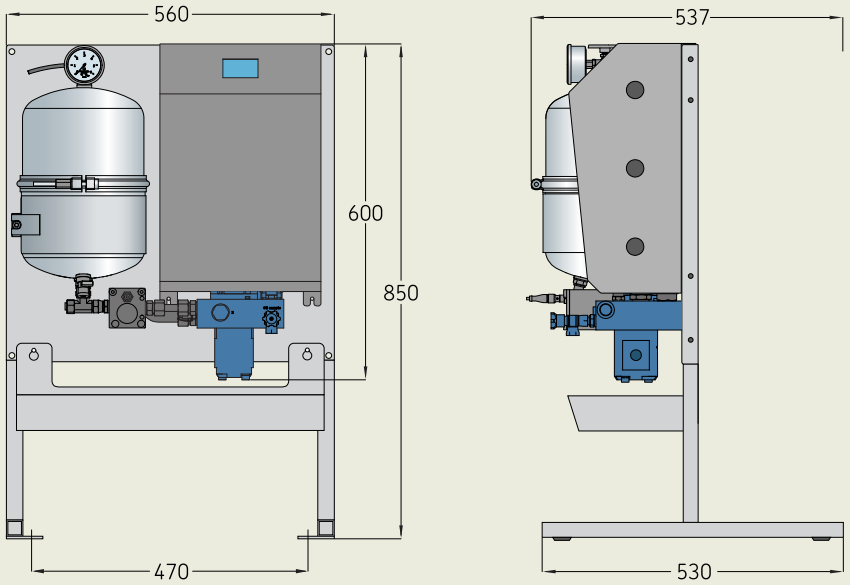
NOTE!

The final configuration and the oil type must be approved by SKF RecondOil AB or a designated partner before the system is put in operation.

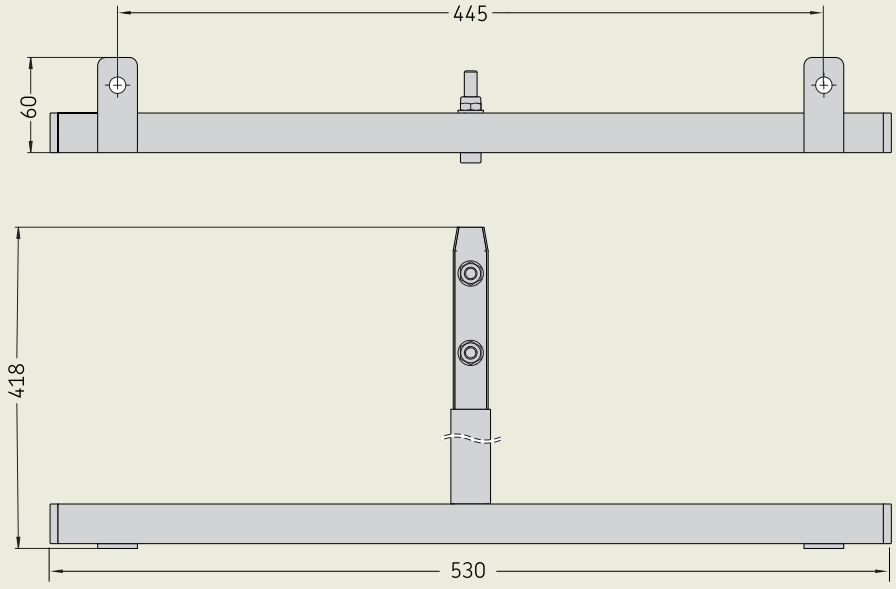
The tables in this section present standard values and may vary per installation.

Physical data

Dimensions: Single housing, front and right views [mm]



Dimensions: Optional legs only [mm]



Dimensions: Mounting plates (2- and 3-unit) [mm]

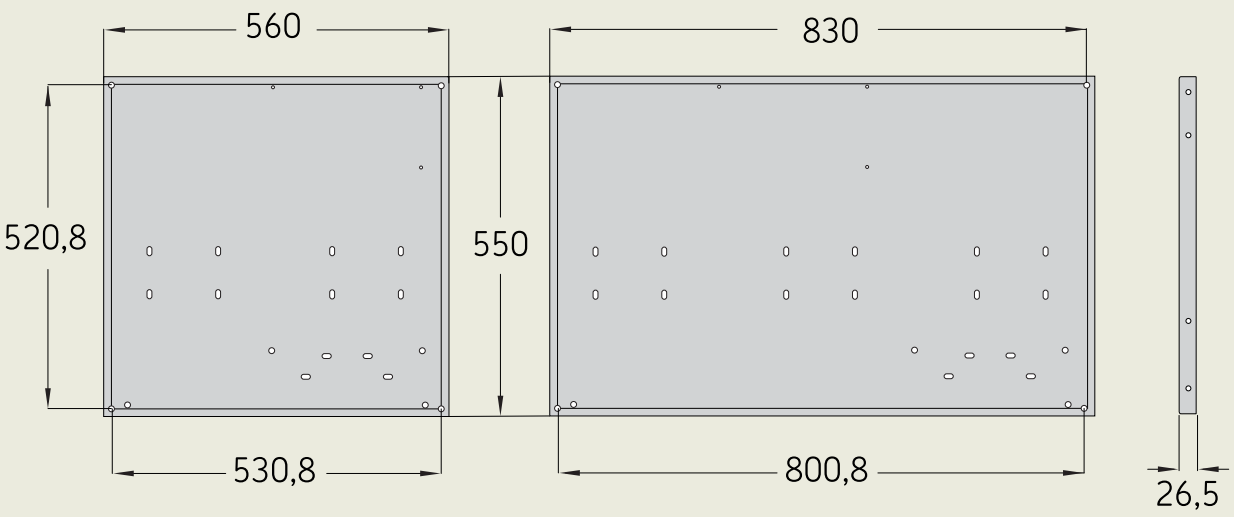


Table 3: Weight and dimensions by model type

		xxx = DSL: Display + Spill tray + Legs					xxx = DS: Display + Spill tray				
		Weight [kg]		Dimensions [mm]			Weight [kg]		Dimensions [mm]		
Type	#Housings	Empty	Full	Width	Depth	Height	Empty	Full	Width	Depth	Height
Side-by-side:											
ROBX3115xxx	1	33	42	560	537	850	30	39	560	290	600
ROBX3125xxx	2	46	64	830	537	850	43	61	830	290	600
ROBX3135xxx	3	63	90	1 120	537	850	59	86	1 120	290	600
ROBX3145xxx	4	76	112	1 390	537	850	70	106	1 390	290	600
ROBX3155xxx	5	89	134	1 660	537	850	83	128	1 660	290	600
ROBX3165xxx	6	106	160	1 950	537	850	97	151	1 950	290	600
ROBX3175xxx	7	119	182	2 220	537	850	110	173	2 220	290	600
ROBX3185xxx	8	132	204	2 490	537	850	123	195	2 490	290	600
Back-to-back:											
ROBX3125xxx/B	2	42	60	560	537	850	-	-	-	-	-
ROBX3135xxx/B	3	51	78	560	537	850	-	-	-	-	-
ROBX3145xxx/B	4	64	100	830	537	850	-	-	-	-	-
ROBX3155xxx/B	5	73	118	830	537	850	-	-	-	-	-
ROBX3165xxx/B	6	90	144	1 120	537	850	-	-	-	-	-
ROBX3175xxx/B	7	99	162	1 120	537	850	-	-	-	-	-
ROBX3185xxx/B	8	112	184	1 390	537	850	-	-	-	-	-

Table 4: Weight and dimensions by model type

		xxx = DL: Display + Legs					xxx = D: Display				
		Weight [kg]		Dimensions [mm]			Weight [kg]		Dimensions [mm]		
Type	#Housings	Empty	Full	Width	Depth	Height	Empty	Full	Width	Depth	Height
Side-by-side:											
ROBX3115xxx	1	31	40	560	537	850	28	37	560	290	600
ROBX3125xxx	2	43	61	830	537	850	40	58	830	290	600
ROBX3135xxx	3	59	86	1 120	537	850	53	80	1 120	290	600
ROBX3145xxx	4	71	107	1 390	537	850	65	101	1 390	290	600
ROBX3155xxx	5	83	128	1 660	537	850	70	122	1 660	290	600
ROBX3165xxx	6	99	153	1 950	537	850	90	144	1 950	290	600
ROBX3175xxx	7	111	174	2 220	537	850	102	165	2 220	290	600
ROBX3185xxx	8	123	195	2 490	537	850	114	186	2 490	290	600
Back-to-back:											
ROBX3125xxx/B	2	42	58	560	537	850	-	-	-	-	-
ROBX3135xxx/B	3	51	76	560	537	850	-	-	-	-	-
ROBX3145xxx/B	4	64	97	830	537	850	-	-	-	-	-
ROBX3155xxx/B	5	73	115	830	537	850	-	-	-	-	-
ROBX3165xxx/B	6	90	140	1 120	537	850	-	-	-	-	-
ROBX3175xxx/B	7	99	158	1 120	537	850	-	-	-	-	-
ROBX3185xxx/B	8	112	179	1 390	537	850	-	-	-	-	-

For other configurations, contact SKF RecondOil AB.

