

# Instructions for the heat exchanger control system SILVER C RX, RECO<sup>n</sup>omic, sizes 100/120, RECO<sup>s</sup>orptic, sizes 50-120

## 1. General

The heat exchanger control system is a control system for 380 W step motors. It is designed for precise and quiet control of rotary heat exchangers in the SILVER C RX ventilation units with standard rotor (RECO<sup>n</sup>omic) in size 100/120, and with sorption rotor (RECO<sup>s</sup>orptic) in sizes 05-120.

Integrated functions:

- 0 - 10 V DC analogue input for controlling the speed.
- Alarm for overloading, over-voltage and under-voltage.
- Protective motor switch with integrated current limiting function.
- Short-circuit protected inputs and outputs.
- Digital input for start/stop.
- Digital input for alarm resetting.
- Integrated EMC filter.

In the size 50-80 SILVER C units the heat exchanger control system is located inside the filter section in the lower level. In the size 100/120 SILVER C units the heat exchanger control system is located inside the fan or filter section to the left of the centre section in the lower level (viewed from the inspection side). For access, open the inspection door.

### Forbidden to start operation

It is absolutely forbidden to start operation until the entire air handling unit, where the above-mentioned heat exchanger control system is integrated, has been declared to conform to relevant regulations in Machinery Directive 98/37/EEC and to existing national legislation, if applicable.

The heat exchanger control system must not be energized until the entire installation conforms to the provisions in ALL relevant EU Directives. If the heat exchanger control system has been damaged, for instance during transport, it must be inspected and repaired by qualified personnel before the voltage is connected.

### Safety functions

The heat exchanger control system is protected against phase-to-phase short-circuiting, and has integrated current limiting function for protection of the motor.

The electrician is accountable for ensuring correct earthing as well as protection according to local standards and regulations. An earth fault circuit breaker, multiple protective earthing or ordinary earthing can be used as extra protection, provided that the local regulations are complied with. The earth leakage currents exceed 3.5 mA. Therefore a fixed, permanent installation and heavy-duty protective earthing are required.

**NOTE!** If an earth fault occurs, there can be a direct current component in the leakage current. Earth fault circuit breakers should therefore be designed to be able to detect this and be installed according to applicable national and international regulations, where they are used.

## 2. Technical data

Power supply	50-60 Hz, 1x230 V AC -10%/+15 %
Rated motor shaft power:	0.38 kW
Motor current cons. (max. load)	4.5 A
Maximum fuse protection	10 A
Ambient air temp., operation	-40/+40 °C
Ambient air temperature, storage	-40/+70 °C
Enclosure class	IP54
Control voltage	0-10 V DC
Weight	4.9 kg

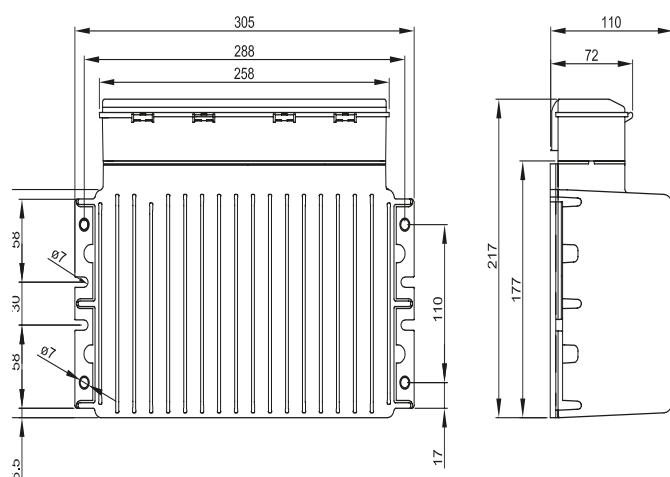


Fig. 1. Dimensions

## 3. Function

### General

The motor control system advantageously replaces the traditional solution with gear motor. The step motor has uniform torque across the entire rpm range, in contrast to gear motors that lose torque at low and high speeds of rotation respectively. The step motor's constant torque curve provides an essentially greater operating range where the speed of rotation can be controlled with precision. It is therefore possible to control the heat recovery in an energy-optimum manner and achieve a more accurate temperature.

The heat exchanger control system is controlled with 0 – 10 V signals.

The step motor is controlled in micro steps with sinusoidal constant current for ensuring motor shaft rotation with uniform torque throughout the revolution. This prevents torque pulses and at the same time provides quieter operation.

### Rotation monitor

The rotation monitor consists of an inductive sensor.

When the rotation monitor is mounted correctly, the sensor's LED flashes yellow each time the detection surface passes the rotation monitor.

### Operation

#### LED indications

The junction box has 2 integrated LEDs located under the cover. They are therefore not visible when the cover is mounted.

