

## Mechatronic systems



8660-15 C

### Stepper motor with integrated driver

- **Low noise**  
cool running ..... 1/8 & 1/256 step
- **Dimensions** ..... 57.2 x 57.2 x 55.85 mm
- **Interface** ..... Pulse / Direction /  
Boost / Enable /  
Stepselect

This complete drive system is composed of a reliable stepper motor with an integrated driver assembled in a compact housing.

### ▶ Main features

- **Compact**

A small size and a very low temperature rise are obtained through the integration of a driver in the hybrid bipolar stepper motor.

- **High frequency interface**

The driver allows a high input frequency up to 200 kHz. All inputs have opto-couplers.

- **Low noise**

Thanks to the high resolution of 256 microsteps per step and the driver optimization, the motor rotates with practically no noise and vibration.

- **Very low temperature rise**

The temperature rise is typically 15° C when the motor operates continuously for 2 hours at nominal current (value obtained with the motor screwed on a 150 x 150 x 6 mm aluminium plate). In the same operating conditions, the temperature rise is typically 25° C at boost current.

- **Intelligent driver**

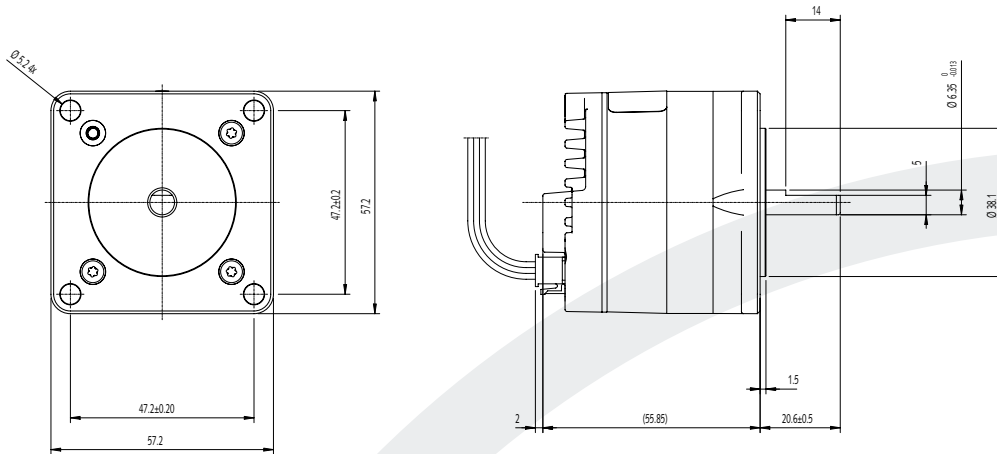
The boost option is particularly useful when a higher torque is required (for example during acceleration / deceleration ramps). The current is automatically reduced to 2/3 of the nominal value at standstill. This feature minimizes the temperature rise.

### ▶ Technical data

|  |                      |
|--|----------------------|
| Power supply (+/-20%)                          | 24 VDC               |
| Maximal input power (Full load, Iboost ON)     | 38 W                 |
| Maximum input frequency                        | 200 kHz              |
| Rotor inertia                                  | 131 gcm <sup>2</sup> |
| Detent torque                                  | 26 mNm               |
| Holding torque at standstill (reduced current) | 200 mNm              |
| Maximum torque at low speed                    | 325 mNm              |
| Weight   | 392 g                |
| Microsteps per revolution                      | 1600/51200           |