Process data

The following applies to all system configurations.

Component	Value
Viscosity @ 40° C [cSt]	10 - 460
Max. oil temperature [° C]	70
Minimum oil flashpoint [° C]	60
Ambient temperature range [° C]	0 - 50
Particle threshold [µm]	See filter insert datasheet
Working pressure [bar]	0.8 - 5
Relief valve threshold [bar]	5
Pressure gauge range [bar]	0 - 10
Power supply	100 - 270 VAC, 50/60 Hz
Motor	0.17 kW, 24 V as standard
Pump	Gear pump as standard
Connection, inlet	1/2” BSP female
Connection, outlet	1/2” BSP female

Radio data

Radio technology	Frequency band [MHz]	Transmit power range [dBm]
GSM 900	880 - 915	31.65
DCS 1800	1 710 - 1 785	30.12
NB-IoT Band 3	1 710.1 - 1 784.9	20.44
NB-IoT Band 8	880.1 - 914.9	20.32
NB-IoT Band 20	832.1 - 861.9	19.98
NB-IoT Band 28	703.1 - 747.9	20.27
GPS	1 574.4 - 1 576.44	Not used

Installation

This section describes how to place and install the system to optimize performance and minimize the need for service and maintenance.

Site requirements

These requirements must be fulfilled before installation can begin.

- overhead access for lifting equipment to position the system
- electrical installation complete
- piping between the system and the equipment ready to connect.

NOTE!

Piping between the system and the equipment is not supplied by SKF RecondOil AB. The system inlet and outlets have 1/2" BSP female couplings. Systems with one filter housing require 1/2" piping at a minimum. It is recommended to increase the size of piping for higher capacity systems.

NOTE!

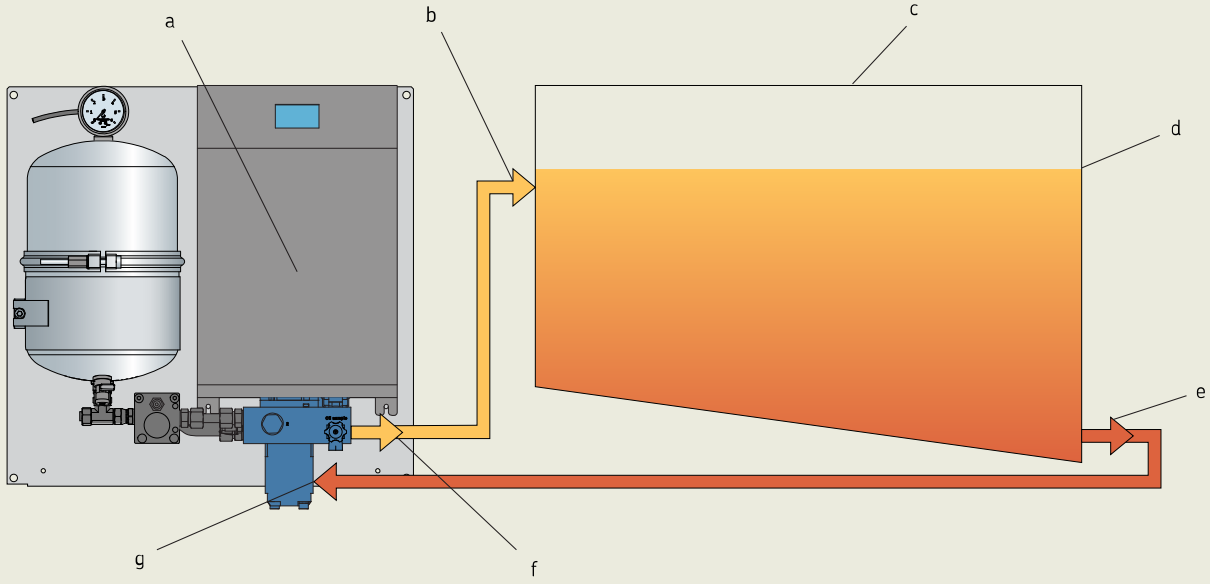
An area of 1 000 mm in front of the system and overhead clearance of 250 mm above the system is required for operation and maintenance after installation.

NOTE!

Depending on the condition of the contaminated oil, it may be necessary to install a pre-strainer at the system inlet to prevent the pump from clogging.

System placement

System placement recommendations



a. R0BX3100
b. Equipment inlet
c. Equipment reservoir
d. Minimum oil level
e. Equipment outlet
f. System outlet
g. System inlet

The placement of the system relative to the equipment will affect process performance, as well as wear and tear on the pump. The more viscous or contaminated the oil, the more important it is to optimize system placement.

The recommended system placement follows the following guidelines, where possible:

- Minimize the distance between the equipment reservoir and the system inlet. The recommended maximum distance is 5 m.
- Minimize the height differential between the oil level in the reservoir and the system inlet. The average oil level should be +/- 1.5 m relative to the system inlet.
- Place the equipment outlet high enough on the reservoir to avoid clogging the system with settled contaminants. The equipment outlet should be fitted with a manual valve.
- The system inlet and outlet should be fitted with a manual valve.
- Place the system inlet level with, or lower than, the equipment outlet.
- Place the equipment inlet lower than the minimum oil level, or such that incoming oil flows along the reservoir wall. Returning oil dropping into the reservoir will disturb the sludge.
- Place the equipment inlet and the equipment outlet on opposite sides of the reservoir.
- Place the system in an easily accessible position.
- Protect the system from humidity, dust, and vibrations.
- Protect the system from pests, such as rodents.

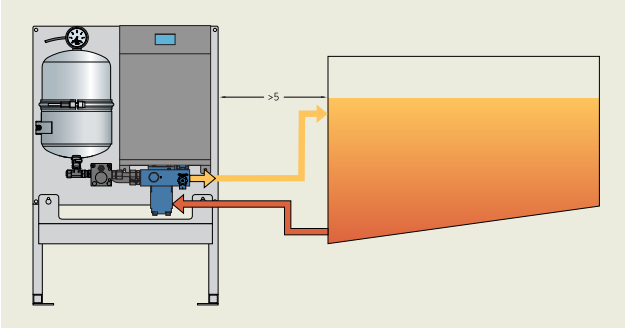
The following conditions are mandatory:

- Pipes and hoses must have a minimum pressure rating of PN16, and a minimum gauge of 1/2". If the length of the pipe or hose exceeds 2 m, it is recommended to increase the gauge on the suction side by one size. If the operating viscosity exceeds 100 cSt, the recommended minimum gauge is 3/4".
- The system must be installed indoors. The ambient temperature around the system must be within the range specified in *Technical specifications*, **page 17**.

Alternative placements

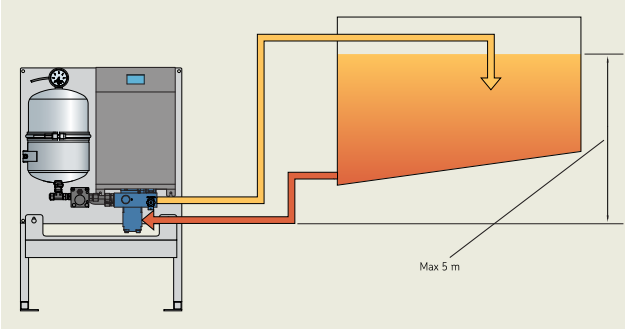
The following considerations apply if it is not possible to follow the recommended placement guidelines:

Greater than 5 m between system inlet and equipment reservoir, and within recommended height.



- Increase pipe / hose gauge to up to 1 ".

Equipment reservoir above system (up to 5 m).

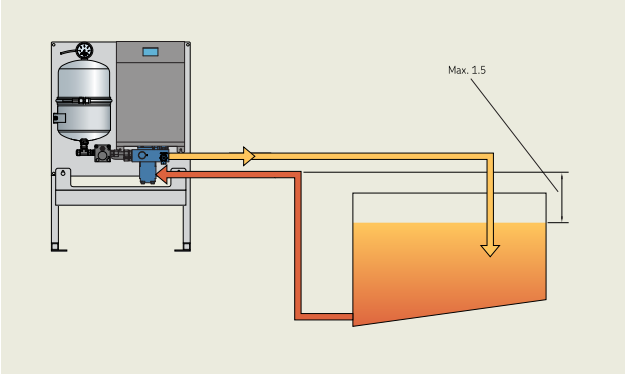


- Increase pipe / hose gauge to up to 1 ".
- The system inlet must have a manual valve.

