OPERATING INSTRUCTIONS

CENTRIFUGAL PUMPS WITH INTEGRATED FREQUENCY DRIVE

SC-SERIES

Contents

1. General

1.1 Symbols

Warns that failure to observe the precaution may cause personal injury or damage to property.

Warns that failure to observe the precaution may cause electric shock.

ATTN! Indicates something to be noted by the reader.

1.2 Fields of applications

The most common applications are heating, air condition, cooling systems. Also heat exchangers, pressure boosting systems, district heating systems, ice halls, public baths and industrial processies.

1.2.1 AE_-, L_-, AL_- pumps

Clean, thin, non-aggressive liquids.
- circulating water in for heating and cooling systems
- water-glycol mixtures. Recommendation: propylene glycol.

1.2.2 AEP-, LP-, ALP- pumps

Clean, thin, slightly aggressive liquids.
- domestic water, oxygen rich waters

1.2.3 LH-, ALH- pumps

- like in L- and AL -series, but nominal pressure 16 bar

1.2.4 LS-, ALS- pumps

Agressive, thin, not bigger solid particles containing liquids
- in addition to above mentioned liquids various acids, salts, oxidizing and chemically active organic fluids

1.3 Limits of application and use

Nominal pressure: AE-, AEP-, L-, AL-, ALP- pumps: 10 bar
LH-, ALH-, LS- and ALS-pumps: 16 bar
Medium temperature range: -10 ... + 90 °C
Ambient temperature: 0 ... +40°C (diurnal average max. +35°C)

ATTN! Suitability of materials and seals for pumped liquid shall be always checked between purchaser and supplier.

The nominal pressure and the max. temperature of pumped liquid are stamped on the pump rating plate. Never use the pump in any other application or conditions without manufacturer's acceptance. In the case of damage there may be danger to persons by having poisoning, burns, wounds etc. depending on the pumped liquid and it's temperature and pressure. The pump surface temperature may cause danger depending on the working conditions.

1.4 Manufacturer

This product is manufactured by KOLMEKS OY, P.O.BOX 27, FIN-14201 TURENKI, FINLAND.

1.5 Version

Release date of this manual is 01.02.2012. This is version no. 0.

2. Handling, transport and storage of the pump

ATTN!

Normally the pumps are stable when they are transported and don't go down even they are bent 10°. Pumps shall be stored in a dry and cool place protected from dust. Temperature of environment must be in -10 °C ... +50°C. It is not allowed to lift the pump from frequency converter. In the case of longer storage time or the pump serves as a stand-by, it is recommended to rotate the pump manually eg. from the motor fan at least once a month.

3. Design and function

3.1 Construction

The pump and motor constitute a unit, where the rotating parts of both the pump and the motor are on the same shaft (mono-block design). The motor is of a dry type and the frequency converter is integrated to the electric motor.

Electric motor: Totally enclosed, fan cooled A.C. motor, with frequency converter.
Protection form: IP54
Insulating class: F

3.2 Technical data

Pump type	Connection	Hz max	Nominal power P_{2n} kW	Supply current A 1 x 230 V	Weight kg
AE-20/4SC	3/4"	50	0,08	1,1	14
AE-25, -26/4SC	1"	50	0,08	1,1	14
AE-25, -26/4SC	1"	65	0,2	2,1	15
AE/AEP-25,-26/2SC	1"	50	0,65	6,0	19
AE-32,-33/4SC	1 1/4"	50	0,2	2,1	20
AE-32,-33/4SC	1 1/4"	60	0,37	3,6	35
L-32A/4SC	DN32	50	0,08	1,1	18
L-32A/4SC	DN32	65	0,2	2,1	19
L-32A/2SC	DN32	50	0,65	6,0	23
L-40A/4SC	DN40	50	0,2	2,1	24
L-40A/4SC	DN40	60	0,37	3,6	39
L-50A/4SC	DN50	50	0,2	2,1	27
L-50A/4SC	DN50	60	0,55	4,6	42
L-65A/4SC	DN65	50	0,55	4,6	47
L-65A/4SC	DN65	50	0,75	6,1	47
L-80A/4SC	DN80	50	0,55	4,6	48
L-80A/4SC	DN80	50	0,75	6,1	48
AL-1102/4SC	DN100	50	0,75	6,1	58

Noise level of all pump types is under 70 dB (A, 1 m). Weight is without transmitter.

3.3 Pump identification

Markins for accessories:
T = external mechanical seal for aggressive medium
H = flush for mechanical seal
KT = double mechanical seal
Sn = different mechanical seal
Kn = different surface treatment

Different material of impeller:

PM = Bronze CuSn10

SS = Stainless steel AISI316

Pump type
Serial number, Nominal pressure
Duty point, Max. medium temperature
Motor type
Nominal voltage and current
Rotating speed range, isolating and enclosure glass
Manufacturer, country of origin

Motor code
Impeller size
Electrical power at duty point
Phases, frequency and duty
Nominal shaft power
Bearing types, CE -marking

AL - 110 2 / 4 SC B
L P - 50 A / 4 SC C

Pump serie:
AE-, L-, AL-

Material of pump housing, sealing flange and impeller:
no letter = grey cast iron EN-GJL-200 / 10 bar
H = nodular cast iron EN-GJS-400 / 16 bar
P = bronze CuSn10 / 10 bar
S = stainless steel AISI 316 / 16 bar

Flange size, DN-size:
20 = 3/4”
25 = 1”
32 = DN 32
40 = DN 40
50 = DN 50
65 = DN 65
80 = DN 80
110 = DN 100

Poles of the electric motor:
2 = rotation speed 50 r/s (50 Hz)
4 = rotation speed 25 r/s (50 Hz), rotation speed 30 r/s (60 Hz), rotation speed 32.5 r/s (65 Hz)

SC = SC - the frequency converter is integrated to the pump:
SCA, SCB, SCC, SCD, SCF, SCG, SCM (check *5.3 Control methods and connections*)

4. Safety

This manual includes important information concerning installation and operating the pump. Persons who are involved in installation or/and operation of the pump, should read and understand these instruction before installation or starting the pump.

There are live parts inside the frequency converter of the SC -pump, when the supply voltage is connected. Incorrect installation of SC –pump may cause damage to the pump or bodily injuries, even death. Touching the live parts may be mortal even the supply voltage is disconnected. Obey instructions of this manual and national and local requirements and standards.

Wait at least 10 minutes!

- installation must be protected by fuses and insulated correctly.
- covers and cable inlets (EMC –type) must be installed.

ATTN!

It is user's or certified electrician's responsibility to ensure the correct earthing and protection in accordance with applicable national and local requirements and standards.

4.1 Safety instructions

1. SC-pump must be disconnected from the mains if repair work is to be carried out. Check that the mains supply has been disconnected and necessary time has passed (at least 10 minutes).
2. The device must be connected correctly to the earth. User must be protected from supply voltage and the pump must be protected from short circuit according to the national and local requirements and standards. The overload protection is included in SC -pump.
3. Earth leakage is more than 3,5 mA. It means, that installation of supply cable must be fixed.

4.2 Training

The persons who have responsibility for installing or/and operating the pump, should be trained.

4.3 Elements of danger if safety regulations are not obeyed

If the safety regulations are not obeyed, personal injuries or damage to the pump or related devices may occur. Valid safety instructions must be obeyed.

4.4 Safety instructions for inspection and assembly

it is user's responsibility to ensure that persons who carry out inspections and installations are qualified experts and familiarized themselves with these instructions carefully.

4.5 Operating the pump

Working safety of the delivered pump and related devices can be ensured only if these devices are operated according to the section *1.2 Fields of application* and *1.3 Limits of application* and use of this manual.

