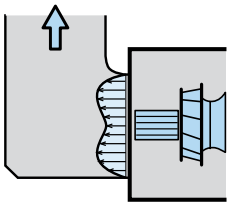
Instructions for the BASIC BCRWD fan

1. General

The BCRWD is a direct-driven fan of axi-centrifugal design. This fan offers excellent power efficiency, low, uniform air flow, low sound generation and short installation length. The fan is available for the size 004–055 units.

The air velocity at the outlet duct is low (max. 6 m/s) and uniform. This ensures minimal system losses. In addition, the low dynamic pressure (max. 22 Pa) generated in the BCRWD enables the designer to consider a lower total pressure rise than he would if he were sizing a conventional centrifugal fan. This difference may be up to 100 Pa. The design of the BCRWD also enables a space savings in the fan room, since another unit section or a sharp bend can be connected directly to the fan outlet. This also means a savings on energy since no pressure will be needlessly lost.



The system losses are minimised thanks to the low air velocity and uniform air distribution pattern at the fan outlet. Sharp duct bends can therefore be directly mounted on the fan outlet with only marginal pressure losses.

The fans have built-in flow measuring equipment as standard. The measurement accuracy is ± 5%.

The fans are effectively isolated from the unit casing to minimise the transfer of vibrations.

The entire fan assembly of the size 004-014 fans is withdrawable.

The size 004-014 BCRWD fans can be installed for vertical air flow.

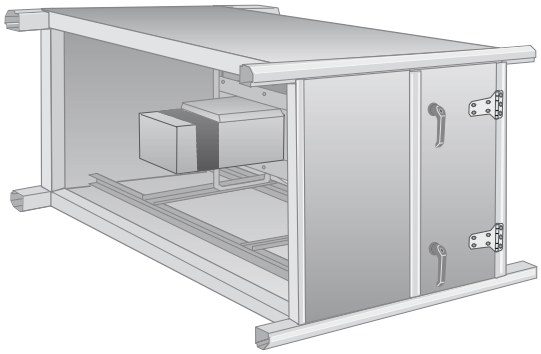
1.1 Specification

The design, size, etc. are specified in the delivery documents.

2. Installation

2.1 Electrical connections

The cables must be run to the fan motor through cable glands arranged in a fixed casing panel. If cables are run through a fixed panel located beside an inspection door, note that this arrangement must permit removal of the fixed panel for inspection and withdrawing the fan. The electrical connections to the motor must be according to local regulations. A necessary safety isolating switch shall be mounted near the inspection door. The safety isolating switch shall consist of a fuse load separator.

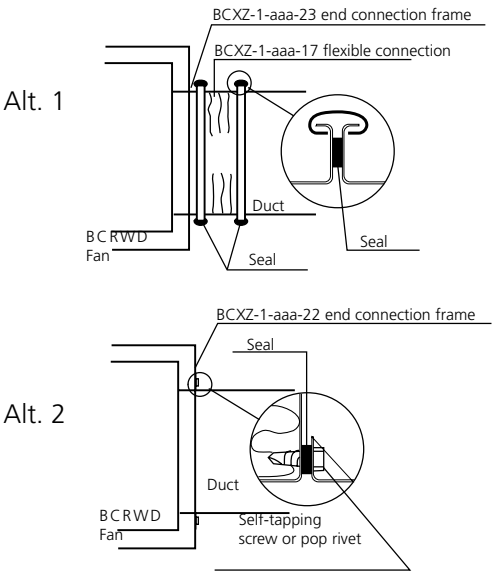


CAUTION! Do not mount the safety isolating switch on or run cables through inspection doors.

Warning! Do not touch the power connections by the motor until at least 5 minutes have elapsed after the motor has been de-energised. The same applies to safety isolating switches. (Danger of electric shock: The intermediate motor components may hold a strong electric charge).

2.2 Connecting the fan to the ducting

The fan can be connected to a duct or outlet as follows:



Warning!
Make sure that the flexible connection or the internal insulation does not obstruct the air flow near the fan outlet.

2.3 Starting up the fan

2.3.1 Functional

To be carried out by authorised personnel only.

First check that all the dampers in the ducting are open. Then start the motor. Check that the fan is rotating in the direction indicated by the direction arrow. If not, get in touch with your nearest service outlet.

Check that the fan motor does not consume more power under normal operating conditions than the rated current and that the current in the phases has the same amperage. Use an ammeter that measures "True RMS".

2.3.2 Functional check during commissioning

The operation of the fan should be checked and adjustment of the installation should be carried out according to the project design instructions in conjunction with commissioning.

In Sweden, a special report must be drawn up by specific authorised personnel in accordance with the Statue on Functional Checks of Ventilation Systems.

Get in touch with your nearest Swegon Service representative for further particulars of authorised personnel.

2.3.3 Manometer connection/adjustment

Measurement probes for air flow measurement have been factory-fitted at each fan. Hoses interconnect the probes with measurement tappings on the inspection door of the fan.

A manometer may be connected to the measurement tappings. Mount the manometer on the unit where it will not obstruct inspection, servicing or replacement of functions.

See the instructions that accompany the manometer.

3. Maintenance

3.1 Cleaning

Check at least every six months whether the fan section, motor and impeller require cleaning. The normal interval for cleaning is approx. 12 months.

The inside of the fan section may be vacuum-cleaned.

Dirt deposits on the fan impeller may be removed by vacuum-cleaning or by washing with a mild, non-caustic cleaning agent depending on the nature of the dirt.

The motor must be kept clean so that cooling will not be impaired. The motor should be brushed off or carefully cleaned with a mild, non-caustic cleaning agent.

3.2 Balancing

Check the balance of the fan impeller once a year.

