Instructions for the heat exchanger control system RHX 2M SILVER C RX, RECOnomic, sizes 04-80, RECOsorptic, sizes 04-40

1. General

The RHX2M heat exchanger control system is a system for controlling step motors. It is designed for precise and quiet control of rotary heat exchangers in the SILVER C RX ventilation units with standard rotor (RECOnomic) in sizes 04-80, and with sorption rotor (RECOsorptic) in sizes 04-40.

The control system consists of one step motor control system, one step motor and one rotation monitor. The rotation monitor is used for monitoring the rotor movement to ensure that the rotor rotates as intended.

The heat exchanger control system is designed for precise control of the rotor speed of rotation, which enables energy-optimum heat recovery.

The heat exchanger control system is located inside the centre section of the air handling unit. 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 it is energized.

Safety functions

All the control signals are galvanically separated from the 230 V supply voltage. The output voltage to the step motor is galvanically separated and limited to a maximum of 48 V.

Short-circuit protection

All the inputs and outputs are short-circuit protected in order to protect against damage to the control system in the event of incorrect connections or a malfunction in the step motor.

Thermal protection

The heat exchanger control system has integrated thermal protection that protects the electronic equipment against overloading.

2. Technical data

Input signals

Power supply	50-60 Hz, 230 V AC ±15 %
Max. fuse protection	6 A
Control voltage	0-10 V DC
Impedance (control voltage)	10 kΩ
Serial communication	RS485 Modbus, EIA485
Rotation monitor	(Integrated 1.1 kΩ pull-up to +10 V) inductive sensor
Reversing	(Integrated 10 kΩ pull-up to +10V) Digital input

Output signals

Relay output for alarms	Normally-open relay contact 5 A 250 V
LED indication	3-colour glow (green/yellow/red)
Torque	2 Nm, 4 Nm and 6 Nm
Turnover ratio	max 1:50 motor/rotor
Power supply to Hall element	+10 V DC, max 100 mA

Environmental data

Power consumption (standby mode/holding torque)	3 W
Ambient air temperature, operation	-20/+40 °C
Ambient air temperature, storage	-20/+60 °C
Enclosure class	IP43
Weight	1.6 kg

Motor

Lowest speed of rotation	1 rpm
Highest permissible speed of rotation	200 rpm
Motor temperature while operating	max. 80 °C
Enclosure class	IP43

Size, heat exchanger control system

Standard rotor, RECOnomic

SILVER C RX 04-30:
Heat exchanger control system, type RHX2M-1211
SILVER C RX 35-40:
Heat exchanger control system, type RHX2M-1411
SILVER C RX 50-80:
Heat exchanger control system, type RHX2M-1611

Rotor, sorption, RECOsorptic

SILVER C RX 04-08:
Heat exchanger control system, type RHX2M-1211
SILVER C RX 11-40:
Heat exchanger control system, type RHX2M-1411

RHX2M-1211: 2 Nm

Power consumption (max. load/150 rpm)	45 W
Holding torque	0.2 Nm
Combined maximum shaft load	Radial 275 N Axial 50 N
Motor weight:	2.4 kg

RHX2M-1411: 4 Nm

Power consumption (max. load/150 rpm)	90 W
Holding torque	0.4 Nm
Combined maximum shaft load	Radial 307 N Axial 50 N
Motor weight:	3.6 kg

RHX2M-1611: 6 Nm

Power consumption (max. load/150 rpm)	150 W
Holding torque	0.6 Nm
Combined maximum shaft load	Radial 678 N Axial 260 N
Motor weight:	5.5 kg

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 control system's LED flashes green each time the detection surface passes the rotation monitor.

Operation

Status light for normal operation

The status light in the front of the heat exchanger control system can have 3 different colours as well as shine constantly or flash.

- Steady yellow glow: The heat exchanger control system is OK and the motor is idle.
- Flashing yellow: The motor is running to purge the rotor surfaces of dust.
- Steady green glow: The motor is running normally and rotating.
- Flashing green: Pulses from the rotation monitor are being detected.
- Steady red glow: See the section on TROUBLESHOOTING.