5. Installation, introduction and start-up

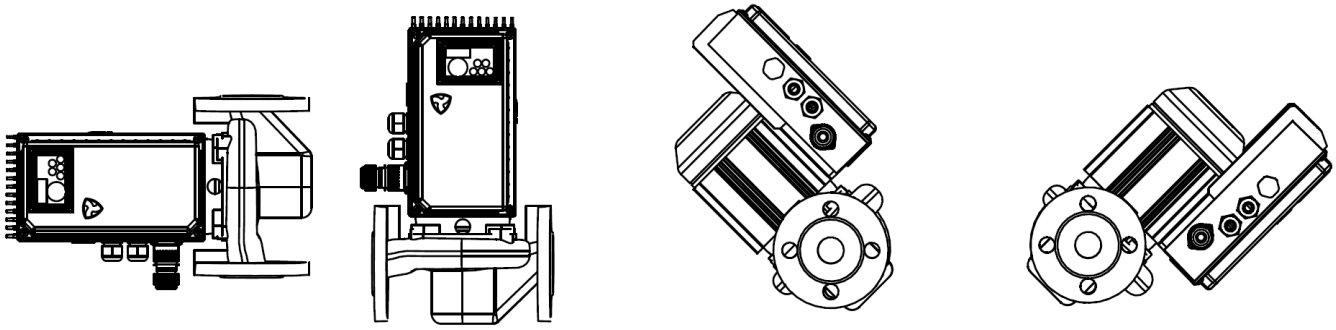
The pump can be installed to the piping without separate supporting.

The position of the motor unit with the frequency converter can be changed by removing the motor unit from the pump housing and setting it to the desired position with certain limitations.

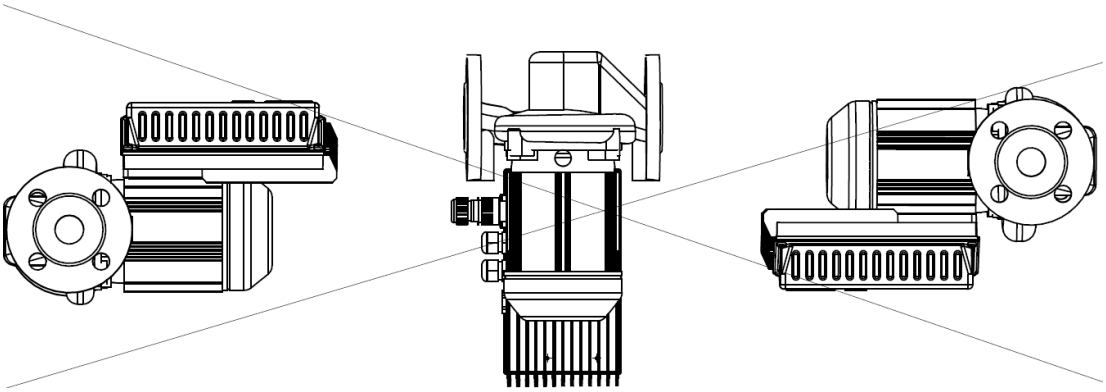
When installing the pump pay attention to the following:
- space enough for service and inspection of the pump
- free visibility to the display of the potentiometer
- free visibility to the rating plate of the pump.
- possibility to use lifting mechanism if needed
- shut-off valves on the both sides of the pump
- the frequency converter is not too close hot pipes.

5.1 Positions for installation

Allowed positions



Not allowed positions



5.2 Electrical connections

ATTN!

All electrical work shall be carried out by qualified electrician approved by the local authorities. Supply voltage may be connected with standard cable, screened cable is not required. Ensure, that the nominal voltage of the electric motor corresponds the local supply voltage.

ATTN!

Use always screened control cables.

Before starting the pump fill and vent the system. Make sure that the pump rotates freely by rotating it manually eg. from the motor fan. Never start or let the pump run dry. Before starting the pump fill and vent the system. After starting make sure that there is no extra noise coming from the pump and that no leakages appear.

5.3 Control methods and connections

5.3.1 I/O's of the SC-pump (inputs and outputs)

Terminal 4	programmable analog input 4-20 mA, 0-5 VDC, 0-10 VDC (voltage / current selected by the switch)
Terminal 2	programmable analog input 0-5 VDC, 0-10 VDC
Terminals STF, STR, RH, RM, RL	programmable digital inputs
Terminal PC	24 VDC supply for digital inputs and feedback (max. 100 mA)
Terminal 10	5 VDC supply for potentiometer
Terminal 5	signal ground
Terminal AM / 5	programmable analog output 0-10 VDC
Relay output, terminals A,B,C	relay output (different possible functions), potential free change-over contacts max. 230 VAC / 0.3 A, cos fi 0.4, max. 30 VDC / 0.3A
Transistor output, terminals RUN, SE	load 27 V / 0.1 A, voltage loss 3.4 V.

5.3.2 Factory settings

Terminal 4: programmed as feedback 4-20 mA or not in use (depending on selected control method)
Terminal 2: 0-10 VDC reference for frequency (speed control) or reference for PI –controller (depending on selected control method)
Terminal STF: in between terminals PC – STF open/closed = pump off/on
Terminal STR: Not in use
Terminal RH: Dry running protection in SCD –version
Terminal RM: Jogging operation. PC – RM open/closed = normal operation / pump is running forced 40 Hz frequency.
Terminal RL: Control mode selection: PC – RL open/closed = Direct speed reference (e.g. SCG) / Closed loop control (e.g. SCC)
Terminal AM / 5: Analog output 0-10 VDC. In versions SCCVAK (with external controller in use) and SCG programmed as frequency. In version SCB, SCC, SCCVAK (with inverter controller in use), SCD and SCF programmed as feedback.
Relay output, Terminals A,B,C: Programmed as alarm. Terminals A and C are connected when pump is running normally or is in stand by (voltage connected, terminals PC – STF open). Terminals B and C are connected when there is alarm or the main supply voltage is disconnected.

5.3.3 SCA-pump – speed reference from the display

Applications
Systems, where the duty point remains constant and where is no need for continuous automated regulation.

Accessories
Pump and frequency converter.

Operation principle
The speed of electric motor can be adjusted manually at the site during commissioning of the pump. The pump will run with constant speed. The required speed is selected with potentiometer and then it is saved by pushing button SET. When pump is running, the present motor current (A) or frequency (Hz) can be selected to the display by pushing SET -button.

Pump curve
QH-curve of the pump is equal with that of single speed pump.

Standard control connections (see ANNEX 8.1 SCA-wiring diagram), PU / EXT COMBINED OPERATION MODE

5.3.4 SCB-pump – constant pressure between the pump flanges

Applications
Systems, where are variations in the flow and where pressure losses are generated mainly on the consumption equipment. Heating circulation, where the pressure loss on the heat equipment is small.

Accessories
Pump, frequency converter, and differential pressure transducer with pipes to the pump flange.

Operation principle and flow adjustment
The level of the constant pressure difference between the pump flanges can be adjusted by the buttons of frequency drive (parameter 133). By pushing button MODE, opens parameter submenu P.xxx. Parameter P.133 is selected with the potentiometer By pushing SET –button, appears value of the parameter 133 to the display which is reference for PI –controller (constant differential pressure). It is percents of max. measuring value of the differential pressure transducer (mentioned in transducer). The required reference value can be adjusted by the potentiometer. It is saved by pushing SET –button. By pushing button MODE twice, starting situation is achieved. When pump is running, the present motor current (A), feedback (%) or frequency (Hz) can be selected to the display by pushing SET-button. Unauthorized operating of the display can be prevented by locking it by pushing MODE –button 2 seconds. Unlocking is done in a same way.

Pump curve
QH-curve of the pump is controlled to a horizontal line, which is suitable for systems with low pressure loss share in heat exchanger compared to the total pressure loss.

Standard control connections (see ANNEX 8.2 SCB-wiring diagram), PU / EXT COMBINED OPERATION MODE

5.3.5 SCC-pump - constant pressure in between inlet- and outlet-line

Applications
Systems, where are variations in the flow and where pressure losses are generated mainly on the source of heat equipment. Heating and cooling circulations and the pressure boosting of parellel circulations.

Accessories
Pump, frequency converter and differential pressure transducer with pipes. One pipe to be installed to the suction or pressure flange of the pump and an another one on to the system, inlet or outlet pipe.

Operation principle and flow adjustment
The level of the constant pressure difference between the pump flanges can be adjusted by the buttons of frequency drive (parameter 133). By pushing button MODE, opens parameter submenu P.xxx. Parameter P.133 is selected with the potentiometer By pushing SET –button, appears value of the parameter 133 to the display which is reference for PI –controller (constant differential pressure). It is percents of max. measuring value of the differential pressure transducer (mentioned in transducer). The required reference value can be adjusted by the potentiometer. It is saved by pushing SET –button. By pushing button MODE twice, starting situation is achieved. When pump is running, the present motor current (A), feedback (%) or frequency (Hz) can be selected to the display by pushing SET-button. Unauthorized operating of the display can be prevented by locking it by pushing MODE –button 2 seconds. Unlocking is done in a same way.