3.3 Lubrication of the motor bearings

The smaller motors are permanently lubricated. The larger motors have grease fittings. For particulars of how much grease to inject into the fittings, see the accompanying motor instructions. If the motors are equipped with a frequency inverter, see the instructions furnished by the motor supplier.

4. Technical data

4.1 Design

4.1.1 General

The fan is designed without casing. The design enables a natural, direct-drive with the impeller on the motor shaft. This facilitates servicing and maintenance (cleaning).

4.1.2 Fan impeller inlet

The design of the impeller inlet offers optimum air flow conditions. The inlet plate of the impeller overlaps the inlet forming a minimum gap between the inlet and the plate. Very little air can enter the gap. The design of the impeller inlet plate deflects the air without any formation of vortices.

The outer edge of the impeller blades is chamfered; the backside of its mounting plate is rounded off. This produces a partially axial flow through the impeller and greatly reduces the level of noise generated by the fan in the lower frequency bands.

The impeller is made of sheet steel and has a painted finish.

4.1.3 Fan stand – anti-vibration isolation

The fan stand is a flexible construction of struts enabling the fan to be easily withdrawn whenever needed. The whole stand is painted. The design includes rubber isolators and a flexible connection for very effective anti-vibration isolation from the casing. The flexible connection is available in two materials: standard woven plastic or aluminium-coated glass fibre.

4.1.4 Fan motor with frequency converter

The new motor with variable rpm makes it possible to match the speed and output to present load conditions. This considerable reduces power consumption, the need for maintenance and lowers the noise level.

The motor is of standard induction type with built-in frequency converter and an EMC filter. The motor and frequency converter are optimally tailored to one another.

The max. permissible ambient temp. of the motor is 40°C.

It has degree of protection IP 54.

Motors with rated outputs of 1.4 kW and 9.2 kW meet EMC requirements to Standards EN 50081-1, 2 and 61000-6-2. Other motors meet EMC requirements to Standards EN 61000-6-2, EN 61000-6-3 and Machinery Directive EN 60204-1.

4.2 Electric motors

4.2.1 Electrical connections of motors with rated outputs of 1.4 kW

Power supply:
1-phase 230 V + N + earth or 3-phase 400 V + earth. The connection cable, cut to the appropriate length, is factory-wired to the motor. RDOE 3 x 1.5. The opening for the cable gland and cable through the unit casing should be drilled at an appropriate spot by the fitter. The fan must be connected to the mains power across a safety-isolating switch.
A shielded multi-lead cable, cut to the appropriate length, is factory-wired to the motor. The opening for the cable gland and cable through the unit casing should be drilled at an appropriate spot by the fitter. The cable should be spliced in a shielded junction box. Use a shielded cable from the box to the control unit. The power supply and control cables must be separated along their entire length due to the risk of interference.

4.2.2 Electrical connections of other motors

Power supply:
3 x 400V + earth. Connection cable, of suitable length, is factory-connected to and wired in the motor.

A connection cable with cross-sectional area of 4 x 1.5 mm2. A motor protection with a current limit as tabulated below is therefore utilised. Otherwise, the cable can be replaced by a cable having a cross-sectional area as required.

The cable entry opening shall be drilled in the air handling unit casing at a suitable spot by the ventilation fitter. Connection shall be made across a safety isolating switch/fuse load separator.

Control:
A shielded multi-lead cable, cut to the appropriate length, is factory-wired to the motor. The opening for the cable gland and cable through the unit casing should be drilled at an appropriate spot by the fitter. The cable should be spliced in a shielded junction box. Use a shielded cable from the box to the control unit. The power supply and control cables must be separated along their entire length due to the risk of interference.

4.2.3. Motordata

Motor with built-in frequency converter

BCRWD	Rated output (KW)	Type	Current (A)	Fuse (A)	Min speed (r/m)	Max speed (r/m)	Voltage (V)	Weight (kg)
004	1,4	Grundfos	9,2-8,4	Max 16	500	4100	1x220-240	12,5
006	3,0	WEG	6,0	10	300	3000	3x400±10%	29
009	3,0	WEG	6,0	10	300	2550	3x400±10%	29
014	4,6	WEG	9,4	10	300	2150	3x400±10%	38
014	6,5	WEG	12,4	16	300	2150	3x400±10%	53
020	6,5	WEG	12,4	16	300	1800	3x400±10%	53
020	9,2	Siemens	18,5	20	300	1800	3x400±10%	71
027 Std	6,5	WEG	12,4	16	300	1800	3x400±10%	53
027 Duo	2x4,6	WEG	2x9,4	2x10	300	1800	3x400±10%	76
027 Duo	2x6,5	WEG	2x12,4	2x16	300	1800	3x400±10%	106
035	2x6,5	WEG	2x12,4	2x16	300	1800	3x400±10%	106
055	3x6,5	WEG	3x12,4	3x16	300	1800	3x400±10%	159

High-performance motor with temperature monitor, without frequency inverter.

