

MIRUVENT power roof ventilator

Installation and Maintenance Instructions



1. General

1.1 Range of Application

The MIRUVENT is an extract air fan, designed for use in most extract air systems, in which the air has a low content of impurities.

The power roof ventilator should preferably be mounted on an LBFT roof penetration collar. This provides a fire-resistant and sound-absorbent extraction passage through the roof and a tight connection to the extract air duct. As an alternative the power roof ventilator can be mounted on an existing roof penetration collar across a TBFS connection fitting.

The power roof ventilator is hinged, which simplifies inspection and cleaning of both the fan and the extract air duct.



Important!

Always read the safety precautions in Section 2 that explain the risks involved in running the unit and designate who shall be permitted to operate and service the unit, and carefully follow the installation instructions provided in each paragraph.

The product identification plate is located on the exterior of the power roof ventilator. Refer to the particulars on the product identification plate when you contact Swegon.

1.2 Mechanical Design

The power roof ventilator is available in 5 physical sizes with 27 different airflow variants up to 24,000 m³/h.

The turbulence-free, upward airflow through the ventilator protects the roof from becoming fouled.

Closed, discretely designed casing made of corrosion-resistant aluminium, Environment class C4.

Base frame made of galvanised sheet steel for mounting a connection fitting, with wide overhang for accommodating the insulation of the connection fitting.

Outlet openings covered with self-opening and self-closing airstream-operated dampers as protection against bad weather when the fan is idle. The airstream-operated dampers also counteract heat losses.

The sections of the casing and the fan impeller with motor are easy to dismantle for inspection and maintenance.

The electric equipment conforms to the provisions of the EMC Directive and are tested according to EN 61000-6-2 and EN 61000-6-3 Standards (radiation in homes, offices, shops and similar environments as well as for immunity in industrial environments).

Fan unit with EC motor and integrated motor control system

Centrifugal impeller with backward-curved blades, mounted on the rotor of an outer rotor motor installed where it is not exposed to the extract air, statically and dynamically balanced to DIN ISO 1940. Fully maintenance-free, vibration-free mounted motor with motor controller. The motor is cooled with a separate supply of chilled air.

Min. permissible exhaust air temperature: -20°C; max. permissible exhaust air temperature: +40°C while operating continuously.

Min. ambient temperature: -30°C, max. ambient temperature: +40°C.

Fan unit with AC motor

Centrifugal impeller with backward-curved blades, mounted on the shaft of a standard motor (Construction form B5, Degree of protection IP55), statically and dynamically balanced to DIN ISO 1940. Fully maintenance-free, vibration-free mounted motor. The motor is cooled with a separate supply of chilled air.

Selected variants are available with integrated frequency inverter. Other variants can be equipped with an optional external frequency inverter.

AC motors, without frequency inverter or with externally mounted frequency inverter, can handle exhaust air temperatures from -20°C up to +120°C while operating continuously. AC motors with integrated frequency inverter are designed for exhaust air temperatures from -20°C up to +40°C.

Min. ambient temperature: -30°C, max. ambient temperature: +40°C.

2. Safety Precautions

All staff concerned must acquaint themselves with these instructions before beginning any work on the power roof ventilator. Any damages to the power roof ventilator or parts of it due to improper handling or misuse by the purchaser or the fitter cannot be considered subject to guarantee if these instructions have not been followed correctly.



Warning

Only an authorised electrician or qualified service personnel trained by Swegon shall be permitted to carry out electrical installation on the power roof ventilator.

2.1 Safety switch/Main Switch

The safety isolating switch is placed on the exterior surface of the power roof ventilator.

Always switch off the safety isolating switch before servicing the power roof ventilator if not otherwise specified in the pertinent instructions.

2.2 Risks



Warning

Before carrying out any work, make sure that the power supply to the power roof ventilator has been switched off. Risk of personal injury!

Risk areas where there are moving parts

Typical moving parts are fan impellers and airstream-operated dampers.



Warning

Wait until the fan has stopped rotating before carrying out work. Wait until warm surfaces have cooled. Reassemble all disassembled parts, if any, before you restart the ventilator. Risk of personal injury!

To open/close the hinged power roof ventilator

The power roof ventilator is hinged and can be swung open for inspection and maintenance.



Warning

Make sure that the power roof ventilator, in open position, cannot suddenly swing back and close. Risk of personal injury!

2.3 Safety Guard

The power roof ventilator is delivered without safety guard for the fan inlet. If there is risk of contact with the fan impeller, due to the way it has been installed, the power roof ventilator must be fitted with a safety guard (wire mesh).

3. Installation

3.1 Packaging

The power roof ventilator is supplied pre-packaged in a sturdy carton or on a wooden pallet, depending on its size and weight. The power roof ventilator should be handled with care and should stand upright (see the arrows on the packaging) and must be kept dry.

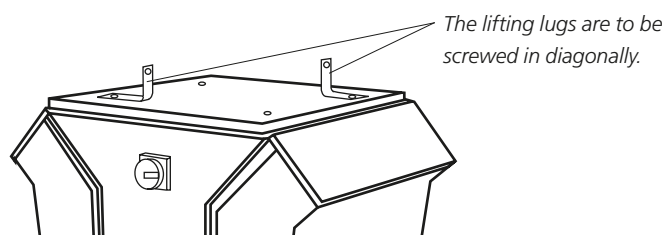
3.2 Storage

Store the power roof ventilator, in its packaging, in a well ventilated space where the air is free of corrosive substances, at temperatures ranging from -30°C to +40°C and max 70 % relative humidity.

