pTAC serie

Technical information for OEMs

For constant airflow mode

- ✓ **High efficiency centrifugal fans**
- ✓ **Extremely quiet operation**
- ✓ **Proprietary permanent magnet brushless DC motor**
- ✓ **TAC technology (constant airflow, torque, rotation speed)**
- ✓ **Inputs: 0-10V, PWM, Mains inputs, or Serial**
- ✓ **Ideal for mechanical home ventilation units**
- ✓ **Horizontal or vertical mounting (ball bearing motors)**

Please Note

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1. Product range

1.1 Description

The pTAC serie is a range of small direct driven centrifugal fans, equipped with a new generation of high efficiency permanent magnet DC motors. They belong to the TAC technology family since they have similar features - airflow control and high efficiency - and have their specific control devices . The range is fully CE compliant and approved.

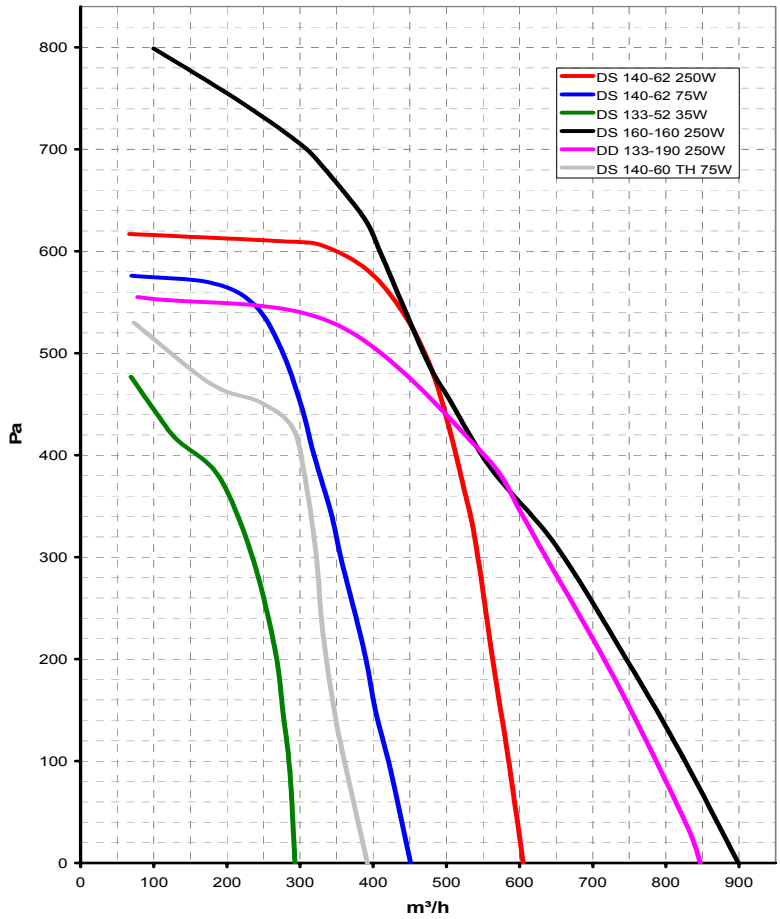
These fans are particularly designed for mechanical home ventilation applications, but can also be applied to other applications such as heat pumps or air conditioning, or any application were airflow control and/or high efficiency are required.

The range features many variants of the same product in order to comply with your specific requirements. Whether you require a complete fan and housing or only a motor-wheel to fit in your own design, we can provide it. We can also help you by providing you with the data you require to specify your product using this product range. The whole range can be set up to operate in either constant airflow, constant torque or constant rpm mode.

This document is focused on “CONSTANT AIRFLOW” applications only. A “CONSTANT TORQUE” and “CONSTANT RPM” document is also available.

Please note that if you wish to use the full option RVMC mechanical home ventilation controller you need to set the fans in constant torque mode. For more information check the RVMC controller documentation or contact us.

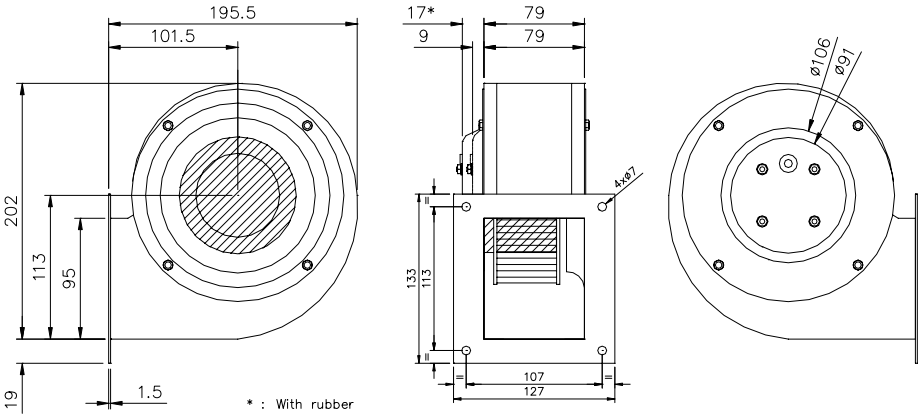
1.2 Working zone



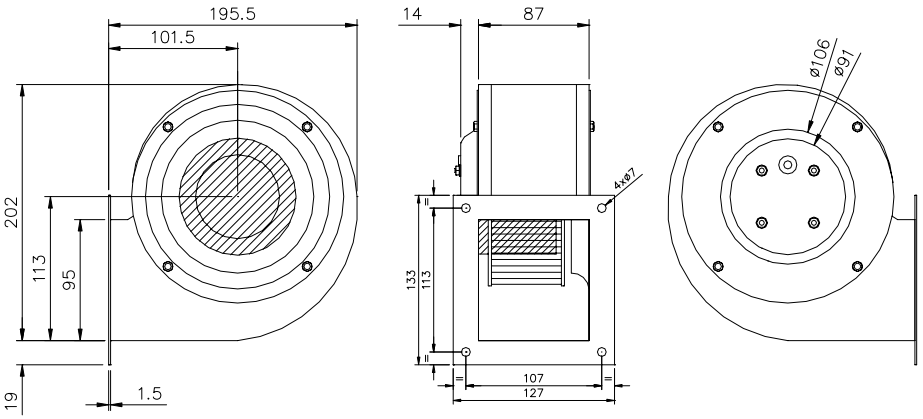
1.3 Dimensions

1.3.1 Complete fans

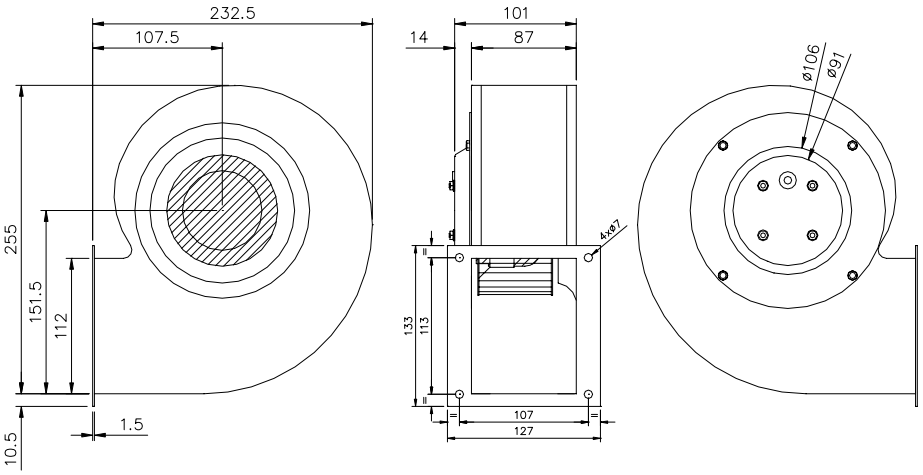
720090 DS 133-52 35W (replaced by DS 140-60 TH 75W excepted for high volume project)



