DC FAN MOTOR FUNCTIONS & CONNECTIONS

0. Reverse Polarity Protection

All ***PELKO Motors*** DC Fans are reverse polarity protected in order to avoid damage of the fan in case the RED (+) and BLACK (-) wires are connected oppositely. The fans are protected at least if the maximum specified voltage is applied in reverse.

1. Locked Rotor Protection

All ***PELKO Motors*** DC Fans are locked rotor protected ELECTRONICALLY. The current is reduced to zero when the fan blade is force-stopped and the fan motor will try to restart at specific time internals. If the rotor is freed to move, normal operation will resume. Otherwise the locked rotor protection will remain in effect, as shown below. (See Fig. 1)

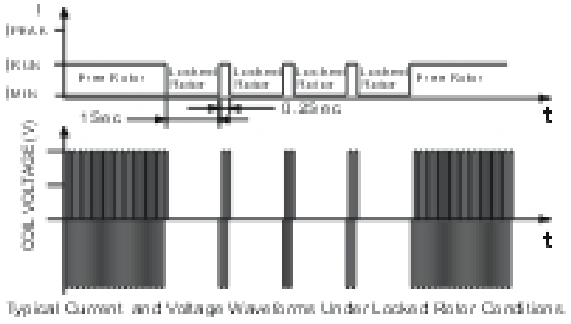

Fig. 1

2a. Frequency Generator (Tachometer Output, (FG), **Yellow Wire**)

In order to monitor the speed of the fan, a signal output is generated (Yellow wire) by means of an OPEN COLLECTOR or OPEN DRAIN arrangement as shown below. The user is required to connect an external resistor to the yellow wire and the other end of the resistor must be tied to an external power supply (or to the fan's same power supply) maintaining the same ground potential with the Fan's power supply. For most of our models the maximum power supply voltage must not exceed 35V and the maximum external resistor current must not exceed 20mA. (See Fig. 2)

Caution: For some models the maximum voltage may not exceed 15V and the maximum current should not exceed 5mA.

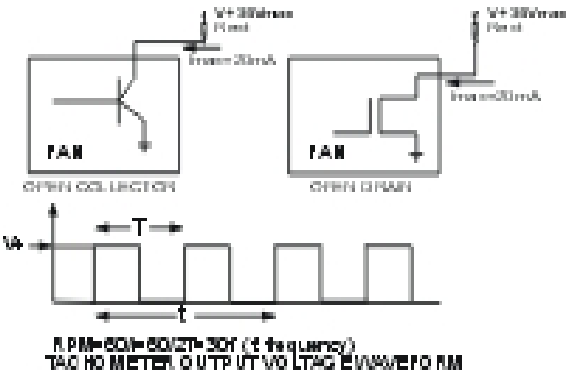

Fig. 2

2b. RD Output (**Grey wire**)

This output can be connected exactly the same way as the FG wire and the output toggles HIGH or LOW:
Output signal HIGH = Motor Stalled
Output signal LOW = Motor Running

3. Stop & Go Function (S/G, **Blue wire**)

This is an input of 10K minimum input resistance where a logic level signal can be applied and serves two purposes:

a. When a DC voltage signal is applied 3~30V then the motor is stopped and its current is reduced to about zero. When this input is open or at ground the motor is not affected by this input. Note: In some models, the motor is stopped if S/G is at Ground (this way the S/G input can be driven by an OPEN collector driver).

b. The S/G input can also serve as external PWM control. By applying a pulse of frequency 300~400Hz and varying the pulse width, the motor speed can be changed. (See Fig. 3)

PPWM EFFECT AS A RESULT OF APPLYING EXTERNAL PULSE OF VARIABLE PULSE WIDTH

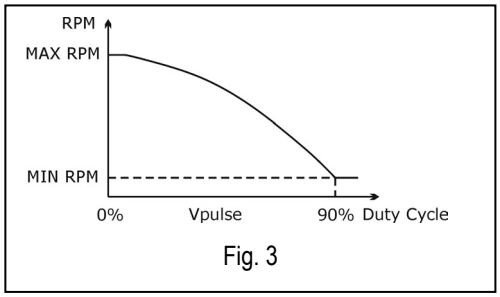

Fig. 3

4. Over-voltage Protection (OV)

Many of ***PELKO Motors*** models offer this optional feature. With this feature the fan motor is protected (current drops to about zero) in accidental abuse of applying voltages over the specified maximum operating voltage.