3.3 Transport

Lift the power roof ventilator securing the lifting slings to the base frame and/or to the lifting lugs supplied. For mounting the lifting lugs, back off two of the top panels screws diagonally for correct weight distribution. Secure the lifting lugs with screws in the holes by means of the top panel screws. See the illustration below.

Carefully secure the load.



Warning

Make sure that no person is below the items being lifted. Risk of personal injury!

3.4 Preparations

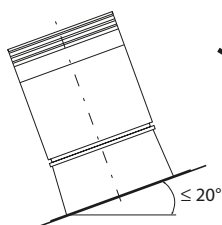
The location of the power roof ventilator must be appropriate with regard to type, necessary conditions, ambient temperatures and environment.

Make sure that the roof structure is designed for supporting the weight of the power roof ventilator.

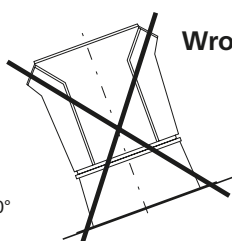
The power roof ventilator should normally be installed standing straight up, however a slope of up to and including 20° is acceptable.

N.B.! If you install the power roof ventilation in an inclined position, it must be turned to assume the position shown in the illustration below.

Correct

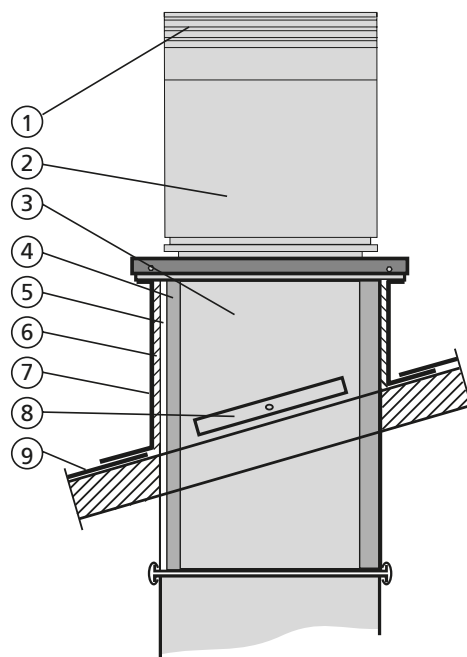


Wrong



3.5 Typical installation

TBFT roof penetration collar



1. Outlet openings covered with self-opening and self-closing airstream-operated dampers (standard) as protection against bad weather when the fan is idle. The airstream-operated dampers also counteract cold down draughts and heat loss.
2. MIRUVENT power roof ventilator
3. TBFT roof penetration collar including TBFS connection fitting
4. 50 mm thick insulation conforming to the provisions of Fire-resistance Class EI 30 alt. EI 60, internally lined with perforated sheet steel.
5. Cable protection
6. Structural panel (not supplied by Swegon)
7. Roofing felt, sheet steel or similar weatherproof roofing material (not supplied by Swegon).
8. Pivotal mounting brackets (supplied as separate items).
9. Existing roofing (not supplied by Swegon)

The TBFT roof penetration collar is equipped with slip-clamp profiled sections for connection of a rectangular duct.

3.6 Implementation



Warning

Install the power roof ventilator in a way that will always guarantee its stability throughout its useful product life. The installation must be carried out by a HVAC professional.

3.6.1 General

The power roof ventilator is mainly designed for installation on a connection fitting. If an existing roof penetration collar is to be used, a TBFS connection fitting is available as an accessory.

The connection fitting is included when you place an order for the TBFT roof penetration collar accessory.

3.6.2 TBFS connection fitting and MIRUVENT power roof ventilator

The connection fitting is supplied as a separate item.

The joint between the existing roof penetration collar and the connection fitting should be sealed with a sealing strip/sealing compound (not supplied by Swegon). Carefully fix the connection fitting in position and in an appropriate way in the existing roof penetration collar.

Install the sealing list supplied with the ventilator onto the connection fitting to seal the joint between the power roof ventilator and connection fitting.

Place the power roof ventilator onto the roof collar and secure it with screws and nuts (not supplied by Swegon) in the predrilled mounting holes (4 holes, not size 71). See adjacent illustration. Tighten the screws with uniform torque.

Sizes 25-45: Remove the locking screws on the connection fitting. Swing the hinged power roof ventilator to its open position. Carefully secure the chain/wire mounted on the inner side of the connection fitting to the roof penetration collar to obtain a correct angle of aperture.

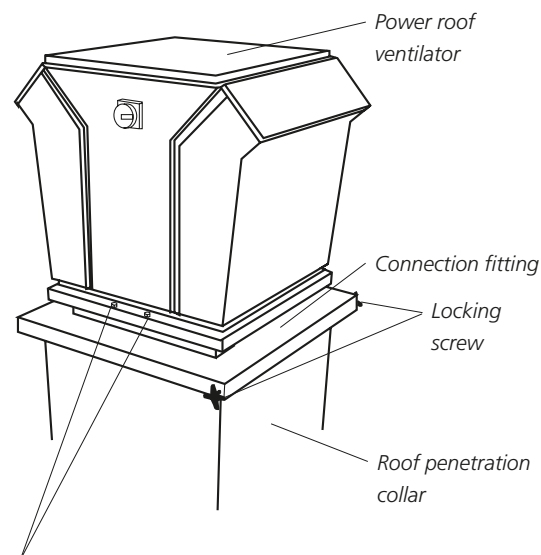
3.6.3 TBFT connection fitting and MIRUVENT power roof ventilator

The connection fitting is included in the TBFT roof penetration collar accessory and is supplied mounted on the roof penetration collar.

