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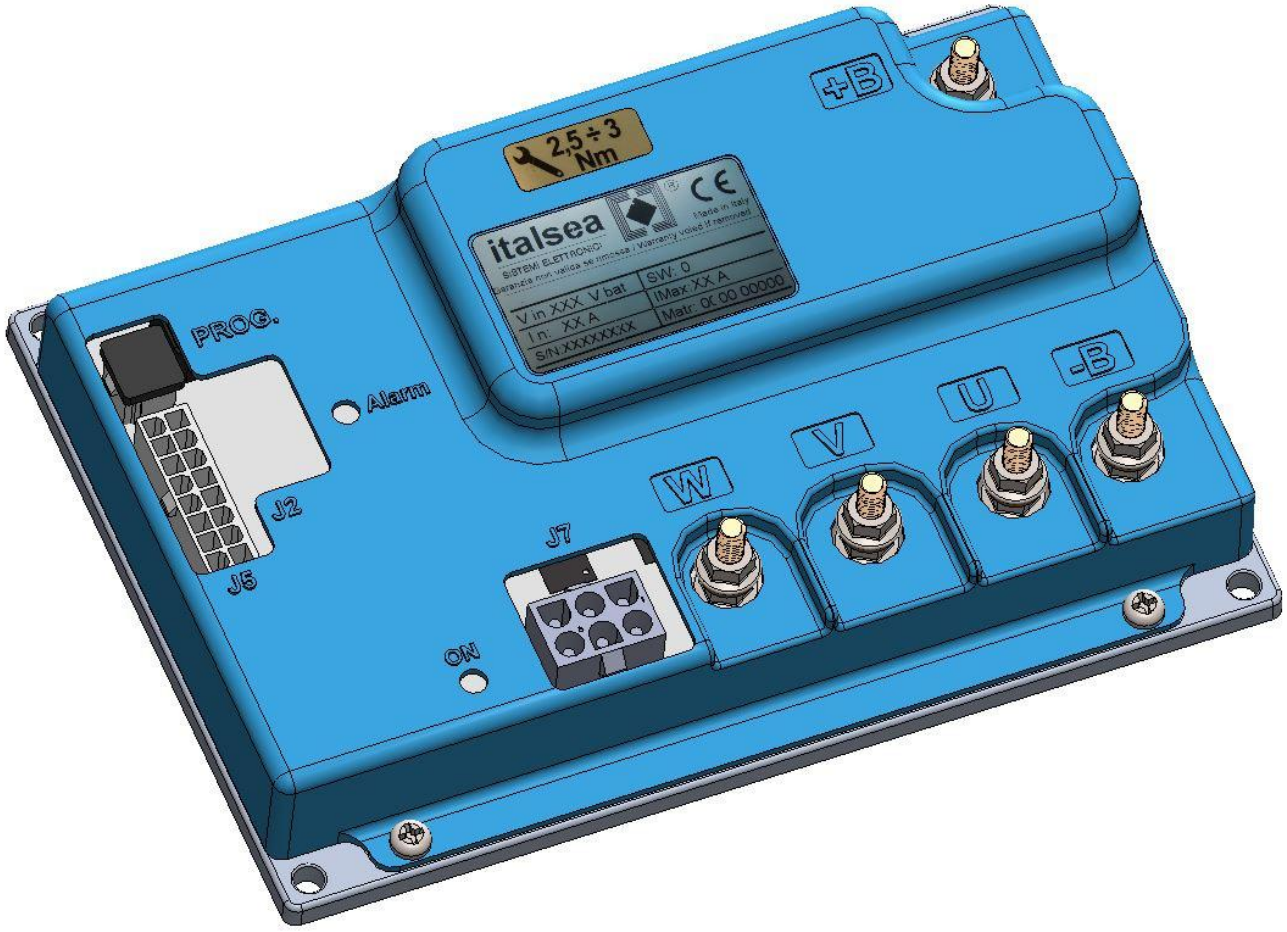
7BL00120_REV.0	DATE : 19/12/2019	REV. 0.0

