TR-EM-208 STARTER AND CURRENT LIMIT FOR DC-MOTORS 12-35V 1-20A

FEATURES
• **soft start**
• **soft stop**
• **limit switch input (stop)**
• **brake**
• **adjustable current limit**
• **impulse / continuous**
• **pos. / gnd control logic**
• **cmos / TTL / switch**
• **thermal protection**

TR-EM-208 is designed specially for spindle motor use. Adjustable soft start, soft stop and current limit are main features of the card. Additionally impulse or continuous type control can be selected as the control mode. Control input can be set to positive or negative (gnd) logic. Card has control inputs for forward, reverse and stop commands.
Stop has the highest priority and will be executed even if forward or reverse command is on. After stop, restarting can be done in both directions or only in reverse direction, according to condition setting. During acceleration ramp and settling time the motor current is limited to 150% of the adjusted current limit value. After this start period, exceeding current limit will stop motor immediately. Current limit activation will always be indicated with error output and error led. In overheat situation the thermal protection will be activated and it will switch off the control. This will be indicated with error output and with led blinking.

TECHNICAL DATA

supply	12-35Vdc (ripple max. 30%)
max. current	12A cont.
	20A 30% on / 70% off
idle current	10mA typically
current limit	range1 1-5A (start 1.5x)
	range2 5-10A (start 1.5x)
	range3 10-20A (start 1.5x)
therm. protection	120°C
start ramp	0-3s adjustable
free deceleration	0-3s adjustable
operating freq.	2kHz
voltage loss	0.6V (Im 12A)
control inputs	"1" = 4-30Vdc , "0" = 0-1V
error output	NPN open-coll. 30V 50mA
oper. temp.	-10...60°C
weight	105g

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TR-EM-208 SETTINGS AND CONNECTIONS

Fig 1

Fig 2 - forward, reverse and stop input   Fig 3 - error output and led
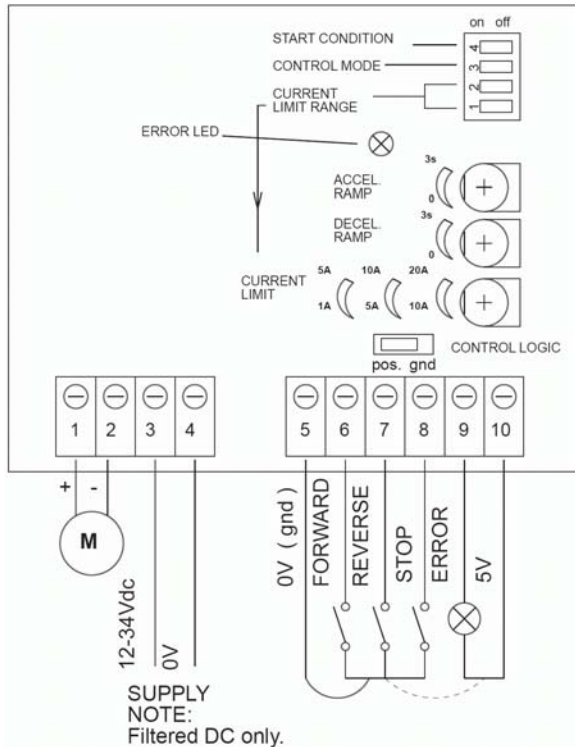

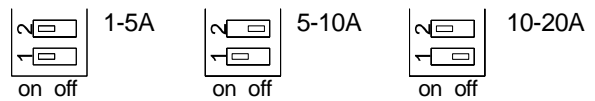Fig 4 - thermal protection

START CONDITION switch 4

"ON" = after STOP command or exceeding the current limit
activation start only in reverse direction
"OFF" = after STOP command or exceeding the current limit
activation start in either direction

CONTROL MODE switch 3
"ON" = impulse control, start with FORWARD or REVERSE
control, stop with STOP or FORWARD or REVERSE
"OFF" = continuous drive, motor will only run as long
as there is active FORWARD or REVERSE command

CURRENT LIMIT RANGE switches 1 & 2
First choose coarse current range (on+on = off+off)

 1-5A   5-10A   10-20A

ACCELERATION RAMP
set acceleration time 0-3s.

DECELERATION RAMP
Set the free deceleration time before braking, 0-3s.
NOTE: If D-ramp is set to 0s, the control commands will
be executed immediately regardless of the previous
command or the command under execution at the time.

CURRENT LIMIT
current limit fine adjustment.

CONTROL LOGIC switch, gnd- / pos-logic
Select control as gnd(NPN) or positive (PNP) control.
If positive control is used, 5V reference output or
external 4-30Vdc can be used.

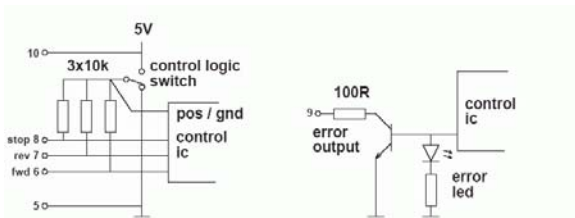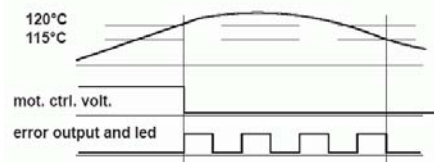New settings will be loaded when card status is stop.