NOTE!

It is not recommended to place the equipment outlet more than 5 m higher than the system inlet. The maximum static pressure at the system inlet must be less than 0.5 bar.

Equipment reservoir below system (up to 1.5 m).



- Increase pipe / hose gauge to up to 1 ".
- The equipment inlet and outlet must have a manual valve.

NOTE!

It is not recommended to place the equipment outlet more than 1.5 m lower than the system inlet. Pre-priming of the pump may be necessary.

Electrical preparation

⚠ DANGER!

Electrical hazard. Risk of serious injury or death.

Electrical installation must be carried out by a qualified electrician.

The pre-installed electrical cable has a temperature tolerance of 60 °C. Take care to ensure that the cable does not come into contact with hot piping or other heated components.

The system is delivered with a pre-installed power cable. The cable is 1.6 m long and is a three-wire cable where:

- the live wire is brown
- the neutral wire is blue
- the earth wire is green and yellow.

NOTE!

Take the cable length into account when planning the location of the system. The electrical mains outlet / circuit breaker must be accessible to the operator at all times. See *System placement*, **page 24**.

To complete electrical installation (electrician only):

1. Connect the power cable to an earthed plug or a lockable circuit breaker.

Table 7: Electrical specifications

Component	Value
Voltage	100 - 270 VAC, 50/60 Hz
Max. supply current	13 A
Power	170 W

Installation

NOTE!

This instruction assumes that the electrical installation is complete. See *Electrical preparation*, **page 25**.

Before beginning installation:

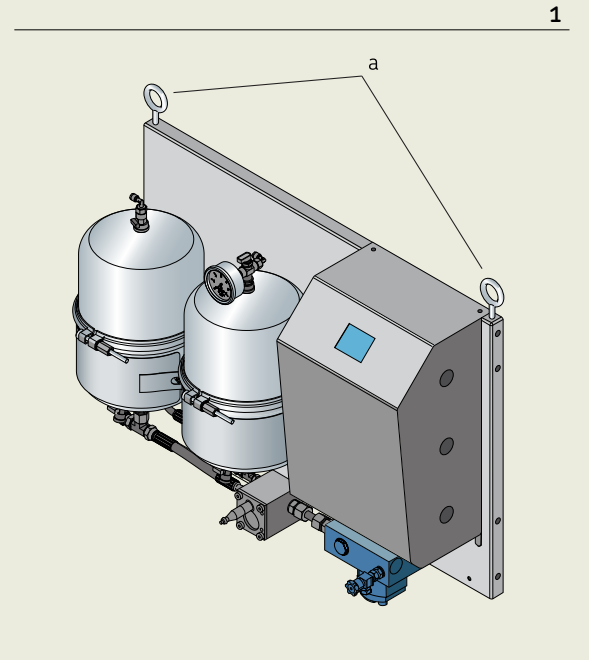
- Ensure that electrical power is disconnected.
- Remove the spill tray, if installed.
- Check that all valves on the system and the equipment are closed.

Tools required:

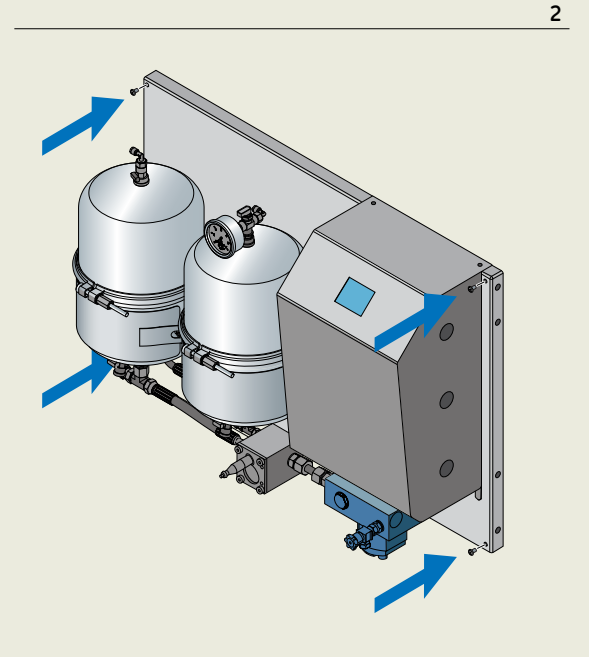
- Lifting apparatus sufficient for the weight of the system. See *Physical data*, **page 18**.
- 4 and 5 mm hex keys.
- Shifting spanner, or 10 and 13 mm spanners.

To install the system:

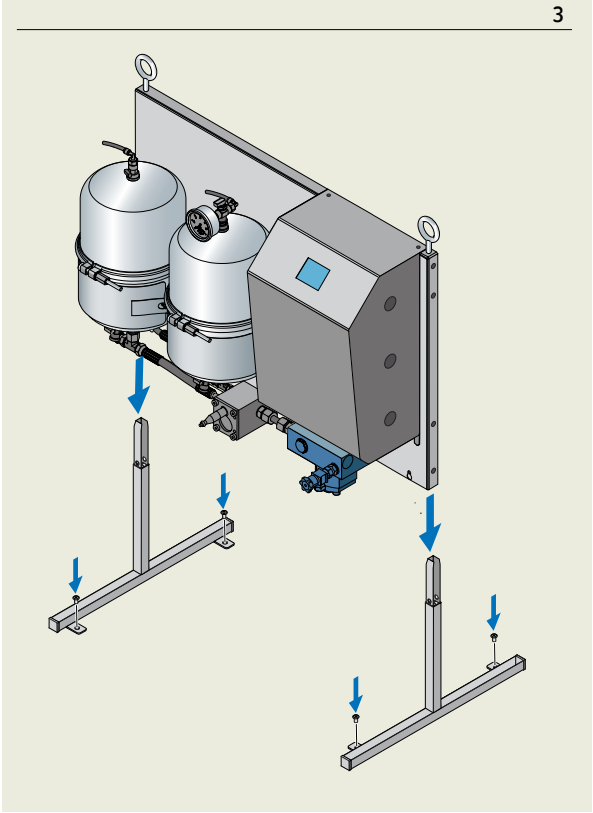
1. Position the system using the lifting appatarus. Only lift the system using the lifting loops (a).

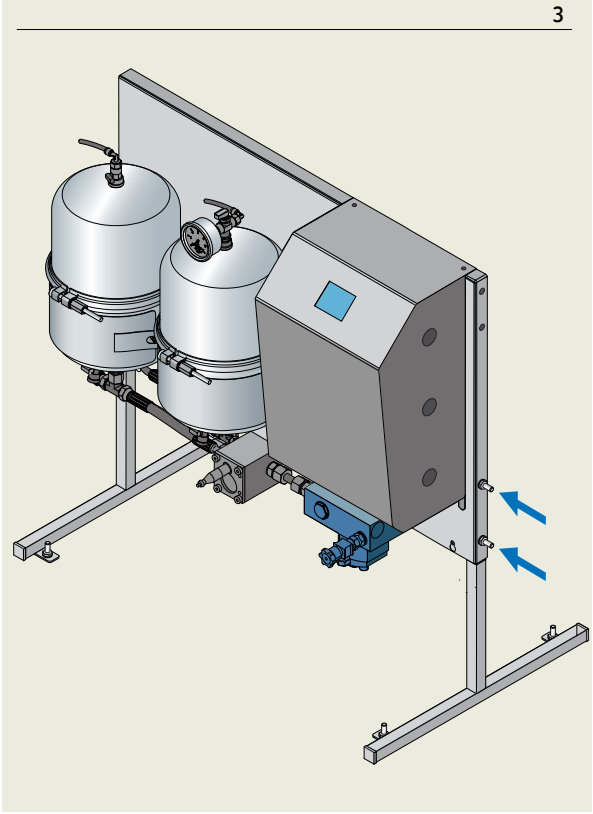


2. For wall-mounted models, secure the system on the wall (fixtures not supplied).



3. For leg-mounted models, lower the system onto the legs, secure the legs to the floor (fixtures not supplied), then secure the system at both sides of the mounting panel.





NOTE!

Back-to-back models are delivered with the legs already attached.

NOTE!

Do not install the spill tray yet.

4. Connect the equipment outlet to the system inlet.
5. Connect the system outlet to the equipment inlet.
6. Open the equipment inlet and outlet valves.
7. Connect the electrical power.

   - At the HMI, check that the parameters are correct. Configure if necessary. See *Operator interface*, **page 29**.
8. Position the spill tray over the keyhole mounting at both sides and lower gently.
9. Fill the system.

   - See *Fill the system*, **page 36**.
10. Monitor the HMI or the flow transmitter until oil begins exiting the system.
11. Ensure that oil is entering the equipment reservoir.

The system is now in production.

NOTE!