7BL00120

MICROPROCESSOR CONTROLLER FOR BLDC MOTORS



- USER'S GUIDE -

- INTRODUCTION -

The 7BL0012X is a controller designed for brushless DC PM motors powered by battery 24V or stabilized DC power supply for pump , fan and compressor applications.
The controller is equipped with a powerful microprocessor for digital control of the speed, current regulation and failures of the motor ; an efficient diagnostics of the failures and wrong wiring connections, programmability of the main parameters .
The MOSFET power stage is operating with PWM modulation.
The controller is designed in accordance with the related EC standards.

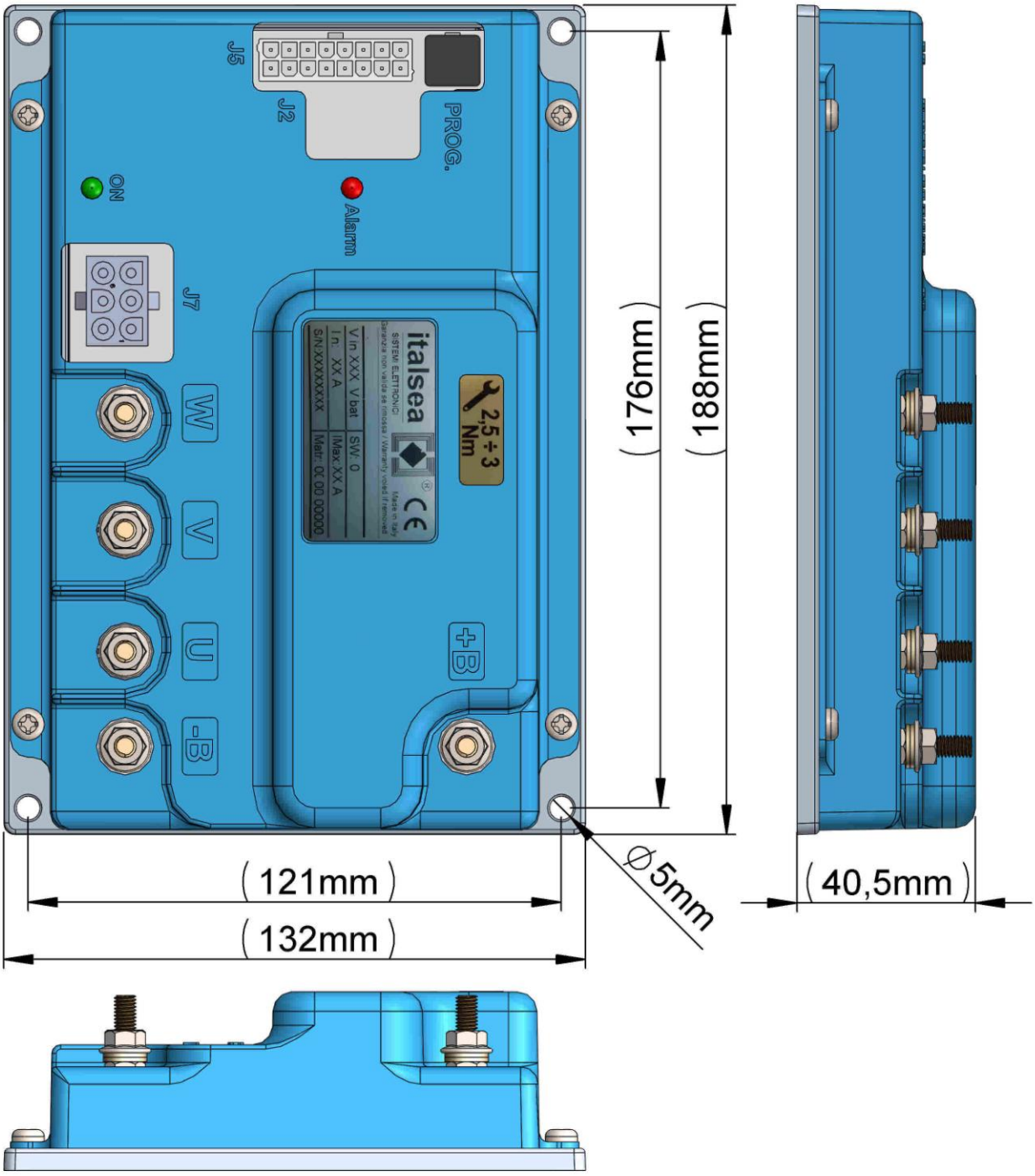
- FEATURES -

SUPPLY	24 V (Battery) / 18-26VDC (Stabilized supply)
RATED CURRENT	50 Arms (S2-60 min)
MAX CURRENT	80 Arms (1min)
FREQUENCY	16 KHz
MAX TEMPERATURE	90 °C
SPEED REFERENCE	Voltage (0-5VDC/10VDC) / Potentiometer 1-10 KΩ
ON BOARD MAIN RELAY	24V-80A
PARAMETERS PROGRAMMABLE	

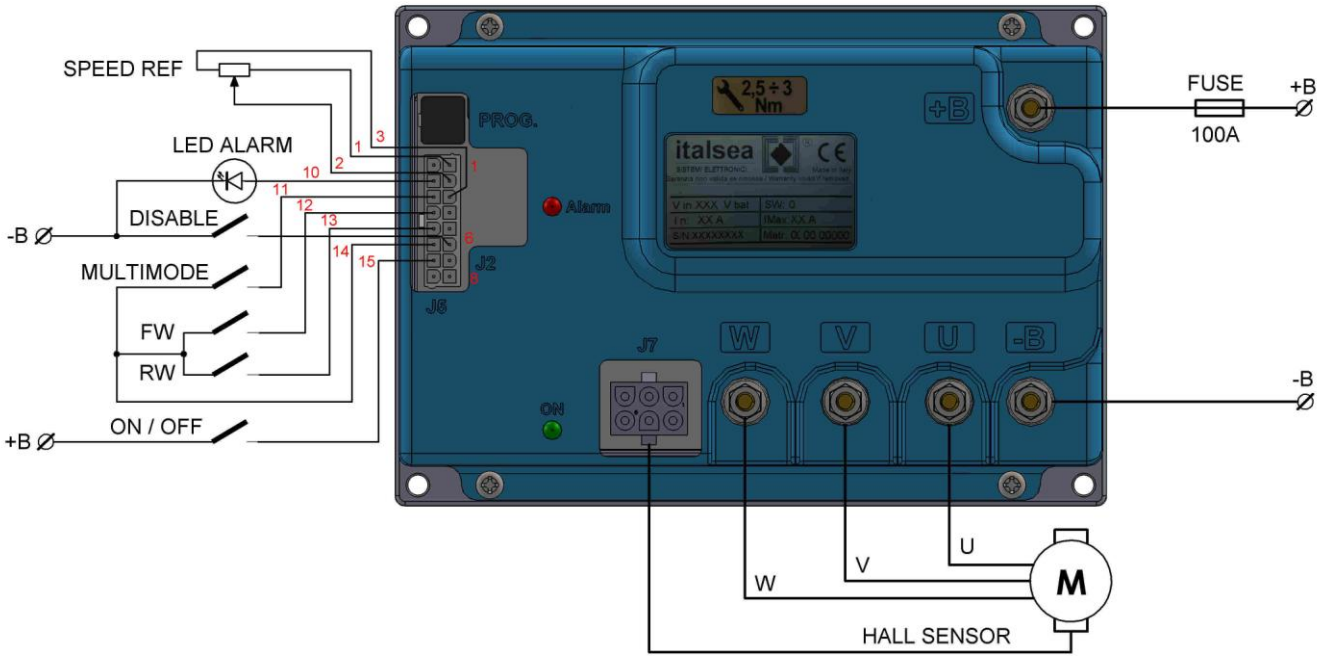
SAFETY:	• **OUTPUT SHORT CIRCUIT PROTECTION** • **MOSFET SHORT CIRCUIT PROTECTION** • **THERMAL PROTECTION** • **LOW VOLTAGE AND OVERVOLTAGE PROTECTION** • **REVERSE BATTERY PROTECTION** • **OVERCURRENT PROTECTION (FUNCTION OF TEMPERATURE)** • **POTENTIOMETER AND WIRINGS FAULT**