Mount the roof penetration collar in a suitable way. The mounting brackets supplied with the collar can be used for this purpose. Make sure that the supporting roof structure is designed for supporting the weight of the power roof ventilator.

Install the sealing list supplied with the ventilator onto the connection fitting to seal the joint between the power roof ventilator and connection fitting.

Place the power roof ventilator onto the roof collar and secure it with screws and nuts (not supplied by Swegon) in the predrilled mounting holes (4 holes, not size 71). See adjacent illustration. Tighten the screws with uniform torque.



Bolt and nut in predrilled fixing hole (total of 4 holes, not size 71)

4. Electrical connections



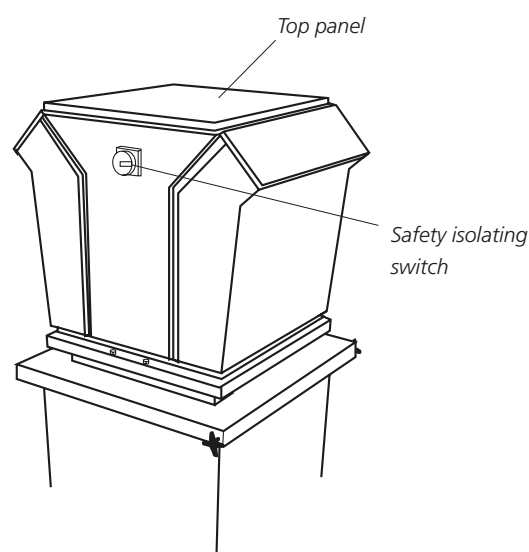
Warning

The electrical connections should be wired by a qualified electrician in accordance with local electrical safety regulations.

Make sure that the safety isolating switch is open.

4.1 General

The MIRUVENT power roof ventilator is available with three different types of fan motor: standard AC motor, AC motor with integrated frequency inverter and EC motor with integrated motor control system. All types of motor have an operating frequency of up to max 50 Hz. The power supply should be wired to the safety isolating switch of the power roof ventilator (factory fitted). Remove the top panel of the power roof ventilator. See illustration.



Run the power supply cable through the roof or the cable protection of the roof penetration collar (accessory), and further through pre-drilled holes, fitted with rubber cable glands, in the side or underside of the power roof ventilator.

4.2 Power roof ventilator with standard AC motor

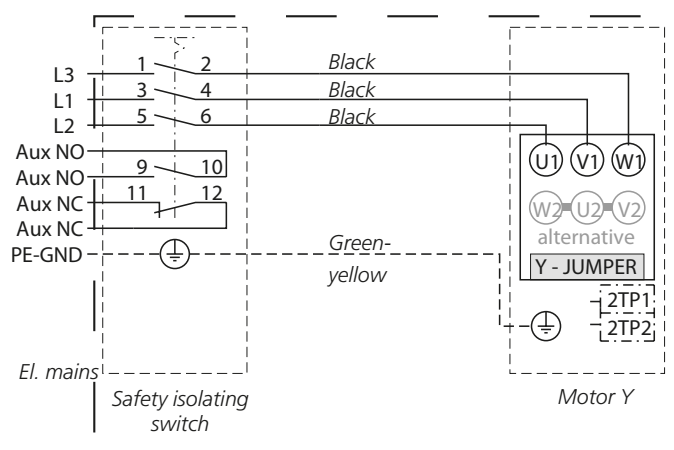
The motor is equipped with a type PTC temperature relay as standard. A type Klaxon temperature relay is available to special order.

The MIRUVENT power roof ventilator with standard AC motor can be equipped with an external frequency inverter (not supplied by Swegon).

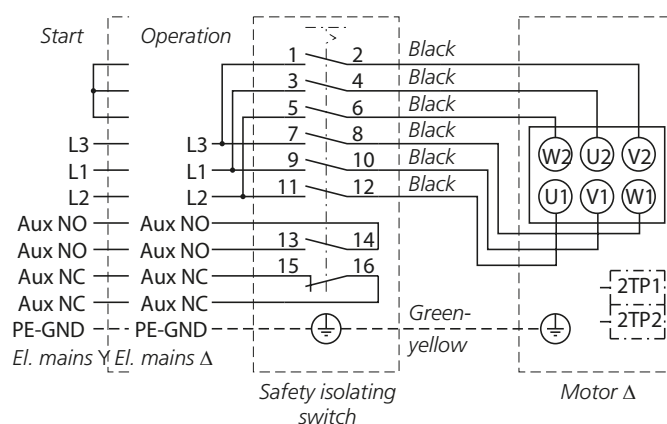
N.B.! The max. permissible operating frequency is 50 Hz

