Control wiring applications for BLDC drivers EM-352, 356B/C , 366A firmware v1.7

The list on the right side shown available control functions of EM- versatile series BLDC drivers. These functions can be set and adjusted with parameter, which can set with EM-236A , EM328 or Rs-485

The default parameters are select so that driver can be used only with potentiometer. When you get motor run well with potentiometer control then you could try other control combination. Below has shown few examples, we hope that these helps you find right setting for your own application.

Meaning of markings

"0" = input is open or 0-1V

"1" = input is 4-30V

"0->1" = input change low to high

"1->0" = input change high to low

"free" means that Power stage set as open circuit and motor do not resist rotation

SPEED   Analog speed signal input, range adj. with par. 6 and 7. max. range is 0-10V
if input 0-50mV then speed = 0, with values over 50mV = speed setting

TORQUE   Analog torque signal input, can be activated with par. 13 range 0-5V
Value < 100mV will set speed adjust = 0 (stop)

START/STOP   "0->1" starts , if this is "0" or "open" then stop and keep stopped.
LOCAL/ BUS   this selects control source, default set is LOCAL, par 11= 0

IMPULSE MODE   "0->1" impulse starts or stops Pin 15 starts FW and pin 16 starts BW
(start fw-bw / stop)   but if the motor already is running, either "0-1" impulse will stop.

STOP   "0->1" stops, but "1" not prevent new start
STOP FW   "1" stop and disable run FORWARD
**STOP BW**   "1"stop and disaple run BACKWARD

DISABLE/RES   "1" stops motor and set the power stage to "free" as long as "1".
Also "0-1" reset I-trip alarm. When this command set back
to "0" , then the motor will start to the set speed value.

DIRECTION.   Changes rotation direction. "0 " = FORWARD and "1" = REVERSE.
The change "0->1" or "1->0" will change direction via with stop and
start ramps, After safety stop or end stop, changing this causes a start

SAFETY STOP   Safety switch input, "1->0" will stop the motor and set the power stage
to "free".   New start is possible only opposite direction

SPEED-2   "1" activates preset speed which is set with par. 13

POWER ON MODE This defines the state when power switch on, In disable mode
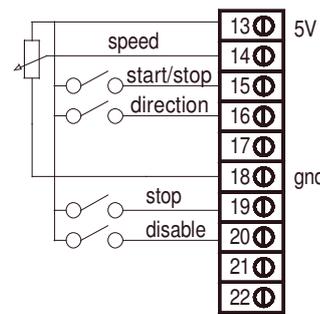driver will not start directly, This can be set with par. 15
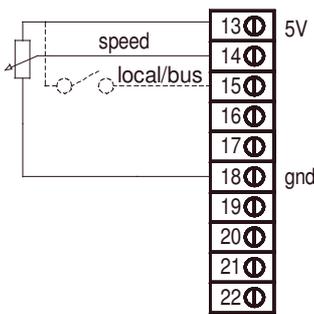
Start up mode
(with default par. settings)

Par. 11 = 0   (pin 15)
Par. 13 = 50 (pin 19)
Par. 20 = 0   (pin 20)

Local/bus switch is not neccessary. Switch open means local

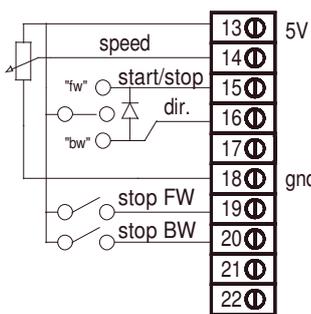Also signal 0-5 or 0-10 V can be used for speed setting to pin 14

Basic Local mode

Par. 11 = 3   (pin 15)
Par. 13 = 1   (pin 19)
Par. 20 = 0   (pin 20)

Speed input range adjustment can be done with par. 6 & 7

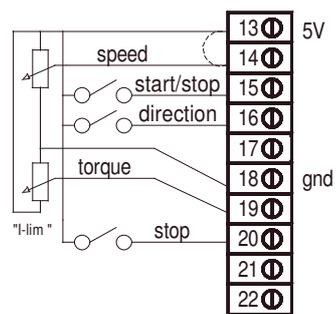For pins 19 and 20 can be selected different functions with par 13 and 20.

Speed and 1-0-2 switch

Par. 11 = 3   (pin 15)
Par. 13 = 2   (pin 19)
Par. 20 = 4   (pin 20)

Speed input range adjustment can be done with par. 6 & 7

Also signal 0-5 or 0-10 V can be used for speed setting to pin 14

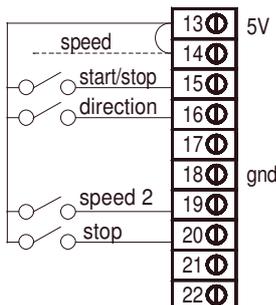Instead of diode there can be used two pole switch for BW dir. to give start signal

Torque adjust mode

Par. 11 = 3   (pin 15)
Par. 13 = 0   (pin 19)
Par. 20 = 2   (pin 20)