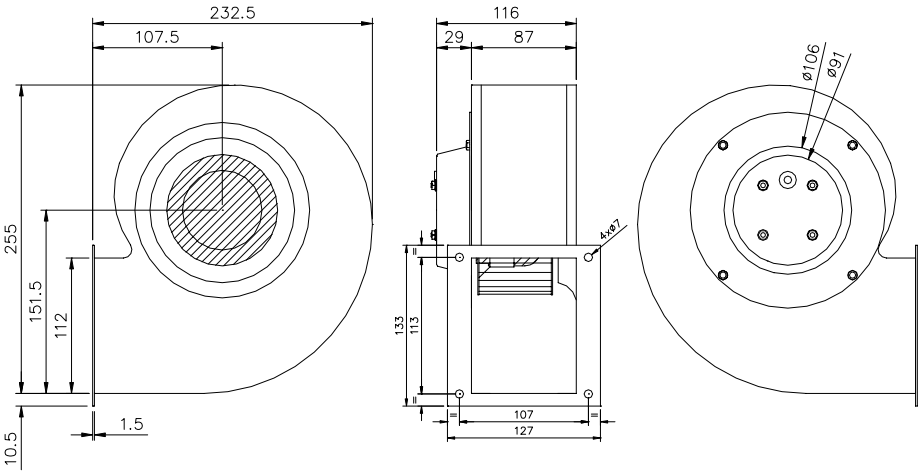
720101 DS 140-60 TH 75W



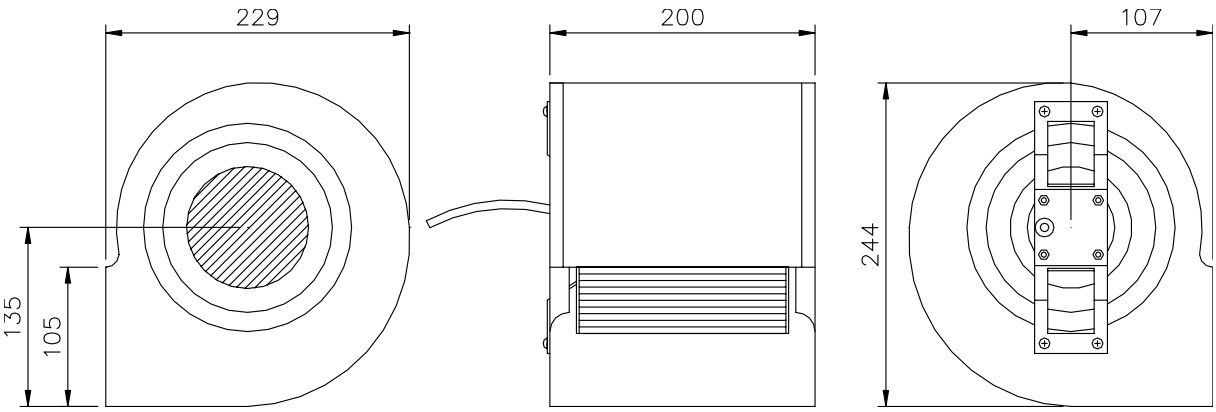
720088 DS 140-60 75W



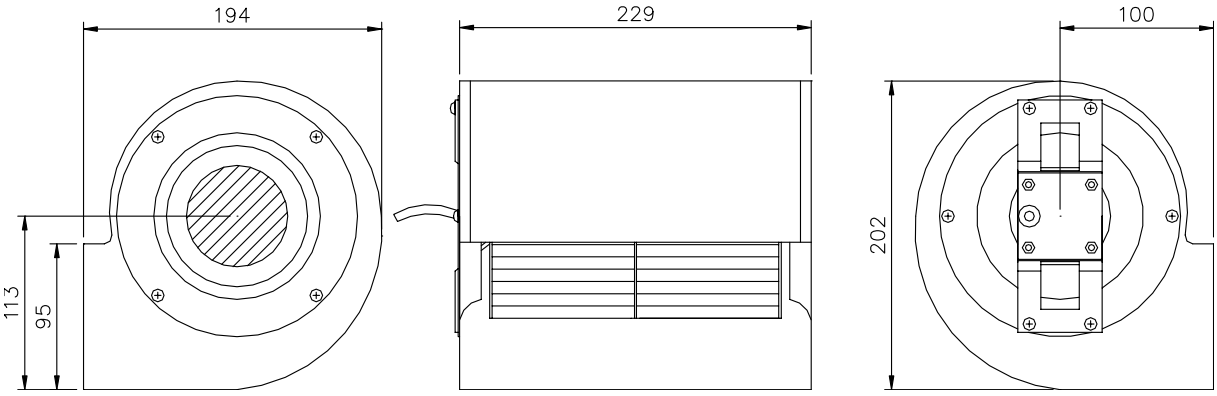
720089 DS 140-60 250W



720099 DD 160-160 250W

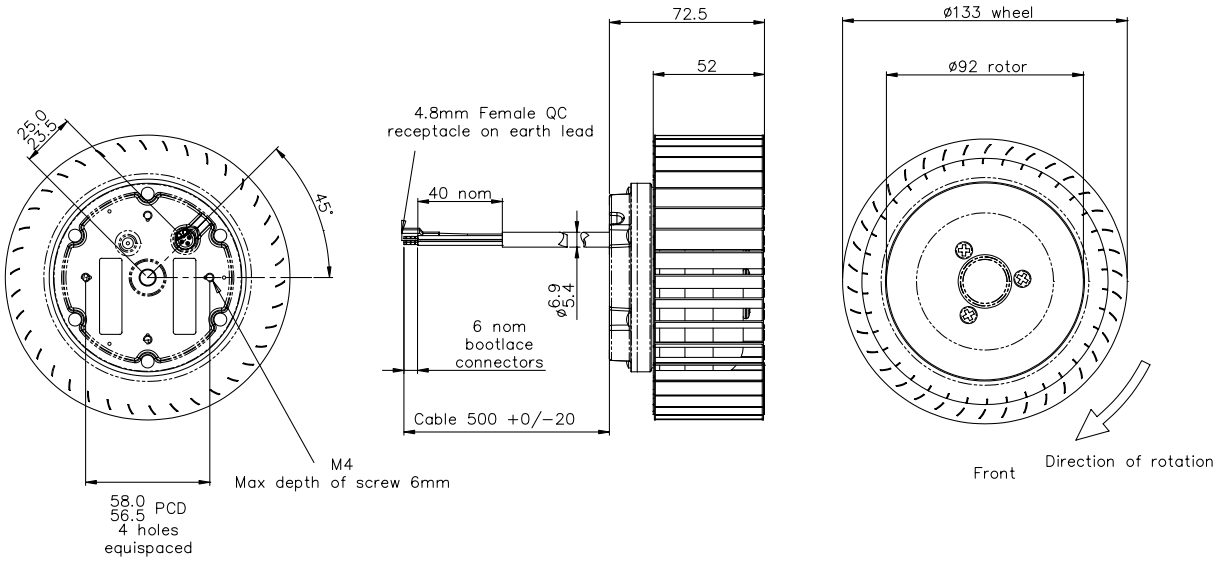