MIRU	Wiring diagram	Rated voltage (V)	Connection	Rated current, Motor (A)	Rated output (kW)
-1-25-28-0-4	1	230/400	Δ/Y	0,73/0,42	0,12
-1-25-31-0-4	1	230/400	Δ/Y	1,0/0,58	0,18
-1-35-35-0-4	1	230/400	Δ/Y	1,34/0,77	0,25
-1-35-35-0-6	1	230/400	Δ/Y	1,25/0,72	0,18
-1-35-40-0-4	1	230/400	Δ/Y	2,54/1,46	0,55
-1-35-40-0-6	1	230/400	Δ/Y	1,25/0,72	0,18
-2-35-45-0-4	1	230/400	Δ/Y	3,01/1,74	0,75
-1-35-45-0-6	1	230/400	Δ/Y	1,37/0,79	0,25
-2-45-50-0-4	1	230/400	Δ/Y	5,72/3,3	1,5
-1-45-50-0-6	1	230/400	Δ/Y	2,1/1,2	0,37
-2-45-56-0-4	1	230/400	Δ/Y	10,7/6,2	3
-2-45-56-0-6	1	230/400	Δ/Y	3,43/1,98	0,75
-1-45-56-0-8	1	230/400	Δ/Y	1,98/1,14	0,37
-2-56-63-0-4	2	400	Δ	11,4	5,0
-2-56-63-0-6	1	230/400	Δ/Y	6,41/3,7	1,5
-1-56-63-0-8	1	230/400	Δ/Y	2,75/1,58	0,55
-2-56-71-0-6	1	230/400	Δ/Y	9,01/5,2	2,2
-1-56-71-0-8	1	230/400	Δ/Y	5,0/2,9	1,1
-2-71-80-0-6	2	400	Δ	8,7	4
-1-71-80-0-8	1	230/400	Δ/Y	9,9/5,7	2,2
-1-71-90-0-8	1	230/400	Δ/Y	14,1/8,1	3

Wire diagram 1



Wire diagram 2



The cabling between motor and safety switch is pre-connected for star/delta starting.

4.3 Power roof ventilator with AC motor and integrated frequency inverter

If the MIRUVENT power roof ventilator is equipped with an integrated frequency inverter, you have the option of controlling it with a 0-10 V control signal. See next page.

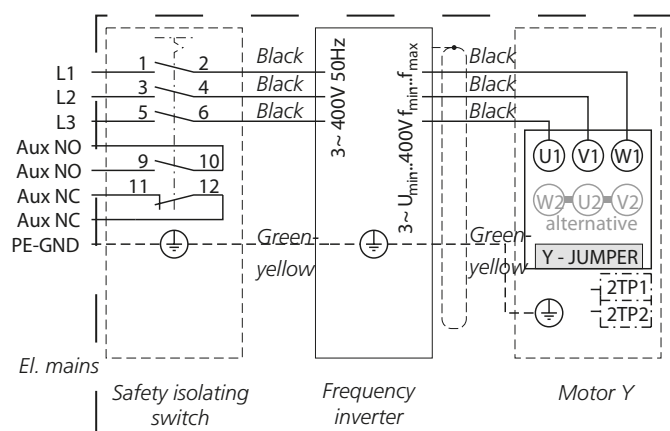
The motor is equipped with a type PTC temperature relay as standard. A type Klixon temperature relay is available to special order.

The frequency inverter is factory fitted for optimum MIRUVENT fan performance. Therefore no further adjustment of the frequency inverter should be made.

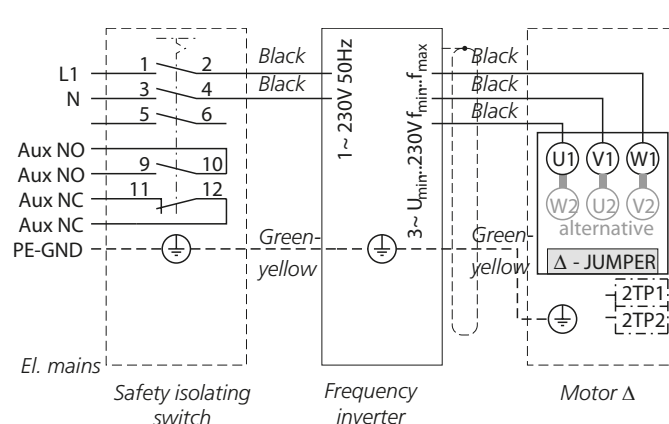
N.B.! The max. permissible operating frequency is 50 Hz

MIRU	Wiring diagram	Rated voltage (V)	Connection	Rated current (A)	Rated output (kW)
-2-45-50-1-4	3	400	Y	3,1	1,5
-1-45-50-1-6	4	230	Δ	2,6	0,37
-2-45-56-1-4	3	400	Y	4,7	3
-2-45-56-1-6	4	230	Δ	4,1	0,75
-2-56-63-1-6	3	400	Y	2,9	1,5
-2-56-71-1-6	3	400	Y	4,5	2,2
-1-71-80-1-8	3	400	Y	3,5	2,2
-1-71-90-1-8	3	400	Y	7,6	3