Speed input scaling with par 6 & 7

Torque input scale 0-5V

If wanted to use torque adjust only then pin 13 and 14 can be linked and leave potentiometer away

Two speed mode

Par. 11 = 3   (pin 15)
Par. 13 = 35 (pin 19)
Par. 20 = 2   (pin 20)

Speed-2 is set with with par. 13 (35%)

Speed adjustment with par. 6 and 7

if link pin 13 to 14 will removed then speed setting is available with signal or potentiometer to pin 14
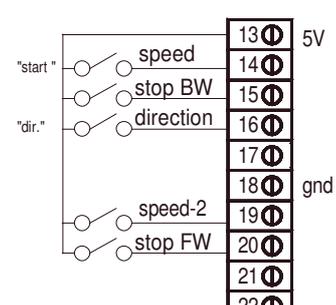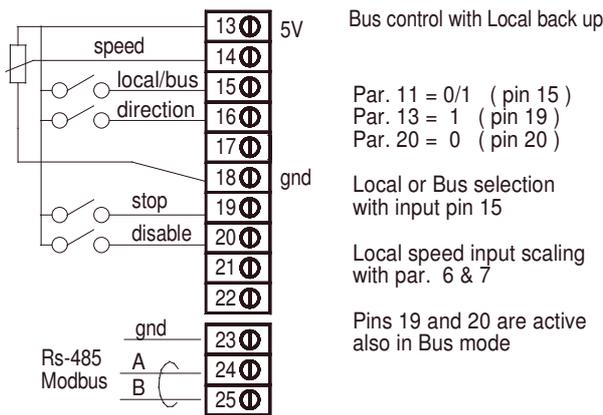

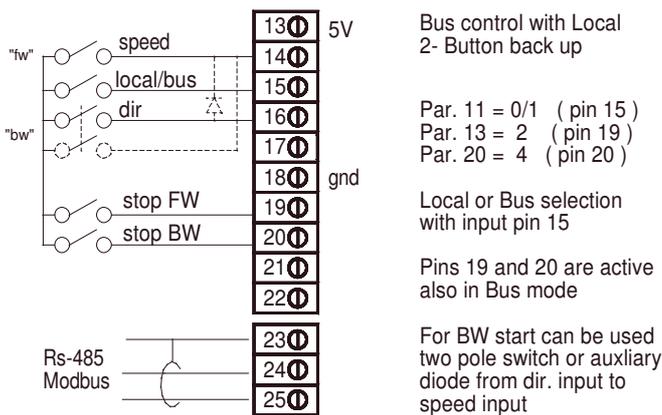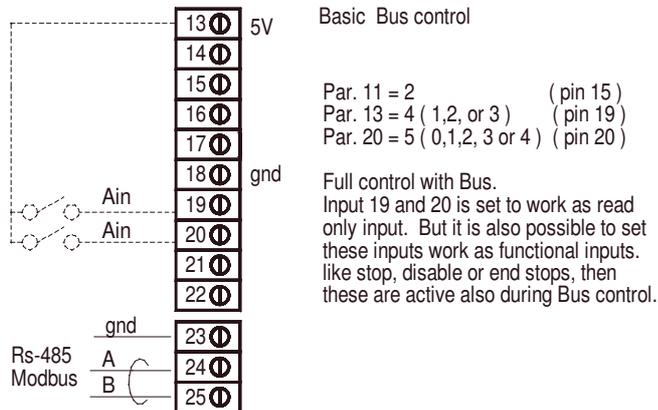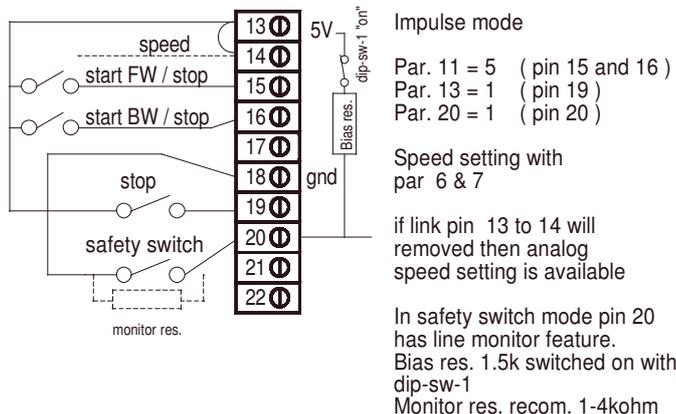
Two speed mode opt. 2

Par. 11 = 6   (pin 15)
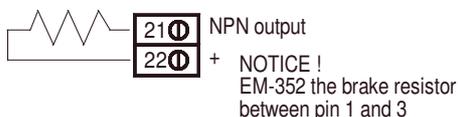Par. 13 = 50 (pin 19)
Par. 20 = 3   (pin 20)

Speed setting with par. 6 & 7

Speed-2 setting with with par. 13
In this example Speed-2 is 50%

when pin 15 is not set to start/stop, then speed input can be used for start up

Impulse mode (pin 13, 14 "5V"; 15 start FW / stop; 16 start BW / stop; 17; 18 gnd; 19 stop; 20 safety switch; 21, 22)

speed
start FW / stop
start BW / stop
stop
safety switch
monitor res.
dip-sw-1 "on"
Bias res.