The green LED is constantly lit when voltage is supplied..

The red LED is lit if at least one active alarm has been initiated.

**Warning** The chassis on the heat exchanger control system can become very warm!



Warning! Do not repair the heat exchanger control system at the site. Never attempt to repair a defective control system unit.

Contact the supplier to obtain a replacement unit.

## Control with 0 – 10 V DC

The heat exchanger control system can be controlled via external input signals. The heat exchanger control system needs a start/stop signal in order to start. The start/stop signal is transmitted by short-circuiting Terminals 7 (Start/stop) and 8. (⌞) (See Fig. 2).

The heat exchanger control system regulates the speed linearly between 0 % and 100 %, however it is limited to the regulation range between the preset lowest and highest speeds (See Fig. 3) 100 % speed is defined as an input voltage of "0-10 V in" (Terminal 13) at 9.5 V (100 % at 9.5 V, +/- 2 %).

## Compensation for non-linear heat transfer

The 0 – 10 V signal is compensated internally in the heat exchanger control system with a contrary rotor characteristic to provide far more linear heat transfer than comparable systems and better regulation (See Fig. 4).

## The function selector switch positions (Factory preset):

- 4 = Sizes 100/120, standard rotor
- 5 = Sizes 50/60, sorption rotor
- 6 = Sizes 70/80, sorption rotor
- 7 = Sizes 100/120, sorption rotor

## To reverse the direction of rotation

The direction of motor rotation is reversible so that the rotor always has the correct direction of rotation in relation to the purging sector.

To reverse the motor's direction of rotation, transpose two optional conductors to Motor Terminal V - U - W (See Fig. 6).

## Automatic restart after alarm

The heat exchanger control system automatically attempts to start again following an alarm, such as over or under-voltage alarm. This automatic restart is carried out maximally 3 times (rotation monitor alarm: 1 restart) After that, the heat exchanger control system will remain in the error mode, and must be restarted by resetting the alarm.

Alarm resetting: See Section on "Alarm resetting".

## Alarm relay/output

The heat exchanger control system is equipped with an alarm output in the form of an alarm relay. The alarm relay is activated if an alarm arises in the heat exchanger control system or if alarms are discovered in motors or fans. Connect the alarm signal cable leads to Terminals 16 (C) and 17 (normally closed). The relay contact is closed in deenergized condition and if there are active alarms.

## Alarm reset

The heat exchanger control system is equipped with a digital input for resetting alarms. The alarm input is reset by short-circuiting Terminals 11 (Alarm reset) and 12 (⌞) (See Fig. 2). The alarm output can also be reset by switching off the supply voltage to the heat exchanger control system for more than 60 seconds.

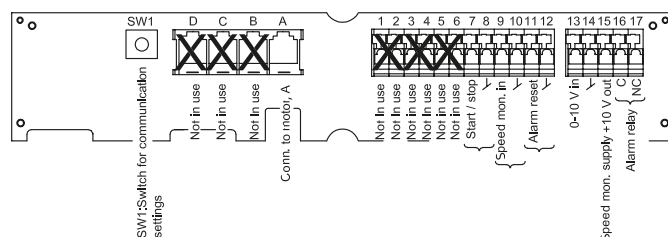


Fig. 2. Junction box, overview of the wiring terminals

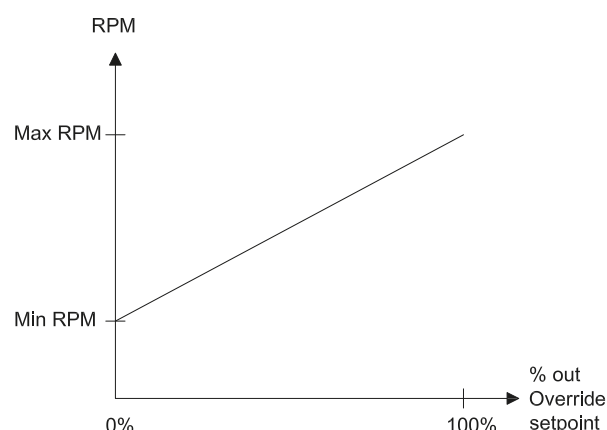


Fig. 3. The ratio between the speed and the min./max. speed setting

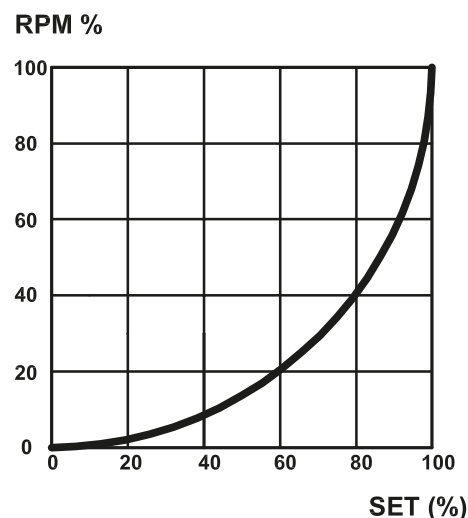


Fig. 4. Compensation for non-linear heat transfer.