720100 DD 133-190 250W (does not exist – can be developped only for high volume project)

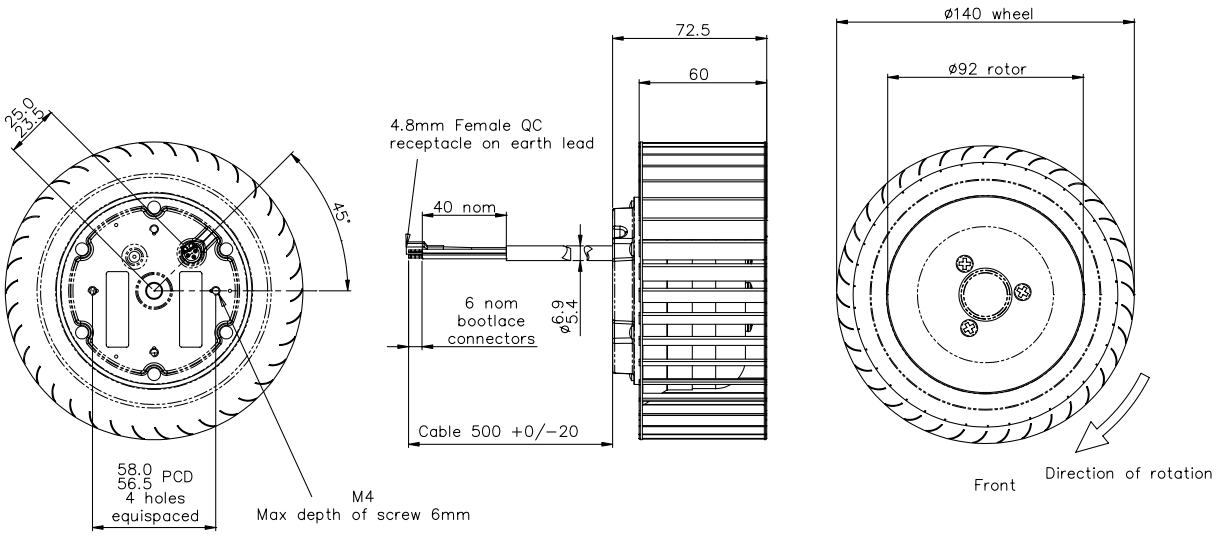


1.3.2 Motor/wheel only

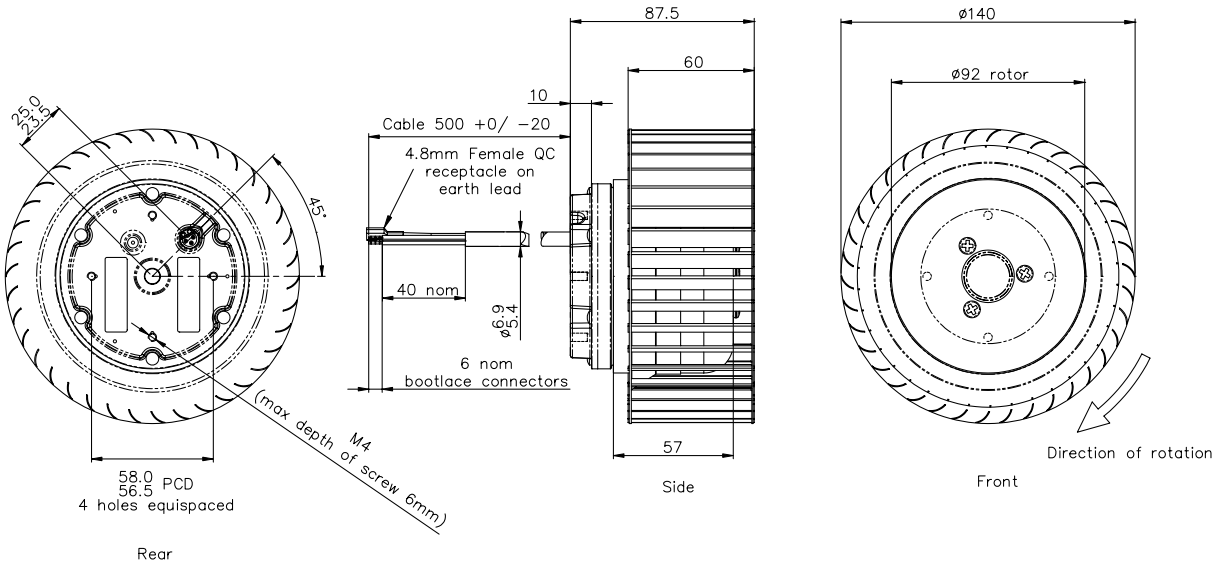
137014 MT 133-52 35W



137015 MT 140-60 75W

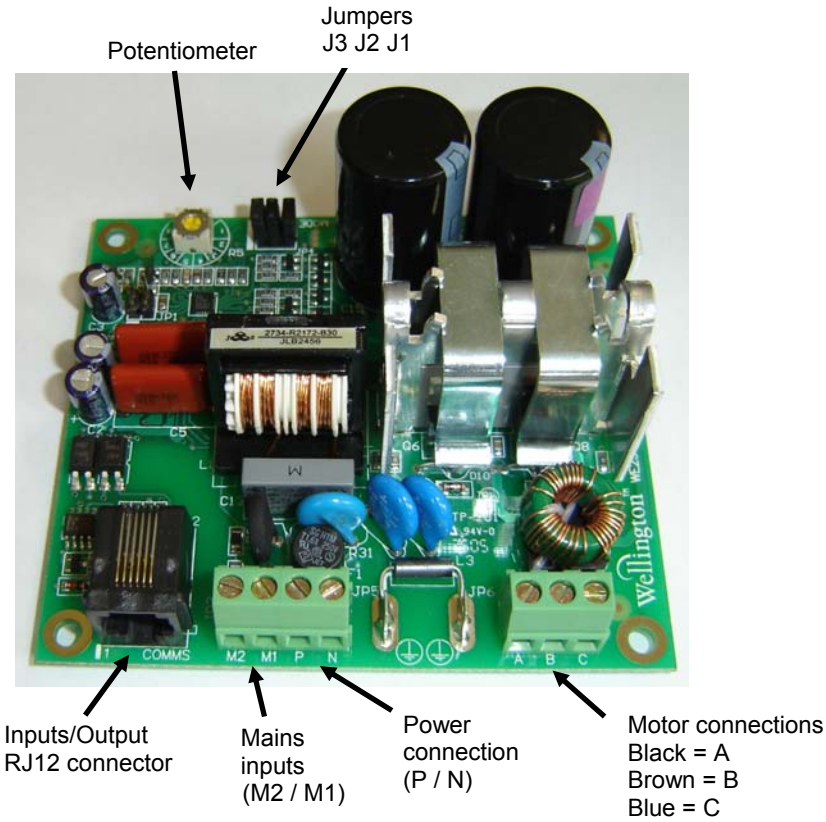


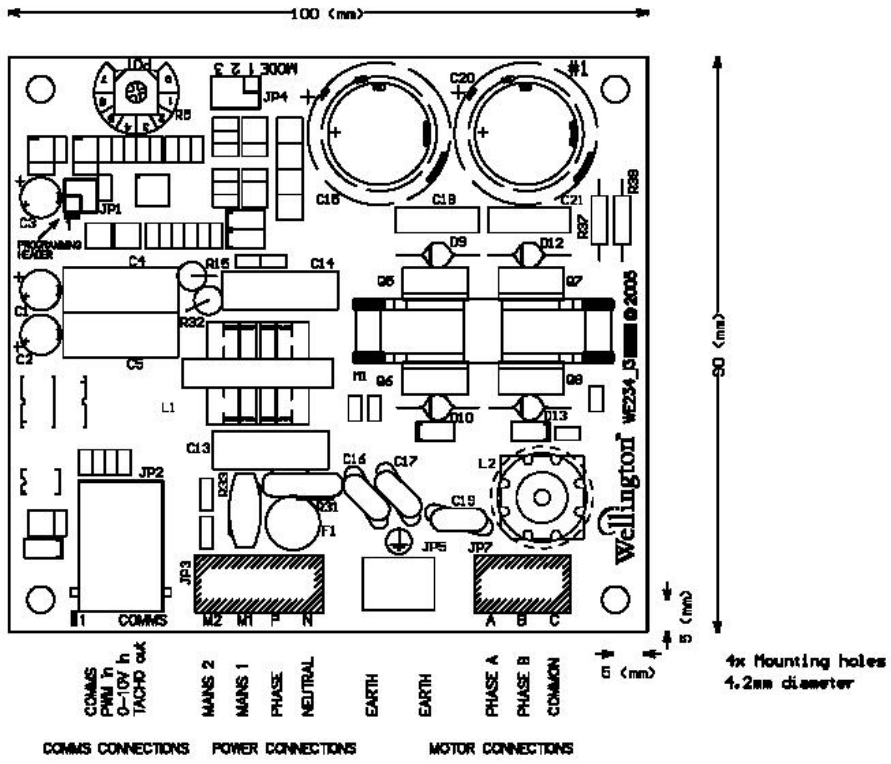
137016 MT 140-60 250W



