

# SKF ST-1100s control center

(Original operating and maintenance instructions)



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# 1 EC Declaration of conformity

## Original Declaration of conformity according to EMC Directive 2004/108/EC and Low Voltage Directive 2006/95/EC

Oy SKF Ab

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FINLAND

herewith declares that the product:

### **SKF ST-1100s control center**

conforms to the relevant requirements of EMC Directive 2004/108/EC. The product complies with the following harmonized standards:

- EN 61000-6-4:2001, for emissions
- EN 61000-6-2:2001, for immunity

conforms to the relevant requirements of Low Voltage Directive 2006/95/EC. The product complies with the following harmonized standards:

- IEC 61010-1:2001

Muurame

14.12.2012

*Place*

*Date*



Tuomo Helminen  
*General Manager*



**Warning** Read and follow the safety precautions and general instructions in this manual and also in the SKF manual *"Safety and general instructions for lubrication systems."* Failure to follow these instructions could result in serious injury or damage to the lubrication system or the equipment that is lubricated.

## 2 General description

SKF ST-1100s is a control center for a chain lubrication system. The system lubricates each link of the chain either according to the settings in the automatic mode or manually. Lubrication interval can be set either on the basis of time or number of chain rotations. The lubrication pulses are timed by means of an inductive sensor, which recognizes the links of the chain.

## 3 Design

The main switch of the SKF ST-1100s control center is located at the bottom edge of the center enclosure. The enclosure cover has a green indicator lamp for power and a red indicator lamp for alarm. The control panel of the center is located inside the enclosure.



**Figure 1** SKF ST-1100s control center design

## 3.1 Cover

### 3.1.1 Indicator lamps

Indicator lamp	Description
Power	Green indicator lamp is lit when power is on.
Alarm	Red indicator lamp is lit when control center is in alarm mode.

### 3.1.2 Buttons

The buttons on the cover are not in use in this application.

## 3.2 Control panel

### 3.2.1 General

Control panel is located inside the enclosure. The control panel has a 6-character display, three (3) buttons and LED-signals for inputs and outputs. The display and buttons can be used for setting the parameters for lubrication program and for operating the lubrication system manually.

### 3.2.2 Buttons

Button	Description
<b>Setting</b>	In setting mode and while entering password, pressing down the button enables changing of the displayed value with the arrow buttons. In normal mode, the button is used to start extra lubrication, to reset an alarm and to stop lubrication.
↓	The button can be used for scrolling to the previous parameter display. In setting mode and while entering password, the button can be used for decreasing the displayed value, if the <b>Setting</b> -button is pressed down.
↑	The button can be used for scrolling to the next parameter display. In setting mode and while entering password, the button can be used for increasing the displayed value, if the <b>Setting</b> -button is pressed down.

### 3.2.3 LED-signals

LED-signal	Description
PULSE 1	The LED-signal is lit, when the sensor for the sensor input 1 is closed
PULSE 2	The LED-signal is lit, when the pressure switch is closed.
LOW LEVEL	Lubricant reservoir low level. The LED-signal is lit when the reservoir is empty i.e. the low level switch is closed.
INTERLOCKING	Operation information of the equipment that is lubricated. The LED-signal is lit when the equipment is not in operation (= no interval calculated) i.e. the interlocking switch is closed.
LINE 1	The LED-signal is lit, when air blowing is active.
LINE 2	Pump control 2 (optional). The LED-signal is lit when the pump control is switched on.
PUMP	Pump control. The LED-signal is lit when the pump control is switched on.
ALARM	The LED-signal is lit when the center is in alarm mode.
OK	The LED-signal is blinking, when the electronics operate normally.

### 3.2.4 Display

The control panel has a 6-character 7-segment display.

The display has been divided into two groups:

- 2-character value display indicates the **code** for phase or value
- 4-character time display indicates the **value** corresponding to the code

When the display shows a time value, the decimal point blinks at intervals of one (1) second.

The time is displayed as hours and minutes. For example, 12.34 indicates 12 h 34 min and 123.4 indicates 123 h 40 min.

When the control center is in normal or alarm mode, the code corresponding to the program phase is shown on the value display.

Phase code	Phase description	Time display
Ct	Interval, time counted	Interval duration
Cr	Interval, rotations counted	Full chain rotations
Ht	Manual operation, time displayed	Interval duration
Hr	Manual operation, number of rotations displayed	Full chain rotations
P	Lubrication	Number of lubricated links
L	Interlocking switch is closed or pulse time-out reached	Interval duration
AL	Lubricant reservoir low level alarm	Elapsed alarm time
AP	Pressure alarm	Elapsed alarm time
AE	Electronics error alarm (Electronics alarm)	Error code

Buttons  and  can be used to browse the normal mode displays which show the lubrication program set values.