## 4. Electrical connections

The heat exchanger control system has a junction box installed in the lower part of the heat exchanger section. For access, open the inspection cover in front of the heat exchanger.

### To connect control signal wiring

- Insert the control cables into the junction box through the cable grommets fitted with rubber gaskets. Clip an appropriately large hole in the gaskets to enable the gasket to seal tightly around the cable. Only by doing so can the stated Enclosure class IP54 be complied with.
- Connect the 0 – 10 V DC control signal from an external regulator in the junction box to Terminals 13 (0 - 10 V in) and 14 (See Fig. 5). The heat exchanger control system regulates the speed in a capacity linear manner between 0 % and 100 % (100 % at 9.5 V +/- 2 %), however according to the preset times for up ramp and down ramp, and limited to the regulation range between the preset lowest and highest speeds (See Fig. 3 and 4). The "Control with 0-10 V DC" function is described in Section 3. Function.
- Connect the start/stop signal cable leads in the junction box to Terminals 7 (Start/stop) and 8 (See Fig. 5). This should be a potential-free digital contact. The "Start-/stop" function is described in Section 3. Function.
- Connect the Alarm Reset signal cable leads to the heat exchanger control system's junction box to Terminals 11 (Alarm reset) and 12 (See Fig. 5). This should be a potential-free digital contact. The "Alarm Reset" function is described in Section 3. Function.
- The heat exchanger control system is equipped with an alarm relay output with normally-open contact function in the event of a malfunction or alarm. The alarm signal cable is marked "Alarm relay", and should be connected in the junction box to Terminals 16 (C) and 17 (See Fig. 5). This should be a potential-free digital contact. The "Alarm Relay" function is described in Section 3. Function.
- Connect the sensor cable of the rotation monitor to Terminals 9 (digital in), 10 (See Fig. 5) and 15 (+10 V out, power supply to sensor).

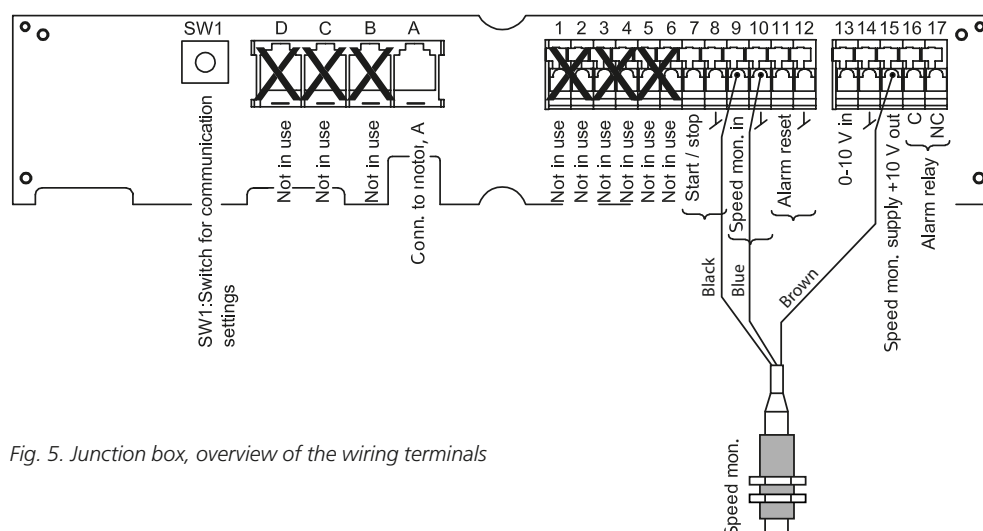


Fig. 5. Junction box, overview of the wiring terminals

## Electric Power Connections

In the size 50-80 SILVER C units the heat exchanger control system is located inside the filter section in the lower level. In the size 100/120 SILVER C units the heat exchanger control system is located inside the fan or filter section to the left of the centre section in the lower level (viewed from the inspection side). For access, open the inspection door.

For appropriate connection, see Fig. 6.

For electrical data, see Section 2.