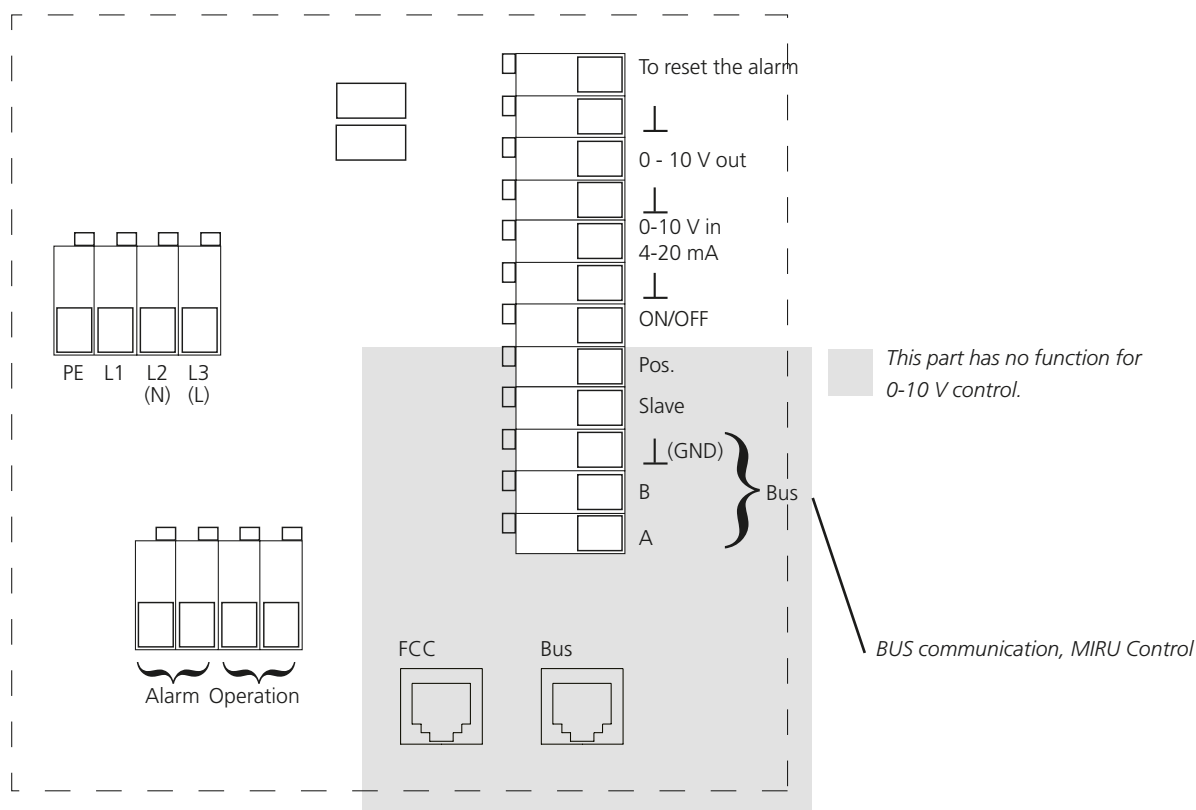
Wiring diagram 3



Wiring diagram 4



Control with a 0-10 V signal



Start-Stop

The motor is started up by means of closure between the terminals \perp and ON/OFF.

Speed control

The speed of the motor is controlled between min. and max. speed by means of a 0-10 V DC input signal between \perp and 0-10 V(+in).

Operation relay

Operation is indicated by means of a relay with normally-open contact action, closure occurs between terminals marked "Operation". Max. permissible load: 250 V AC, 5A/AC1.

Alarm relay

An alarm is obtained by means of a relay with normally-open contact action, closure occurs between terminals marked "Alarm". Max. permissible load: 250 V AC, 5A/AC1.

To reset the alarm

A possible alarm can be reset in two ways:

1. Disconnecting the supply voltage for approx. 2 minutes.
2. Closure between terminal \perp (-) and Alarm reset.

10 VDC output signal

Steady 10 V DC power is supplied between terminals \perp (-) and Fixed +10V Out. The voltage can be used for potentiometer control, for instance. Max. permissible load: 10 mA.

Light-emitting diode indication

Light-emitting diode 1 (furthest from the connection terminals for alarms)

Indicates 12 V power supplied from the upper section of the frequency inverter.

Light-emitting diode 2

Indicates cause of error according to the number of flashes followed by a longer period not lit.

1 flash	Low voltage alarm
2 flashes	High voltage alarm
3 flashes	Overcurrent alarm
4 flashes	Excess temperature alarm
5 flashes	Phase error alarm
6 flashes	Voltage ripple alarm
10 flashes	Communication error between upper and lower sections
11 flashes	Memory error

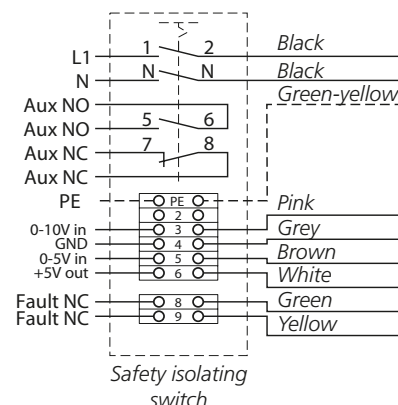
4.4 Power roof ventilator with EC motor and integrated motor control system, 0-10 V

If the MIRUVENT power roof ventilator is equipped with EC motor and integrated motor control system, you have the option of controlling it with a 0-10 V control signal. See next page.