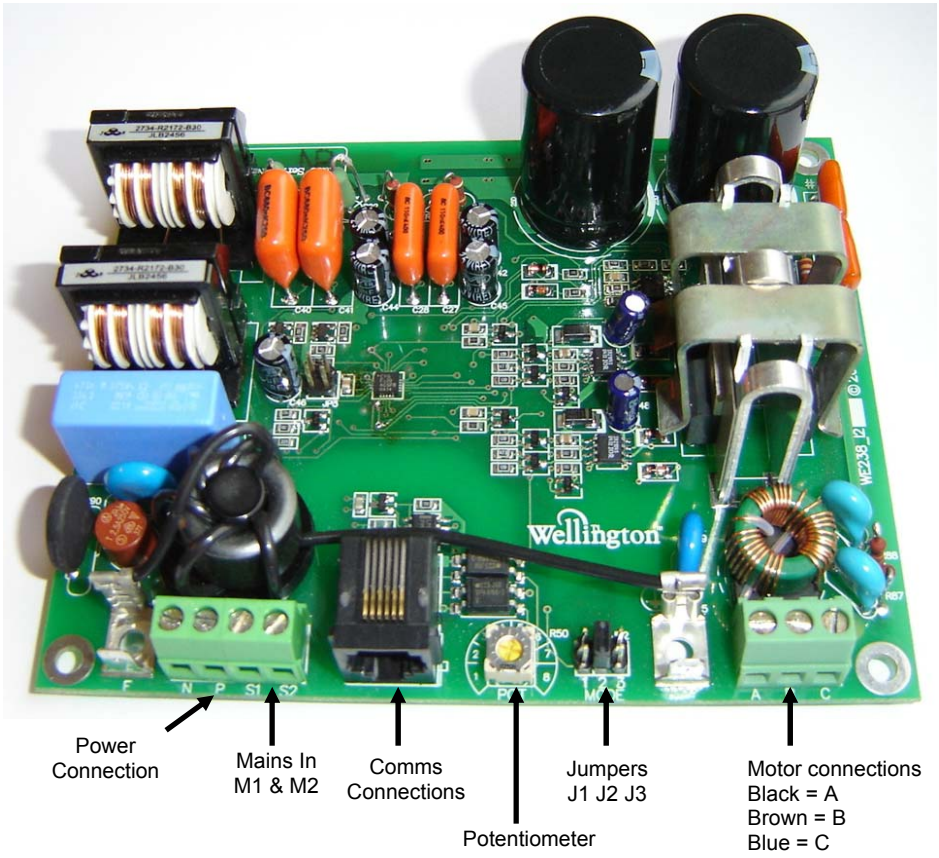
1.3.3 Motor controllers

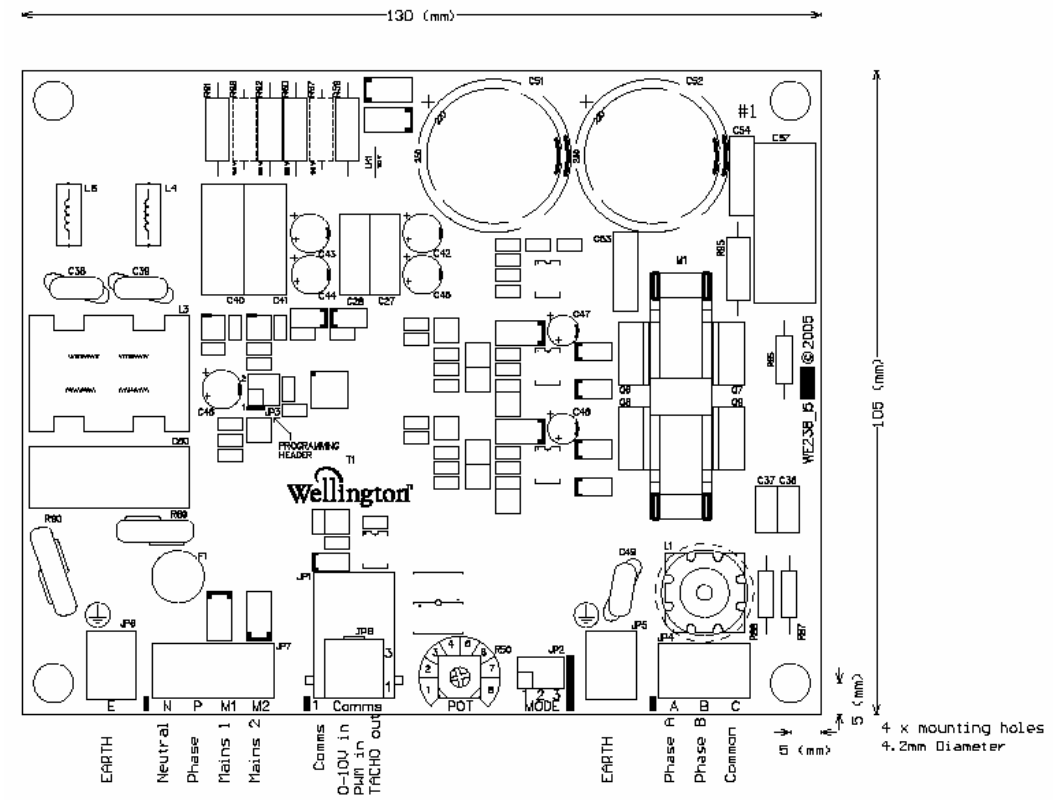
MC 35W / MC 75W





MC 250W


Wellington
F
N
P
S1
S2
A
C
Power Connection
Mains In M1 & M2
Comms Connections
Potentiometer
Jumpers J1 J2 J3
Motor connections
Black = A
Brown = B
Blue = C


