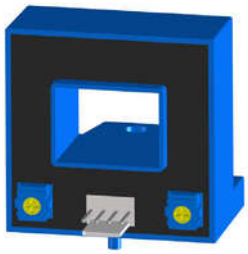
# Current Transducer HAL 50 .. 600-S

# $I_{PN}$ = 50 .. 600 A

For the electronic measurement of currents: DC, AC, pulsed..., with galvanic separation between the primary circuit and the secondary circuit.



## Electrical data

| Type | Primary nominal rms current $I_{PN}$ (A) | Primary current, measuring range $I_{PM}$ (A) |
|---|---|---|
| HAL 50-S | 50 | ±150 |
| HAL 100-S | 100 | ±300 |
| HAL 200-S | 200 | ±600 |
| HAL 300-S | 300 | ±900 |
| HAL 400-S | 400 | ±1000 |
| HAL 500-S | 500 | ±1000 |
| HAL 600-S | 600 | ±1000 |

| | | | |
|---|---|---|---|
| $\hat{I}_P$ | Overload capability (Ampere Turns) | 30000 | At |
| $V_{out}$ | Output voltage (Analog) @ $\pm I_{PN}$ | ±4 | V |
| $R_L$ | Load resistance @ $T_A$ = 0 °C .. 70 °C | >1 | kΩ |
| | @ $T_A$ = -25 °C .. +85 °C | >3 | kΩ |
| $U_C$ | Supply voltage (±5 %) | ±15 | V |
| $I_C$ | Current consumption | <±25 | mA |
| $R_{IS}$ | Insulation resistance @ 500 V DC | >500 | MΩ |

## Accuracy - Dynamic performance data

| | | | | |
|---|---|---|---|---|
| $X$ | Accuracy @ $I_{PN}$, $T_A$ = 25 °C, ±15 V | | <±1 | % of $I_{PN}$ |
| $\varepsilon_L$ | Linearity error [1] | | <±0.5 | % of $I_{PN}$ |
| $V_{OE}$ | Electrical offset voltage @ $T_A$ = 25 °C | HAL 50-S | <±20 | mV |
| | | HAL 100 .. 600-S | <±10 | mV |
| $V_{OM}$ | Magnetic offset voltage @ $I_P$ = 0, after an overload of 3 × $I_{PN}$ | | | |
| | | HAL 50-S | <±30 | mV |
| | | HAL 100 .. 200-S | <±20 | mV |
| | | HAL 300 .. 600-S | <±10 | mV |
| $TCV_{OE}$ | Temperature coefficient of $V_{OE}$ | HAL 50-S | <±2.0 | mV/K |
| | | HAL 100 .. 600-S | <±1.0 | mV/K |
| $TCV_{out}$ | Temperature coefficient of $V_{out}$ (% of reading) | | <±0.05 | %/K |
| $t_r$ | Step response time to 90 % of $I_{PN}$ | | ≤3 | µs |
| $BW$ | Frequency bandwidth (-3 dB) [2] | | DC .. 50 | kHz |

## General data

| | | | |
|---|---|---|---|
| $T_A$ | Ambient operating temperature | -25 .. +85 | °C |
| $T_S$ | Ambient storage temperature | -25 .. +85 | °C |
| $m$ | Mass | 75 | g |
| | Standards | EN 50178: 1997<br>UL 508: 2010 | |
| | Deviation in output when tested to EN 61000-4-6 | <20 | % of $I_{PN}$ |
| | Deviation in output when tested to EN 61000-4-3 | <20 | % of $I_{PN}$ |

Notes: [1] Excludes the electrical offset

[2] Derating is needed to avoid excessive core heating at high frequency.

## Features

- Hall effect measuring principle
- Insulating plastic case recognized according to UL 94-V0.

## Advantages

- Easy installation
- Low power consumption
- Small size and space saving
- Only one design for wide current ratings range
- High immunity to external interference.

## Applications

- AC variable speed drives and servo motor drives
- Static converters for DC motor drives
- Battery supplied applications
- Uninterruptible Power Supplies (UPS)
- Switched Mode Power Supplies (SMPS)
- Power suppliers for welding applications.

## Application domain

- Industrial.