N.B.! The max. permissible operating frequency is 50 Hz

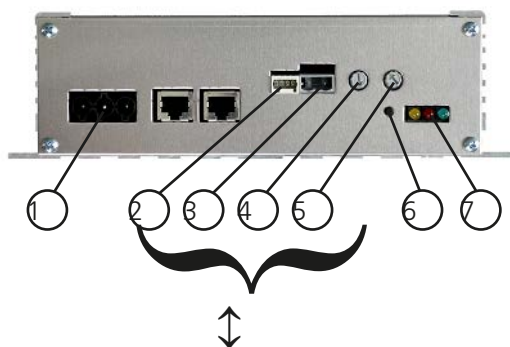
MIRU	Wiring diagram	Rated voltage (V)	Rated current, Motor (A)	Rated output (kW)
-1-25-28-2-0	5	230	1,05	0,23
-1-25-31-2-0	5	230	1,5	0,34
-1-35-35-2-0	5	230	1,5	0,34
-1-35-40-2-0	5	230	1,8	0,40
-1-35-45-2-0	5	230	4,7	1,1
-1-45-50-2-0	5	230	4,4	1,0

Wiring diagram 5

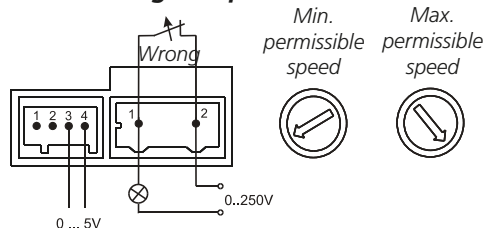


Control with a 0-10 V signal

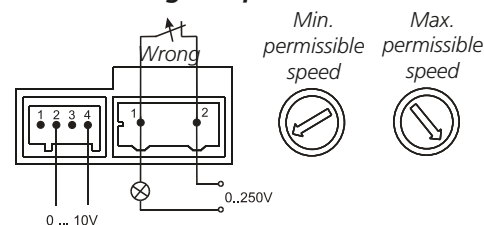
Motor control, EC motor



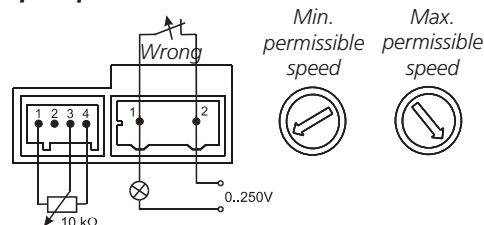
0 - 5 V analogue input



0 - 10 V analogue input



Input, potentiometer



- 208-277V AC, 50-60Hz power supply
- Analogue input

1	+5V out
2	0-10V in
3	0-5V in
4	GND

Factory-wired to a terminal inside the safety isolating switch

- Faulty contact, NC

- Nmin - min. permissible speed
- Nmax – max permissible speed
- Reset
- Yellow - Not used

Red - Malfunction
Green – In operation

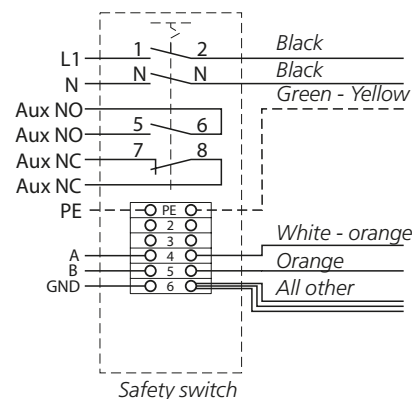
4.5 Power roof ventilator with EC motor and integrated motor control system, Modbus

It is possible to control the power roof ventilator via Modbus communication if the MIRUVENT power roof ventilator is equipped with an EC motor and integrated motor control system. See below.

NOTE! The max. operating frequency is 50 Hz

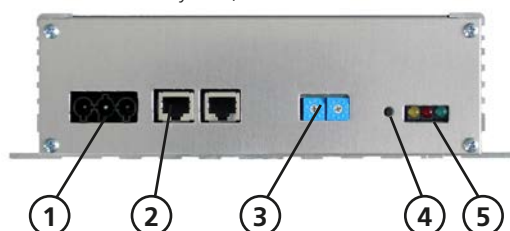
MIRU	Wiring diagram	Rated voltage (V)	Rated current, Motor (A)	Rated output (kW)
-1-25-28-3-0	6	230	1.05	0.23
-1-25-31-3-0	6	230	1.5	0.34
-1-35-35-3-0	6	230	1.5	0.34
-1-35-40-3-0	6	230	1.8	0.40
-2-35-45-3-0	6	230	4.7	1.1
-2-45-50-3-0	6	230	4.4	1.0

Wiring diagram 6



Control via Modbus communication

Motor control system, EC motor



1. Power supply: 208-277V AC, 50-60 Hz
2. Communication

1	A
2	B
3	-
4	GND
5	GND
6	-
7	GND
8	GND

Factory-wired to terminals in the safety switch.

3. Address setting buttons
The Modbus address for communication with MIRU Control should be 01 (factory setting). If you find it necessary to change this address, you must first switch off the current before doing so.
4. Reset
5. Yellow - Not used.
Red - Error
Green - In-operation

5. Commissioning / Adjustment



Warning

Make sure that the safety guard, if required, and the top panel/side panels are mounted. Risk of personal injury!

The power roof ventilator is designed for continuous operation. If the power roof ventilator is started more than three times per hour, get in touch with Swegon to verify whether the motor is suitable for continued use.

1. Check that there are no foreign objects inside the power roof ventilator or the duct system.
2. Switch on the safety isolating switch to start the power roof ventilator.

6. To program the motor control system

6.1 EC motor, 0-10 V

The red reset button (next to the LEDs) is used for programming the motor control system.

1. Press and hold the reset button pressed in for more than 5 seconds.
2. When the programming mode has been activated, the red and green LEDs will flash alternately.
3. Press the reset button just as many times as the program index for the relevant fan type (see table below). The yellow LED will light up each time you press the reset button.
4. After you have pressed the button the required number of times, wait 5 seconds. The yellow LED will flash just as many times as the selected program index. When you have finished programming, the red LED will stop flashing (only the green LED will flash).

Max. speed and program index for power roof ventilators.

