Systems Control & Protection

Ensure the Safety of Door Openers with Current Measurement

Applications

- ***Garage Door Openers, Powered Doors, Gates, Awnings or Shutters***
  - *Safety opening or closing of the openers*
  - *Threshold detection*
- ***Electric Power Seats***
  - *Motor protection*
- ***Low Cost Drives***
  - *Current monitoring*

Features

- *Low cost*
- *Bipolar AC & DC current measurement for 10 ARMS nominal (15 A pk)*
- *Single 5 V (± 10 %) power supply : V_C (V_{dd} = + V_C, V_{ss} = 0 V)*
- *Expected to be used with a ratiometric µcontroller*
- *Ratiometric voltage output = V_{out} = ½ V_{dd} + I_P / I_{PN} x 0,2 x V_{dd}*
- *Galvanic Isolation up to 2.5 kVRMS/50Hz/1 min*
- *Compact PWB mounting : 17 x 19 mm footprint*
- *EN 50178 Compliance*
- *CE Compliance*
- *UL Recognized*
- *5 year warranty*

Door Openers must provide safety and protection for the users. Imagine the consequences of a garage door closing on a person or a vehicle. Current measurement can ensure this protection function while also allowing fast and efficient operation.

Power openers, used for garage doors, gates, shutters or awnings, are becoming more common in day to day life, and protection is a concern which must be taken into account during their design.
This protection can be provided through current measurement.
HTS 10 models provide bipolar current measurement while only requiring a single 5 V power supply. These products are ratiometric, causing a direct variation of their sensitivity and offset with respect to the power supply voltage. This ratiometric output and 5 V power supply make them perfect for use with ratiometric A/D converters. The low supply consumption (< 12 mA) allows the HTS to be powered from the same source as the A/D reference. This eliminates any susceptibility to supply and/or reference voltage changes, even though this voltage may have a ± 10 % tolerance.
This configuration provides a nominal resolution of 0.5 % of I_{PN} with a 10-bit A/D converter.

As a very low cost transducer, the tolerance of the sensitivity and offset has an influence on the measuring range.
Let's take an example :
With a power supply of + 5 V ± 0 %, ± 30 % as sensitivity tolerance and ± 12 % as offset tolerance, the HTS 10-P transducer may have a maximum initial offset of 2.8 V, and a sensitivity of 130 mV/A at +25°C.
Under these conditions of use, the sensor provides a measuring range of + 13 A and - 17 A. The full scale output is limited at V_{dd} -0.5 V = 4.5 V for the positive side and V_{ss} +0.5V = +0.5V for the negative side. Positive measuring range : (+4.5V -initial offset)/sensitivity = (4.5V -2.8 V)/0.13 = +13 A pk. Negative measuring range : (+0.5V -initial offset)/ sensitivity = (+0.5V -2.8V)/0.13 = -17.7 A pk.

COMPACT AC/DC CURRENT TRANSDUCERS : *HTS models*

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Application Note

Garage & Electrical Door 0peners, Automatic Gates, Awnings & Shutters

The HTS 10-P/SP1 current transducer with a better sensitivity (20 %) and initial offset tolerance (3 %) is the solution for a measuring range with less fluctuation (thermal drift values are also improved). When the sensor is used with a µcontroller, the device can be calibrated into the application. These tolerances can be cancelled or adjusted out in the accuracy calculation to ensure repeatable results.

The HTS 10-P and HTS 10-P/SP1 are rated for 10 A RMS (15 A pk) measurement and provide max linearity of 1 % and 0.5 % respectively at + 25°C which is adequate for the detection requirements in this type of application. The tolerances and price are the differences between the two transducers, the HTS 10-P being the least expensive.

In this application, protection refers to the action taken after the detection of a person or some object located in the path of the moving doors, gates, shutters or awnings, preventing the intended closing or opening.

This protection can be achieved thanks to the measurement of the current drawn by the motor used for the moving of the doors. The use of a compact current transducer (like the HTS 10-P with the 17 x 19 mm footprint) is essential when the available real estate dedicated to the electronics is minimal. At the same time, the accuracy is not considered vital in this type of application.

The aim is not to control and regulate the motor but to ensure protection by detection. In conjunction with the µcontroller, the current transducer is used to detect when the motor is drawing too much current at any given moment, for example, when the door attempts to move against interfering obstacles thus creating an overcurrent into the motor.

The DC brush motor used for the garage door opener, as it can also be for the electrical gates, awnings or shutters, has its own, particular and repeatable current profile during the normal opening and closing motions.

This profile is stored into the µcontroller.

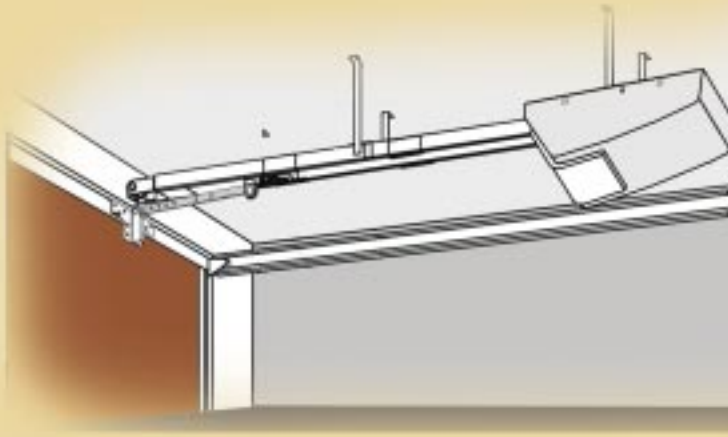
The transducer provides the measured motor current versus time to the µcontroller.

Then, the µcontroller verifies that the current drawn by the motor matches the expected profile within a certain window defined by the electrical opener systems manufacturer. If it doesn't match, the µcontroller considers the condition undesirable. In these applications, safety is a must, and special attention is given to the motor overcurrent detection warning of a possible door, gate, awnings or shutters obstruction.

The µcontroller can then activate a safety mechanism either by sounding an alarm, disabling the motor or initiating the auto reverse motion of the door.

Furthermore, the transducer can also detect the motor stall current when the operation of the electrical power seats are locked by obstruction (detection for motor protection).

Finally, low price is key in applications such as these. And since the HTS 10 models are competitively priced, this family of transducers help keep low cost drive systems, low cost.



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