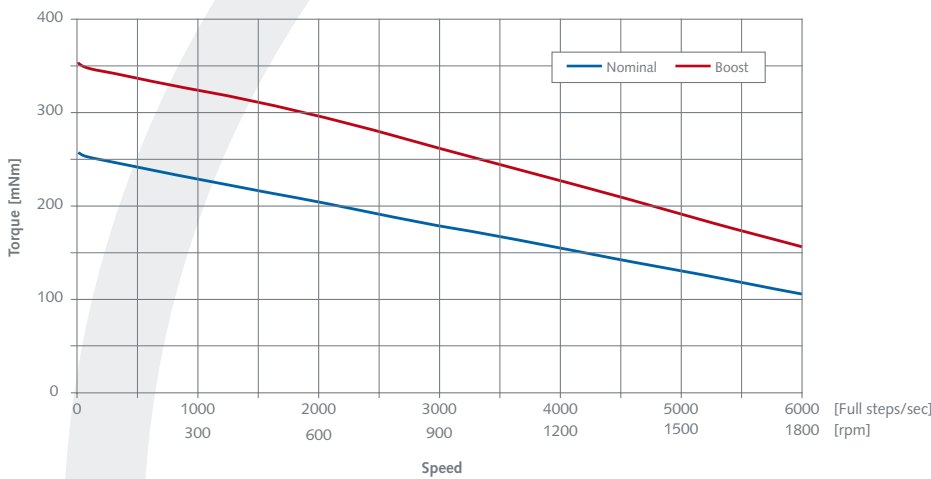
► Dimensions

Drawing not to scale. All dimensions in mm.

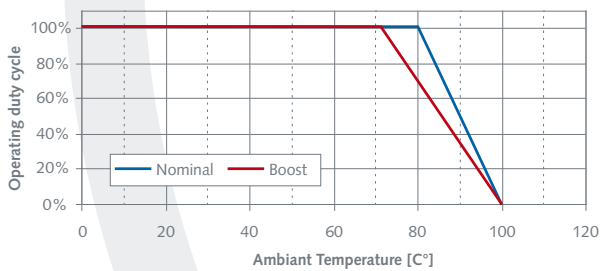


► Thermal and torque characteristics

• Dynamic torque



• Max duty cycle vs temperature range



Values obtained with the motor screwed on an aluminum plate (dimensions 150 x 150 x 6 mm)

Special requirements upon customer specifications. Right to change reserved.

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▶ Electrical Interface

**CONNECTOR**

• Header MICRO-FIT 3.0 8p

• MOLEX n° 43045 0812



Front view

**Matching products:**

Molex female terminal: 43030 (series)  
Molex female housing: 43025 0800

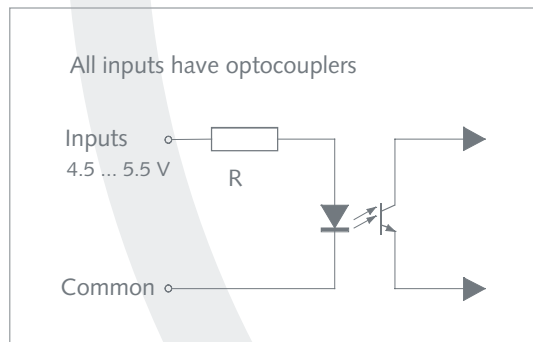
**PIN ASSIGNMENTS**

- +24 VDC ..... Power supply
- GND ..... Power ground
- Common ..... Ground for logical inputs (Step select, Dir, Enable, Boost, Pulse)
- Pulse ..... Microstep clock input (active on rising edge)

| Pin         | Description           | State 0                                    | State 1                                       |
|-------------|-----------------------|--|---|
| Step select | Microstep resolution  | 1/8 step<br>(= 1600 microsteps/revolution) | 1/256 step<br>(= 51200 microsteps/revolution) |
| Dir         | Direction of rotation | CW   | CCW   |
| Enable      | Power ON              | OFF  | ON  |
| Boost       | Increase in torque    | OFF  | ON  |

Note: Step select input is only selectable when Enable = 0 (current OFF)

**INPUTS**



R = 470 Ω, excepted for the pulse input R = 220 Ω.

An external resistor can be added in series with the input to increase the logical voltage up to 24 VDC. For Vin = 24 VDC, the external resistors would be 1.2 kΩ for the pulse and 2.7 kΩ for the others inputs.