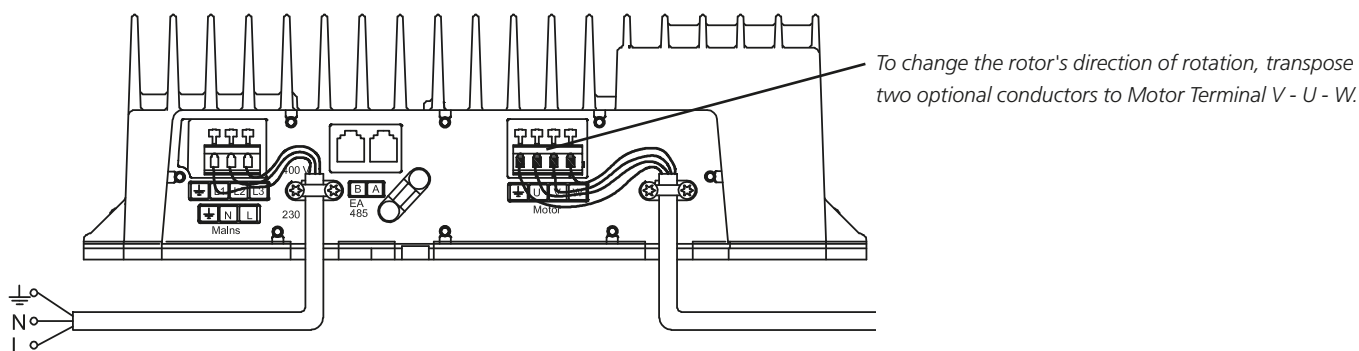





Fig. 6. To connect power supply wiring to the heat exchanger control system.

## 5. Trouble shooting

### To open the heat exchanger control system

Before you open the heat exchanger control system, isolate the line voltage and wait at least 2 minutes. Failure to do so will expose you to the risk of coming into contact with harmful residual voltage inside the unit.

Troubleshooting when the heat exchanger control system is controlled with external (A/D) signals:

Symptoms	Cause	Action
The motor is not rotating	There is no power supply	Check whether there is voltage on the heat exchanger control system's "L" and "N" terminals on the models for 230 V.  (Operating voltage is specified on the rating plate, affixed to the side of the heat exchanger control system.)
	Poor electrical connections	Check the connectors and other electrical connections
	There is no in-operation signal	Short-circuit Terminals 7 and 8 in the heat exchanger control system junction box marked  (GND) and "Start/Stop" (Fig. 5).
	There is no 0 – 10 V DC control signal	Check that the 0 - 10 V DC control signal is correctly connected to Terminals 13 and 14 in the heat exchanger control system junction box marked  (GND) and "0-10 V in" (Fig. 5).
	The motor has been stopped by the internal protective motor switch 3 times due to overloading or some other alarm.	Reset the alarm by short-circuiting Terminals 11 and 12 in the heat exchanger control system junction box marked  (GND) and "Alarm reset" (Fig. 5).  You can also reset the alarm by switching off the supply voltage to the heat exchanger control system and switching it back on after 60 seconds.
	Defective heat exchanger control system	Replace the heat exchanger control system
	Defective motor	Replace the motor
The heat exchanger control system switches off. a) Remember to reset the alarm by short-circuiting Terminals (GND) and "Alarm Reset".	At least two phases are short-circuited on the motor wiring terminals.	Eliminate the short-circuit on the motor wiring terminals a)
	Defective motor	Replace the motor a)
	Overloaded motor	Remedy the overload condition of the motor a)
	Defective motor	Replace the motor a)
	Overloaded motor	Remedy the overload condition of the motor a)

## 6. Service and maintenance

No particular maintenance is required. Contact Swegon if any problem arises.

To troubleshoot the unit: See Section 5. Troubleshooting.

## 7. Alarm

The integrated alarm relay in the junction box has normally-closed contacts and is marked "Alarm Relay". The alarm relay contacts are closed in deenergized condition and open in faultless condition. The alarm relay contacts close in the event of an alarm. The heat exchanger control system stops and an alarm indicating LED is lit. If the fault ceases to exist, the alarm is reset automatically and the heat exchanger control system starts up.

## 8. Environment and waste disposal

Help to protect the environment by ensuring correct disposal of the packaging and use the products in accordance with applicable environmental regulations.

### Disposal of the product



Products with this mark must not be disposed as ordinary household refuse. They must be collected in separate containers according to applicable local rules.

## 9. Applicable standards.

**GB-61800-2** "Electric motor operation with variable speed, General Requirements"

**EN-61800-3** "General electromagnetic compatibility"

## 10. CE marking

Swegon AB certifies under its own sole responsibility that this product conforms to the Commission's Directive 92/31 with subsequent modifications concerning electric compatibility as well as the Commission's Directive 73/23 dealing with electric material for use within certain voltage limitations.

APPROVALS	
EMC	EN 61800-3
LVD	EN 61800-2
PRODUCT STANDARD	EN 61800 PART 2 & 3
THE ROHS DIRECTIVE	YES
PRODUCT APPROVALS	CE