130 (mm)
105 (mm)
Wellington
#1
PROGRAMMING HEADER
E
N
P
M1
M2
Comms
POT
MODE
A
B
C
EARTH
Neutral
Phase
Mains 1
Mains 2
Comms 0-10V in PWM in TACHO out
EARTH
Phase A
Phase B
Common
51 (mm)
4 x mounting holes
4.2mm Diameter

1.4 Technical data

Power supply: 230V ±10%
50/60 Hz

Protection: IP44

Maximum T°: 50°C (motor control must be ventilated)

Absorbed power/efficiency: see our DDDSDP selection software

2. Motor controller overview

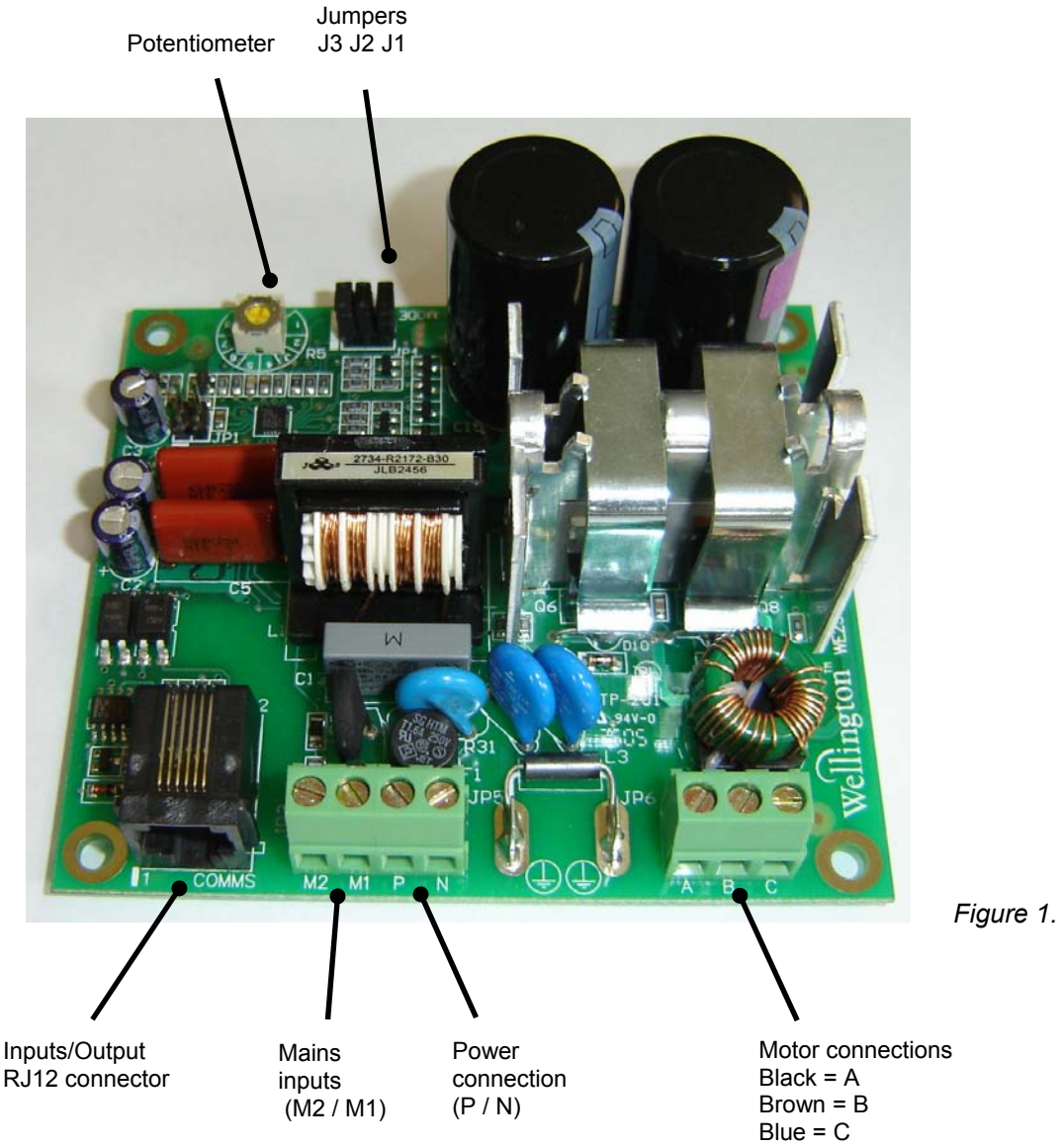


Figure 1.

When AC power is removed from the unit, the DC bus remains charged for several minutes. Care should be exercised when handling controllers after power has been removed.

3. Motor connection to motor controller

The motor connections are shown in Figure 2. The motor rotation direction can easely be changed, but the standard wheel configuration is designed for a clockwise rotation.

Standard wheel configuration is made for clockwise application

In the “clockwise” configuration, the motor black wire is connected to the controller phase-a, the motor brown wire is connected to the controller phase-b and the motor blue wire is connected to the controller common.

Rotation direction can be changed to counterclockwise by swapping the phase-a and phase-b wires, as shown in Figure 3. Note that the performance of the fan will then be altered.

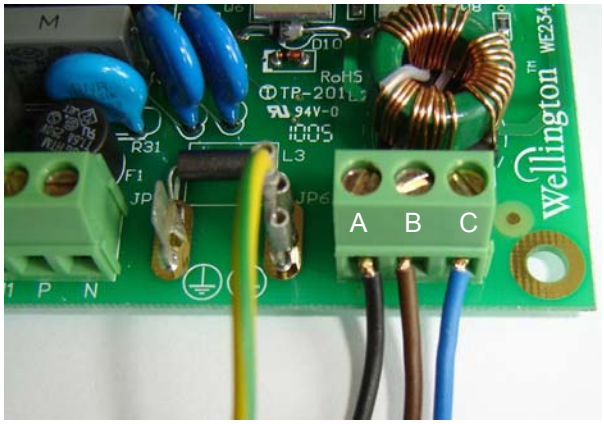


Figure 2 : Motor connections (Clockwise motor rotation).

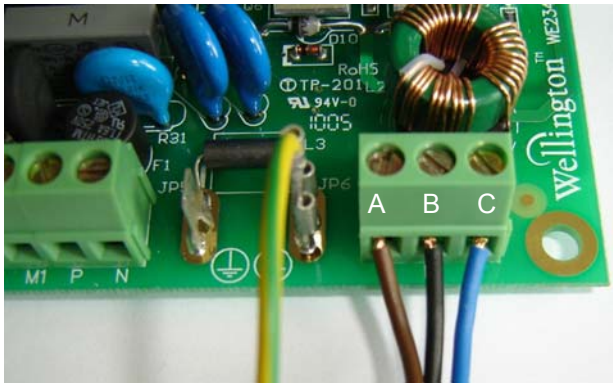


Figure 3 : Motor connections (Counterclockwise motor rotation).