BCRWD	Rated output (kw)	Number of motor poles	Voltage (V)	Current (A)	Weight (kg)	Max speed (r/m)	Min rek. speed (r/m)
004	1,5	2	3x230D/3x400Y	5,23/3,01	20	4100	500
004	2,2	2	3x230D/3x400Y	7,65/4,4	22		
006	2,2	4	3x230D/3x400Y	7,72/4,44	33	3000	300
006	3	4	3x230D/3x400Y	10,2/5,89	45		
006	4	4	3x230D/3x400Y	13,7/7,85	49		
009	2,2	4	3x230D/3x400Y	7,72/4,44	33	2550	300
009	3	4	3x230D/3x400Y	10,2/5,89	45		
009	4	4	3x230D/3x400Y	13,7/7,85	49		
009	5,5	4	3x230D/3x400Y	18,4/10,6	66		
014	3	4	3x230D/3x400Y	10,2/5,89	45	2150	300
014	4	4	3x230D/3x400Y	13,7/7,85	49		
014	5,5	4	3x230D/3x400Y	18,4/10,6	66		
014	7,5	4	3x230D/3x400Y	24,2/13,9	76		
020	4	6	3x230D/3x400Y	15,1/8,71	68	1800	300
020	5,5	4	3x230D/3x400Y	18,4/10,6	66		
020	7,5	4	3x230D/3x400Y	24,2/13,9	76		
020	11	4	3x230D/3x400Y	36,4/21	125		
027 std	4	6	3x230D/3x400Y	15,1/8,71	68	1800	300
027 std	5,5	4	3x230D/3x400Y	18,4/10,6	66		
027 std	7,5	4	3x230D/3x400Y	24,2/13,9	76		
027 std	11	4	3x230D/3x400Y	36,4/21	125		
027 Duo	2x3	4	3x230D/3x400Y	20,4/11,8	90	2150	300
027 Duo	2x4	4	3x230D/3x400Y	27,4/15,7	98		
027 Duo	2x5,5	4	3x230D/3x400Y	36,8/21,2	132		
027 Duo	2x7,5	4	3x230D/3x400Y	48,4/27,8	152		
035	2x4	6	3x230D/3x400Y	30,2/17,42	136	1800	300
035	2x5,5	4	3x230D/3x400Y	36,8/21,2	132		
035	2x7,5	4	3x230D/3x400Y	48,4/27,8	152		
035	2x11	4	3x230D/3x400Y	72,8/42	250		
055	3x4	6	3x230D/3x400Y	45,3/26,13	204	1800	300
055	3x5,5	4	3x230D/3x400Y	55,2/31,8	198		
055	3x7,5	4	3x230D/3x400Y	72,6/41,7	228		
055	3x11	4	3x230D/3x400Y	109,2/63	375		

4.3 Functions

4.3.1 BCRWD with WEG motor

Start-stop: The motor is started by closure between parts 5 and 6.

Speed regulation: The motor speed is modulated between min. and max speed by means of a 0-10V DC signal between part 7 (+) and part 8 (-).

In-operation relay: Unit in operation is indicated by means of a relay with normally open contact function between parts 1 and 2. Max permissible load: 250 VAC, 5A/AC1.

Alarm relay: Alarms are initiated by means of a relay with normally open contact function between part 3 and 4. Max permissible load: 250VAC, 5A/AC1.

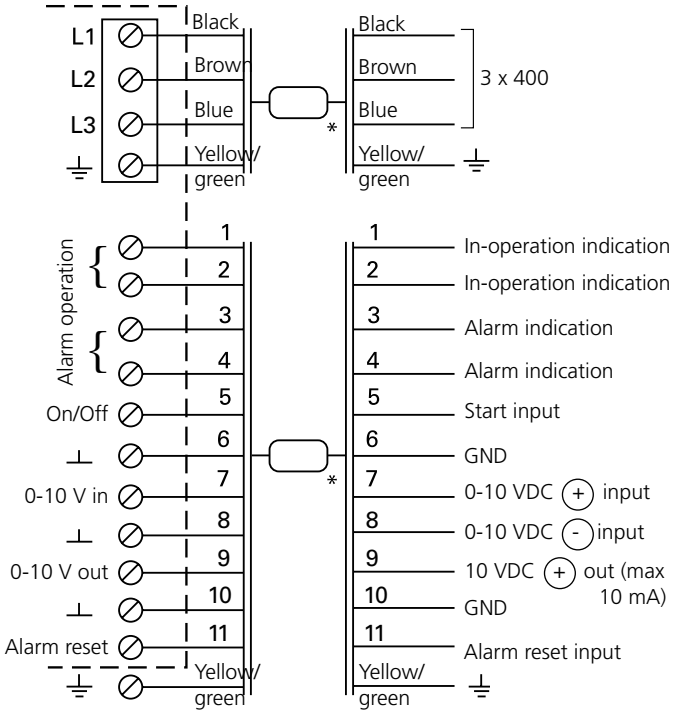
Resetting of alarms: Alarms can be reset in two ways:

- By interrupting the power supply for about 2 minutes.

- Closure of the alarm reset, parts 10 and 11.

- 10 V DC power supply: Continuous 10 V DC supply is between parts 9 (+) and 10 (-). Max permissible load: 10 mA

Cable wiring:



** These cables are connected to the motor at the factory.*

The motors are test run and the wiring is tested prior to delivery.

4.3 Functions

4.3.2 BCRWD with GRUNDFOS motor

Start-stop: The motor is started by means of closure between leads 1 and 7.

Speed control: The motor speed is controlled, between min. speed and max. speed, by means of a 0 - 10 V DC input signal between lead 1 (–) and lead 5 (+).

Alarm relay: Alarms are initiated by means of a relay with changeover contact action. Max. permissible load: 250 V AC, 2A.

Lead 2: Common connection of the relay.

Lead 3: Relay position when de-energised or if an alarm has tripped.