Pump curve
QH-curve of the pump is controlled to a quadratic. The relation of pressure loss in the source of heat (cold) to the loss in the system defines the shape of the curve. When the losses in the heat exchanger are large part of the whole losses in the system the curve is more steep.

Standard control connections (see ANNEX 8.3 SCC-wiring diagram), PU / EXT COMBINED OPERATION MODE

5.3.6 SCCVAK-pump - constant pressure between supply- and return-line with external controller in use

Operation principle (speed reference 0-10 VDC from external controller)

The level of the constant pressure difference between the inlet- and outlet-line of the system can be adjusted by external control system.

Flow adjustment and balancing the system
Before adjusting and balancing the system the differential pressure transducer is connected to the external control system. The main control valve must be opened as open as possible and then the flow is adjusted by giving the reference for differential pressure to external controller. Alternatively the flow adjustment can be done in SCA –connection (*5.3.3 SCA-pump – speed reference from potentiometer*). The flow is adjusted by selecting the correct frequency. When the system has adjusted and balanced, the value of the pressure difference is read and saved to the control system as a reference value.

Another alternative is to get correct reference value for differential pressure by running the pump in SCC-connection (5.3.5 SCC-pump - constant pressure in between inlet- and outlet-line). Wire jumper must be fixed in between terminals PC and RL (PI –controller in use). When the system has adjusted and balanced, the reference value of the pressure difference is read from parameter 133 which is programmed as reference value for external controller.

Standard control connections (see ANNEX 8.4 SCCVAK-wiring diagram- with external controller in use), EXT OPERATION MODE

5.3.7 SCCVAK-pump - constant pressure between supply- and return-line with controller of the frequency converter in use

Operation principle (reference for pressure difference 0-10 VDC from external control system)
The level of the constant pressure difference between the inlet- and outlet-line of the system can be adjusted by external control system (reference for differential pressure 0-10 VDC). Connections are the same as in SCC – pump, however, the reference is fed from the external control system in between terminals 2 and 5. Parameter 133 must be selected 9999.

ATTENTION! If external control sytem is not in use when pumping is needed, select the required reference for differential pressure with parameter 133 (check 5.3.5 SCC-pump - constant pressure in between inlet- and outlet-line).

Standard control connections (see ANNEX 8.5 SCCVAK-wiring diagram- with controller of the frequency drive in use), PU / EXT COMBINED OPERATION MODE

5.3.8 SCD-pump - constant pressure in discharge (pressure boosting)

Applications
Pressure boosting or other open systems, where constant pressure is required.

Accessories
Pump, frequency converter and pressure transmitter. The pressure transmitter is installed to the pressure flange of the pump or near to the consumption in the pipe line.

Operation principle
The level of the constant pressure in discharge can be adjusted by the buttons of frequency drive (parameter 133). By pushing button MODE, opens parameter submenu P.xxx. Parameter P.133 is selected with the potentiometer By pushing SET –button, appears value of the parameter 133 to the display which is reference for PI –controller (constant pressure). It is percents of max. measuring value of the pressure transducer (mentioned in transducer). The required reference value can be adjusted by the potentiometer. It is saved by pushing SET –button. By pushing button MODE twice, starting situation is achieved. When pump is running, the present motor current (A), feedback (%) or frequency (Hz) can be selected to the display by pushing SET-button. Unauthorized operating of the display can be prevented by locking it by pushing MODE –button 2 seconds. Unlocking is done in a same way.

Standard control connections (see ANNEX 8.6 SCD-wiring diagram), PU / EXT COMBINED OPERATION MODE

5.3.9 SCF-pump - constant temperature

Applications
Heating and cooling systems, where the constant temperature is required by adjusting the flow.

Accessories
Pump, frequency converter and temperature transmitter (and sensor).

Operation principle
The level of the constant temperature in discharge can be adjusted by the buttons of frequency drive (parameter 133). By pushing button MODE, opens parameter submenu P.xxx. Parameter P.133 is selected with the potentiometer By pushing SET –button, appears value of the parameter 133 to the display which is reference for PI –controller (constant temperature). It is percents of max. measuring value of the temperature transducer (mentioned in transducer). The required reference value can be adjusted by the potentiometer. It is saved by pushing SET –button. By pushing button MODE twice, starting situation is achieved. When pump is running, the present motor current (A), feedback (%) or frequency (Hz) can be selected to the display by pushing SET-button. Unauthorized operating of the display can be prevented by locking it by pushing MODE –button 2 seconds. Unlocking is done in a same way.

ATTENTION! When ordering the pump, the response of the control must be informed. In the heating system the response is normal, in the cooling system inverse. *Normal*, the pumping goes down, when the temperature (feedback) goes up, *inverse,* the pumping goes up, when the temperature (feedback) goes up (par. 128 => normal = 20, inverse = 21).

Standard control connections (see ANNEX 8.7 SCF-wiring diagram), PU / EXT COMBINED OPERATION MODE

5.3.10 SCG-pump - controlled by external system

Applications
Systems, where are variations in the flow and/or where the flow is controlled mainly with the pump. The pump is controlled by an external system or controller.

Accessories
Pump and frequency converter.

Operation principle
The speed reference for pumps is given from external control system, external controller, process control, etc

ATTENTION!! If the external control system is not in use when pumping is needed, PU / EXT COMBINED OPERATION is selected by the parameter 79 (par.79: 0=>3). Then constant speed can be selected according to *5.3.3 SCA-pump – speed reference from the display.*

Standard control connections (see ANNEX 8.8 SCG-wiring diagram - with external controller in use), EXT OPERATION MODE

5.3.11 SCM-pump – controlled by MODBUS RTU –bus connection

Applications
Systems, where are variations in the flow and/or where the flow is controlled mainly with the pump. The pump is controlled by an external system or controller.
.
Accessories
Pump and frequency converter.

Operation principle
All control, adjusting and indications are taken care with MODBUS RTU –bus connections.

Standard control connections (see ANNEX 8.9 SCM-wiring diagram - MODBUS RTU –bus connection), NET OPERATION MODE

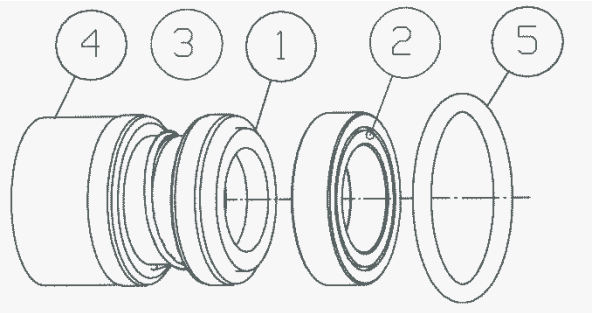
5.3.12 Local Control Panel

The SC -pump optionally features a separate cable connected Local Control Panel, which makes up the complete interface for operation and monitoring of the SC -pump. If the pump is located such as the display is hard to see, it helps the parameterizing of the frequency converter.

6. Service, spare parts and troubleshooting

The pump doesn't need any regular servicing. As a shaft seal is used an adjustment free mechanical seal. It is a wearing part which has to be replaced if it starts to leak. Note that few drops leakage per hour can be quite normal especially when coolants (eg. glycol) are pumped.

