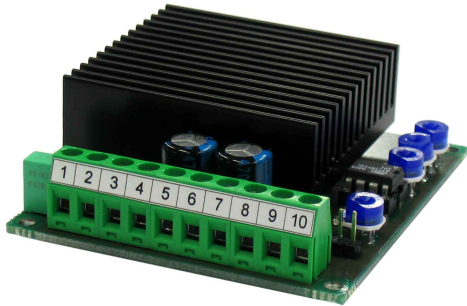


# EM-176 DC-MOTOR CONTROLLER

## 12/24Vdc 10A



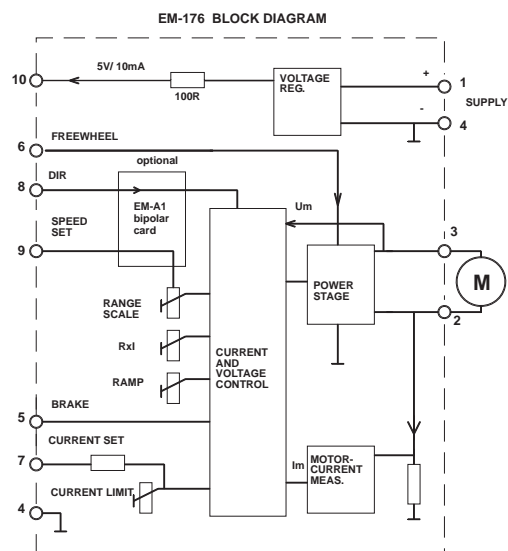
### FEATURES:

- 4 Quadrants
- Braking
- Freewheeling
- Reversal
- 0...10V control
- Optional  $\pm 10V$  control
- Soft start ramp
- Adjustable current limit
- Load compensation ( Rxl )
- High efficiency
- High peak loading capacity
- Rail mountable

EM-176 is designed for DC-motor speed control. The unit can be used with unregulated DC supply. Motor loading can be compensated with inbuilt Rxl-type adjustment. EM-176 utilizes PWM driven H-bridge, thus achieves high efficiency and extensive controlling options. Speed control value can be set with voltage signal or with potentiometer, there is an auxiliary voltage signal output for potentiometer use. The scale trimmer can be used to scale set value to correspond better the motor rpm. An auxiliary card can be fitted into EM-176 for bipolar input controlling with voltage signal or potentiometer. The ramp feature is used to limit the motor start and brake speed, in other words soften the operation and prevent the occurrence of current spikes. The current limit limits motor torque that is current; this protects the motor and the mechanics. The unit has separate inputs for brake, freewheel and reverse. Brake short-circuits the motor poles and produces powerful braking. Freewheel detaches the power stage from the motor and leaves motor rotating freely. Reverse changes motor rotating direction, this is done using the set ramp times. Brake and freewheel bypass the ramp feature.

### TECHNICAL DATA:

Supply	12-35Vdc
Over voltage protection	39V
Idle current	approx. 30mA
Motor current	10A cont. ( $T_a < 50^\circ C$ ) 15A peak ( 20% on/ 80% off )
Motor voltage	0-29V ( 0-100% )
Current limit	adj. 0...15A
Current lim. volt. ctrl	0...5V ( 0...15A )
Ramp time	adj. 0...3s
Voltage loss	1.2V ( $I_m = 10A$ )
Operating freq.	25kHz
Aux. voltages	+5V 10mA ( option -5V )
Set value range	0...5 or 0...10V ( $\pm 5V$ or $\pm 10V$ option )
Set value input imp.	100kohm ( pin 7 and 9 )
Control voltage	"on" when $U_{in} 4 - 30V$ "off" when $U_{in} 0-1V$ or open
Control input imp.	10kohm ( pin 5, 6 and 8 )
Operating temp ( $T_a$ )	-20...+70
Measures	65x73x30mm
Weight	approx. 100g



# EM-176 WIRING AND INSTALLATION

## INSTALLATION EM-176

Supply voltage 12-35VDC, ripple <30% at full load.  
**CAUTION !** Wrong polarity may damage the device.  
**CAUTION !** The device is not equipped with an internal fuse.