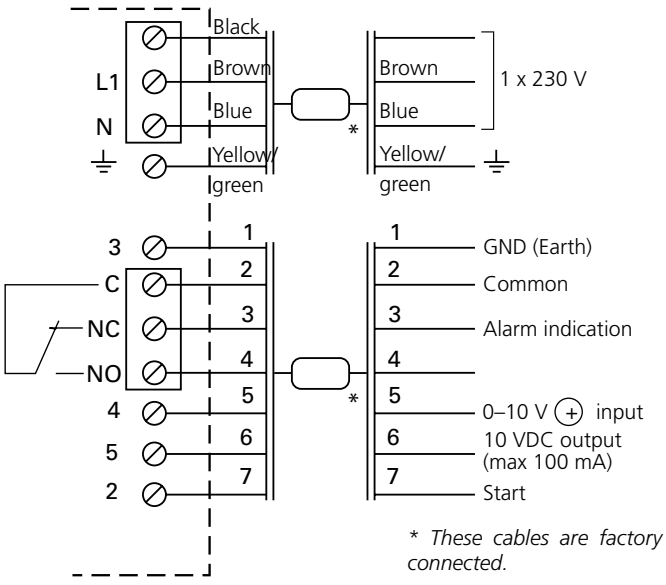
Lead 4: Relay position when not alarming.

Resetting an alarm: If an alarm has tripped, it can be reset in one of two ways:

– By opening the power supply for about 60 seconds.

– By first switching the start/stop switch to stop and then back to start.

Cable wiring:



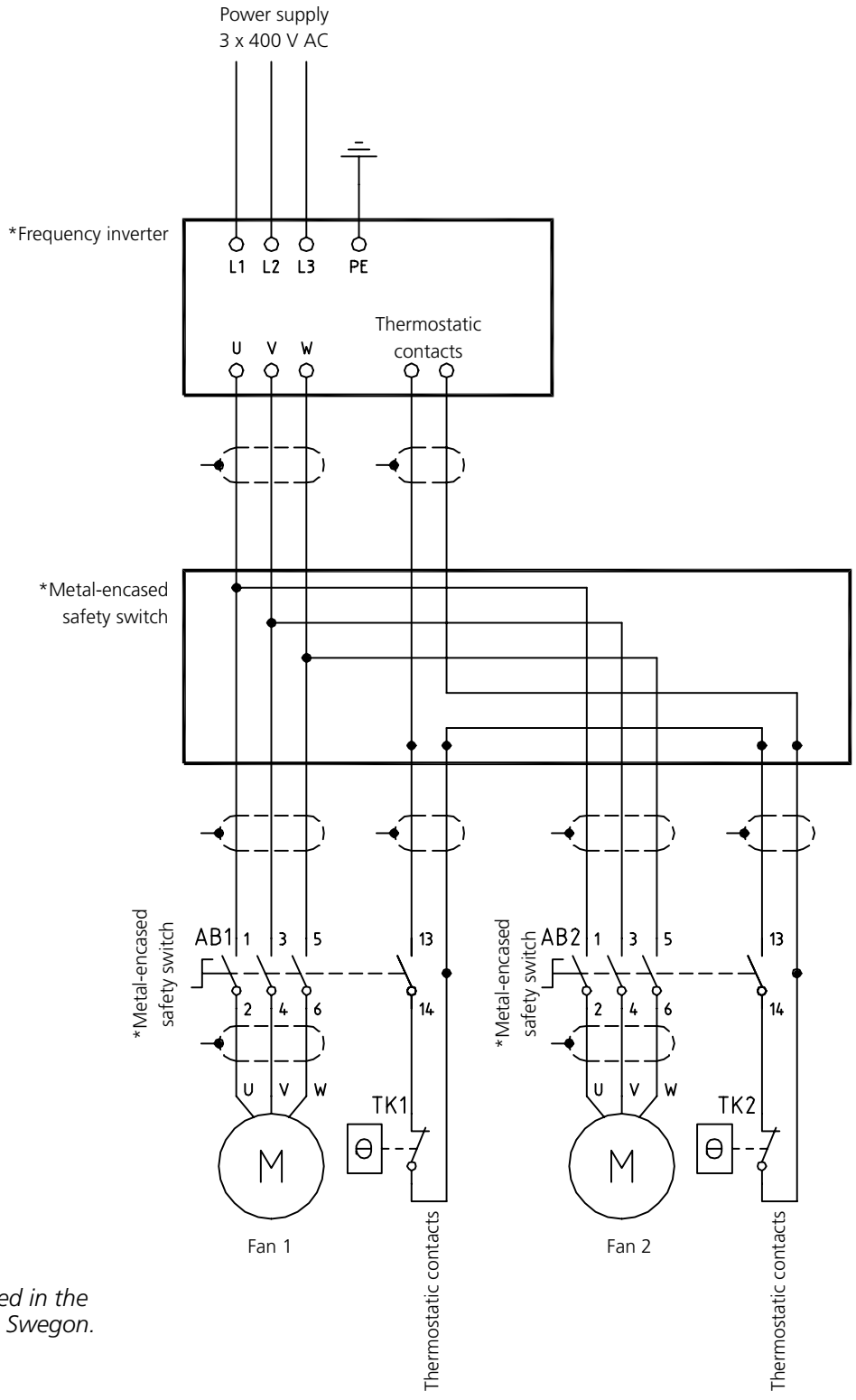
** These cables are factory connected.*

LEDs		Status	Relay
Green	Red		
OFF	OFF	Dead	C-NC
ON	OFF	Normal operation	C-NO
Flashes	OFF	Stopped	C-NO

The motors are test run and the wiring is tested prior to delivery.