6.1 Shaft seals

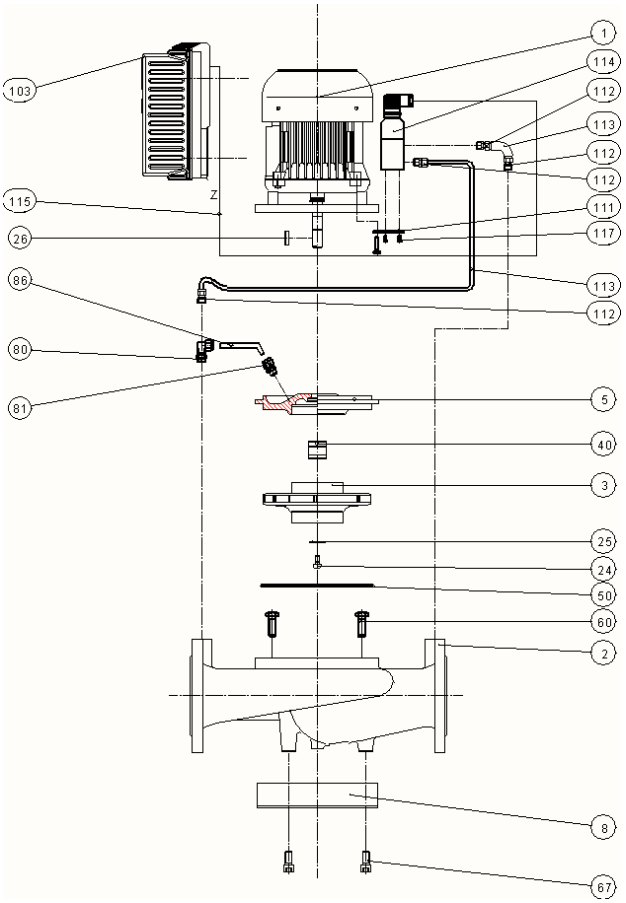


Pump type	Shaft mm	O-ring mm
AE_-25/-26 SC_	12	123x2,5
L_-32A SC_	12	100x2,5
L_-40A, AE_-32/-33 SC_	12	145x2,5
L_-50A SC_	12	150x3
L_-65A SC_L_-80A -1102 SC_	18	179,3x5,7

1 Rotating ring
2 Stationary ring
3 Body / bellows
4 Spring
5 O-ring

The motor is equipped with ball bearings which are lubricated for life and therefore do not need any service. In the case of any motor malfunction it is recommended to replace the whole motor unit.

6.2 Other parts



1 Electric motor
2 Pump housing
3 Impeller
5 Sealing flange
8 Foot (not always)
24 Screw or nut
25 Washer
26 Key
40 Shaft seal
50 O-ring or gasket
60 Screw or nut
67 Screw
80 Pipe union (L- and ALH -serie)
81 Pipe union (L- and ALH -serie)
86 Cooling pipe (L- and ALH -serie)
103 Frequency converter
111 Fixing plate (SCB, SCC)
112 Pipe joints (SCB, SCC)
113 Pipes (SCB, SCC)
114 Transmitter for pressure, pressure difference or temperature (SCB, SCC,SCD, SCF)
115 Cable (SCB, SCC, SCD, SCF)
117 Screws (SCB, SCC)

ATTN!

WHEN ORDERING SPARE PARTS, PLEASE SPECIFY THE TYPE IDENTIFICATION, SERIAL NUMBER, THE SIZE OF THE IMPELLER, THE MOTOR TYPE AND POWER AND THE POSITION NUMBER OF THE SPARE PART.

6.3 Troubleshooting

Trouble	Fault	Fixing
Shaft seal is leaking.	Wearing.	Change the seal.
	Pump has run dry.	Change the seal.
Pump doesn't run.	The shaft of the pump is blocked.	Check the free rotation of the shaft by turning the motor fan. If required, loosen the motor unit from the pump housing and repair the cause of the block.
	Fuses have worked.	Repair the cause of the fault. Change the fuses. If necessary, call the expert.
	No electricity.	Check and repair connections. If necessary, call the expert.
	The disorder has stopped the pump.	Reset the pump by disconnecting the supply voltage at least for 10 seconds.
	Control wiring is not correct.	Check the wiring in accordance with the control diagram. Between terminals PC-STF must be jumpered or closed switch.
	The parametres of the frequency converter are changed or the pump is stopped with local control panel.	Correct the parameters or start the pump with the local control panel (not included in standard delivery). If necessary, call the expert.
	The frequency converter or electric motor is damaged.	Replace the frequency converter and/or electric motor with a new one. Contact to Kolmeks.
ATTN!	If the pump is operated when cover of the frequency converter is open, the special carefulness must be observed.	
Pump stops by itself or runs irregular and noisy.	The supply voltage is defective. One phase is possible missing.	Check the supply voltage. Check and repair fuses and connections of the cables.
	The frequency converter or electric motor is damaged.	Replace the complete motor unit with frequency converter with a new one. Contact to Kolmeks.

Trouble	Fault	Fixing
The pump is running with minimum frequency.	The reference value is missing or in minimum.	Adjust the correct value with the buttons of the local control panel (if intention to use the local reference as source of the reference). Check and correct the reference if the reference is given by external controller.
	The pipes of the pressure or differential pressure transducer are blocked or incorrectly connected.	Check and repair the connections and blockings of the pipes. Open the possible valves, which are installed to the pipes.
	The signal of the feedback transmitter (pressure or temperature) is too high. Possible short circuit.	Disconnect the cable from the transmitter, the speed should increase, if there is a fault in transmitter or the signal (not SCF cooling system). Check the connections, transmitter. If necessary, replace the transmitter with the new one.
	The mechanical or electrical connections of the temperature transmitter of the SCF -pump are incorrect or the transmitter is damaged.	Check and repair of the connections or the transmitter.
	Parameters of the FCF -pump are wrong (cooling and heating pumps have different parameters)	Check and correct the parameters. If necessary, call the expert.
The pump is running only with the maximum frequency, which don't vary in accordance with the requirements of flow changes.	Reference signal is too high.	Adjust the correct value with the buttons of the local control panel (if intention to use the local reference as source of the reference). Check and correct the reference if the reference is given by external controller.
	Feedback transmitter is missing or the signal is wrong	Check and repair the feedback signal and/or connections. If necessary, replace the transmitter with the new one.
	The pipes of the pressure or differential pressure transducer are blocked or incorrectly connected.	Check and repair the connections and blockings of the pipes. Open the valves, which may be installed to the pipes.
Trouble	**Fault**	**Fixing**

The pump is running only with the maximum frequency, which don't vary in accordance with the requirements of flow changes.	The mechanical or electrical connections of the temperature transmitter of the SCF -pump are incorrect or the transmitter is damaged.	Check and repair of the connections or the transmitter.
	Parameters of the FCF -pump are wrong. (cooling and heating pumps have different parameters)	Check and correct the parameters with the local control panel. If necessary, call the expert.
	The maximum speed is required by the system.	Check the adjustments and the need of the pumping in the system. Balance the parallel circulations. It can be the normal situation, then there is no need for any further measures. Solve the actual rotation speed by measuring or with the local control panel. Contact to Kolmeks. Maximum frequency is not allowed to change (factory default).

Trouble	**Fault**	**Fixing**
The pump is not pumping.	There is air in the pump or the system.	Deairate the system. Fill the pumps and the pipes with the fluid. Try to run the pump a moment with the high speed, then possible air pockets leave the system easier.
	The suction pressure is too low.	Increase the suction pressure.
	Circulation is closed with the valves.	Open the valves.
The pump is noisy.	Cavitation.	Increase the suction pressure. Decrease the flow.
	The pressure difference of the pump is too high.	Decrease the pressure reference. If possible, open the control valves and decrease the pressure reference, then the head of the pump is lower and the flow remains the same.
	There is a faulty shaft seal or bearings.	Continuous rough noise refers to the faulty bearings. High noise, few seconds long, occasionally refers to the faulty shaft seal. Replace faulty bearings and shaft seal with the new ones. If necessary, contact Kolmeks.
	Electrical noise from the frequency	Replace the motor with the new

	converter or electric motor.	one. If necessary, correct the parameters of the frequency converter. Contact Kolmeks.

6.4 Checking of alarm history

Push MODE –button twice. To the display appears the last 8 alarms. The last one is E.xxx. If there is no alarms, there is E__0 in the display.