Value display codes change in the following order when **↑**-button is pressed and vice versa, when **↓**-button is pressed.

Display code	Description
CC	Lubrication counter
Lt	Lubrication interval set value when interval is counted as time
Lr	Lubrication interval set value when interval is counted as full chain rotations.
LP	Set value for link pins per rotation
Ld	Selected lubrication mode --Ct= automatic lubrication based on time --Cr= automatic lubrication based on full chain rotations --Ht= manual lubrication, time is displayed --Hr= manual lubrication, number of chain rotations is displayed
Pr	Pressure control with external pressure switch in use <b>Yes/No</b>
LF	Operation mode of the center, configuration setting. In this application the setting must be <b>SPr</b> .
PASS	Entering password. The password is displayed on time display.

The program returns to display program phase code (normal or alarm mode) in the following cases:

- **Setting**- or arrow button was last pressed more than three (3) minutes ago
- both arrow buttons are simultaneously pressed down for 3 seconds
- **↓**-button is used to browse the phase code on the display
- the center is restarted

## 4 Operation

### 4.1 Lubrication modes

Select the lubrication mode with the setting code **L.d**.

#### 4.1.1 Automatic lubrication (1)

The lubrication interval is set as hours (0 ... 9999 h). The display code is **Ct** during the lubrication interval and the elapsed interval time is displayed. Lubrication starts when the set interval time has elapsed. After the lubrication, the system starts counting the interval again. Lubrication can also be started manually by pressing the **Setting**-button.

The interval counting can be interrupted by closing the interlocking input. If the configuration parameter *Timeout* is not set at 0, interval counting is stopped also if no chain pulses have been received during the set time value.

If the interval counting has been stopped, the code displayed is **L** instead of **Ct**.



### 4.1.2 Automatic lubrication (2)

The lubrication interval is set as full chain rotations (0 ... 9999 r). The display code is **Cr** during the lubrication interval. Lubrication starts when the set amount of full chain rotations has been reached. After the lubrication, the rotation count is reset to 0. Lubrication can also be started manually by pressing the **Setting**-button.

### 4.1.3 Manual lubrication (1)

The code displayed is **Ht**. The display shows elapsed time as hours since the previous lubrication. Lubrication is started by pressing the **Setting**-button.

### 4.1.4 Manual lubrication (2)

The code displayed is **Hr**. The display shows the number of chain rotations since the previous lubrication. Lubrication is started by pressing the **Setting**-button.

## 4.2 Lubrication

Lubrication is performed the same way in all lubrication modes described above. Each link pin of the chain is lubricated once during a lubrication phase. The number of link pins per rotation can be set by means of parameter *Link pins per rotation*. The setting code is **L.P.**

Usually each link pin is lubricated one after another. If the parameter *Divider* (display code **P.F.**) is set to value  $> 1$ , a lubrication pulse is sent when the chain pulse counter reaches the divider value. Lubrication pulses are sent according to the parameter *Link pins per rotation*. For example, if the *Divider* = 3, a lubrication pulse is sent at every third chain pulse and lubrication takes three (3) full chain rotations.

During lubrication phase, code **P** is displayed as well as the number of lubricated link pins. The lubrication phase stops, when the number of the lubricated link pins reaches the set value. Lubrication can be stopped by pressing the **Setting**-button.

When lubrication stops, the reading of the lubrication counter is added by one unit. The counter reading does not increase if the lubrication has been stopped prematurely.

In addition, there are two other parameters for controlling the lubrication pulse:

- Pulse length (display code **P.L.**) which is used to adjust the duration of the lubrication pulse
- Pulse delay (display code **P.d.**) which is used to adjust the delay time between the chain pulse and the lubrication pulse

*See also section 5.3.6 Configuration settings.*

## 4.3 Alarms

The control center goes into alarm mode if the low level switch of the lubricant reservoir closes during lubrication. Code **AL** is displayed as well as alarm duration in hours and minutes.

If the parameter **P.r.** has been set in status **Yes**, the pressure of the pump is monitored with an external pressure switch. The control center goes into alarm mode if the switch is closed when the lubrication pulse starts or if the switch is open when the lubrication pulse ends. Code **AP** is displayed as well as alarm duration in hours and minutes.

The **Alarm** indicator lamp on the cover is lit and the alarm relay goes into alarm mode.

The alarm can be reset with the **Setting**-button. An interrupted lubrication phase can be restarted manually by pressing the **Setting**-button.

## 4.4 Air blowing

The purpose of air blowing is to clean the lubrication point before pumping the lubricant.

Air blowing starts in the beginning of the lubrication phase five (5) sensor pulses before the pump starts.