Monitor the system closely after initial startup to ensure that there is no leakage, and that the piping dimensions are sufficient for the system capacity/level of oil contamination.

Commissioning report

The commissioning report is used to sign off that the installation has been performed correctly, and to collect information about each system after installation.

The report includes details of the system information, the customer equipment and application, the oil type, and more. The report is filled in by the commissioning engineer. Save the report in safe keeping, or send it to your local SKF representative.

Operator interface

The system is operated using the HMI. The HMI is a touchscreen display on the control cabinet.
The HMI display is always on.

System information

System information

The system information is displayed for five seconds when the system initializes.

The following is displayed:

cal. touch This text is a hot-spot that opens the **Calibrate touch** function used to recalibrate the touchscreen parameters if required. See *Calibrate the touchscreen*, page 33.

QR code Scanning the code downloads the latest version of this document available at the SKF website.

Sim The number of the SIM card installed in the system.

Program The software version running on the system.

Serial The system serial number.

Filter used The time in days the current filter has been in use.

Filter lifetime The time in days until the current filter is due to be replaced.

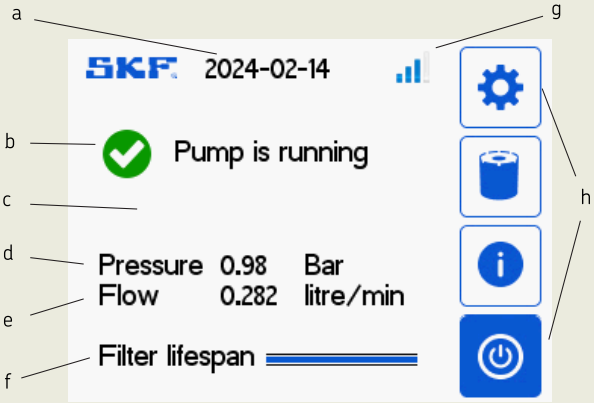
Runtime The time in days since the system was commissioned.

Ack.Flow The total volume in litres since the system was commissioned.

The system information can also be accessed by pressing the Information icon in the main menu. See *Operation icons*, page 30.

Main menu

Main menu layout



a. System date
b. System status. See *System status*, page 30.
c. Alarms. Empty unless active. See *Alarm list*, page 33.
d. Pressure, in bar
e. Flow, in L/min
f. Filter lifespan
g. Connectivity. See *Connectivity*, page 30.
h. Operation icons, see *Operation icons*, page 30.

The main menu is shown when the system starts.

System date

This field displays the system date as determined by the mobile data connection.

System status

This field displays if the system is in production.

The status is indicated as follows:

The system is not in production.

The system is in production.

The system has power, but the motor is stopped. Check for active alarms.

Alarms

This field displays a blinking warning symbol when an alarm is active. See *Alarm list*, page 33.

Filter lifespan bar

This field displays the remaining lifespan of the filter.

The filter lifespan bar will shorten as the filter is used.

Connectivity

The system features a 3G/4G modem with a pre-installed SIM card to provide a mobile data connection. The oil filtration process is not dependent on the connection; the system will operate fully without it.

The connection is used to transmit logfiles with runtime data, and also enables remote software updates. Your local SKF sales representative will reach out to you if there is a new software update to download. See also *Radio data*, page 21.

NOTE!

Do not change the SIM card.

NOTE!

No data is stored locally. Data generated when the connection is down will not be transmitted when the connection is restored.

The connectivity field displays the connection status, represented by these icons:

The modem is disconnected.

The modem is connected at the indicated signal strength.

There is a problem with the SIM card.

Flow status

This field displays the rate of flow in L/min.

Operation icons

Operation icons are used to perform functions and open system settings.

The icons displayed change depending on the current function. The icons are as follows:

System settings. Opens the system settings screens.

Alarm list. Opens the alarm list screen (changes to a warning symbol on active alarm).

System info. Serial number, runtime etc.

Start/stop. Starts or stops production.

On. Enables the selected component.

Off. Disables the selected component.

Enter. Enters and saves the current value, or confirms the chosen function.

Escape. Exits without saving a value, cancels the chosen function, or closes the current screen.

Up. Increases the current value by one increment, or chooses the previous item in a menu list.

Down. Decreases the current value by one increment, or chooses the next item in a menu list.

Input right. Moves the input digit one step to the right without changing the value.

Input left. Moves the input digit one step to the left without changing the value.

Permissions

With the exception of **Start/Stop**, access to all settings and functions requires password-protected permissions.

There are three levels of permission, Master, Administrator, and Operator. Master has access to all settings. Administrator has access to all settings, with the exception of **Year**, **Serial**, and **Unit nr.** on **Page 4**, and **Modem** on **Page 6**. See the individual settings descriptions for Operator permissions.

When a password must be entered, the keypad is displayed. Use the keypad and operation icons to enter the password.

System settings

There are six system settings screens, labelled in the HMI as **Page 1** to **Page 6**.

- Page 1 displays settings for **Sensors and measurement**. See *Sensors and measurement*, page 31.
- Page 2 displays settings for **Operating modes**. See *Operating modes*, page 32.
- Page 3 displays settings for **Administration**. See *Administration*, page 32.
- Page 4 displays **Pump settings**. See *Pump settings*, page 32.
- Page 5 displays **Filter change settings**. See *Filter change*, page 33.
- Page 6 displays **Connectivity settings**. See *Connectivity settings*, page 33.

Use the **Prev. page** and **Next page** button to advance through the screens.

Sensors and measurement

Page 1 is the Sensors and measurement screen. The system has five 4-20 mA channels, configured via this screen. The flow alarm is also configured here.

⚠ CAUTION!

Do not change or reconfigure channel 1, as this will affect the pump control.

The channels are listed to the left of the screen. A green toggle icon indicates that there is a component installed on the channel. A red icon indicates that the channel is unused.

Highlight a channel (green background) using **Up** and **Down**. Press **Enter** to open the channel settings.

The following functions are available on the channel settings screen:

On/Off

Enable/disable the component installed on this channel.

Unit

Displays the chosen unit of measurement. Press **Enter** to configure.

The default units are:

- Channel 1: bar
- Channel 2: oqv
- Channel 3: °C
- Channel 4: °C
- Channel 5: %RH

Min / Max

These two settings are used to calibrate the measurement to show an accurate reading. **Min** corresponds to 4 mA, **Max** corresponds to 20 mA. Press **Enter** to configure.

The default values are:

- Channels 1, 3, 4 & 5: 0/10
- Channel 2: 0/100

Alarm LO / HI

Displays the low and high alarm thresholds. Press **Enter** to configure.

The default values are:

- Channel 1: 0.5/4.5
- Channel 2: 0/200
- Channel 3: 0/20
- Channel 4: 0/20
- Channel 5: 0/20
- Flow alarm: 0.2/1.5

Hyst.

Displays the hysteresis value. Once triggered and reset, the alarm cannot be re-triggered until the value exceeds the low/high set point plus/minus hysteresis. Press **Enter** to configure.

The default values are:

- Channel 1: 0.2
- Channel 2: 20
- Channel 3: 2
- Channel 4: 2
- Channel 5: 2
- Flow alarm: 0.025

Value mA Displays the unadjusted mA value.

Value Adj. Displays the value as adjusted by the component, with the chosen unit.

Stop motor Displays whether an active alarm triggered by the component will stop the motor or not. Press **Enter** to toggle.

The default value for all channels is **OFF**.

The following additional settings are only available on the **Flow alarm** screen:

Pulses The flow transmitter's pulses per litre. Press **Enter** to configure.

The default value is 83.

Reset flow Resets the accumulated volume. Press **Enter** to reset.

NOTE!

The operator can change settings for Alarm LO, Alarm HI, Hysteresis, and Reset flow. All other settings require at least Administrator permissions.

Operating modes

Page 2 is the **Operating modes** screen. Press **Enter** to configure a setting.

The following functions are available here:

NOTE!

The **Flow SP** setting is only available if flow control mode is chosen.

Type Choose the control type, pressure or flow control

The default value is pressure.

No. of filters The number of filter housings in the system.

The default value is 1.

Pressure SP The pressure setpoint in bars.

The default value is 3.5.

Flow SP The flow setpoint in L/min.

The default value is 0.4.

NOTE!

The **Flow SP** setting is only available if flow control mode is chosen.

NOTE!

The operator can change settings for Pressure SP. All other settings require at least Administrator permissions.

Administration

Page 3 is the Administration screen. This screen is used to set alarm and user options, and display system information. Press **Enter** to configure or toggle a setting.

The following functions are available on the miscellaneous screen:

Leak Toggles the leakage alarm on and off.

The default value is OFF.

Sound Toggles the alarm sound on and off. If off is chosen, alarms will only be displayed in the HMI.

The default value is OFF.

Year Displays the system year of manufacture.

Serial nr Displays the system serial number.