6.5 Alarm and fault codes

Operation Panel Indication			Name	Refer to Page
Error message	E---	E---	Faults history	241
	HOLd	HOLD	Operation panel lock	246
	LOCd	LOCd	Password locked	246
	Er1 to Er4	Er1 to 4	Parameter write error	246
	Err.	Err.	Inverter reset	247
Warnings	OL	OL	Stall prevention (overcurrent)	247
	oL	oL	Stall prevention (overvoltage)	247
	rb	RB	Regenerative brake prealarm	248
	TH	TH	Electronic thermal relay function prealarm	248
	PS	PS	PU stop	248
	MT	MT	Maintenance signal output	248
	UV	UV	Undervoltage	248
Alarm	FN	FN	Fan fault	249
Fault	E.OC1	E.OC1	Overcurrent trip during acceleration	249
	E.OC2	E.OC2	Overcurrent trip during constant speed	249
	E.OC3	E.OC3	Overcurrent trip during deceleration or stop	249
	E.OV1	E.OV1	Regenerative overvoltage trip during acceleration	250
	E.OV2	E.OV2	Regenerative overvoltage trip during constant speed	250
	E.OV3	E.OV3	Regenerative overvoltage trip during deceleration or stop	250
	E.THT	E.THT	Inverter overload trip (electronic thermal relay function)	250
	E.THM	E.THM	Motor overload trip(electronic thermal relay function)	251
	E.FIN	E.FIN	Fin overheat	251

Operation Panel Indication			Name	Refer to Page
Fault	E.ILF	E.ILF *	Input phase loss	251
	E.OLT	E.OLT	Stall prevention	251
	E. bE	E. BE	Brake transistor alarm detection	251
	E. GF	E.GF	Output side earth (ground) fault overcurrent at start	252
	E. LF	E.LF	Output phase loss	252
	E.OHT	E.OHT	External thermal relay operation	252
	E.PTC	E.PTC*	PTC thermistor operation	252
	E. PE	E.PE	Parameter storage device fault	252
	E.PUE	E.PUE	PU disconnection	253
	E.rET	E.RET	Retry count excess	253
	E.CPU	E.CPU	CPU fault	253
	E.CdO	E.CDO*	Output current detection value exceeded	253
	E.IOH	E.IOH *	Inrush current limit circuit fault	253
	E.AIE	E.AIE *	Analog input fault	253

* If a fault occurs when using with the FR-PU04, "Fault 14" is displayed on the FR-PU04.

7. Declaration of Conformity

We, OY KOLMEKS AB, P.O.Box 27 FI-14201 Turenki, FINLAND
declare under our sole responsibility that the products:

SC_ - PUMP SERIE,

types AE, AEP, L, LH, LP, LS, AL, ALH, ALP, ALS

to which this declaration relates, are in conformity with the
– Council Directive 2006/42/EY on the approximation of the laws of
the Member States relating to machinery
– Low voltage directive 2006/95/EY
– Pumps and pump units for liquids. Common safety requirements. EN 809:1998+A1:2009.

Serial / manufacturing number _____

EMC-STANDARDS

Generic standards
The generic standards are stated in the EMC directive (2004/108/EY).

SC_ -pump complies with:

EN 61000-6-3, EN 61000-6-1.
Residental, commercial and light industrial environment.

EN 61000-6-4, EN 61000-6-2.
Industrial environment.

Turenki 01.02.2012

Kimmo Issakainen
Managing Director

Technical file collected by R&D manager

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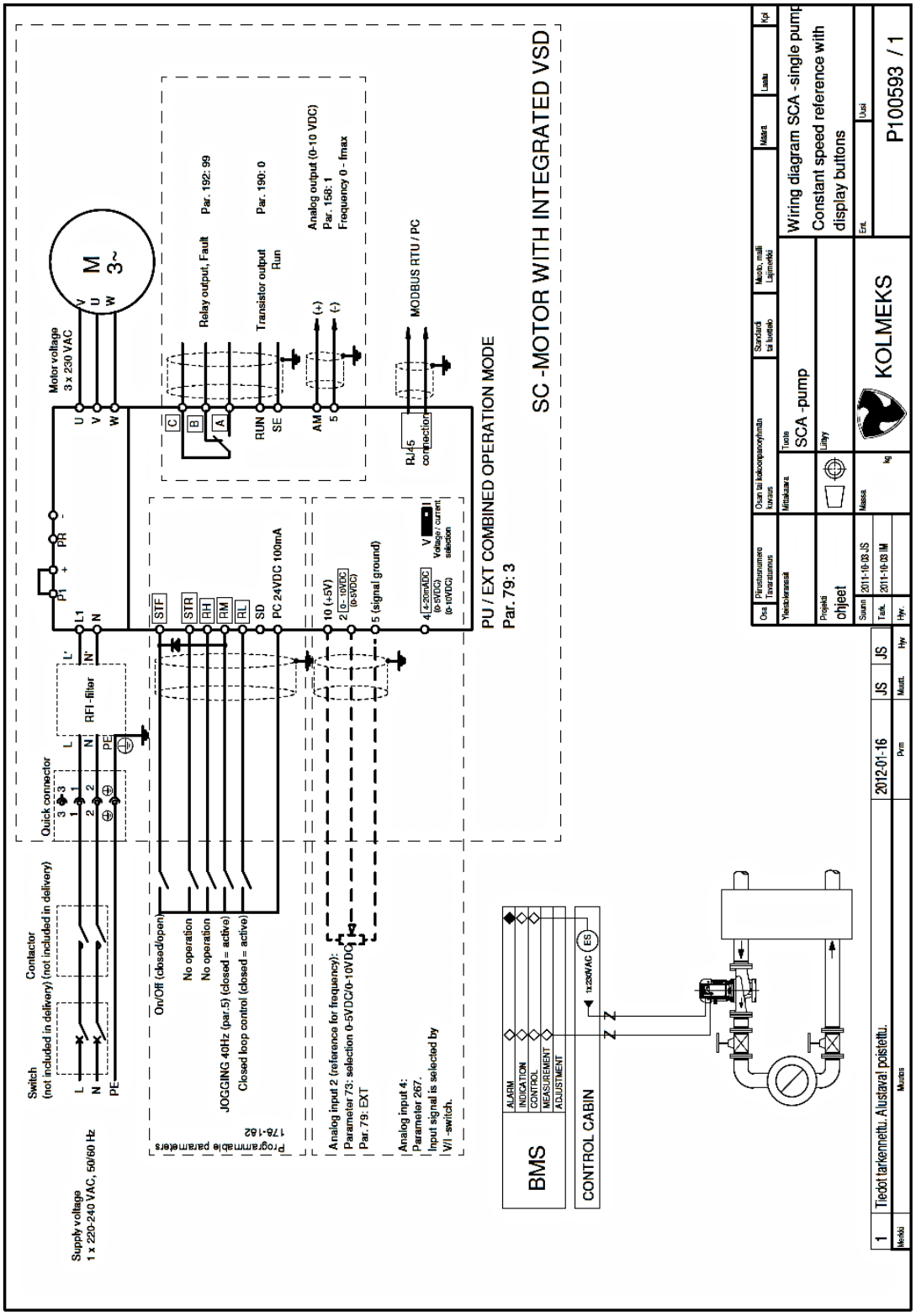
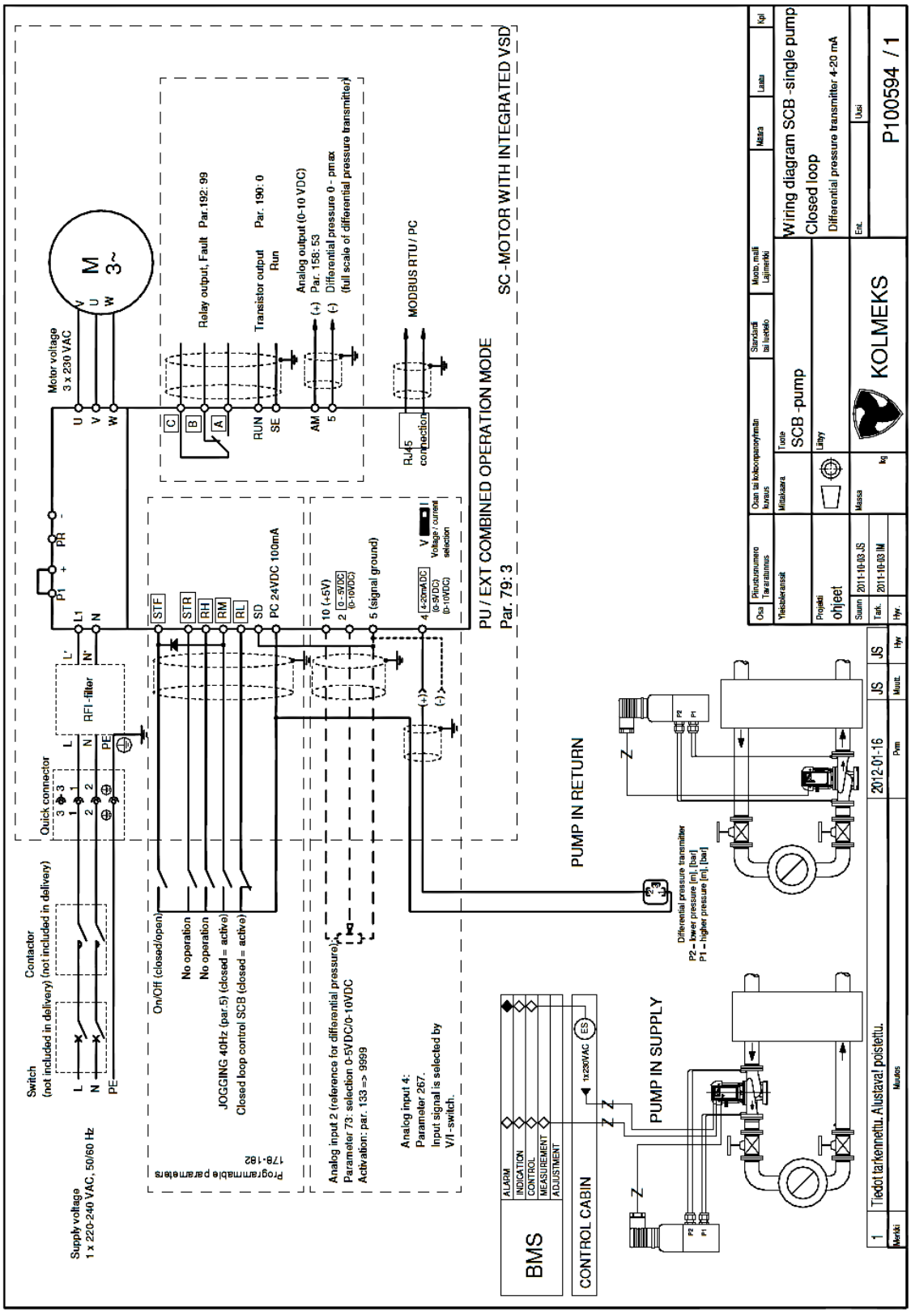
8. Annex