The sensor pulse starts air blowing during lubrication. The duration of the air blowing is set as seconds with parameter **A.b.** If the value is set to 0, air blowing is not in operation.

## 4.5 Power failure

All settings are stored in the memory which is protected against power failures (EEPROM). If a power failure occurs, the current status of the control center is stored in the memory: interval, alarm or lubrication. Once the power is back on, the operation will resume from the status it was in before power failure occurred. An exception to this is the lubrication phase. After the power failure, operation starts with interval counting.

# 5 Settings

## 5.1 General

Center settings can be divided into two groups:

- Set values
- Configuration settings

Set values are lubrication system basic values. For example, lubrication interval set values can be changed in settings mode.

Configuration settings determine the center functions according to the lubrication system. These settings are usually factory settings and there should not be any reason to change them during operation.

All settings are password-protected.

## 5.2 Entering password

- 1 Select code **PASS** at time display.
- 2 Enter correct password using **Setting-** and arrow buttons.
- 3 When **Setting-**button is released, the center goes into setting mode. The codes show now decimal points, for example "C.C."

**Note!** The password for set values is 2.

## 5.3 Entering settings

- 1 Select the code for the setting to be changed on the display. Value display codes change in the same order as in the following table when **↑**-button is pressed and vice versa, when **↓**-button is pressed.
- 2 Press **Setting-**button and keep it down.
- 3 Use arrow buttons to select the desired setting on the display.
- 4 Release **Setting-**button and the new setting is stored in the system memory.
- 5 Exit setting mode by browsing the code **PASS** on the display by means of **↓**-button.

**Note!** If the arrow button is pressed down continuously, settings will change on the display at accelerating speed.

Display code	Description
C.C.	Lubrication counter
L.t.	Lubrication interval set value, when interval is counted as time
L.r.	Lubrication interval set value, when interval is counted as full chain rotations.
L.P.	Set value for link pins per rotation
L.d.	Selected lubrication mode --Ct= automatic lubrication based on time --Cr= automatic lubrication based on full chain rotations --Ht= manual lubrication, time is displayed --Hr= manual lubrication, number of chain rotations is displayed
P.r.	Pressure control with external pressure switch in use <b>Yes/No</b>

### 5.3.1 Lubrication counter

Code **C.C.** displays the count of lubrications made.

The counter can be reset by setting the counter value to zero with **Setting-** and arrow buttons. The only changeable counter setting is to reset the counter.

### 5.3.2 Lubrication interval

Code **L.t.** or **L.r.** shows the lubrication interval set value on the display.

Enter desired lubrication interval value using **Setting-** and arrow buttons.

If the code is **Lt**: The time can be set within 0 h 00 min – 9999 h.

If the code is **Lr**: The time can be set within 0 - 9999 rotations.

### 5.3.3 Link pins per rotation

Code **L.P.** on value display shows the set value for link pins per rotation.

Enter desired value for link pins per rotation using **Setting-** and arrow buttons.

The value can be set within 0 ... 9999.

### 5.3.4 Lubrication mode

The following lubrication modes are available:

- **Ct**= automatic lubrication based on time
- **Cr**= automatic lubrication based on full chain rotations
- **Ht**= manual lubrication, time is displayed
- **Hr**= manual lubrication, number of chain rotations is displayed

### 5.3.5 Pressure control

If the parameter **P.r.** has been set in status **Yes**, the pressure of the pump is monitored with an external pressure switch.

### 5.3.6 Configuration settings

Configuration settings are factory settings. For a chain lubrication system, the settings are the following:

Display code	Description
<b>P.L.</b>	Duration of the pump control pulse 0000 ... 9999 ms. Factory setting is 300 ms.
<b>P.d.</b>	Delay time between sensor pulse and pump control pulse 0000 .... 9999 ms. Factory setting is 0.
<b>P.F.</b>	Divider 000 ... 160. During lubrication, the system waits for the set amount of chain pulses between each pump control pulse. Factory setting is 3.
<b>t.o</b>	Timeout value after which the interval counting is stopped if there are no sensor pulses. Setting within 0000 ... 9999 s. If the value is set to 0, this function is not in operation. <i>See also Interlocking.</i>
<b>A.b.</b>	Pulse duration for air blowing 000 ... 999 s. If the value is set to 0, this function is not in operation.

**Note!** Configuration settings can be accessed with password **22**.

**Note!** There are several other settings in the configuration mode, but they are not documented in this manual as the operator is not allowed to change them.

## 6 Start-up

The corresponding display code is in brackets.