Unit nr Displays the system unit number.

User code Displays the password for operator access.

NOTE!

The operator can change settings for Sound and User code. All other settings require at least Administrator permissions.

Pump settings

Page 4 is the Pump settings screen. This screen is used to configure the pump and heater. Press **Enter** to configure or toggle a setting.

The following functions are available on the Pump settings screen:

Oil heater Toggles the oil heater on and off.

The default value is OFF.

Pump Selects the type of pump in use.

The default value is medium.

Autostart Toggles the autostart function.

The default value is Enabled.

Min. speed Sets the minimum pump speed.

The default value is 200 rpm.

Pump speed Displays the current pump speed in rpm.

No of restart Displays the number of restarts.

The default value is 5.

NOTE!

The operator cannot change any settings on this screen. All settings require at least Administrator permissions.

Filter change

Page 5 is the Filter change screen. Press **Enter** to configure or toggle a setting.

The following functions are available on the filter change screen:

Filter changed Highlight and press **Enter** to reset the **Filter used** value to 0 and the **Filter lifetime** value to 365.

Filter used [days] Highlight and press **Enter** to configure manually.

The default value is 0.

Filter lifetime [days] Highlight and press **Enter** to configure manually.

The default value is 365.

Runtime [days] Non-configurable. Displays the total system uptime.

Reset Highlight and press **Enter** to reset the **Runtime** value to 0.

NOTE!

The operator can change the Filter changed and Filter used settings. All other settings require at least Administrator permissions.

Connectivity settings

Page 6 is the Connectivity settings screen. Press **Enter** to configure or toggle a setting.

The following functions are available on the Connectivity settings screen:

Log period The duration of the log file in days before it overwrites itself.

The default value is 5.

Send log Highlight and press **Enter** to manually upload a log to support.

Reset Cnt Highlight and press **Enter** to reset the log count.

Modem Toggle the modem on and off.

The default value is On.

VPN Toggle the VPN on and off.

The default value is On.

NOTE!

The operator can send a log from this screen. All other settings require at least Administrator permissions.

Alarm list

This screen displays active alarms.

Black text indicates a component that is installed and enabled. Grey text indicates a component that is disabled, or a channel that is unused. Red text indicates an active alarm. A green tick indicates normal operation. A yellow warning symbol indicates an active alarm.

NOTE!

Alarms will be automatically reset after 2 minutes if the fault condition no longer exists.

The following components are shown on the **Alarm list** screen:

Ch.1 - 5 4-20 mA channels 1 - 5

Pump Indicates a pump error

Flow Flow transmitter

Filter Filter runtime

Leak Spill tray

Calibrate the touchscreen

The touchscreen on the HMI can be calibrated.

You will need:

- A tablet stylus, or similar pointed plastic instrument.

NOTE!

It is not recommended to use your finger to calibrate the touchscreen, as this will affect the accuracy of the calibration. Do not use metal, as this will scratch the display.

To calibrate the touchscreen:

1. Press the **Information** icon at the main menu.
2. The **System information** screen is displayed:

3. Press **cal.touch**.

   The calibration sequence is initiated.
4. The **Calibration screen** is displayed:

5. Using the stylus, press firmly inside **Calibration box 1** at the top left of the display, then inside **Calibration box 2** at the bottom right.

   The screen is calibrated.
6. To accept the calibration, press firmly inside the **Ok** box and proceed to step 7.

   To reject the calibration and try again, press **Reset** and return to step 5.

7. The calibration is accepted, and the system restarts.

The touchscreen is now calibrated.

Operation

Start and stop production

⚠ CAUTION!

Ensure that all drainage, bleed, and sampling valves are closed before starting production.

1. At the HMI, press **Start/Stop**.

   The motor starts, and the pump begins transferring oil from the equipment reservoir.

   a) If the system is filling, see *Fill the system*, page 36

Press **Start/Stop** again to stop production.

Autostart

The autostart configuration will determine what happens when the system is powered on. Autostart has two options, chosen via a toggle:

Retain status (toggle green)	The system will retain the status it had before it was powered off. If the pump was on, it will be on. If it was off, it will be off.
Pump off (toggle red)	The system will always start with the pump off.

Choose filter type and settings

The system can operate with two types of filter: the standard depth filter, and the DST activated filter.

NOTE!

Changing the filter type and settings will affect the performance of the system. Different types and viscosities of oil will require different settings for optimal results.

To choose the filter type and settings:

1. At the HMI, press **System settings**. Enter the password if prompted. See *Permissions*, page 31.

   Settings screen 1 is displayed.
2. Press **Next screen**.

   Settings screen 2 is displayed.
3. Press **Type**.

   The **Type** button is highlighted in green.
4. Press **Enter** to toggle between **Pressure** and **Flow** until the correct type is displayed.
5. If **Pressure** is chosen, the current value **Pressure PV** is displayed, and the setpoint **Pressure SP** can be configured.

   The default setpoint value is 3.5 bar.
6. If **Flow** is chosen, the current value **Flow PV** is displayed, and the setpoint **Flow SP** can be configured.

   The default setpoint value is 0.4 L/min.
7. Press **Enter** to save the chosen value.

Press **Escape** to exit the settings menu.

NOTE!

If the filter type is changed, the pump must be restarted for the new settings to take effect. In software version 6.1 or later, the pump will stop automatically when the filter type is changed, but it must be restarted manually.

Fill the system

NOTE!

This task requires a container to collect oil from the bleed valve.

1. Ensure that all drainage and bleed valves and the sample valve are closed.
2. Ensure that the equipment inlet and outlet valves are open.
3. At the HMI, press **Start/stop** to start production.

   The pump begins transferring oil into the system.
4. Monitor the pressure gauge until pressure begins building in the system.

   a) If pressure does not build, check that all the valves are in the correct position.
5. When the pressure begins to build up, carefully open the bleed valve.

⚠ CAUTION!

Bleeding air from the system may cause an oil mist to form around the system. Exercise caution when bleeding the system.

   Air bleeds from the housing. Use a container to collect spill oil, if any.
6. When the pressure drops to zero, close the bleed valve.

   Pressure begins building again.
7. Repeat steps 5 & 6 until oil begins exiting the bleed valve.

   a) Collect the oil in the spill container, and close the bleed valve.
8. Repeat the process for each filter housing.

When no air bleeds from the filter housing(s), the system is full.

Monitor the system for leaks after filling.

Dispose of spill oil, or return to the equipment reservoir.

Sampling and analysis

Regular sampling and analysis is necessary to maintain the performance of the filtration process and prolong to lifetime of the system. See *Conditional maintenance*, page 42.

⚠ WARNING!

Use PPE when necessary. See the Material Safety Data Sheet for the oil type being processed for details. Protective gloves are mandatory when handling oil at temperatures in excess of 50 °C.

Analysing oil that has been sampled during production requires comparison with a baseline sample. It is recommended that virgin oil is used for the baseline sample, but it can be collected during production if necessary.

Collect a sample

⚠ CAUTION!

Oil in the system may exceed 60 °C. Exercise caution when collecting a sample.

You will require:

- a 1 L plastic sample bottle, with a screw cap
- an adhesive label to identify the sample
- a container for spill.

1. Remove the sample valve cover.
2. Fill the sample bottle to half-full.

   Make sure the sample valve is closed when done.
3. Seal the sample bottle, then shake the contents gently.

   Empty the contents of the sample bottle into the spill container.
4. Repeat steps 2 - 3 three times.
5. Fill the sample bottle with oil and seal it.

   Take care not to introduce any bubbles into the oil. Clean any oil residue from the sample bottle.
6. Attach the adhesive label to the sample bottle.
7. Reattach the sample valve cover.

Send the sample for analysis. Contact SKF RecondOil AB for instructions.

Dispose of spill oil, or return to the equipment reservoir.

Send a sample for analysis

Prepare a label for the sample. The label must include the following information:

- Oil type
- System name and serial number
- Customer name and address
- Type of analysis required.

Note any additional information that may be useful when analysing the sample, such as time elapsed since the last oil change, or any changes to the external process since the last analysis.

TIP!

Pre-printed labels are available from SKF RecondOil AB when using SKF oil analysis services.

To send a sample for analysis:

1. Ensure that the sample bottle is clean and dry.
2. Attach the prepared label to the bottle.
3. Send the sample to an external lab for analysis, following instructions provided by the lab.

   Contact SKF RecondOil AB for a list of recommended labs.

Empty the spill tray

⚠ CAUTION!

Exercise caution when removing the spill tray - moving liquid will make it unstable.