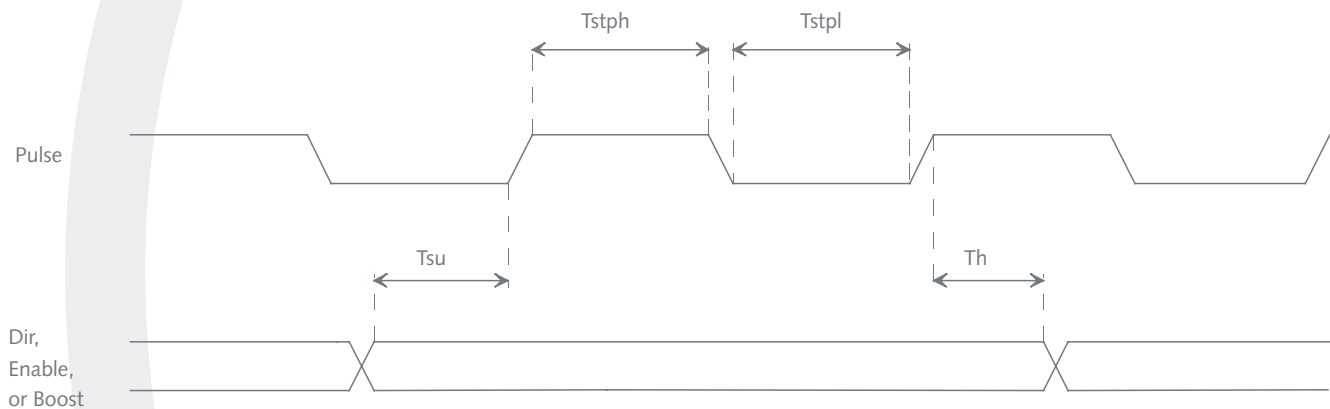
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## CHARACTERISTICS

| Characteristics                         | Symbol | Min | Typ | Max | Unit    |
|---|--------|-----|-----|-----|---------|
| Input control voltage low               | Vil    | 0   | 0   | 0.8 | V       |
| Input control voltage high              | Vih    | 4.5 | 5   | 5.5 | V       |
| Input current high [Pulse]              | lin    | 12  | 16  | 20  | mA      |
| Input current high [Dir, Enable, Boost] | lin    | 6.5 | 8   | 9.5 | mA      |
| STEP pin low                            | Tstpl  | 2.5 | -   | -   | $\mu$ s |
| STEP pin high                           | Tstph  | 2.5 | -   | -   | $\mu$ s |
| Setup time for input change to STEP     | Tsu    | 900 | -   | -   | $\mu$ s |
| Hold time for input change from STEP    | Th     | 2.5 | -   | -   | $\mu$ s |

## TIMING DIAGRAM



Special requirements upon customer specifications. Right to change reserved.

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## ▶ Working conditions

- **Operating temperature range** ..... 0 to 80° C  
(Inominal, see graph. Max duty)
- **Protection class** ..... IP50
- **Thermal and over/under voltage protections**

If the motor temperature exceeds 100° C or if the supply voltage comes outside its operating range, the driver is automatically switched off. This is intended to protect components from failure due to excessive temperature or under / over voltage.

To restart the motor after cut off, a rising edge must be applied on the ENABLE input when temperature or voltage error has been cleared. Thermal hysteresis is ~10° C and voltage hysteresis is ~1 V.

## ▶ Installation

- **Cables and power supply:**

The cables used must have an insulation temperature of at least 105°C. The motor interface must be SELV type (Separated Extra Low Voltage). The cables between the power supply and motor must no be longer than 1 m and a minimal AWG24 diameter must be respected. Every system is delivered with 2 fastening screws and a 25 cm connection cable.

- **Temperature and protections:**

Max. temperature of motor and electronic ..... 100°C

It is possible to improve the motor's heat dissipation by fixing it to a metal plate which acts as a heat sink and by using thermoconductive paste. If the motor is accessible or its temperature is high, it may be necessary to fit protecting elements for the safety of the user.

## ▶ CE marking

- **Electromagnetic compatibility (EMC):**

### Directives:

89/336/EEC  
+ Modification 92/31/EEC  
+ Modification 93/68/EEC

### Harmonised standards:

- Electromagnetic emissions in an industrial environment ..... EN 61000-6-4: 2001  
- Electromagnetic immunity in an industrial environment ..... EN 61000-6-2: 2001

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## ▶ Options and adaptations

- Options (minimum quantity required):

- Inputs 24 VDC
- Inputs configuration on request
- Choice of 2 resolutions in the range from full step (1/1) to 1/256 step

- Following adaptations available upon request:

- Communications bus (CAN, RS485, ...)
- Programmable positioning sequences
- Stand-alone operation
- PC programmable
- Mechanical adaptation, connections, etc.

## ▶ Ordering information

| Type                           | Specific characteristic                | Ordering code |
|--------------------------------|--|---------------|
| 8660-15 Low noise cool running | 1/8 & 1/256 step, low temperature rise | 8660R908      |