4. Mode and communication selection

The motor controller features 3 operating modes:

- Constant airflow (see § 5 of this document)
- Constant torque (documentation available on request)
- Constant speed (documentation available on request)

The mode selection is set by jumpers J1, J2 and J3.

The selected operating mode (airflow / torque / speed) is read only once at first power up and the controller remains in this operating mode until power down. No changes can be made while operating.

The value selection itself (which airflow ?, which torque ?, which rotation speed ?) can be set using one of several communication methods.

- 0-10V (stepless airflow selection)
- PWM (stepless airflow selection)
- Mains inputs (discrete airflow selection)
- Serial communication (stepless airflow selection)

Chapter 5 discusses the different value selection methods for a constant airflow operating mode.

The jumpers on the motor controller will allow fan setup.

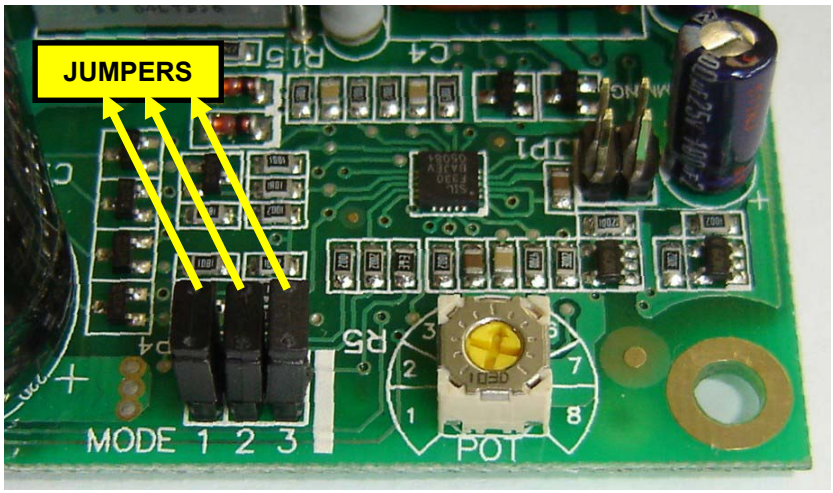


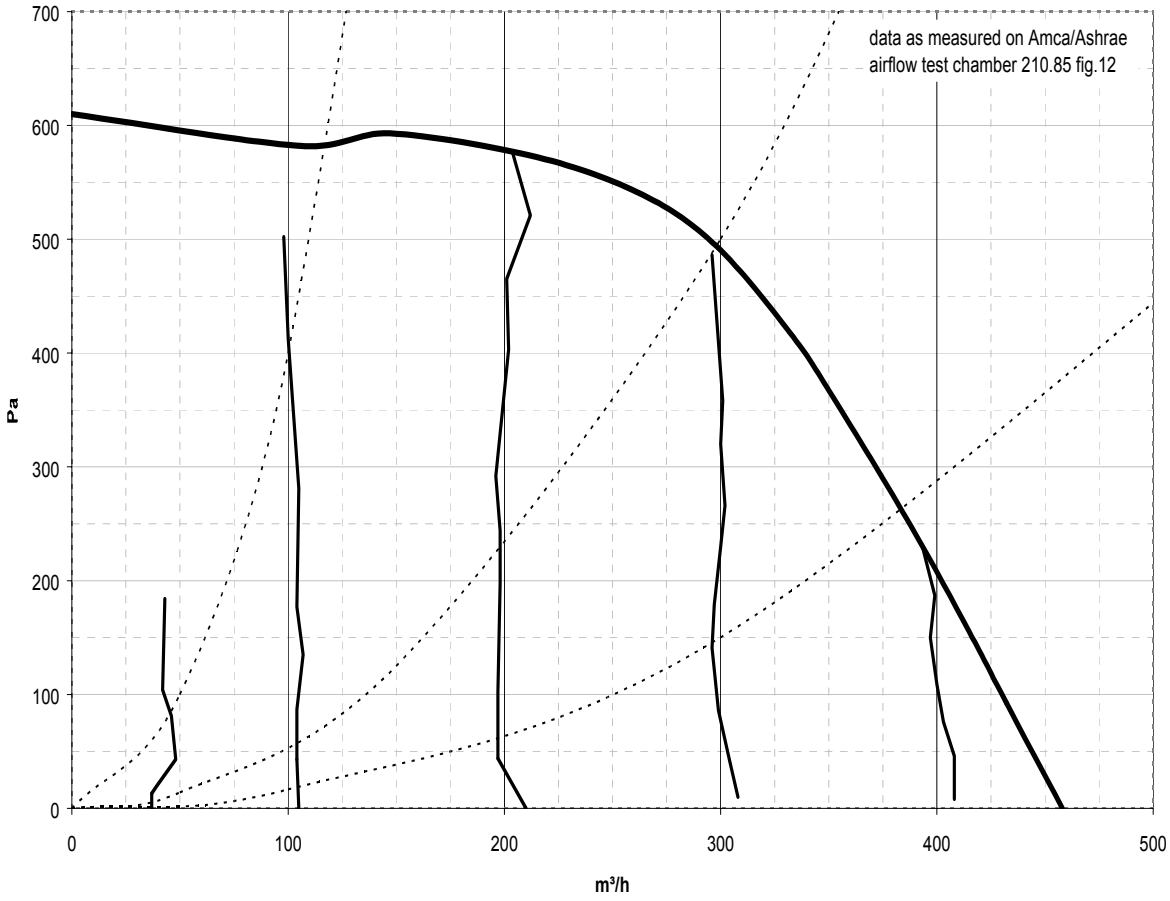
Figure 4 : Jumpers on motor controller.

5. Constant airflow mode

5.1 Description

In constant airflow mode, the controller regulates the resultant airflow to be a constant. The pressure changes, but the airflow automatically remains constant, without sensors. The airflow is calibrated for a specific fan and housing. Altering the fans used or airflow pattern configuration will result in an inaccurate airflow flow result from the controller.

The airflow request can be accomplished using one of several input types: 0/10V, PWM, digital or serial input. Each of these input type is discussed hereunder.



Example of constant airflow curves (DS 140-60 TAC 75W):

5.2 Setup characteristics for 0-10V input type

The airflow is modified from minimum to maximum as the input voltage is varied from 1 to 10 V.