5. PWM, Temperature Sensing Green Wire)

This input is provided for AUTOMATIC speed control purposes by positioning an NTC thermistor internally (or externally) or for MANUAL speed control by an external variable resistor. The selected speed in this case **will not** be independent to power supply variations.
NOTE: IF SPEED CONTROL IS NOT REQUIRED THE GREEN WIRE SHOULD BE CONNECTED TO THE GROUND WIRE

6. Current Limit Control (CL)

Many of ***PELKO Motors*** models have this option as a standard feature. With this feature the motor starts smoothly without inrush current, which maybe hostile to the power supply or interfere with delicate equipment sharing the same power supply. Also, under rocked rotor conditions the restarting (AUTOSTART) CURRENT IS APLIED SMOOTHLY FOR A SHORT PERIOD OF TIME AND STILL NOT EXCEEDING THE MAXIMUM OPERATING CURRENT OF THE FAN. By this technique, a locked rotor fan will have less than its normal running temperature.

7. Constant Speed, (CS), **White Wire**)

The CS input (White wire) can be used to vary the speed of the fan motor by the following ways:

a. **RPWM**: An external variable resistor can be connected from the CS input to ground. The value of the external variable resistor depends on the maximum RPM of the fan and on the speed range to be controlled. The external resistor may consist of one fixed resistor (or trimming resistor) and one variable resistor of standard value. The sum of the two resistors is in the range of 100~250KΩ. To select the correct resistor value for a given application, insert a variable resistor and increase it until the fan speed is just starting to be reduced. Measure this resistor value (e.g. R1). Then increase further the value of the resistor until the minimum desirable RPM is obtained. Measure this resistor value (e.g. R2). Based on the above measurements of R1 and R2, select a fixed resistor a little lower than the value of R1 and use a variable resistor of value equal to R2-R1 to obtain full dynamic range of your variable resistor. (See Fig.4)

b. **TPWM (Temperature Sensing):** The method described in 8a can be used for the connection of an NTC thermistor, which replaces the manually variable resistor used in 8a. The selection of the NTC thermistor value will then correspond to the equivalent variable resistor range for the temperature range required for the application. (See Fig. 5)

c. **VPWM :** The fan motor speed can also be varied by the application of a DC voltage signal to the CS (white wire) input as shown below: (See Fig. 6)

NOTE: When CS input is used for speed control, the selected speed will remain constant over a certain power supply range variation (RPM vs. Power Supply Variation (See Fig. 7)). **IF CS NOT USED IT SHOULD BE LEFT OPEN.**

RPWM or **NTC** Effect As Result of Increasing External Resistor or Decreasing Temperature

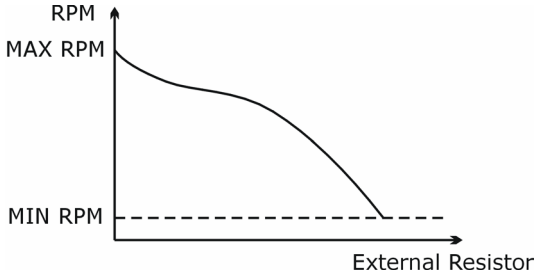

Fig. 4

TPWM PQ Characteristic Using **NTC**

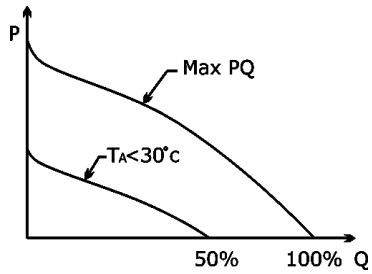

Fig. 5

VPWM Effect As result of Varying External VDC Signal

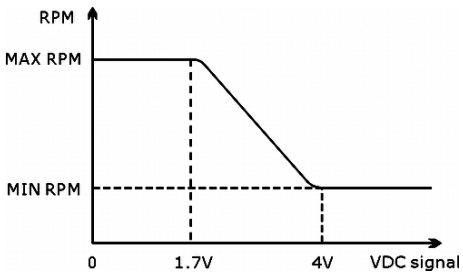

Fig. 6

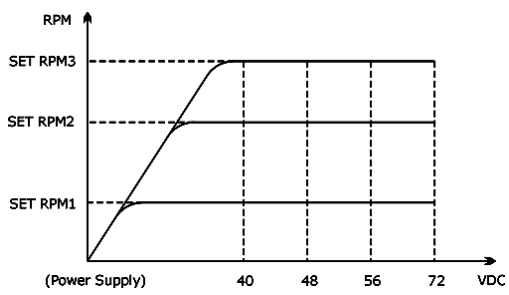

Fig. 7