All control commands in Fig. 2
operate with so called positive logic
(PNP-control, positive voltage
commands). It is also possible to
use GND controlling, in which all
commands operate activate with zero
voltage (NPN-control, inversely to
positive control).

SPECIAL situation (Fig.4) with thermal
protection activated. When thermal
protection activates (t >120°C), motor
stops and error output starts to blink
at 1Hz. The controller will execute
new commands only when the temperature
of the controller goes down to 115°C.
At this point also the error output
will stop blinking. In order to execute
a new command, command inputs must
first be set to zero.

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TR-EM-208 TIMING CHART

A: Normal start with forward command. Motor voltage will rise along accel.-ramp (ramp time A->B adjustable 0-3s).
C: Command aborted, motor voltage drops, motor runs freely during free deceleration C->E (time adjustable 0-3s). New commands (D) won't affect the operation. After free deceleration, the controller will switch to braking at point E, in other words motor poles will be short circuited (braking). With impulse control either "new" command will stop. During C->E new impulses will not activate a start.
F: Start with reverse command.
G: Stop input changes 0->1 and stops the motor. Motor will remain in this condition until a new command is assigned. Start condition setting applies to this moment, restart can be activated in both directions or only in reverse direction.
H: New start attempt, if old command is still on, new command will not be executed. When old command exits, new command must first be set to zero before it will be executed.
Notice that new stop command will activate only after stop is first set to zero, in other words changed 0->1 at point I.
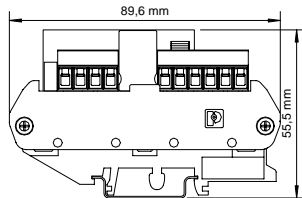
J: Start, in which motor will exceed current limit already during acceleration ramp J->L, at point K current is 1.5 times adjusted current. Controller starts to limit motor current by limiting control voltage.
L: Settling time L->M (constant 0.5s), motor current is still being limited. During this time, if motor current will not decrease to current limit range, the controller will switch off motor voltage.
N: If motor current exceeds set limit after acceleration and settling time, control will be switched off as in point N. Motor will be stopped and error output and led will be activated.
O: After over current switch off, restart is possible either in both directions or with only reverse control, see start conditions on first page. Restart resets error output and led.
! Activity with continuous control mode is illustrated with solid line.
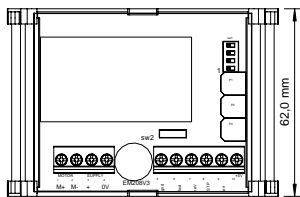! Activity with impulse control mode is illustrated with dashed line.
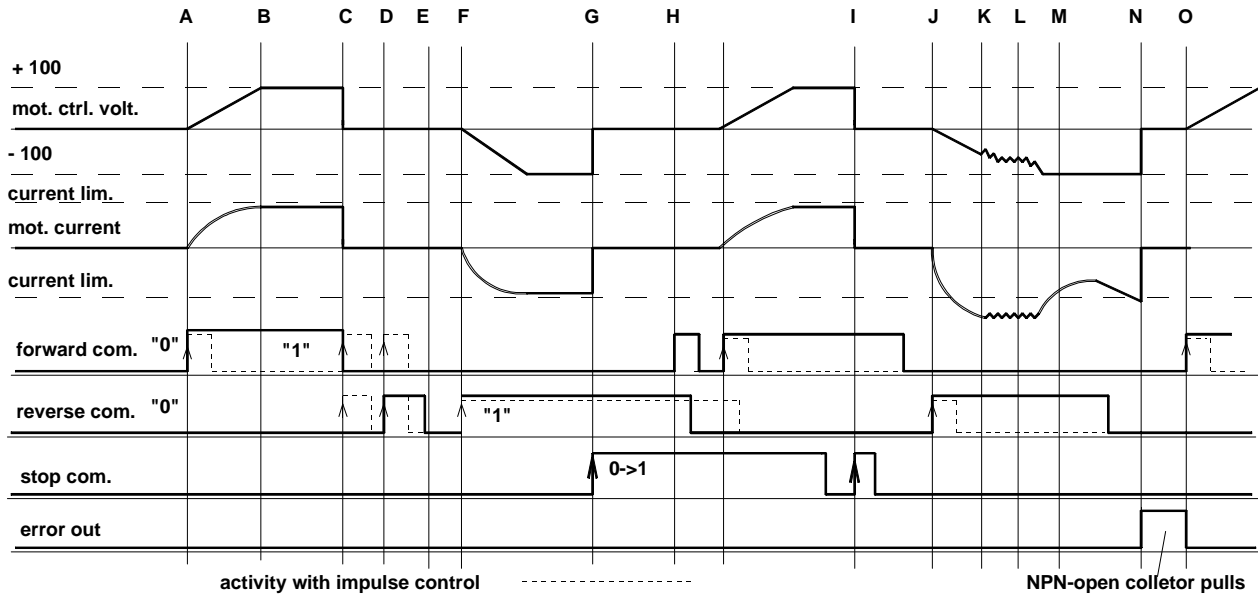
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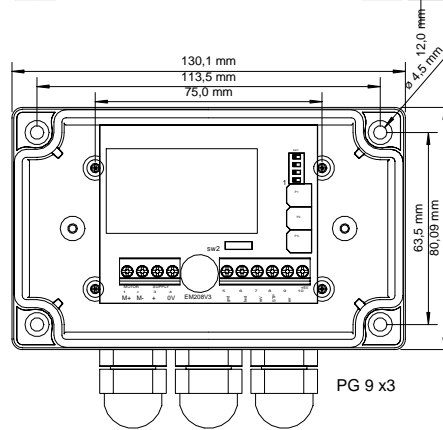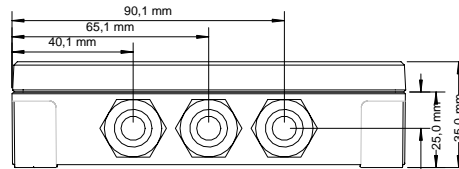# TR-EM-208 Housing options