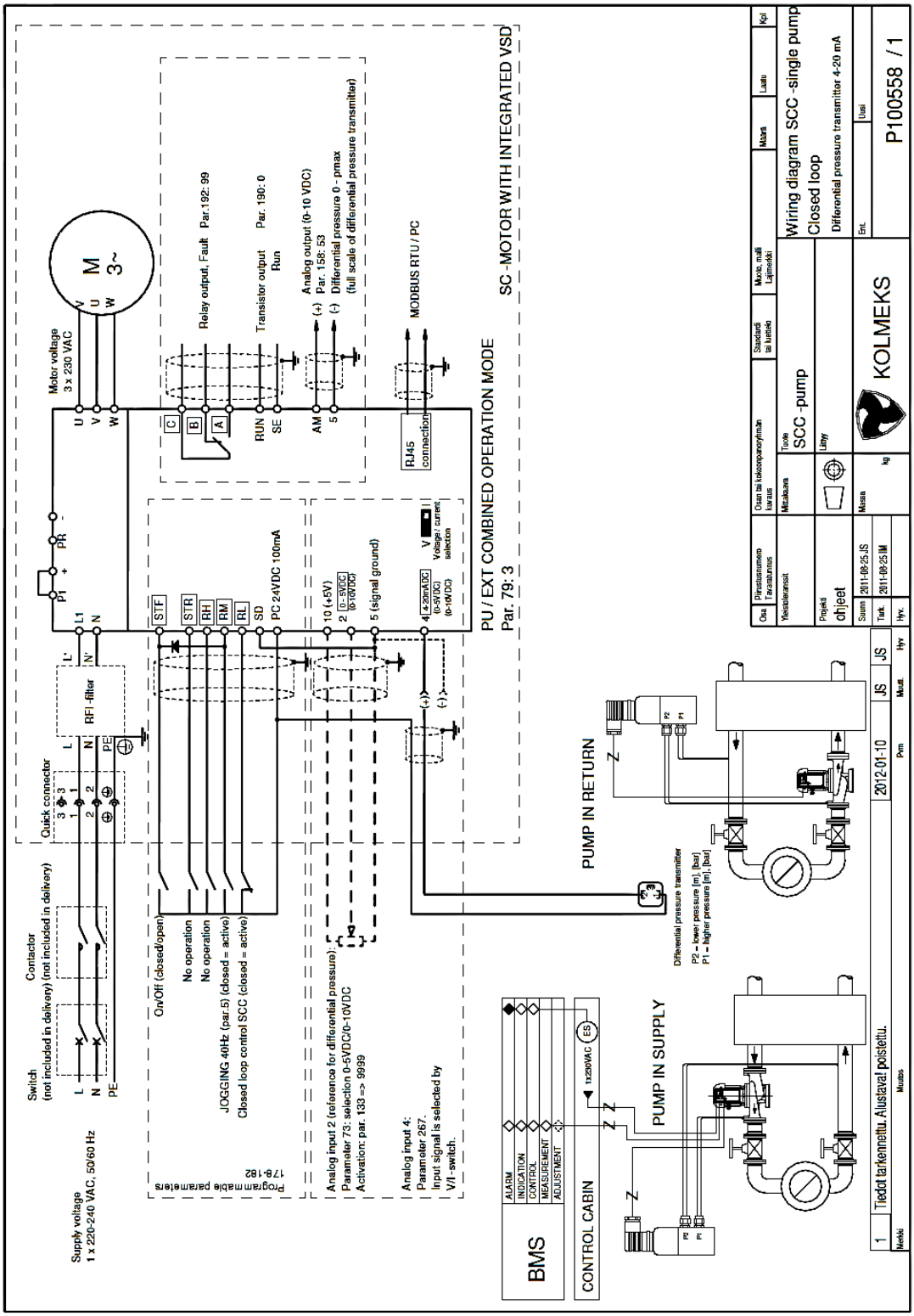
8.1 Wiring diagram SCA-single pump



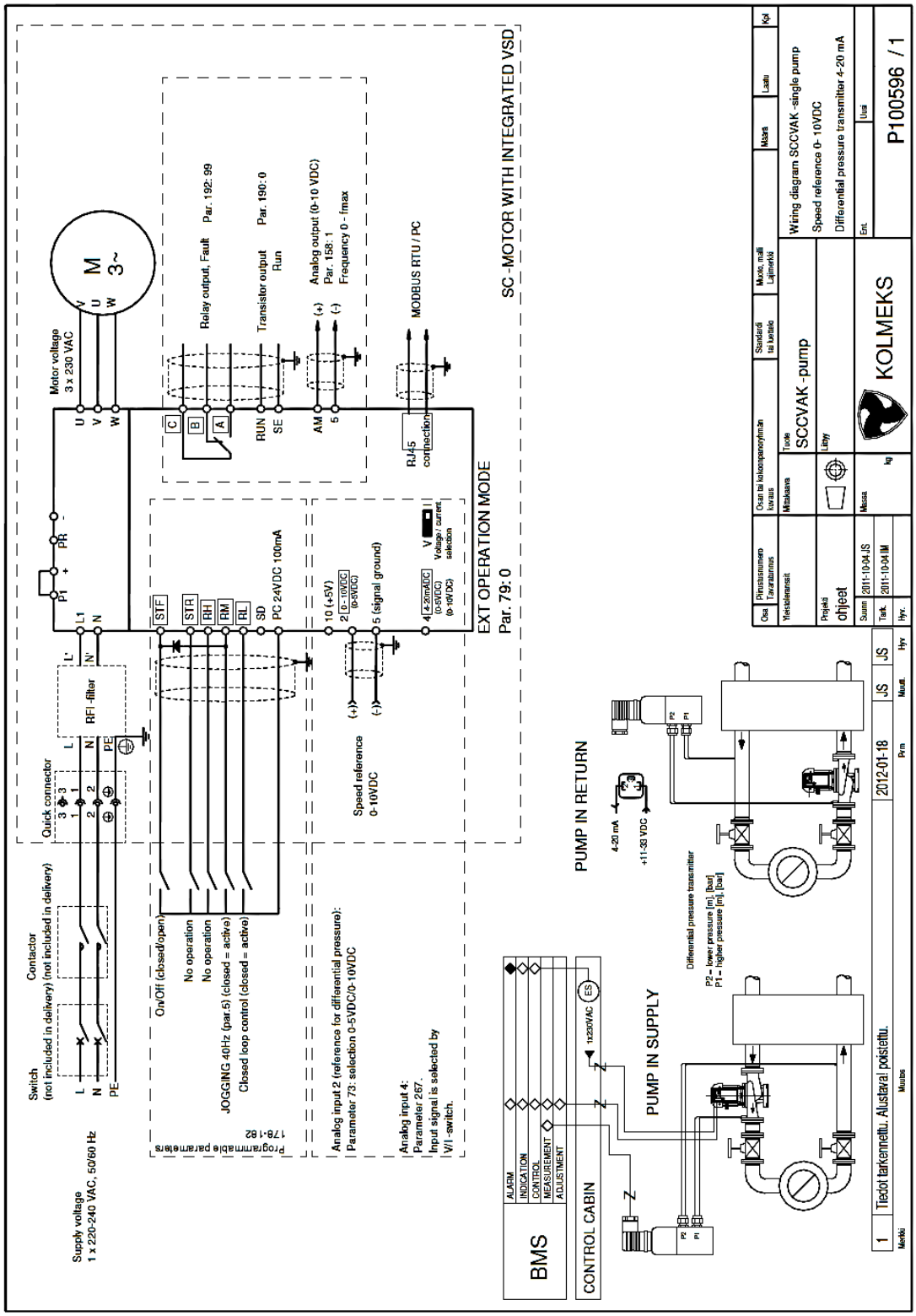
8.2 Wiring diagram SCB-single pump



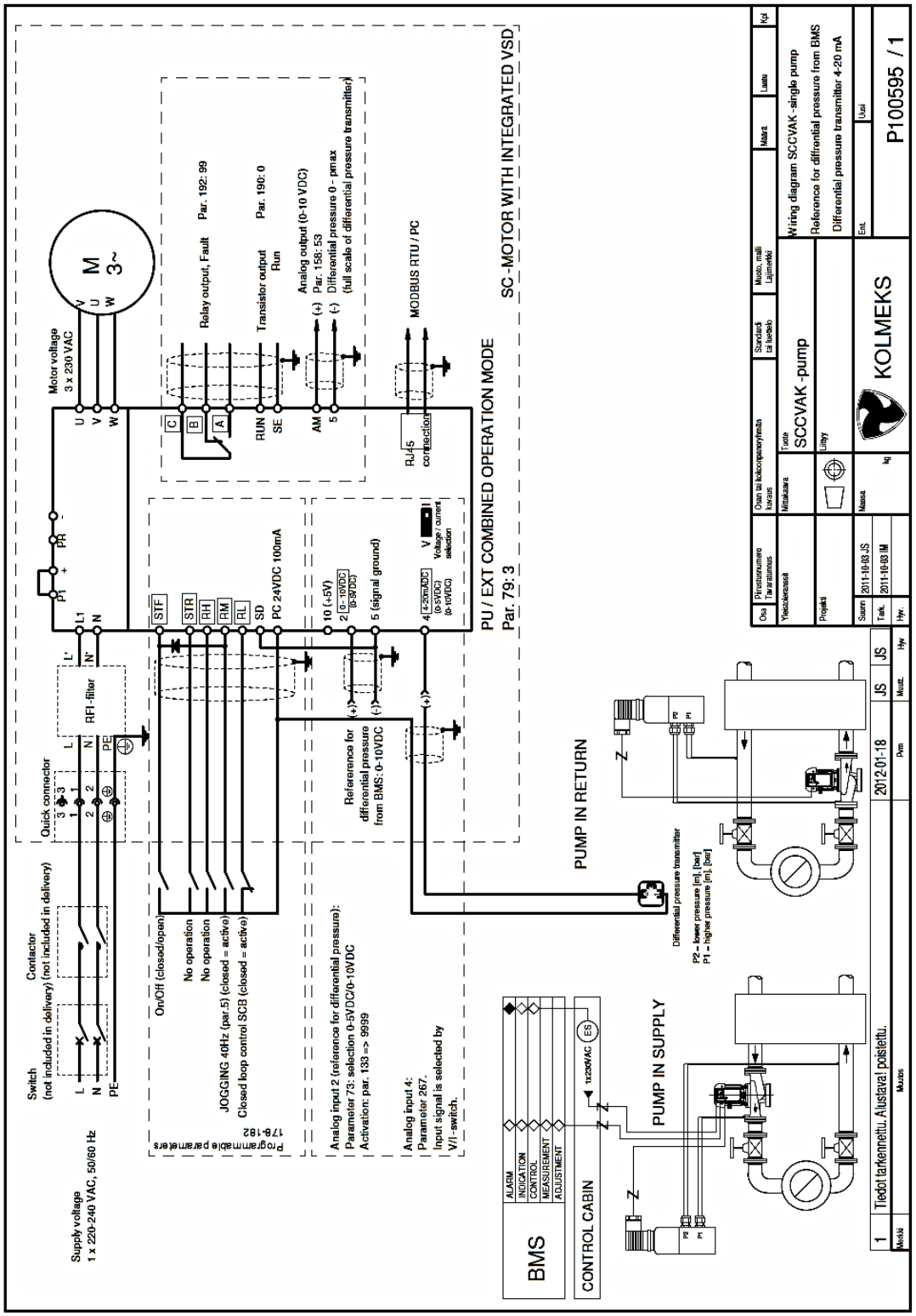