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

Control system adjustments can be set with the DIP switches. It is ONLY permissible to change the settings when the motor is idle, i.e. NOT OPERATING!

Signal, 0 – 10 V

The following functions are active when the heat exchanger control system is controlled with a 0 -10 V signal.

Motor stop:
A 0 – 10 V signal under 0.6 V stops the motor (See Fig. 1).

Motor start:
A 0 – 10 V signal over 1.1 V starts the motor (See Fig. 1).

Maximum motor speed:
A 0 – 10 V signal over 9.5 V makes the motor operate at maximum preset speed (See Fig. 1).

The Dip switch settings:

The maximum motor speed can be set to 150 or 200 rpm with the DIP switches (See Fig. 2).

Factory settings:
OFF (150 rpm) = Standard rotor, sizes 04-20
ON (200 rpm) = Standard rotor, sizes 25-80 and sorption rotor, sizes 04-40.

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. 3).

Air purging operation

When the heat exchanger control system is in the stop mode due to low 0 – 10 V signal, it will automatically start after a 10-minute interval and operate for 10 seconds at 10 % of the preset maximum speed.

This ensures that the rotor surfaces will continuously pass the purging sector.

Rotation monitor

The rotation monitor function can be switched on and off with the DIP switches (See Fig. 2).

If the function is selected, the rotation monitor must be mounted and transmit a pulse per rotor revolution. If the rotor is not rotating due to a malfunction, the rotation monitor alarm will trip.

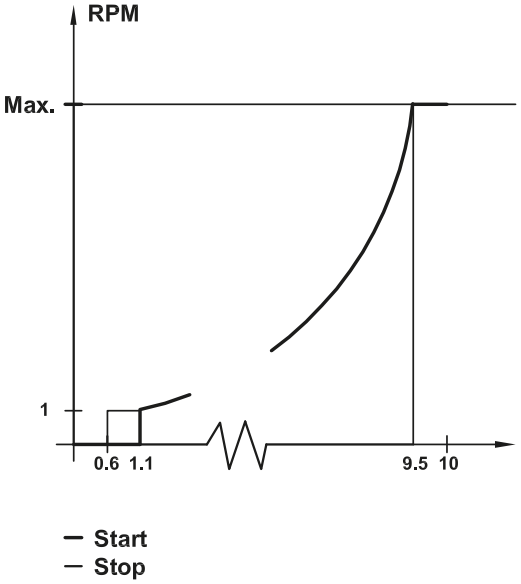

Fig. 1. Signal, 0 - 10 V

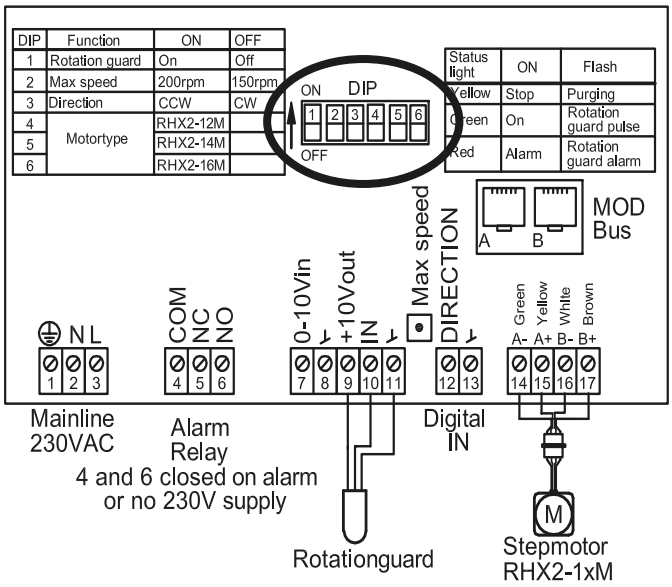

Fig. 2. DIP switches.