TR-EM-208-R

89,6 mm
55,5 mm

Fits to 35 mm DIN-rail or C-rail.

62,0 mm

Phoenix Contact UM 72 profile rail base

TR-EM-208-H

90,1 mm
65,1 mm
40,1 mm
25,0 mm
35,0 mm

130,1 mm
113,5 mm
75,0 mm
ø 4,5 mm
12,0 mm
63,5 mm
80,09 mm

PG 9 x3

Fibox PC100/35LG IP66 housing

TR-EM-208-T-230
(TR-EM-000-T-230)

130,1 mm
ø 4.5 mm
180,1 mm

L PE N

PG 13.5 x3
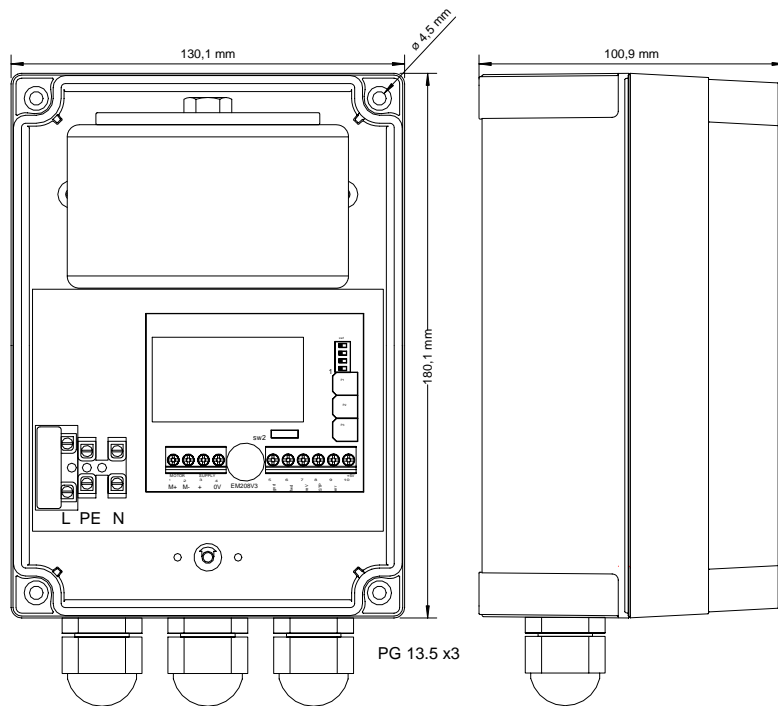
Fibox PC150/100HG IP66 housing

100,9 mm

Power output

voltage (V)
35,0
30,0
25,0
20,0
15,0
10,0
5,0
0,0

0,0   2,0   4,0   6,0   8,0   10,0   12,0
current (A)

Duty cycle vs. current

duty cycle (%)
120,0
100,0
80,0
60,0
40,0
20,0
0,0

0,0   2,0   3,5 4,0   6,0   8,0   10,0   12,0
current (A)
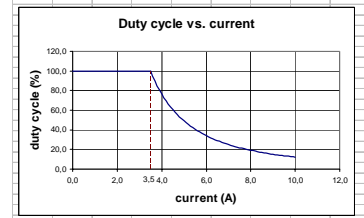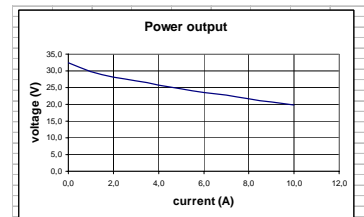
Technical data

Supply voltage	230 Vac
Fuse	T1.6A / 20.0 x 5.0 mm
Transformer	230 / 22 Vac / 150 VA
	Max output 10 A
	(12% duty cycle),
	continuous 3.5 A
Filtering	8800 uF
Weight	2.4 kg

Product is EMC-tested and CE-marked.