LEM reserves the right to carry out modifications on its transducers, in order to improve them, without prior notice

## UL 508:Ratings and assumptions of certification HAL 50 .. 600-S

File # E189713 Volume: 2 Section: 1

## Standards

- CSA C22.2 NO. 14 - 10 INDUSTRIAL CONTROL EQUIPMENT - Edition 11 - Revision Date 2011/08/01
- UL 508 STANDARD FOR INDUSTRIAL CONTROL EQUIPMENT - Edition 17 - Revision Date 2010/04/15.

| Parameter | Symbol | Unit | Value |
|---|---|---|---|
| Primary involved potential | | V AC/DC | 300 |
| Max surrounding air temperature | $T_A$ | °C | 80 |
| Primary current | $I_P$ | A | According to series primary currents |
| Secondary supply voltage | $U_C$ | V DC | ±15 |
| Output voltage | $V_{out}$ | V | 0 to 4 |

### Conditions of acceptability

*When installed in the end-use equipment, consideration shall be given to the following:*

*1 - These devices must be mounted in a suitable end-use enclosure.*

*2 - The terminals have not been evaluated for field wiring.*

*3 - Low voltage circuits are intended to be powered by a circuit derived from an isolating source (such as a transformer,optical isolator,limiting impedance or electro-mechanical relay) and having no direct connection back to the primary circuit (other than through the grounding means).*

*4 - Base on results of temperature tests, in the end use application, a maximum of 100 °C cannot be exceeded at soldering point between primary coil pin and soldering point of on the primary bus bar (corrected to the appropriate evaluated max. surrounding air).*

### Marking

Only those products bearing the UL or UR Mark should be considered to be Listed or Recognized and covered under UL's Follow-Up Service.Always look for the Mark on the product.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## Current Transducer HAL 50 .. 600-S

### Insulation coordination

| | | | |
|---|---|---|---|
| $U_d$ | Rms voltage for AC insulation test, 50 Hz/1 min | 3 | kV |
| $\hat{U}_W$ | Impluse withstand voltage 1.2/50 µs | >8 | kV |
| | | Min | |
| $d_{Cp}$ | Creepage distance | 12.1 | mm |
| $d_{Cl}$ | Clearance | 9.8 | mm |
| *CTI* | Comparative tracking index (group I) | 600 | |

### Applications examples

**According to EN 50178 and IEC 61010-1 standards** and following conditions:

- Over voltage category OV 3
- Pollution degree PD2
- Non-uniform field

| | EN 50178 | IEC 61010-1 |
|---|---|---|
| $d_{Cp}$, $d_{Cl}$, $\hat{U}_W$ | Rated insulation voltage | Nominal voltage |
| Basic insulation | 1000 V | 1000 V |
| Reinforced insulation | 600 V | 300 V |

### Safety

This transducer must be used in limited-energy secondary circuits according to IEC 61010-1.