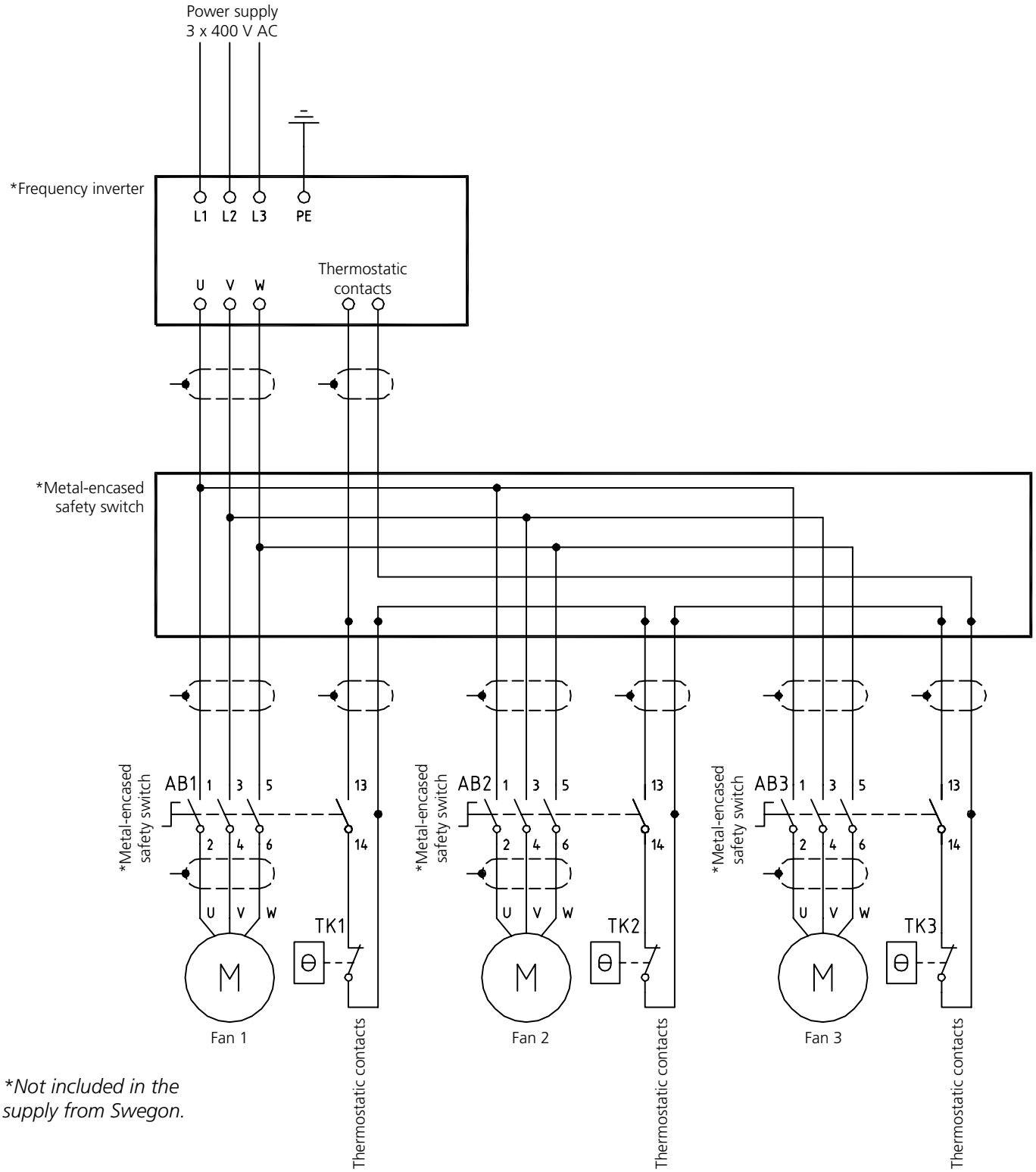
4.4 Wiring instructions for BCRWD Duo and Triple

4.4.1 BCRWD Duo with loose frequency inverter



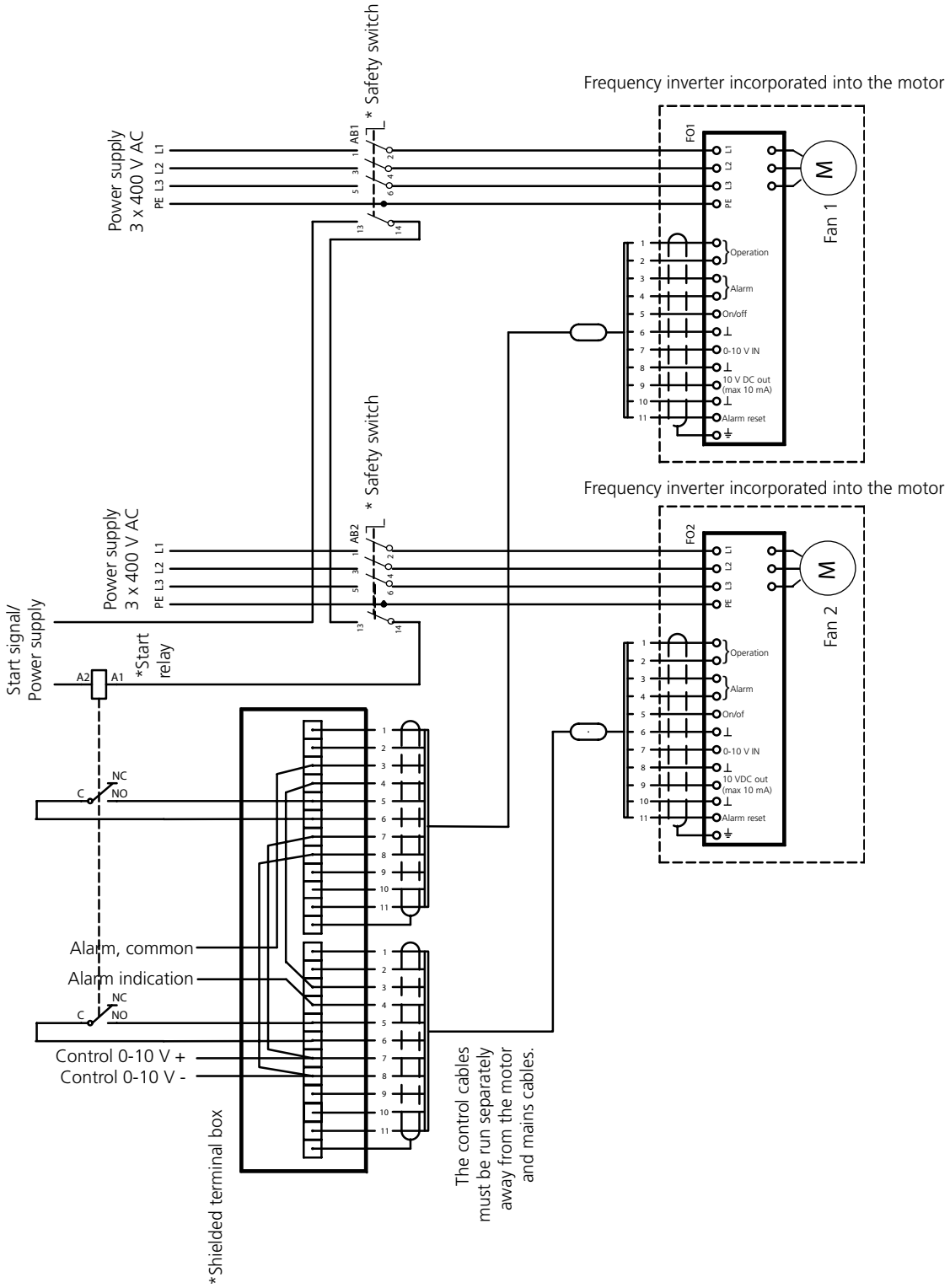
**Not included in the supply from Swegon.*