You will need:

- a 5 mm hex key

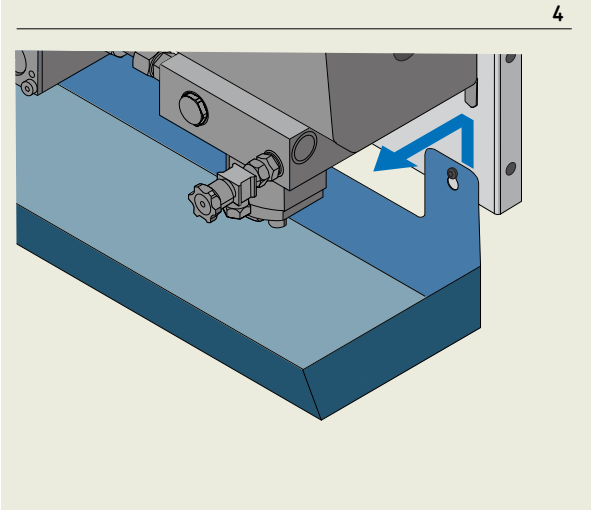
1. Place a protective cover on the floor around the system to prevent the spread of spillage.

   Ensure that there is enough room on the cover to place the spill tray away from the system.
2. Place a temporary container under each filter housing and the sample valve, beneath the spill tray.
3. Using the hex key, loosen the two screws holding the spill tray in place.

NOTE!

Do not remove the screws.

4. Lift the spill tray straight up to clear the keyhole mounting at both sides, then lift it away from the system.



5. Empty the tray into a container, and place the tray on the protective cover.
6. Clean the tray.

To reattach the spill tray, position it over the keyhole mounting at both sides and gently lower into place. Tighten the holding screws.

Dispose of spill oil, or return to the equipment reservoir.

Drain the system

Before draining the system, stop production and remove power from the system.

NOTE!

This task requires a container or containers to collect the oil from the system. Each filter housing contains up to 2-3 L of oil that can be drained.

1. Remove the spill tray.

   Ensure that the protective cover and temporary container(s) are in place, see *Empty the spill tray*, page 37.
2. At each filter housing, remove the drainage valve cover, then open the valve.
3. Wait for the pressure to reduce, then open the bleed valve.

   The system begins draining into the container(s).

Wait for a few minutes after the oil stops draining to ensure that the system is completely empty.

NOTE!

Don't forget to replace the drainage valve cover(s).

Record filter exchanges

Keep a filter insert exchange protocol to help optimise the oil filtration process.

The protocol should record:

- the expected date of exchange
- the actual date of exchange
- the process temperature, flow, and pressure 20 minutes after system restart
- the total volume of oil filtered
- the ID of the oil sample, if any
- the name of the operator.

A sample protocol for printing is presented in Appendix E, *Filter exchange protocol*, **page 55**.

Troubleshooting

Fault matrix

⚠ WARNING!

Do not attempt to use the system if it is operating abnormally, or if any components appear damaged or severely worn.
Discontinue use immediately, and contact SKF RecondOil AB or an authorized dealer.

Fault	Error code	Possible cause	Action	Performed by
No power	-	Power supply failure	Exchange power supply	Electrician
Active alarm (various)	ALARM	One or more sensors outside alarm limit	Check that alarm settings in configuration are correct, adjust if required	SKF RecondOil AB
Pump will not start NO active alarm condition	Pump failure (displayed in HMI after 5 attempted starts)	Power supply overloaded	Check / exchange power supply	Electrician
		Pump or motor is damaged	Exchange pump	Mechanic
		Pump is clogged or seized	Remove debris. Re-start pump.	Mechanic
		Inlet and/or outlet valve closed	Open valve(s)	Operator
Pump will not start AND active alarm condition	ALARM	Pre-filter clogged	Clean the pre-filter. Re-start pump.	Operator
		Leakage sensor activated	Correct leakage and clear up spill, or clean the leakage sensor. Re-start pump.	Operator
		Inlet valve is closed	Open the inlet valve	Operator
		Oil reservoir is empty	Fill the oil reservoir	Operator

Fault	Error code	Possible cause	Action	Performed by
Leakage from housings	-	Housing clamp loose	Check / tighten / reposition clamp. See *Exchange a filter insert*, **page 42**.	Operator
		O-ring worn or loose	Check / reposition / exchange O-ring(s). See *Housing - internal*, **page 16**.	Operator
		Valve open or faulty	Check / close valve(s)	Operator
Leakage from internal pipes/connections	-	Connections loose or damaged	Check connections	Operator
			Exchange components	SKF RecondOil AB
Leakage from pump	-	Worn gaskets	Exchange pump	SKF RecondOil AB
Display not working	-	Cable fault	Check / exchange cable. See *Remove the main cover*, **page 45** .	Operator
Touchscreen fault	-	Screen needs calibration	Calibrate display. See *Calibrate the touchscreen*, **page 33** .	Operator
Poor performance/cleaning results	-	Filter clogged	Check / exchange filter	Operator
		Process fault	Check if the process parameters have changed or need to be adjusted	SKF RecondOil AB
Low pressure, or high flow	-	Leakage	Check housings and connections for leakage / spill	Operator
		Saturated filter (high water content)	Check / exchange filter	Operator
High pressure, or low flow	-	Filter clogged	Check / exchange filter	Operator
		Process fault	Check that the correct number of filter housings and type of pump is selected in the system configuration	SKF RecondOil AB
Irregular flow	-	New filter insert	Allow system to run until the new filter insert is fully saturated with oil and all air is bled from the system.	Operator
		Oil reservoir level	Check that the oil intake is below the surface, fill reservoir if required	Operator
Pump does not start after power cycle or power outage	-	Power supply fault	Check power cable and fuse	Operator
		Automatic start disabled	Enable automatic start	SKF RecondOil AB
Pump starts but cannot transfer oil	-	Oil reservoir level	Check that the oil intake is below the surface, fill reservoir if required	Operator
		System height differential	If the difference in height between the system and the reservoir is too great, pre-prime the pump by filling the system manually, then re-start the pump	Operator
		Pump is clogged or seized	Remove debris. Re-start pump.	Mechanic
		Control system is damaged	Check cabling. Exchange control system.	SKF RecondOil AB

Maintenance

Following these instructions will optimize process performance and extend the lifetime of components.

⚠ CAUTION!

Use only SKF supplied or approved spare parts.

⚠ WARNING!

When starting the system after maintenance or service, monitor for leaks or unusual behaviour such as vibrations or noise that were not present previously. Please note that it may take some time for leaks to become apparent, allow at least 30 minutes for observation.

NOTE!

Due to differences in ambient temperatures, humidity, and other local conditions, it is not possible to determine time intervals for maintenance and service that apply to all installations. The time intervals in the following sections are intended as guidelines only. It is the responsibility of the operator to ensure that they are sufficient.

NOTE!

It is especially important to monitor filter performance and cleanliness in the first year of production. Filter inserts must be exchanged more frequently until the level of contamination in the equipment stabilizes.

Scheduled maintenance

These tasks are carried out on a regular basis.

Daily

- Check the HMI for alarms.
- Check the pressure gauge.
- Check the spill tray. Empty if necessary.
- Check for leakage from the system, including couplings, pipes, and hoses.

Quarterly

- Take an oil sample (first year of production only).

Bi-annually

- Take an oil sample.

Annually

- If the oil sampling schedule has not been followed, change all filter inserts.
- Inspect all housing O-rings. Exchange if necessary.
- Check HMI functionality.

Every two years

- Inspect the sintered filter. Clean or exchange if necessary.
- Inspect the spindle O-ring. Exchange if necessary.

Every five years

- Exchange the sintered filter and the spindle O-rings.

Unscheduled maintenance

These tasks are carried out as required.

When changing filter insert(s)

- Clean inside the filter housing, upper and lower.
- Inspect the housing O-ring, sintered filter, and spindle O-ring. Exchange if necessary.

Conditional maintenance

Filter inserts must be changed when certain analysis criteria are met for sampled oil. See *Sampling and analysis*, page 36.

New installation Standard depth filter inserts are used in all new installations. Oil is sampled and analysed every three months. Depending on the results of the analysis, the standard inserts are exchanged with DST inserts, or new standard inserts.

Existing installation After one year, the sampling and analysis frequency is reduced to once every six months. Depending on the results of the analysis, the inserts may remain in production, be exchanged with new DST inserts, or with standard inserts.

NOTE!

If the filter insert type is changed, change the tag on the filter housing. See *Filter insert tags*, page 16.

Exchange a filter insert

⚠ WARNING!

Before opening a filter housing, remove power to the system and ensure that it cannot be restored. Ensure that the oil temperature in the housing is below 55° C before proceeding.