PROTECTION	POTTED PCB

- MECHANICAL DRAWING -

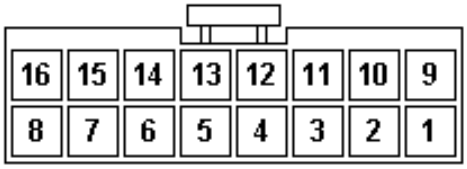


- WIRING DIAGRAM -



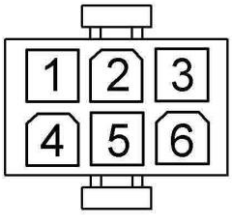
- I/O CONNECTOR -

J1-16v Molex connector (Molex p/n.39012160, contacts p/n.39000038)



Pin 1: **HI–POT. INPUT /** Positive Potentiometer
Pin 2: **C-POT. INPUT /** Central Potentiometer or Voltage (0-10Vdc) Speed Reference
[IF NOT USED CONNECT TOGETHER PIN 2 AND PIN 1 : MAX FIXED SPEED]
Pin 3: **LO-POT.INPUT /** Negative Potentiometer or Gnd Voltage Speed Reference
Pin 4: **NOT USED**
Pin 5: **NOT USED**
Pin 6: **DISABLE INPUT /** Default N.O. input to +V_Batt to disable the controller.
Pin 7: **NOT USED**
Pin 8: **NOT USED**
Pin 9: **NOT USED**
Pin 10: **ALARM /** Output for the diagnostic Blinking Led indicator (5Vdc-10mA)
Pin 11: **MULTIMODE INPUT /** N.O. input to +V_Batt for speed reduction.
Pin 12: **FORWARD SWITCH /** N.O. input to +V_Batt for forward direction
Pin 13: **BACKWARD SWITCH /** N.O. input to +V_Batt for backward direction
Pin 14: **COMMON HIGH /** +V_Batt common output for switches.
Pin 15: **ON/OFF /** Power-on input (+V_Batt).
Pin 16: **NOT USED**

MOTOR HALL SENSORS CONNECTOR :J7-6V TE (p/n.350431)



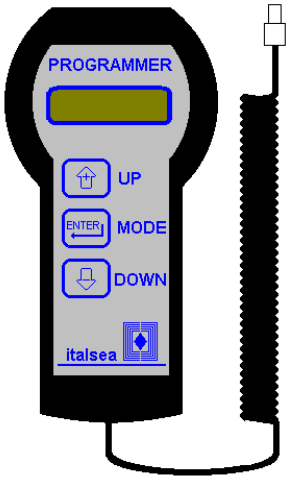
PIN 1 = Hall sensor U
PIN 2 = Hall sensor V
PIN 3 = Hall sensor W
PIN 4 = negative supply Hall sensors(0V)
PIN 5 = temperature sensor (optional)
PIN 6 = positive supply Hall sensors (+5V)

SERIAL COMMUNICATION CONNECTOR FOR PROGRAMMER :
J1-4v Molex (Molex p/n.3901240, contacts p/n. 39000038)

- CONTROLLER SETTING -

7PROGLCD HANDHELD PROGRAMMER

fig.6



LCD 16X2:
Displays parameters, alarms and measures (description and value).