5.2.1 Jumper settings for constant airflow with 0-10V input

Input type	Jumper 1	Jumper 2	Jumper 3
0-10V	ON	ON	ON

5.2.2 Wiring specifications

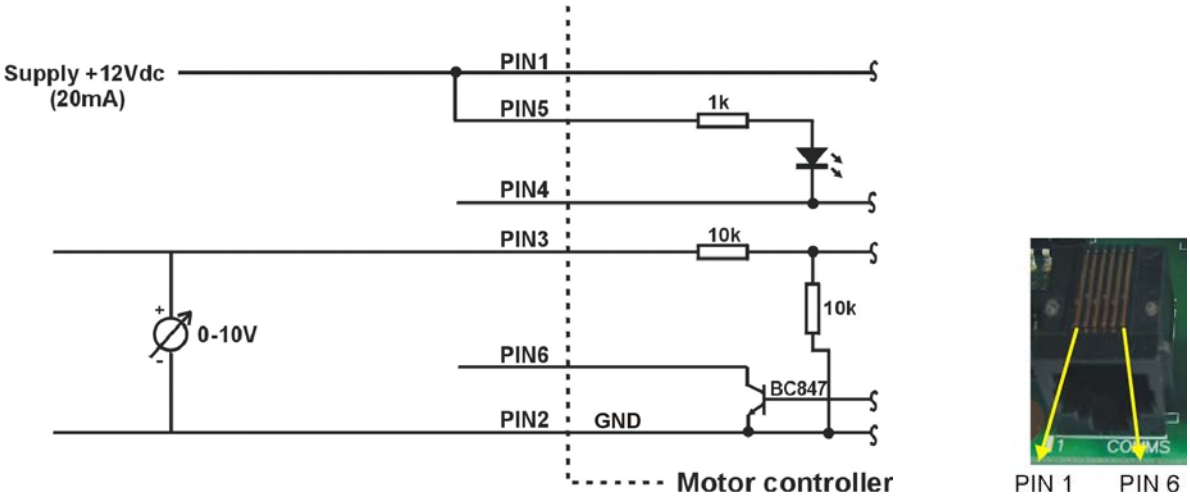


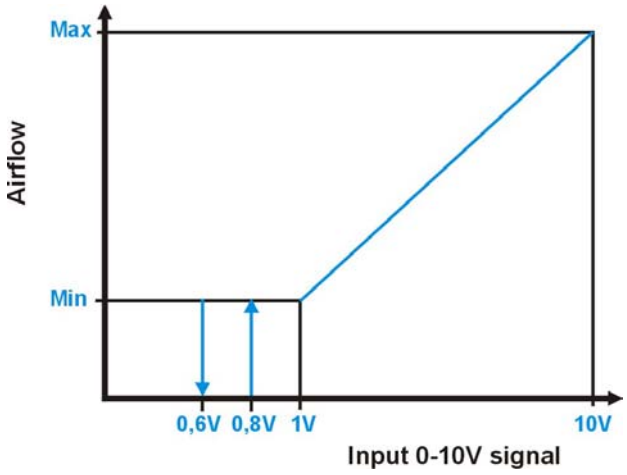
Figure 5 : Wiring diagram for 0-10V input signal.

For correct operation, Pins 1 and 5 of the RJ-12 must both be connected to approximately 12 volts (10 volts to 15 volts is acceptable), and capable of sourcing 20mA. The input of the 0-10V consists of two 10 kohms. The inout impedance is then 20 kohms. The impedance of the 0-10V source has to be as low as possible to reduce the error.
Examples: a 2 kohms impedance causes a 10% error, a 200 ohms impedance causes a 1% error.

5.2.3 Airflow selection:

Figure 6 shows the link between the 0-10 V input signal and the airflow:
An input of 10V will produce the maximum airflow output, whilst an input of 1V will produce the minimum airflow output. Inputs between 1V and 10V will produce a proportional change in airflow, whilst an input voltage of 0V will cause the unit to turn off.

If the unit is off, the unit requires approximately 0,8V before it will turn on, and any increase between 0,8V and 1V will produce the minimum airflow. Once the unit is operating, the input voltage must be reduced to less than approximately 0,6V to turn the unit off. This hysteresis minimises erratic turn on/off behaviour.



Fan Type	*Airflow min*	*Airflow max*
DS 133-52 35W	*25 m³/h*	*250 m³/h*
DS 140-60 TH 75W	*30 m³/h*	*300 m³/h*
DS 140-60 75W	*40 m³/h*	*400 m³/h*
DS 140-60 250W	*55 m³/h*	*550 m³/h*
DD 160-160 250W	*80 m³/h*	*800 m³/h*

Figure 6 : Link between 0-10V input and airflow.

5.3 Setup characteristics for PWM input

The airflow is modified from minimum to maximum as the input PWM is varied from 10 to 100%.

5.3.1 Jumper settings for concatnt airflow with PWM input :

Input type	Jumper 1	Jumper 2	Jumper 3
PWM	ON	ON	ON

5.3.2 Wiring specifications :

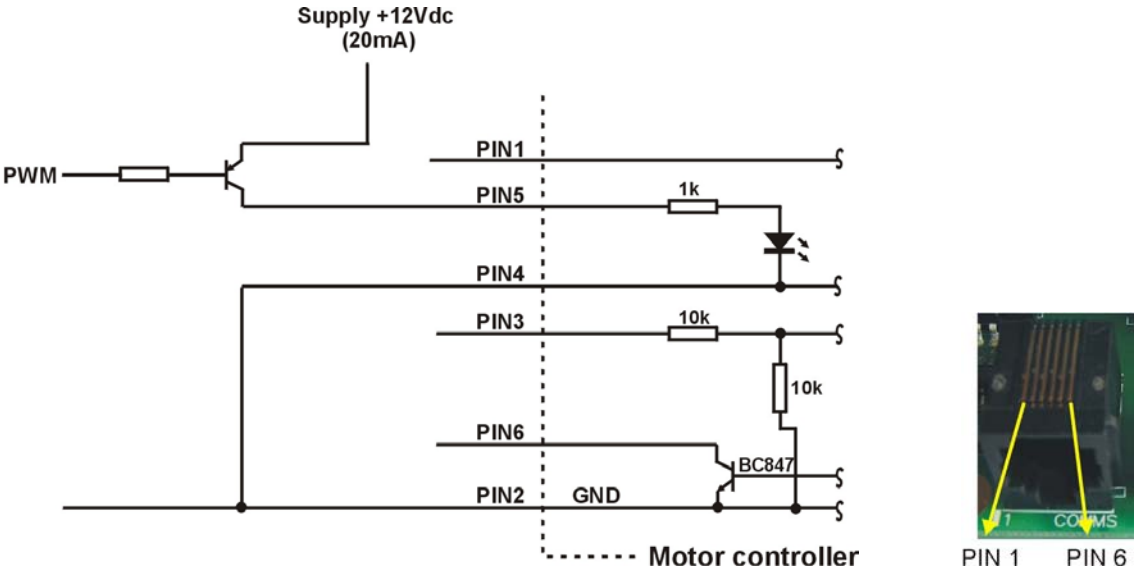


Figure 7.a : PWMa input schematic.

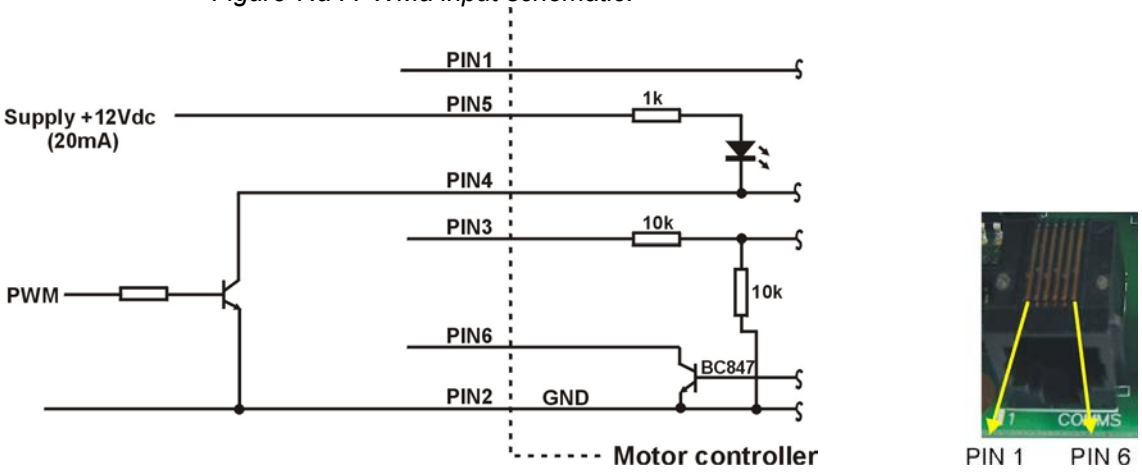


Figure 7.b : PWMb input schematic.