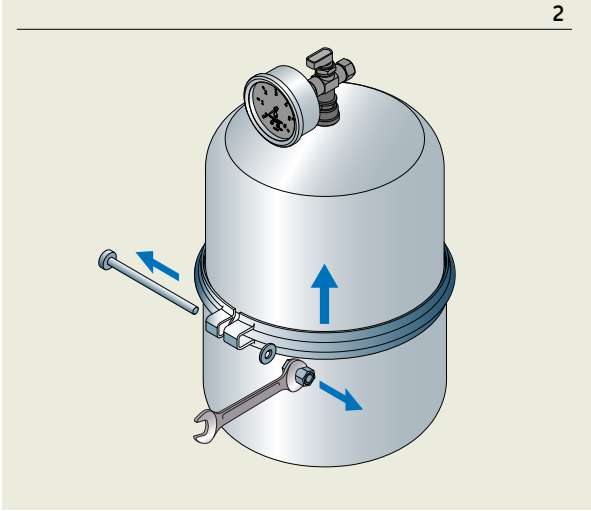
Drain the system before removing a filter insert. See *Drain the system*, page 37.

Required tools:

- Shifting spanner.

1. Place a protective cover on the floor around the system.

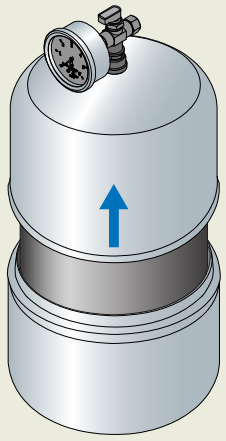
   Ensure there is enough room on the cover to place the upper housing and its contents away from the system.
2. Remove the housing clamp.



a) Use the spanner to loosen the housing clamp.
b) Lift the clamp off the housing.

3. Remove the upper housing.

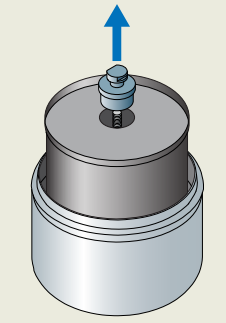
3



Clean the upper housing before proceeding.

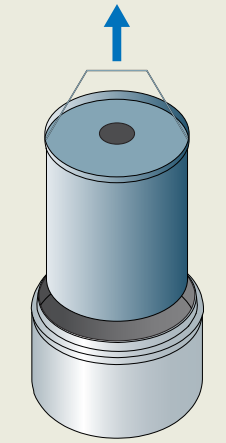
4. Inspect the housing O-ring. Clean or exchange if necessary.
5. Loosen and remove the insert locking nut, using the spanner if necessary.

5



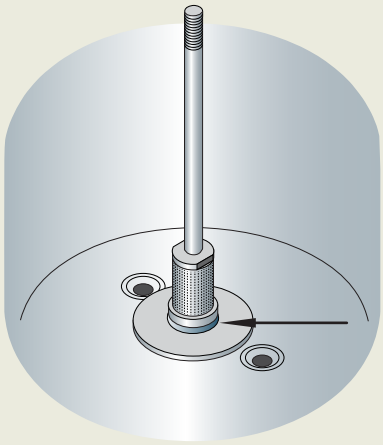
6. Using the handle, pull the used insert straight up off the spindle.

6



7. Clean the lower housing.
8. Inspect the O-ring and the sintered filter at the base of the spindle.

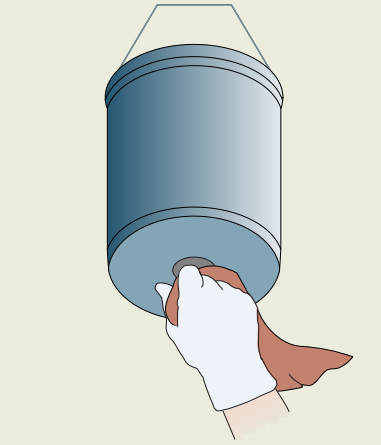
8



Clean or exchange if necessary.

9. Using a little spillage from the old insert and a cloth, lubricate the hole at the base of the new insert.

9



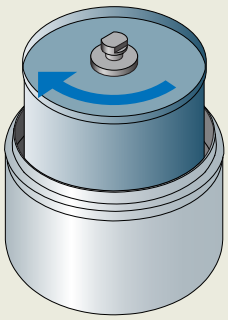
10. Carefully align the insert over the spindle and push down gently.

    The insert will click into place over the O-ring.

11. Put back the locking nut and tighten by hand as far as possible.

12. Continue to tighten by rotating the insert by hand until there is no gap between the locking nut and the insert.

12



13. Check that the insert is situated firmly in the lower housing.
14. Check that the housing O-ring is in the correct position.
15. Put back the upper housing. Push down gently over the O-ring.
16. Reattach the housing clamp.
17. Tighten the housing clamp to 9 ±4 Nm.

NOTE!

Tighten the clamp enough to ensure a correct seal.

The system is ready to be restarted. See *Start and stop production*, page 35. The system must be bled and re-filled, see *Fill the system*, page 36.

Monitor the system for leakage after a filter insert change. Dispose of the old insert and any spillage.

NOTE!

Don't forget to reset the filter lifetime value and check the filter settings, see *Filter change*, page 33. Change the tag on the filter housing.

Clean the system

Keep the system clean to prolong the life of components and reduce the need for maintenance.

⚠ WARNING!

Risk or fire or explosion

Never use flammable cleaning agents to clean the system.

Never use abrasive or corrosive cleaning agents to clean the system.

NOTE!

Always observe the IP protection class of the system.

- Clean the exterior of the system with a clean, dry cloth.
- Clean the spill tray and the inside of filter housings with absorbent paper.
- Never use a steam jet or pressure washer, as these may damage electrical components.
- Clean major spillages with an appropriate spill control agent. See the Material Safety Data Sheet for details.

Remove the side cover

The side cover of the control cabinet can be removed to provide access to internal components and cabling.

⚠ WARNING!

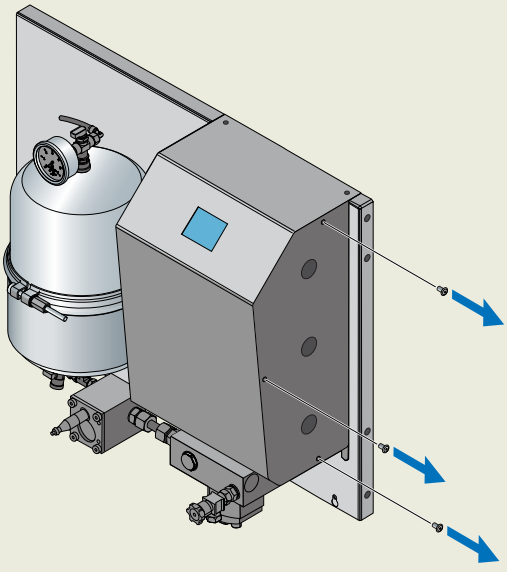
Before removing the side cover, remove power to the system and ensure that it cannot be restored.

Required tools:

- 3 mm hex key

1. Using the hex key, remove the three screws holding the cover in place.

1



Support the cover while removing the screws so it does not fall.

2. Remove the side cover.

Remove the main cover

The main cover of the control cabinet contains the display. It can be removed to provide access to internal components and cabling.

⚠ WARNING!

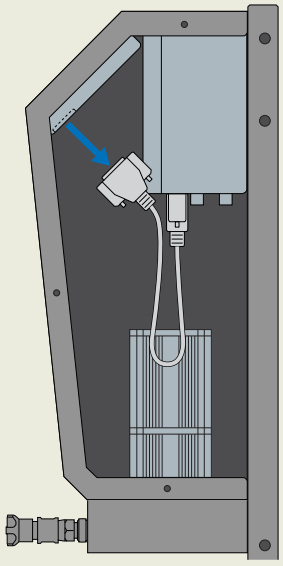
Before removing the main cover, remove power to the system and ensure that it cannot be restored.

Required tools:

- 4 mm hex key

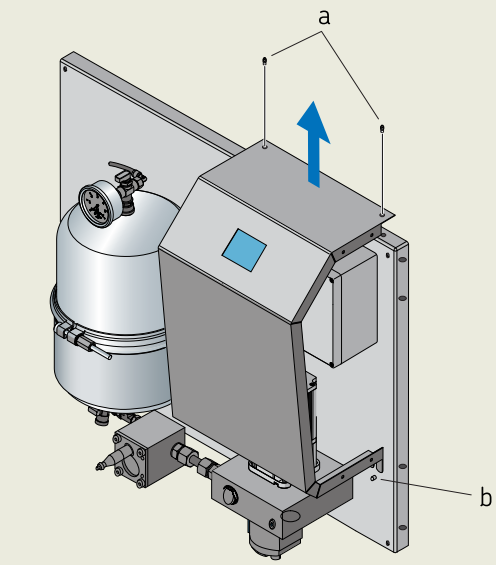
1. Remove the side cover, see *Remove the side cover*, **page 44**.
2. Remove the cable from the display unit.

2



3. Using the hex key, remove the two top screws (a), then loosen but do not remove the holding screws (b), and lift the cover off.