- 6** Ensure that the set operation mode (**LF**) is **SPr**. If this is not the case, please contact the manufacturer.
- 7** Select the desired lubrication mode (**Ld**).
- 8** Depending on the selected lubrication mode, set the lubrication interval time (**Lt**) or the number of full chain rotations (**Lr**). In manual lubrication mode, these settings are insignificant.
- 9** Set the value for link pins per rotation (**LP**).
- 10** Set the pressure switch control in use/out of use (**Pr**).

*See also section 5.3.6 Configuration settings.*

In configuration mode you can:

- change the duration of the pump control pulse
- divide the chain pulses for pump control
- adjust the delay time between sensor pulse and pump control pulse
- adjust the time-out value for pulse interval for interrupting the interval counting process
- set the pulse duration for air blowing

## 7 Technical specifications

### 7.1 Technical data

Quantity	Value	Unit	Description
t	-20...+60	°C	Operating temperature range
U <sub>in</sub>	220 - 240, 50/60 100 - 130, 50/60	V AC, Hz V AC, Hz	Power input, 160 VA max. Voltage range is preset at factory and indicated in the type plate of the control center.
U <sub>out</sub>	24	V DC	Control voltage, unregulated 5 A max. Internal power supply for external lubrication system components.
F1	1 (230) 2 (115)	AT (V AC) AT (V AC)	Power input fuse, 20x5 mm glass tube fuse, slow
F2	5	AT	Control voltage fuse, 24 V for I/O-voltage, 20x5 mm glass tube fuse, slow
F3	2	AT	Electronic system fuse, 15 V, 20x5 mm glass tube fuse, slow
	200 x 300 x 120 (w x h x d)	mm	Steel enclosure
	IP65		Protection classification

### 7.2 Connections

All connections are measured for 2.5 mm<sup>2</sup> wire cross section area.

#### Inputs

- pulse sensor input for 2-wire sensor, NO, input voltage 22VDC (PS1)
- pressure switch input, optional (PS2)
- input for lubricant reservoir low level switch, NO (Level)
- interlocking, the equipment that is lubricated is in operation = switch open (Lock)

#### Outputs

- pump control, closing contact, connects 24V / 5 A max. (Pump)
- pump control 2, optional (Line 2)
- Control for air blowing (Line 1)
- alarm, 2 pcs potential-free changeover contacts, loading 50V / 1A max. (Alarm)

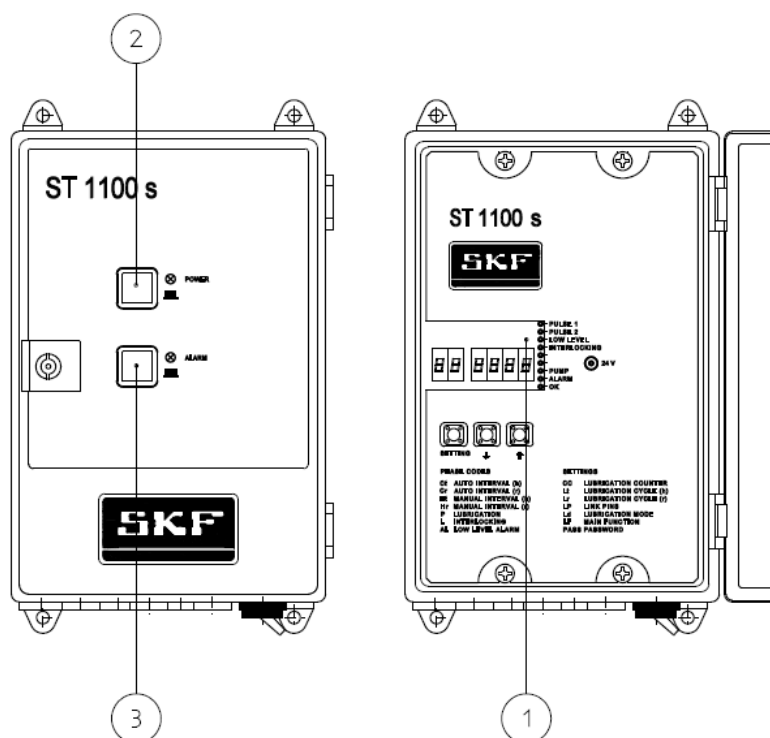
#### Cable channels in the casing

- 5 pcs for 7-10 mm cable diameters
- 1 pc for 10-14 mm cable diameters

## 8 Spare parts

**Table 1** Spare parts for SKF ST-1100s control center. *See Figure 2.*

Item	Description	Order code
1	ST-1100 circuit board PCB+SWB ver 1.3	12501280
2	Indicator lamp green 15010251 T1 BI-PIN	10544083
3	Indicator lamp red 15010250 T1 BI-PIN	10544085



**Figure 2** Spare parts for SKF ST-1100s control center

## 9 Contact information

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