4.4.2 BCRWD Triple with loose frequency inverter



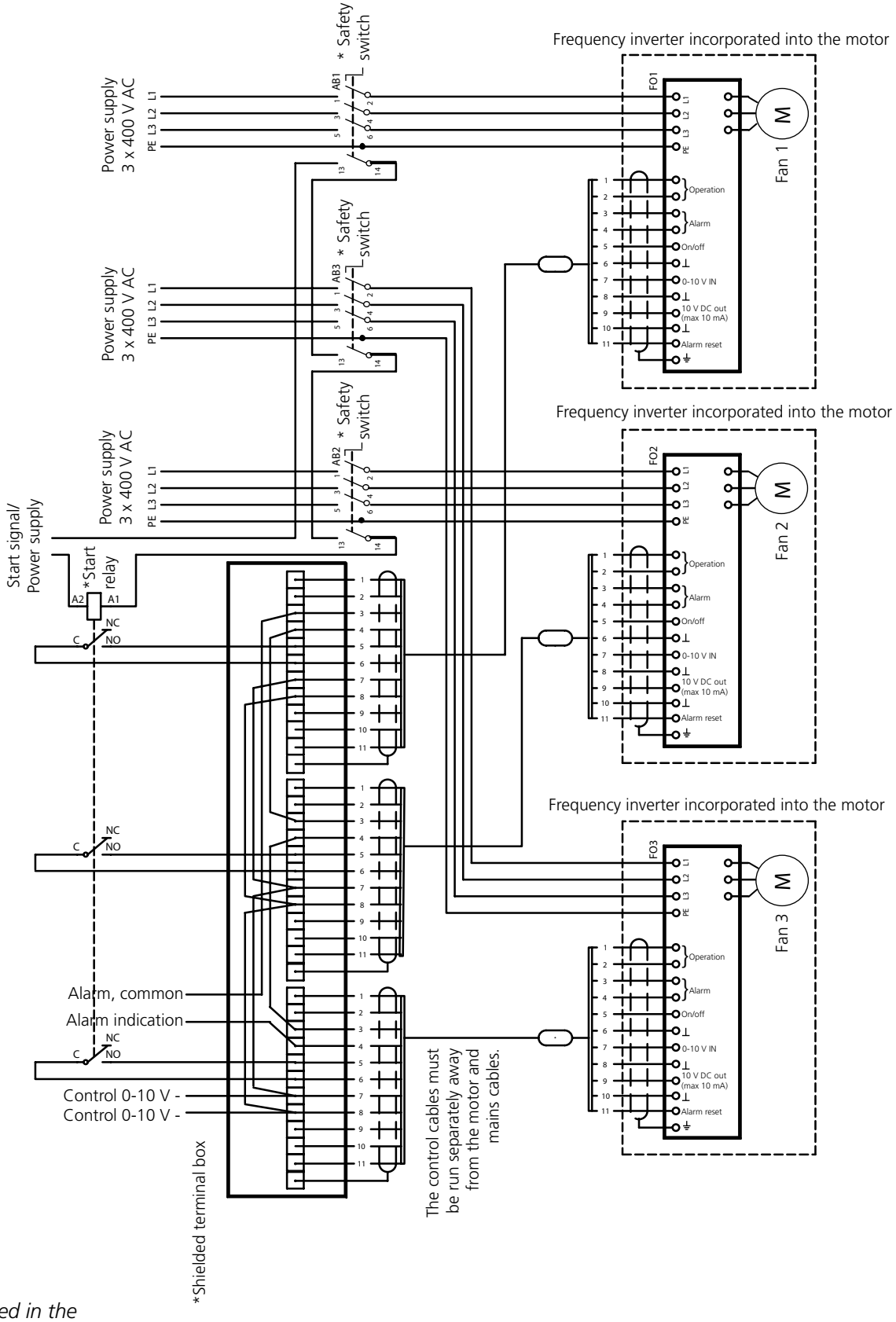
**Not included in the supply from Swegon.*