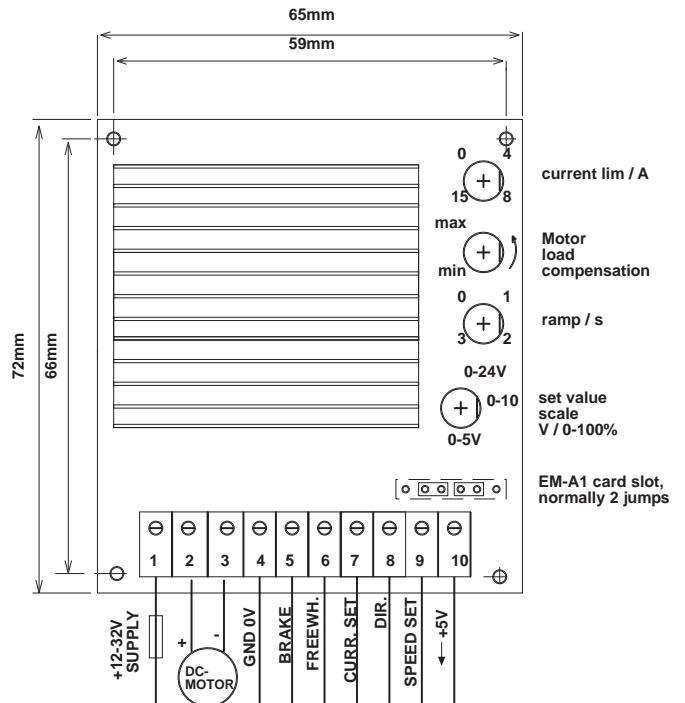
## SETTINGS AND ADJUSTMENTS

Set trimmers in center position. Current limit can be set in the range of 0-15A. If an external voltage signal (0-5V) or potentiometer is used to set the current limit, set the inbuilt current limit trimmer to 0-position.

The compensation (Rxl) is used as follows: first set the motor running slowly. Then increase compensation until the motor starts twitching. Now decrease compensation a little so that the twitching ends. Finally test the operation: when loading the motor, the rotation speed should almost remain constant.

The acceleration- and braking ramp are set with trimmers in the range of 0-3s (the time from zero to full speed or vice versa). The speed can be set with potentiometer or with 0-5V voltage signal. With the set value trimmer the set value range can be scaled to match the motor rotating speed range.

If the use of bipolar control signal is desired, an auxiliary card EM-A1 can be fitted onboard, which makes it possible to use either  $\pm 5V$  or  $\pm 10V$  control voltage signals. EM-A1 card also gives -5V auxiliary voltage into pin8; this enables potentiometer to be used to control both speed and direction (forward-stop-reverse).

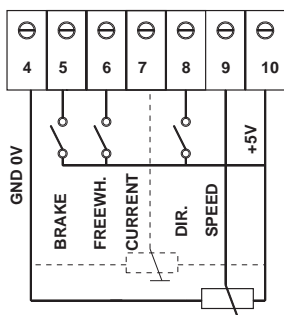


**CAUTION !**  
**Wrong polarity can damage the device.**  
**Select a fuse (1-16A) in accordance with the application.**

### EXAMPLE 1

CONTROLLING WITH SWITCHES.  
 SPEED SET WITH POTENTIOMETER.  
 SPEED RANGE ADJUSTABLE WITH SPEED SET RANGE ADJUSTMENT.

CURRENT LIMIT CAN BE SET WITH INBUILT TRIMMER. IF EXTERNAL ADJUSTMENT IS USED, SET THE INBUILT CURRENT LIMIT TRIMMER TO MINIMUM.



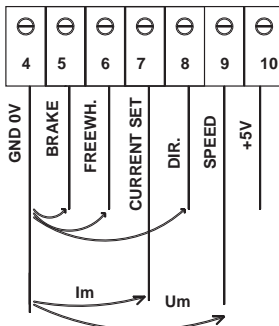
### EXAMPLE 2

CONTROLLING WITH VOLTAGES.

CURRENT 0-5V CORRESPONDS TO 0-15A.  
 CURRENT LIMIT TRIMMER IS SET TO MIN.

SPEED 0-5V CORRESPONDS TO 0-100%  
 SPEED. SCALE WITH TRIMMER.

DIRECTION, FREEWHEEL OR BRAKE  
 0-1V OR OPEN=OFF, 4-30V=ON.



### EXAMPLE 3 (OPTIONAL)

EM-A1 BIPOLAR-CARD INSTALLED.

CONTROLLING WITH POTENTIOMETER  
 FORWARD/REVERSE OR WITH VOLTAGE  
 SIGNAL ( $\pm 5V$  OR LARGER BIPOLAR  
 VOLTAGE). RANGE ADJUSTABLE WITH  
 RANGE SCALE TRIMMER ADJUSTMENT.

OTHER CONTROLS AS IN PREVIOUS  
 EXAMPLES.