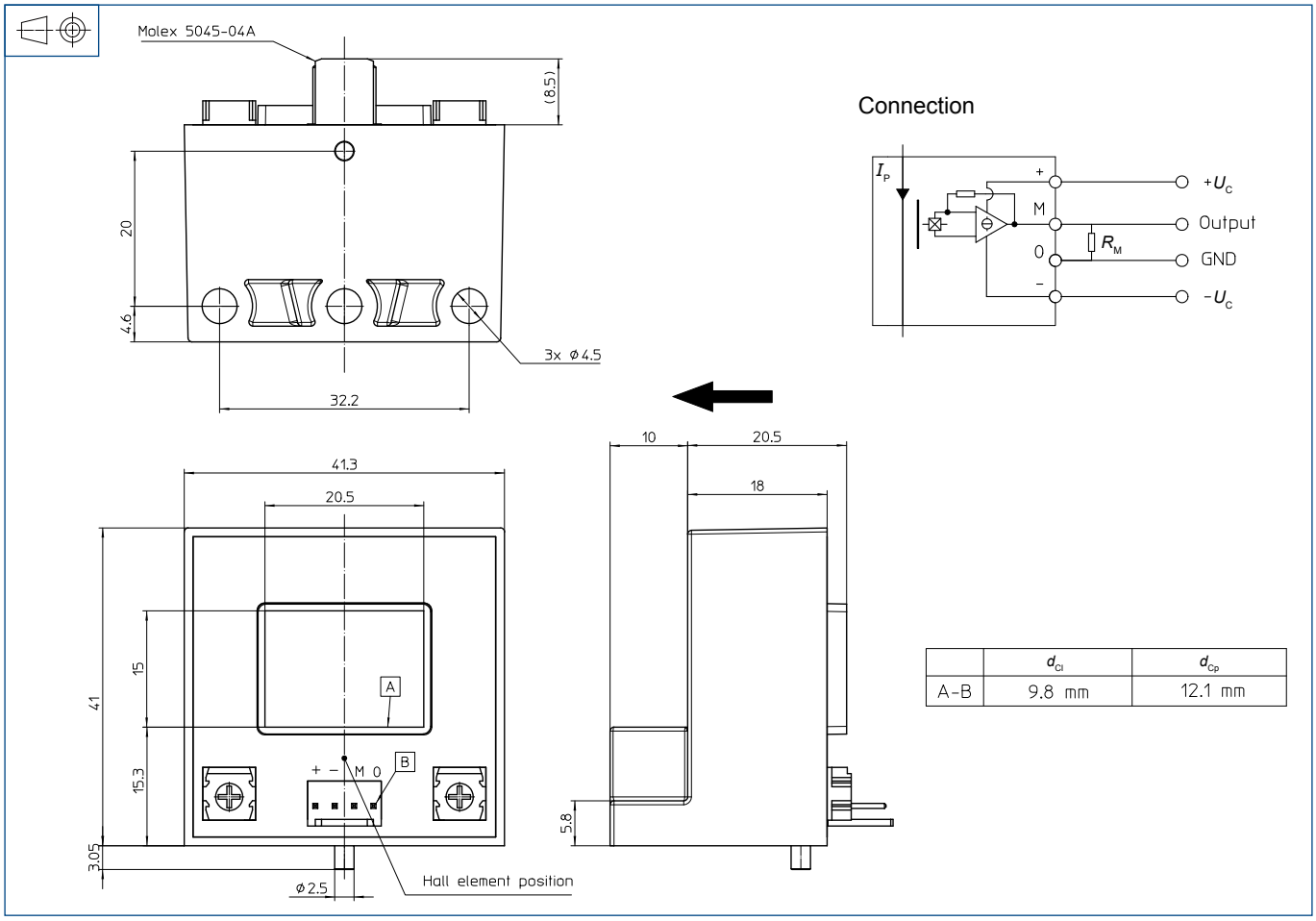
This transducer must be used in electric/electronic equipment with respect to applicable standards and safety requirements in accordance with the manufacturer's operating instructions.



Caution, risk of electrical shock

When operating the transducer, certain parts of the module can carry hazardous voltage (eg. primary busbar, power supply).
Ignoring this warning can lead to injury and/or cause serious damage.
This transducer is a build-in device, whose conducting parts must be inaccessible after installation.
A protective housing or additional shield could be used.
Main supply must be able to be disconnected.

## Dimensions HAL 50 .. 600-S (in mm)




| | $d_{Cl}$ | $d_{Cp}$ |
|---|---|---|
| A-B | 9.8 mm | 12.1 mm |

## Mechanical characteristics

- General tolerance ±0.5 mm
- Transducer fastening 3 holes ⌀ 4.5
  3 M4 steel screws
  Recommended fastening torque 1.2 N·m (±10 %)
- Primary through-hole 20.5 × 15 mm
- Connection of secondary Molex 5045-04A

## Remarks

- $V_{out}$ is positive when $I_P$ flows in the direction of the arrow.
- Temperature of the primary conductor should not exceed 90 °C.
- Installation of the transducer must be done unless otherwise specified on the datasheet, according to LEM Transducer Generic Mounting Rules. Please refer to LEM document N°ANE120504 available on our Web site: **Products/Product Documentation**.
- Dynamic performances (d*i*/d*t* and response time) are best with a single bar completely filling the primary hole.
- This is a standard model. For different versions (supply voltages, turns ratios, unidirectional measurements...), please contact us.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