4.4.3 BCRWD Duo with permanently mounted frequency inverter



**Not included in the supply from Swegon.*

4.4.4 BCRWD Triple with permanently mounted frequency inverter

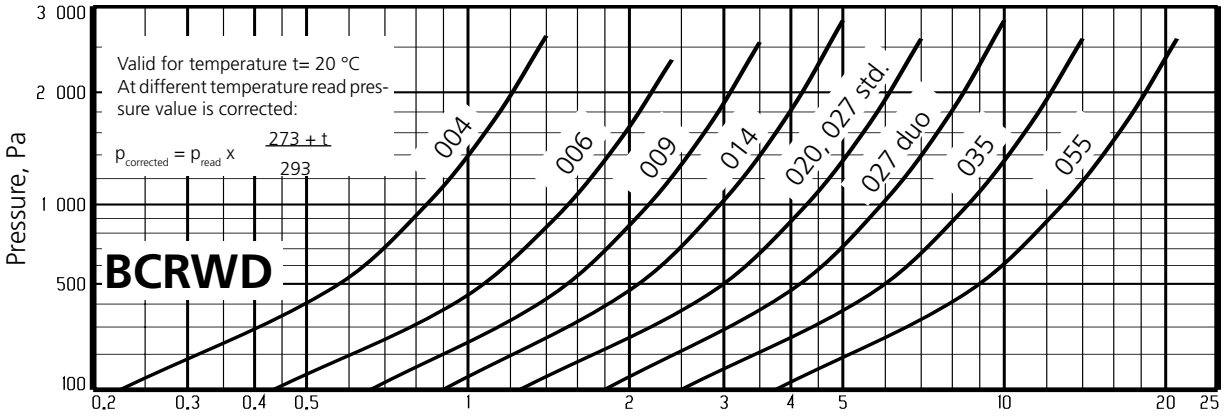


**Not included in the supply from Swegon.*

4.5 Auxiliary diagram for air flow meter

The pressure reading on the manometer corresponds to a relevant air flow which can be read in the chart below.

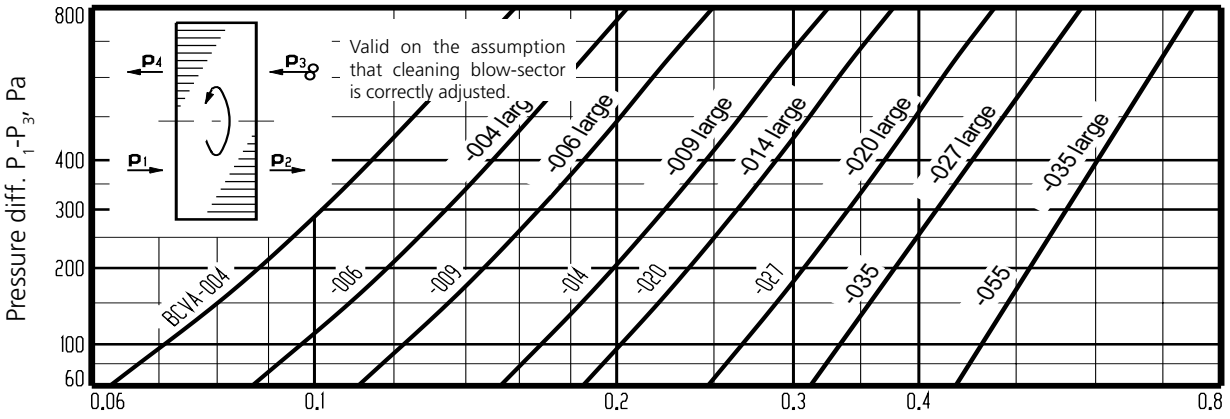
When the unit has rotary heat exchanger, air flow also are to be corrected according to "Correction diagram at rotary heat exchanger".



Correction diagram with rotary heat exchanger

If a rotary heat exchanger is situated between the fan that has been assigned an air flow from the chart above, and the point at which the air flow is to be computed, the chart below will have to be used to correct the flow. Air leakage and the purging air flow move from an air passage having higher pressure to one having lower pressure.

Normally the pressure is higher at the supply side, entailing that the supply flow before heat exchanger is equivalent to the flow of the supply fan added with the sum of leakage flow and and cleaning flow, and the exhaust air flow before heat exchanger is equivalent to the flow of the exhaust air reduced by the leakage flow and the cleaning flow.



Airflow Measurement - BC Fans

Formulas:

$$\Delta p_{flow} = (k_2 \cdot q + k_1) \cdot q$$

$$q = \sqrt{\left(\frac{\Delta p_{flow}}{c_1} + c_2\right)} - c_3$$

Δp_{flow} is the differential pressure for airflow measurement in Pa.

q denotes the airflow in m³/s.