3



Support the cover while removing the screws so it does not fall.

Remove the PCB cover

The cover of the PCB assembly can be removed to provide access to the PCB.

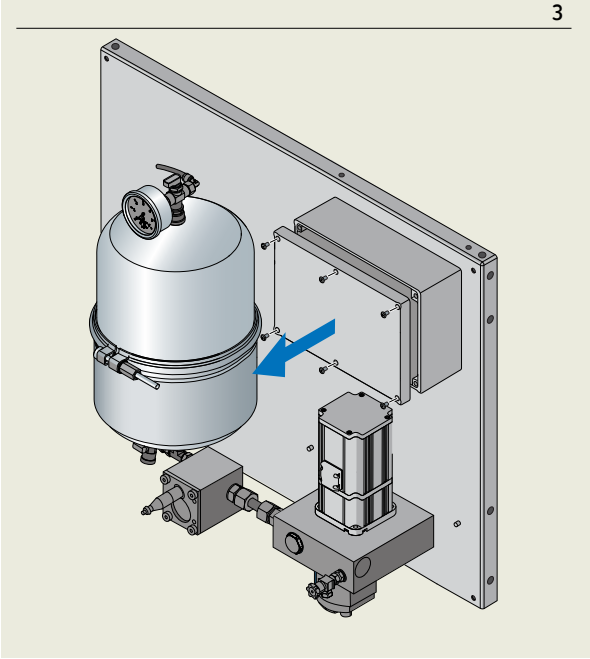
⚠ WARNING!

Before removing the PCB cover, remove power to the system and ensure that it cannot be restored.

Required tools:

- Philips screwdriver

1. Remove the side cover, see *Remove the side cover*, **page 44**.
2. Remove the main cover, see *Remove the main cover*, **page 45**.
3. Unscrew the six screws holding the PCB cover in place until they are loose, then remove the PCB cover.



NOTE!

The screws cannot be removed completely, they are part of the cover. Support the cover as you loosen the screws.

Consumables

Component	Item number
Filter insert, DST activated	ROBX500/DST
Filter insert, standard depth	ROBX500/HY
Filter housing kit, includes: • O-ring, 200 x 6 mm • O-ring, 20 x 4 mm (2) • O-ring, 12 x 2 mm • Sintered filter • Valve ball and spring • Circlips	ROBX/KIT-7518

Spare parts

Component	Item number
Clamp	ROBX/2260-00000080
Clamp bolt (M8)	ROBX/5100-00000001
Clamp nut (M8)	ROBX/2070-00000026
Clamp washer (M8)	ROBX/2090-00000016
Display unit	ROBX/5100-00000017
Electric motor	ROBX/8300-0193
Flow transmitter	ROBX/6788-00000001
Legs (2)	ROBX/5100-00000014
Spill tray, standard	ROBX/4100-00000013
Spill tray, wide	ROBX/4100-00000017
Power unit	ROBX/5100-00000005
Pressure gauge	ROBX/2340-00000170
Pressure transmitter	ROBX/2340-00000167
Pump 1.6	ROBX/5100-00000018
Pump 4.2	ROBX/5100-00000019
Pump 8.5	ROBX/5100-00000020

Contact your SKF representative for item numbers not listed here.

Service

If service is required, contact your local SKF representative.

Appendix A

Declaration of conformity (EU)

NOTE!

This section presents the text of the Declaration of Conformity for the European Union. A copy of the signed original is available on request from SKF RecondOil AB.

EC Declaration of conformity. Directive 2006/42/EC, Annex II 1A. Original.

Manufacturer (and, where applicable his authorized representative):

Company: SKF RecondOil AB

Address: Hammarby Kaj 14, 120 30, Stockholm, Sweden.

Declares that:

Machine type: RecondOil Box

Machine no.: Series 3100 standard base systems of designation:

ROBX3115, ROBX3125, ROBX3135, ROBX3145, ROBX3155, ROBX3165, ROBX3175, ROBX3185

is in conformity with the following EU Directives and Regulations:

Directive/Regulation	Description
2014/53/EU	Relating to Radio Equipment
2006/42/EC	Relating to Machinery
2011/65/EU	Restriction of use of certain hazardous substances

The following harmonized standards have been applied:

- EN ISO 12100:2010
- EN ISO 13732-1:2008
- EN 60204-1:2018
- ETSI ETSI EN 301 511 V12.5.1
- ETSI EN 301 489-1 V2.2.3
- ETSI EN 301 489-52 V1.2.1
- ETSI EN 301 908-1 V15.1.1

Authorized to compile the technical file:

Name: Christian Nathaniel and Erik Råwall

Address: Groenvägen 8, 438 91, Landvetter, Sweden

Place in original for date and signature.

Name: Tova Gothberg

Position: Managing Director, SKF RecondOil AB

Appendix B

Declaration of Conformity (UK)

NOTE!

This section presents the text of the Declaration of Conformity for the United Kingdom. A copy of the signed original is available on request from SKF RecondOil AB.

UK Declaration of Conformity.

The manufacturer:

Company:	SKF RecondOil AB
Address:	Hammarby Kaj 14, 120 30 Stockholm, Sweden.

hereby declares under sole responsibility that the machinery:

Type:	RecondOil Box
Machine no:	Series 3100 standard base systems of designations: ROBX3115, ROBX3125, ROBX3135, ROBX3145, ROBX3155, ROBX3165, ROBX3175, ROBX3185

complies with all requirements of the UK legislation:

Supply of Machinery (Safety) Regulations 2008 No. 1597

at the time of placing on the market.

The technical documentation has been compiled. We undertake to transmit the technical documentation in electronic form, in response to a reasoned request by the national authorities. The person authorised to compile the technical documentation on behalf of the manufacturer is:

SKF (U.K.) Limited, 2 Canada Close, Banbury, Oxfordshire, OX16 2RT, GBR.

Furthermore, the following relevant legislation and designated standards were applied in the applicable areas:

- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 No. 3032
- Electromagnetic Compatibility Regulations 2016 No. 1091

EN ISO 12100:2010, EN ISO 13732-1:2008, EN 60204-1:2018, ETSI EN 301 511 V12.5.1, ETSI EN 301 489-1 V2.2.3, ETSI EN 301 489-52 V1.2.1, ETSI EN 301 908-1 V15.1.1.

Gothenburg, March 12, 2024

Place in original for signature.

Tova Gothberg

Managing Director

SKF RecondOil

Appendix C

Supplier's Declaration of Conformity

NOTE!

This section presents the text of the Supplier's Declaration of Conformity for North America. A copy of the signed original is available on request from SKF RecondOil AB.

Supplier's Declaration of Conformity. Original. FCC 47 CFR Part 15 Subpart B. ICES-003 Issue 7 Class B Device.

Manufacturer:

Company: SKF RecondOil AB

Address: Hammarby Kaj 14, 120 30, Stockholm, Sweden.

Contact: RecondOil_Customerservice@SKF.com

Responsible party:

Company: Lincoln Industrial Corp. (SKF)

Address: 5148 North Hanley Road, St. Louis, Mo 63134, United States

Contact: robert.collins@skf.com

Product:

Type: RecondOil Box

Model no: Series 3100 standard base systems of designations:

ROBX3115, ROBX3125, ROBX3135, ROBX3145, ROBX3155, ROBX3165, ROBX3175, ROBX3185

Included Modular Components:

Type: "SIM7070G" (Manufacturer: SimCom)

FCC ID: 2AJYU-8VC0001

IC ID: 23761-8VC0001

FCC Compliance Statement:

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

  This Class B digital apparatus complies with Canadian ICES-003.

  Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

  This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

  – This device may not cause interference.

  – This device must accept any interference, including interference that may cause undesired operation of the device.

  L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

  – L'appareil ne doit pas produire de brouillage;

  – L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Signature:

Place in original for location, date, and signature.

Name: Robert Collins

Position: Technical Compliance Manager - Product Development SKF Lubrication Management, North America

Appendix D

RoHS table (China)

NOTE!

This section presents the RoHS table for China. The original presents the same information twice, once in a narrow-format table, then again in a wide-format table. A copy of the original is available on request from SKF RecondOil AB.

部件名称 (Part name)	有毒害物质或元素 (Hazardous substances)					
	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
用钢和黄铜加工的零件 (Components made of machining steel and brass)	X	0	0	0	0	0
本表格依据SJ/T11364的规定编制 (This table is prepared in accordance with the provisions of SJ/T 11364.)						
0 :	表示该有毒有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。 (Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.)					
X :	表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572标准规定的限量要求。 (Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.)					

Appendix E

Filter exchange protocol

Print this page and use it to record the filter exchange history.

Planned exchange date	Actual exchange date	Pressure*	Flow*	Temp*	Total accumulated flow	Oil sample ID (or N/A)	Operator initials

*Record value at 20 minutes of normal operation after filter exchange.