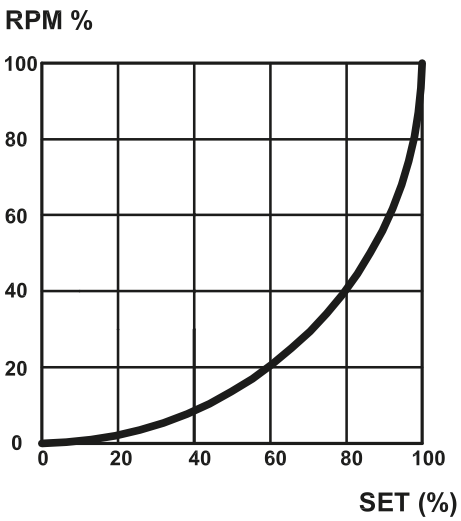

Fig. 3. Compensation for non-linear heat transfer.

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.

If Terminals 12 and 13 (See Fig. 2) are short-circuited, the motor rotates in the opposite direction.

The direction of motor rotation, clockwise (CW) and counterclockwise (CCW) is set by means of DIP switches (See Fig. 4).

Type of motor

The control system is factory-preset for the correct type of motor by means of DIP switches (See Fig. 4). Note that only one of the DIP switches, nos. 4 – 6, is permitted to be set to the ON position!

If the type of motor is incorrectly set, this could cause operation disturbances characterized by insufficient torque, increased noise or excess temperature in the motor.

Test button

When you press the "max. speed" test button (See Fig. 4) the 0 - 10 V input is over-modulated by 10 V, and the motor speed increases to the maximum speed of rotation. It is not necessary to interrupt the connected 0 – 10 V signal. Any alarms that have tripped should be shut off first.

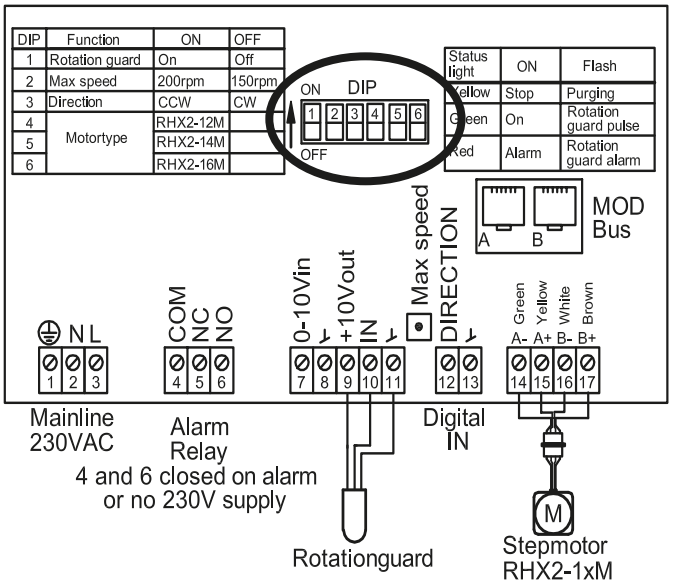

Fig. 4. Electrical connections

4. Electrical connections

The 230 V power supply cable should be protected by a separate type G fuse. The connection is shown in Fig. 5.