MIRU	Max. speed (rpm)	Program index
-1-25-28-2-0	1850	5 (0,40 kW)
-1-25-31-2-0	1750	4 (0,40 kW)
-1-35-35-2-0	1460	3 (0,40 kW)
-1-35-40-2-0	1260	1 (0,40 kW)
-1-35-45-2-0	1470	4 (1,0 kW)
-1-45-50-2-0	1180	2 (1,0 kW)

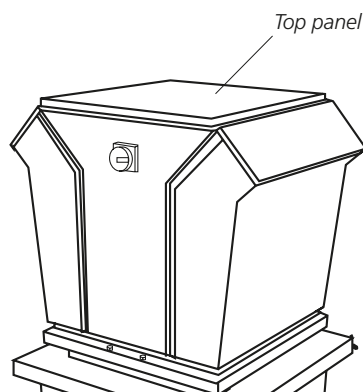
6.2 EC motor, Modbus

Set the fan size under Basic Settings in the MIRU Control unit. The control system will then be automatically set via Modbus communication.

7. Measurement of the airflow

The airflow can be measured by reading a manometer/pressure gauge. Measurement tapings for taking readings are located inside the power roof ventilator, next to the fan motor. Remove the top panel to gain access.

Connect the blue hose (-) from the manometer/pressure gauge to the blue tapping and the white hose (+) to the white tapping.



Convert the pressure reading to airflow using the formulas below:

$$q = K \times 1.29 \times \sqrt{\Delta p}$$

q = Airflow by the fan inlet (m^3/h)

K = C-factor, depending on the fan size ($m^2/s/h$), see table below.

Δp = Pressure reading by the fan inlet (Pa)

The formula is applicable to an air temperature of 20 °C. For other temperatures, the pressure reading must be corrected using the following formula:

$$\Delta p_{flow} = \Delta p_{reading} \times \frac{273 + t}{273}$$

t = Current air temperature in °C

C-Factor table

MIRU	C-Factor
-1-25-28-3-0	70
-1-25-31-3-0	85
-1-35-35-3-0	105
-1-35-40-3-0	130
-2-35-45-3-0	165
-2-45-50-3-0	200
-2-45-50-1-4	210
-1-45-50-1-6	210
-2-45-56-1-4	250
-2-45-56-1-6	250
-2-56-63-1-6	350
-2-56-71-1-6	395
-1-71-80-1-8	480
-1-71-90-1-8	550

8. Maintenance



Warning

Follow the safety instructions in Section 2.

8.1 preparations prior to maintenance

1. Open the safety isolating switch.
2. Wait until the fan has stopped rotating.
3. Wait until all hot surfaces have cooled.
4. Remove any impurities from the casing of the power roof ventilator.

8.2 Accessibility

The power roof ventilator is hinged and can be swung open for inspection and maintenance. All power roof ventilators have a built-in mechanism enabling them to be swung open or closed. See Section 7.2.2. If Swegon's connection fitting or roof penetration collar is installed, the size 25 – 45 power roof ventilators can be swung open or closed as described in Section 7.2.1.

8.2.1 To open/close the hinged power roof ventilator, sizes 25-45, with Swegon's connection fitting/roof penetration collar



Warning

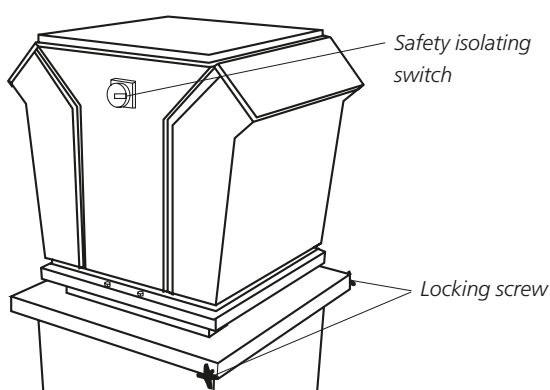
Make sure that the power roof ventilator, in open position, cannot suddenly swing back and close. Risk of personal injury!

To open the hinged power roof ventilator

Unscrew the locking screws on the connection fitting, see the illustration below. Swing the hinged power roof ventilator to its open position. To prevent the power roof ventilator from tipping over, it is secured by means of a chain/wire or internal stays from the roof penetration collar to the connection fitting. If internal stays are fitted, they should be locked in the grooves provided for this purpose.

To close the hinged power roof ventilator

Disconnect the stays from the roof penetration collar to the connection fitting if one is fitted. Swing the hinged power roof ventilator down to its closed position. Tighten the locking screws, see the illustration below.



8.2.2 To open/close the hinged power roof ventilator, others



Warning

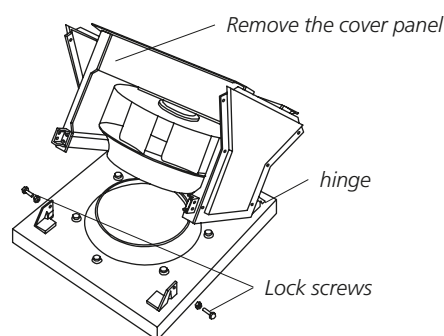
Make sure that the power roof ventilator, in open position, cannot suddenly swing back and close. Risk of personal injury!

To open the hinged power roof ventilator

Remove the cover panel by backing off its screws. Back off the locking screws and swing the hinged power roof ventilator to its open position. Lock the power roof ventilator in position by screwing the locking screws by the hinges. See the illustration below.