8.3 Wiring diagram SCC-single pump



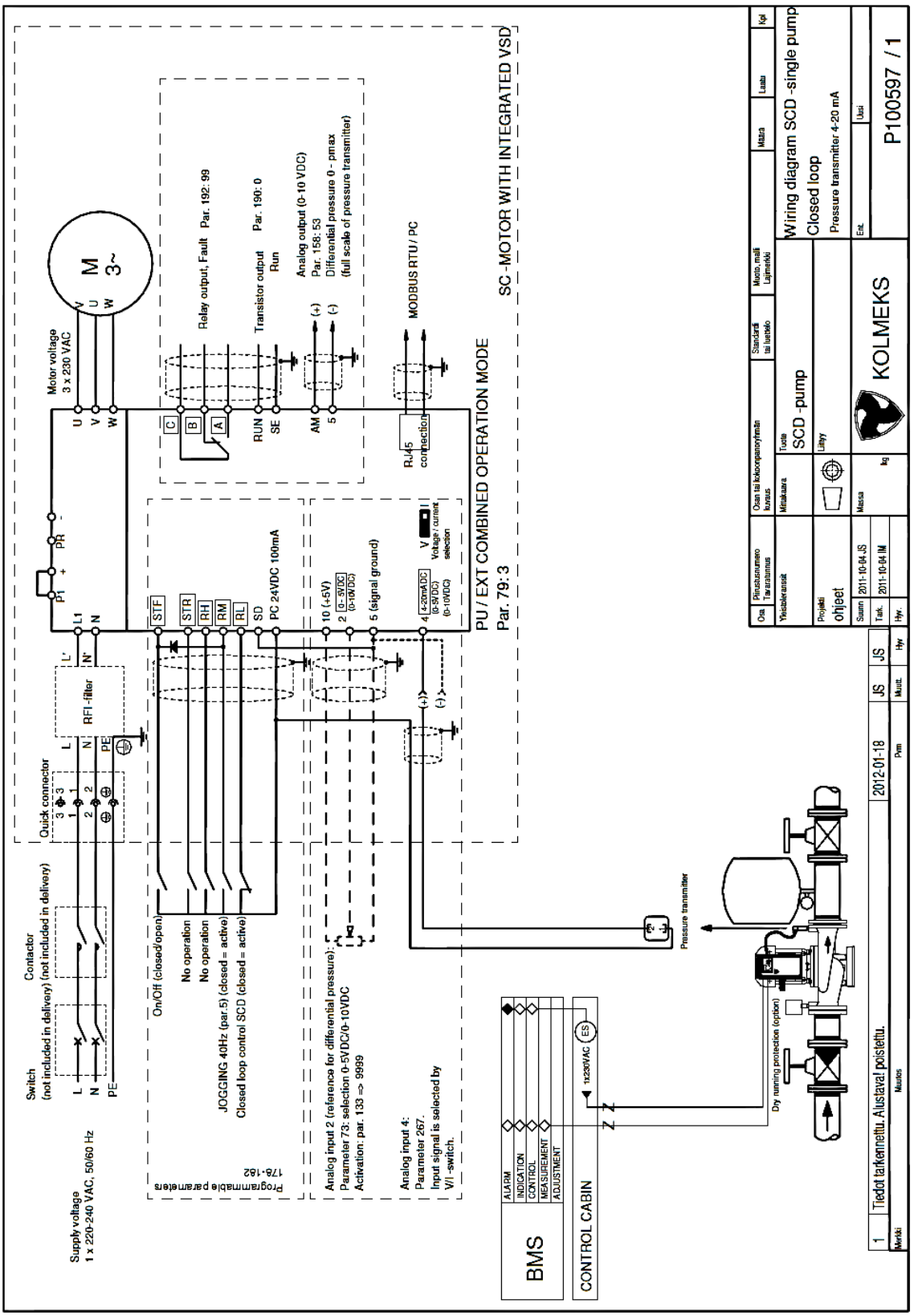
8.4 Wiring diagram SCCVAK-single pump - speed reference 0-10 VDC from external controller