For correct operation, only Pin 5, Pin 4 and Pin2 need be connected. For correct operation, the LED current must be approximately 3mA, and the PWM frequency must be greater than 50Hz and less than 5kHz. Note that duty-cycle refers to the current in the LED – higher duty cycle produces more average LED current which produces more controller output. Since it is possible to 'source' or 'sink' current for the LED, a voltage input can be used in either the PWMa or PWMb configuration to change the polarity of the duty cycle.

5.3.3 Airflow selection:

Figure 8 shows the link between the PWM input signal and the airflow:
An input of 100% will produce the maximum airflow output, whilst an input of 10% will produce the minimum airflow output. Input between 10 and 100% will produce a proportional change in airflow, whilst an input PWM of 0% will cause the unit to turn off.

If the unit is off, the unit requires approximately 8% before it will turn on, and any increase between 8% and 10% will produce the minimum airflow. Once the unit is operating, the input PWM must be reduced to less than approximately 6% to turn the unit off. This hysteresis minimises erratic turn on/off behaviour.

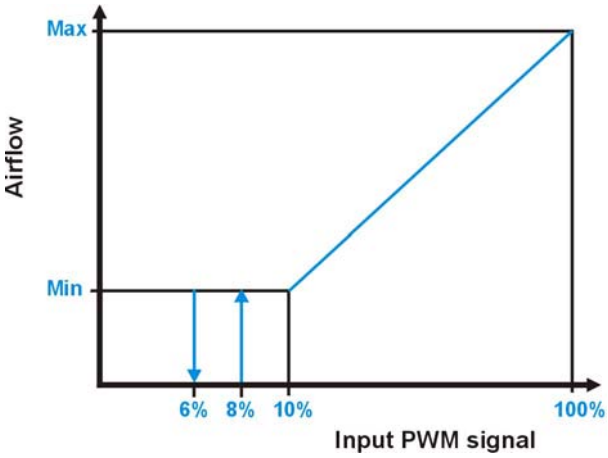


Figure 8 : Link between PWM input and airflow.

Fan Type	*Airflow min*	*Airflow max*
DS 133-52 35W	*25 m³/h*	*250 m³/h*
DS 140-60 TH 75W	*30 m³/h*	*300 m³/h*
DS 140-60 75W	*40 m³/h*	*400 m³/h*
DS 140-60 250W	*55 m³/h*	*550 m³/h*
DD 160-160 250W	*80 m³/h*	*800 m³/h*

5.4. Setup characteristics for digital inputs

The nominal airflow is selected via the 8 position potentiometer and a multiplier (25, 50, 75, 100%) is selected via the M1/M2 inputs.

5.4.1 Jumper settings for constant airflow

Input type	Jumper 1	Jumper 2	Jumper 3
Mains inputs	ON	ON	OFF

5.4.2 Wiring diagram:

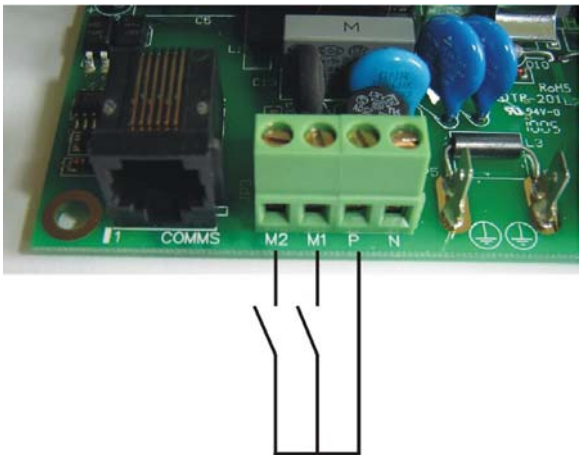


Figure 9: Mains inputs schematic

5.4.3 airflow selection:

1) Nominal (100%) airflow selection

Potentiometer position		1	2	3	4	5	6	7	8
Airflow (m³/h)	DS 133-52 35W	115	135	155	175	195	210	230	250
	DS 140-60 TH 75W	140	165	185	210	230	255	280	300
	DS 140-60 75W	185	220	250	280	310	340	370	400
	DS 140-60 250W	255	300	340	385	425	465	510	550
	DD 160-160 250W	375	435	495	555	620	680	740	800

These positions are indicated on the circuit board by the silk-screened numbers surrounding the potentiometer. For reliable results, the potentiometer needs to be set to the centre of the required region.

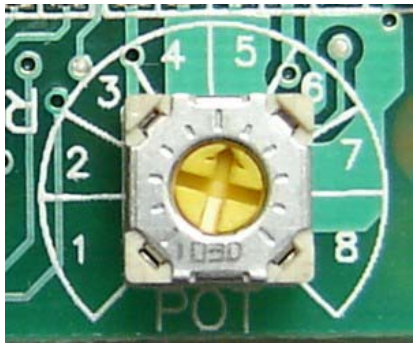


Figure 10: Potentiometer on position 5.

2) Multiplier selection

M2	*M1*	*Multiplier*
OFF	OFF	25%
OFF	ON	50%
ON	OFF	75%
ON	ON	100%

5.5 Setup characteristics for serial input

Input type	Jumper 1	Jumper 2	Jumper 3
Serial address 1 (ID4)	OFF	OFF	OFF
Serial address 2 (ID5)	OFF	OFF	ON

This control mode allows the unit to be controlled solely by the serial interface.

The serial protocol then allows selection of constant speed, constant torque or constant airflow (see *DT PTAC Motor communications protocol for OEMs* document available on request).

6. Constant torque / Constant rotation speed

In constant torque mode, the controller regulates the resultant torque to be a constant. In constant rotation speed mode, the controller regulates the resultant speed to be a constant.

Contact us.

7. Tacho out output

Tacho output is an open-collector output as shown hereunder:

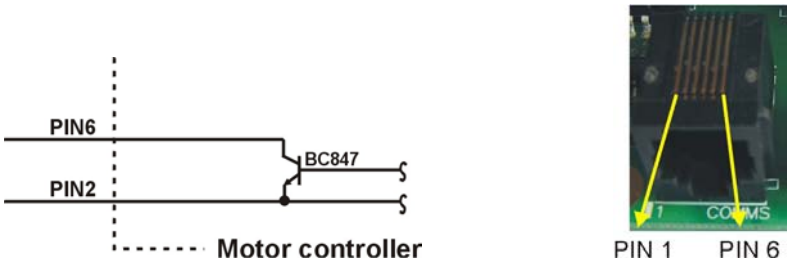


Figure 11 Tacho out output

It consists of a BC847 transistor capable of sinking up to 3mA.

The output is pulsed LOW with a duty cycle of 25% at three times the motor frequency. For example, if the motor is rotating at 1200 rpm, the frequency of the output is 60Hz, the pulse is LOW for 4.16 milliseconds and HIGH for 12.5milliseconds. Note that a pull-up resistor of a suitable value must be connected to see a HIGH.

Tacho output signal is available in all control modes (Torque, Speed or Airflow) except for Serial.

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