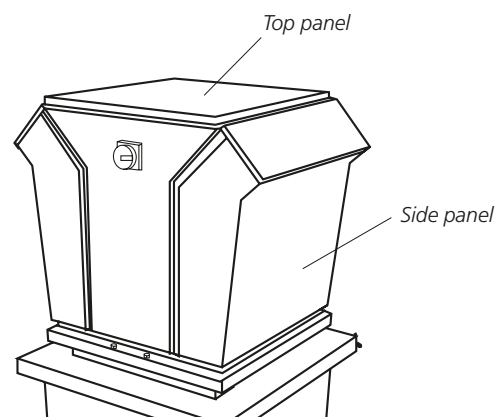
To close the hinged power roof ventilator

Back off the locking screws by the hinges. Swing the hinged power roof ventilator down to its closed position. Tighten the locking screws in their original positions.



8.2.3 To remove panels

Depending on the type of power roof ventilator and the way it is installed, it might be necessary to remove the top panel and/or the side panels. The panels can be dismantled by removing their screws. See the illustration below.



8.2 Inspection intervals

To ensure operational reliability and safety, we recommend that power roof ventilators be inspected at regular intervals by qualified personnel. Installations should be documented in reports.

The extent of the maintenance performed, service interval and other necessary work must be determined from case to case, depending on the range of application of the power roof ventilator and the local environment where it operates.

8.4 Cleaning

Impurities deposited on the fan blades should be removed by vacuum cleaning or by washing with a mild, non-corroding, detergent according to the nature of the impurities.

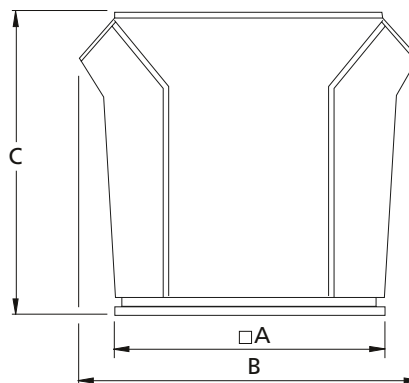
The motor should be brushed off or cleaned carefully with a mild, non-corroding, detergent.

8.5 Troubleshooting and spare parts

If a malfunction arises which maintenance personnel cannot repair or if spare parts are needed, contact your nearest Swegon representative.

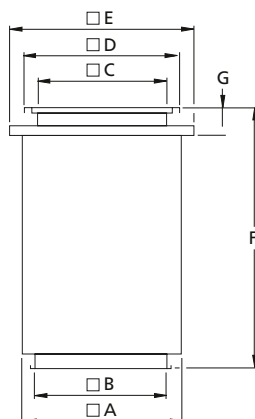
9. Dimensions and Weights

9.1 MIRUVENT power roof ventilator



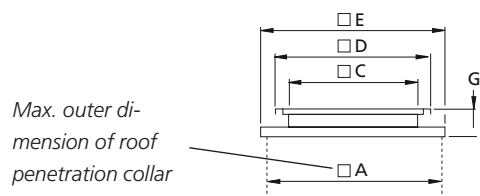
MIRU	A	B	C	kg
-1-25-28-0-4	440	600	525	28
-1-25-28-2/3-0	440	600	525	30
-1-25-31-0-4	440	600	525	29
-1-25-31-2/3-0	440	600	525	31
-1-35-35-0-4	600	770	675	40
-1-35-35-0-6	600	770	675	45
-1-35-35-2/3-0	600	770	675	45
-1-35-40-0-4	600	770	675	47
-1-35-40-0-6	600	770	675	46
-1-35-40-2/3-0	600	770	675	50
-2-35-45-0-4	600	770	675	55
-1-35-45-0-6	600	770	675	48
-1/2-35-45-2/3-0	600	770	675	52
-2-45-50-0-4	750	985	760	85
-1-45-50-0-6	750	985	760	78
-2-45-50-1-4	750	985	760	90
-1-45-50-1-6	750	985	760	83
-1/2-45-50-2/3-0	750	985	760	80
-2-45-56-0-4	750	985	760	101
-2-45-56-0-6	750	985	760	82
-1-45-56-0-8	750	985	760	76
-2-45-56-1-4	750	985	760	98
-2-45-56-1-6	750	985	760	87
-2-56-63-0-4	940	1225	970	199
-2-56-63-0-6	940	1225	970	173
-1-56-63-0-8	940	1225	970	162
-2-56-63-1-6	940	1225	970	178
-2-56-71-0-6	940	1225	970	184
-1-56-71-0-8	940	1225	970	175
-2-56-71-1-6	940	1225	970	199
-2-71-80-0-6	1270	1625	1270	339
-1-71-80-0-8	1270	1625	1270	330
-1-71-80-1-8	1270	1625	1270	336
-1-71-90-0-8	1270	1625	1270	350
-1-71-90-1-8	1270	1625	1270	356

9.2 TBFT roof penetration collar



Size	A	B	C	D	E	F	G	kg
25	505	400	360	433	600/608	1035	120	29
35	605	500	490	593	700/708	1035	120	35
45	805	700	640	743	900/908	1035	120	46
56	905	800	830	933	1000	1035	120	52
71	1105	1000	1000	1243	1200	1035	120	64

9.3 TBFS connection fitting



Size	A	C	D	E	G	kg
25	495	360	433	500	120	5
35	695	490	593	700	120	6
45	895	640	743	900	120	8
56	990	830	933	1000	120	10
71	1190	1000	1243	1280	120	12