Impulse mode

Par. 11 = 5 (pin 15 and 16)
Par. 13 = 1 (pin 19)
Par. 20 = 1 (pin 20)

Speed setting with
par 6 & 7

if link pin 13 to 14 will
removed then analog
speed setting is available

In safety switch mode pin 20
has line monitor feature.
Bias res. 1.5k switched on with
dip-sw-1
Monitor res. recom. 1-4kohm

Basic Bus control

Ain
Ain
gnd
Rs-485 Modbus A B

Basic Bus control

Par. 11 = 2 (pin 15)
Par. 13 = 4 (1,2, or 3) (pin 19)
Par. 20 = 5 (0,1,2, 3 or 4) (pin 20)

Full control with Bus.
Input 19 and 20 is set to work as read
only input. But it is also possible to set
these inputs work as functional inputs.
like stop, disable or end stops, then
these are active also during Bus control.

Bus control with Local 2-Button back up

"fw"   speed
local/bus
"bw"   dir
stop FW
stop BW
Rs-485 Modbus

Bus control with Local
2- Button back up

Par. 11 = 0/1 (pin 15)
Par. 13 = 2 (pin 19)
Par. 20 = 4 (pin 20)

Local or Bus selection
with input pin 15

Pins 19 and 20 are active
also in Bus mode

For BW start can be used
two pole switch or auxliary
diode from dir. input to
speed input

Bus control with Local back up

speed
local/bus
direction
stop
disable
gnd
Rs-485 Modbus A B

Bus control with Local back up

Par. 11 = 0/1 (pin 15)
Par. 13 = 1 (pin 19)
Par. 20 = 0 (pin 20)

Local or Bus selection
with input pin 15

Local speed input scaling
with par. 6 & 7

Pins 19 and 20 are active
also in Bus mode

BRAKE OUTPUT

21 NPN output
22 +

NOTICE !
EM-352 the brake resistor
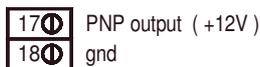between pin 1 and 3

Braking resistor mode

Brake out is NPN power out. it can be used to switch on
braking resistor if voltage will rise too high as a result of
regeneration, for example when motor slowing down.
Recommended resistor type is wirewound and power rate of
resistor can be typically 10-50% of motor power.

This mode can be activated with set par. 19 = 0 or 1.
The threshold voltage adjust with parameter 18, and the value
could be 10-20% higher than idle voltage of used power supply.
For example unregulated power supply voltage is 27V,
then parameter 18 could be 32. This means that Braking resistor
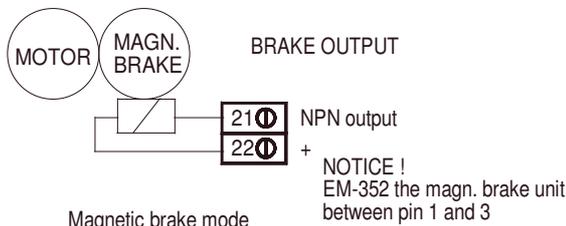will activate if voltage exceed 32V

Notice! if your power source is battery then you should not need
braking resistor because the battery can be absorbed the
braking energy.

BRAKE OUTPUT (Magnetic brake mode)

MOTOR   MAGN. BRAKE
21 NPN output
22 +

NOTICE !
EM-352 the magn. brake unit
between pin 1 and 3

Magnetic brake mode

If motor has integrated magnetic brake module, then
the brake output can be used to control brake unit.
When motor start up the output will switch on and it
releases the brake. This output switch off and return
the brake when motor will stop. The driver counts the
incoming hall-pulses and this way it can see when
motor is actually stopped.

This mode can be activated with set par 19 = 2 and 3

FAULT OUTPUT

17 PNP output (+12V)
18 gnd

This output is PNP signal output. The output levels are
5V or 12V and this can be selected with dip switch 4
The output can be used to give signal for PLC or
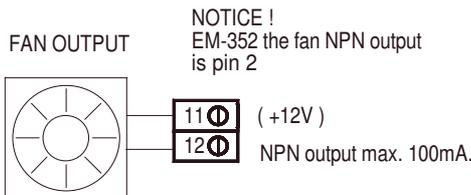indicator light. max. output current is 20mA

The indication combinations can be defined with parameters
16 and 17. The special mode is pulse output when it gives
revolution pulses .

FAN OUTPUT

NOTICE !
EM-352 the fan NPN output
is pin 2

11 (+12V)
12 NPN output max. 100mA.

This output turns on automatically if the temperature
of board will exceed 55°C and turns off if temperature
goes down 50°C

The fan recommendation 40x40mm, 12V max. 1.2W
fastening to heat sink with M3 self tapping screws.
and blowing direction toward heat sink.