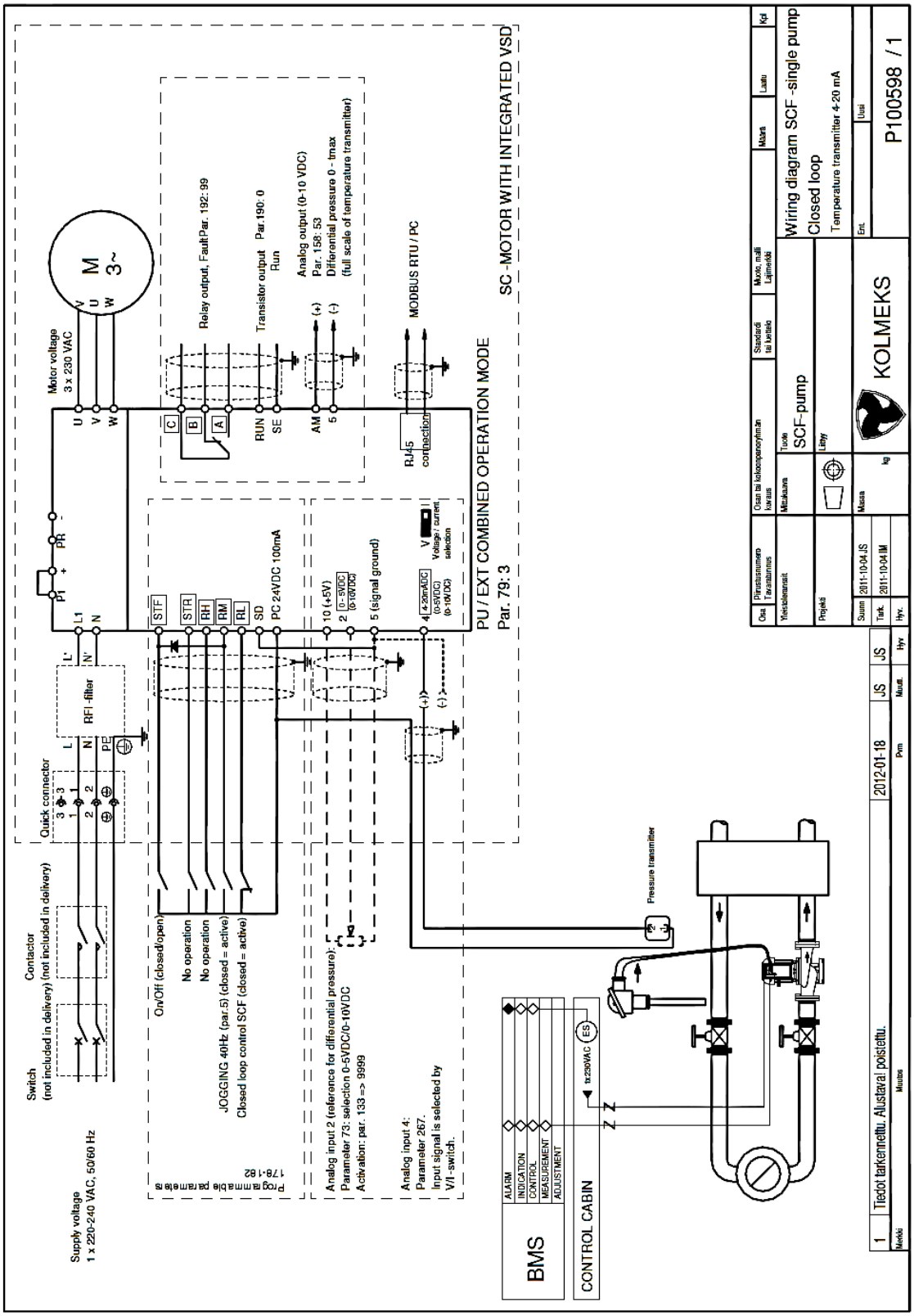
8.5 Wiring diagram SCCVAK-single pump – reference for differential pressure 0-10 VDC from external controller



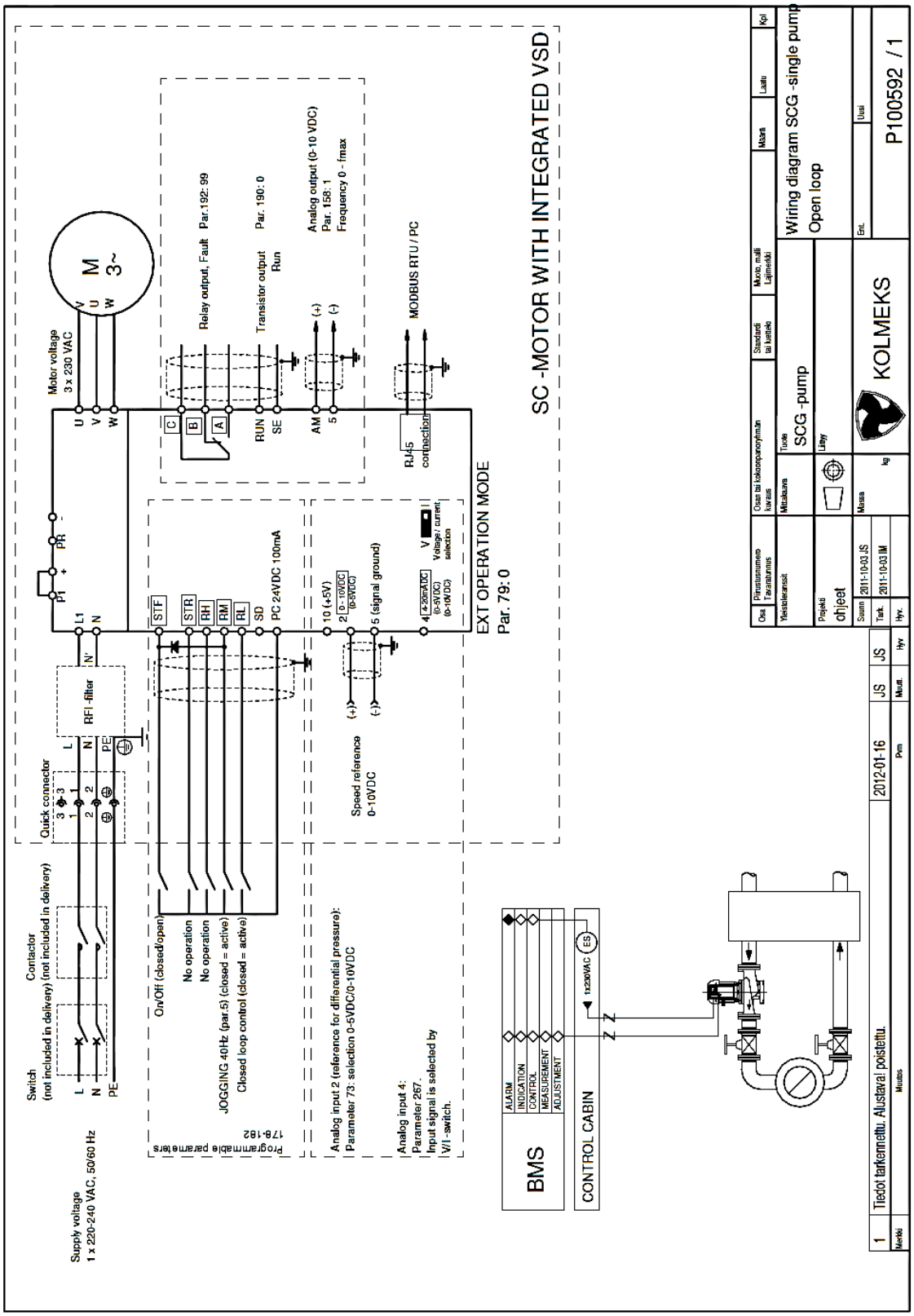
8.6 Wiring diagram SCD-single pump



8.7 Wiring diagram SCF-single pump



8.8 Wiring diagram SCG-single pump



8.8 Wiring diagram SCG-single pump