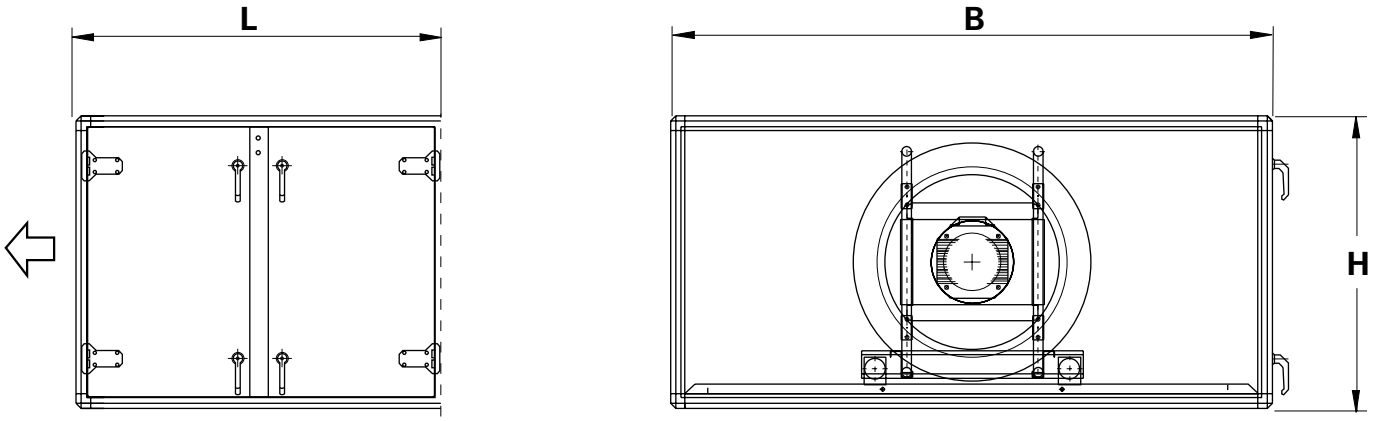
The formula is applicable to an air temperature of 20 °C. For other temperatures, the following expression must be used to correct the pressure:

$$\Delta p_{flow} = \Delta p_{reading} \cdot \frac{273 + t}{293}$$

t denotes the air temperature in °C.

BCRWD	Max airflow m³/s	Max manometer reading Pa	Constant k1	Constant k2	Constant c1	Constant c2	Constant c3
004	1,4	2634	172	1220,9	1220,9	0,005	0,07
006	2,4	2354	65,5	381,46	381,46	0,007	0,086
009	3,5	2558	18,2	203,64	203,64	0,002	0,045
014	5	2822	12,4	110,39	110,39	0,003	0,056
020	7	2600	17,09	50,614	50,614	0,029	0,169
027-standard	7	2600	17,09	50,614	50,614	0,029	0,169
027-duo	10	2822	6,2	27,598	27,598	0,013	0,112
035	14	2600	8,545	12,654	12,654	0,114	0,338
055	21	2600	5,697	5,6238	5,6238	0,257	0,507

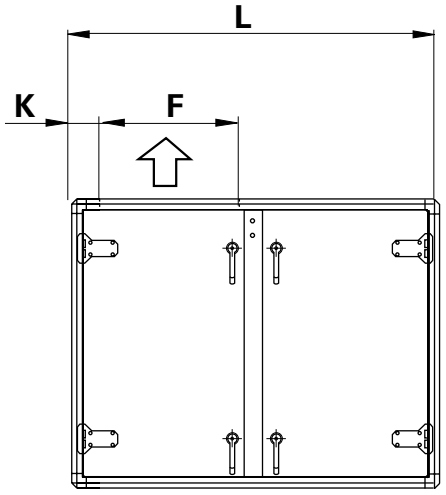
4.6 Dimensions, air discharge straight ahead

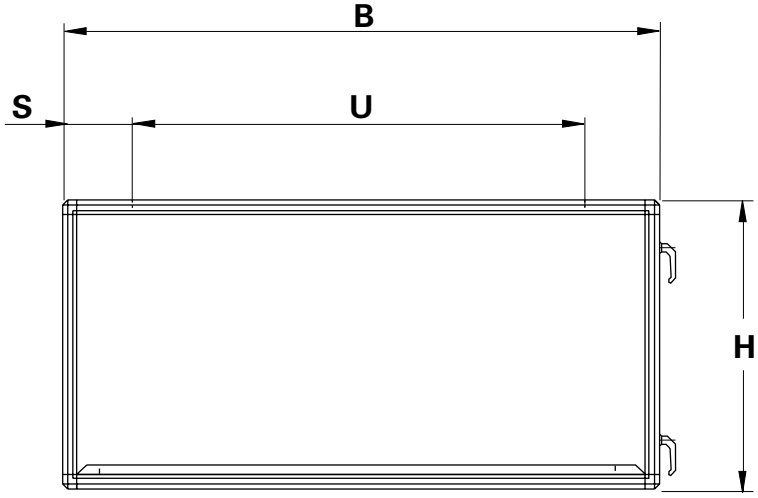


					Weight of completed part 1)	
BCRWD	**Fan alternativ**	**B**	**H**	**L**	Weight std	Weight EI30
004	-	1039	546	853	79	95
006	-	1259	656	1053	117	140
009	-	1459	756	1153	155	184
014	-	1759	906	1253	186	220
020	-	1946	1026	1253	260	304
027	Standard	2306	1206	1253	302	354
027	Duo	2306	1206	1253	324	376
035	-	2706	1406	1253	447	508
055	-	3206	1656	1253	606	678

1) Excl. motor

4.7 Dimensions, air discharge straight ahead





									Weight of completed part 1)	
BCRWD	Fan alternativ	B	H	K	F	S	U	L	Weight std	Weight EI30
004	-	1039	546	123	300	220	600	880	79	95
006	-	1259	656	178	300	230	800	1080	117	140
009	-	1459	756	128	500	330	800	1180	155	184
014	-	1759	906	203	500	380	1000	1280	186	220
020	-	1946	1026	213	600	373	1200	1280	260	304
027	Standard	2306	1206	213	600	453	1400	1280	308	362
027	Duo	2306	1206	213	600	453	1400	1280	330	384
035	-	2706	1406	213	600	203	2300	1280	463	529
055	-	3206	1656	213	600	353	2500	1280	637	720

1) Excl. motor