UP Key:
Rolls up parameters and increases values.

MODE Key:
Confirms a selection and the change of value.

UP Key:
Rolls down parameters and decreases values.

At power-on, handheld programmer displays the “Tester Mode” page. In this pages , you’ll find the motor current and voltage, speed reference input, internal aluminum heat-sink temperature, battery voltage, hour-meter and software release.
To start the programming function push the button “MODE” .
Will appear the first parameter; pushing the “UP” button the number of the parameter will be increased and with the “DOWN” button the number will be decreased. When a parameter is selected , push the button “MODE” to enter in the change menu, change the value with the buttons “UP” and “DOWN”, then confirm the parameter with the button “MODE”. To return to the TESTER menu push together the buttons “MODE “and “UP”, or wait few seconds.

- TESTER MODE -

MOTOR TEMP. **T°=##°C ##°F**	Motor temp. measure (optional not used).
CURRENT A rms **SPEED rpm**	Motor current and speed.
SPEED REF. **#.#V #### rpm**	Speed reference voltage and real speed.
HEATSINK TEMP. **T°= ##°C / ###°F**	Internal heat-sink temperature .
BATTERY VOLTAGE **Vbatt= ##.# Volts**	Battery supply voltage .
Inputs monitor **J1: ##,##,##,##**	Digital inputs activated (if input is present, pin id is shown)
Overload level: **##% (at ### Amps)**	Percentage of overload protection level (100% means alarm on), and running motor current.
HOURMETER **#### hrs, ##### min**	Hour meter counter
SW RELEASE **7BL0012X_#**	Software’s release number.

- ALARMS -

DISPLAY	ALARM	WHAT TO DO
ALARM A5 Over temperature	**Thermal protection > 90°C**	Wait few minutes and check the motor current.
ALARM A6 POWER STAGE	**Controller's power stage damaged**	Change the controller.
ALARM A7 OVERCURRENT	**Over-current** : **short circuit**	Check the motor's wires: if ok, and the controller repeats this alarm, change it.
ALARM A9 UNDERVOLTAGE	**Under-voltage < 18V**	Check battery's charge.
ALARM A10 OVERVOLTAGE	**Over-voltage > 45V**	Check the battery.
ALARM A11 OVERLOAD CURRENT	**Overload protection Function of I > In² x Tn**	Check the motor working current and parameters "rated current" and "overload time".
ALARM A14 EEPROM FAIL	**E²prom fail**.	Check your settings: if the controller repeats this alarm, change it.
ALARM A16 ENCODER FAIL	**Encoder signals failure**.	Check encoder connections.

- PARAMETERS -

PARAMETER	DESCRIPTION	MIN	MAX	DEFAULT
RESET TO DEFAULT	Reset to default	0	0	1
ACCELERATION RAMP	Acceleration	0.5s	20.0s	2s
FORWARD SPEED	Forward max. speed	10%	100%	100%
SPEED REFERENCE	Speed Reference	fixed	voltage	voltage
MODE 1 SPEED	Reduced speed	20%	100%	50%
LOW BATTERY	Undervoltage protection	7.0V	24.0V	18.0V
MOT. DIRECTION	With forward input	CW	CCW	CW
CURRENT LIMIT (Imax)	Controller's current limit	40 Arms	80 Arms	80Arms
RATED CURR (In)	Motor's rated current	15 Arms	60 Arms	60 Arms
OVERLOAD TIME (Tn)	Motor's overload time	1s	60s	30s
MOTOR POLAR COUPLES	Number of polar couples	1	32	4

**BEFORE SWITCHING OFF THE BOARD, MAKE SURE TO RETURN ON THE "TESTER MODE"
PRESSING "MODE+UP" BUTTONS IN ORDER TO SAVE A CHANGED PARAMETER!**