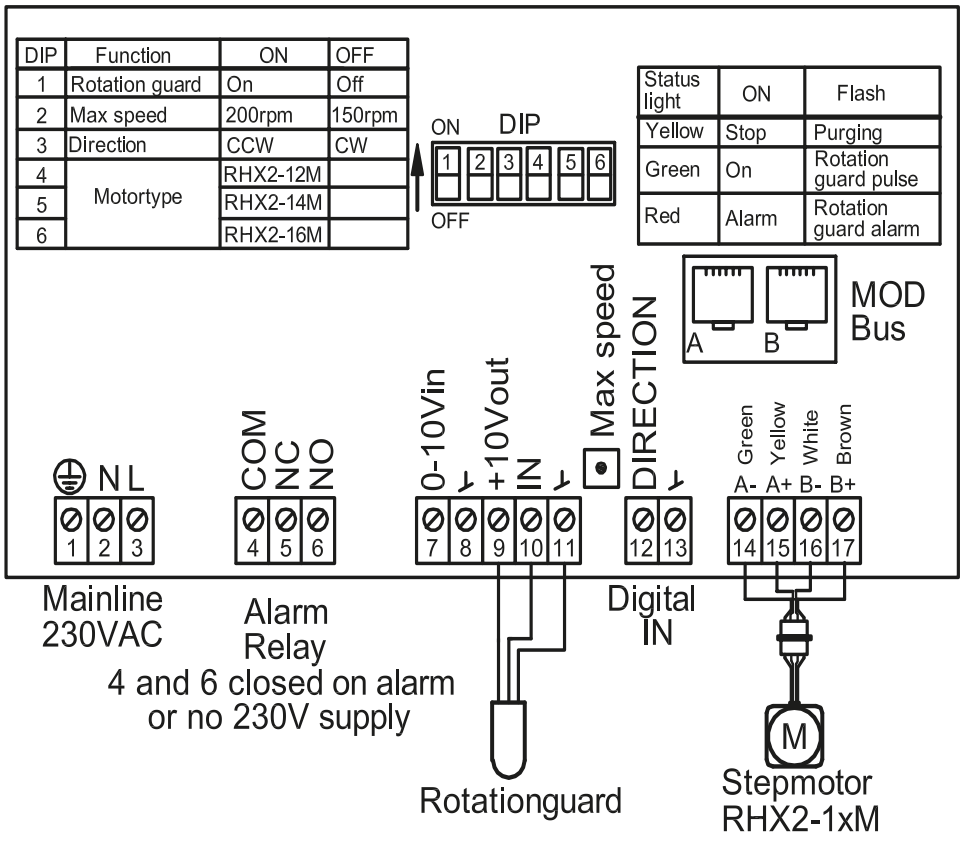

Fig. 5. Electrical connections

5. Trouble shooting

Status light in the event of a malfunction:

- Not lit: 230 V supply voltage is lacking or the heat exchanger control system is defective.
- Steady red glow: General alarm, the motor stops until the alarm condition ceases.
- Flashing red; Rotation monitor alarm, no pulses are being detected.

Alarm

Alarm relays (Terminals 4 and 6) are short-circuited when an alarm trips or if 230 V is no longer supplied.

General alarm
Can trip due to over voltage, over current or excess temperature. General alarm switches off automatically when the alarm condition ceases. General alarm tripped due to over current (short-circuited motor) will not switch off automatically. A general alarm can also be switched off by short-circuiting Rotation monitor terminals 10 – 11 for more than 5 seconds.

Rotation monitor alarm
The rotation monitor input is monitored when the heat exchanger control system starts. If no pulse is detected before the motor has rotated 50 revolutions, the motor speed is reduced to 0 rpm. After that the speed of rotation is again increased up to the set point. If still no pulses are detected, the sequence is repeated a total of 3 times. After that, the rotation alarm trips.

The motor is noisy and runs unevenly.

Motor type
The DIP switch for the type of motor (See Fig. 2) Is incorrectly set, or the step motor is wrong.

Rotor adjustment
The rotor rotates too sluggishly and the step motor is overloaded.

When the rotary heat exchanger or a ventilation unit is correctly set, the motor can be easily rotated by hand. If the installation is wrong, the necessary motor torque can significantly increase due to the following:

- The ventilation unit is not level.
- Insufficient/incorrect adjustment,
- Excessively stiff sealing lists and brushes.

When overloaded, the step motor loses its synchronisation and generates a less pulsating torque. It feels like the motor is "hacking", making noise and does not rotate correctly, Neither the control system nor the motor will be damaged by this.

The motor can be restarted and rotate normally as soon as the rotor is correctly adjusted and can be rotated with normal effort.

6. Service and maintenance

No coils, no service and no maintenance is required. Contact the supplier if any problems arise.

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.

EN 61000-6-2 and EN 61000-6-3 Electromagnetic compatibility (EMC)

EN 60947-4,-3:2001 Wiring equipment for low voltage (LVD)

The product is designed for incorporation into machines or together with other machine parts in equipment covered by Commission Directive 97/37/EC with later modifications. This therefore does not conform to the provisions in this directive in all aspects.

10. CE marking

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