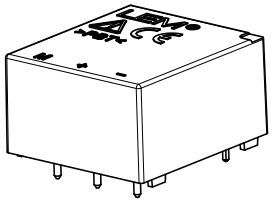
# Voltage Transducer LV 25-P

$I_{PN}$ = 10 mA

$V_{PN}$ = 10 .. 500 V

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



## Electrical data

| | | | | | |
|---|---|---|---|---|---|
| $I_{PN}$ | Primary nominal rms current | | 10 | | mA |
| $I_{PM}$ | Primary current, measuring range | | 0 .. ± 14 | | mA |
| $R_M$ | Measuring resistance | | $R_{M\,min}$ | $R_{M\,max}$ | |
| | with ± 12 V | @ ± 10 mA $_{max}$ | 30 | 190 | Ω |
| | | @ ± 14 mA $_{max}$ | 30 | 100 | Ω |
| | with ± 15 V | @ ± 10 mA $_{max}$ | 100 | 350 | Ω |
| | | @ ± 14 mA $_{max}$ | 100 | 190 | Ω |
| $I_{SN}$ | Secondary nominal rms current | | 25 | | mA |
| $K_N$ | Conversion ratio | | 2500 : 1000 | | |
| $U_C$ | Supply voltage (± 5 %) | | ± 12 .. 15 | | V |
| $I_C$ | Current consumption | | 10 (@ ± 15 V) + $I_S$ | | mA |

## Accuracy - Dynamic performance data

| | | | | | |
|---|---|---|---|---|---|
| $X_G$ | Overall accuracy @ $I_{PN}$, $T_A$ = 25 °C | @ ± 12 .. 15 V | ± 0.9 | | % |
| | | @ ± 15 V (± 5 %) | ± 0.8 | | % |
| $\varepsilon_L$ | Linearity error | | < 0.2 | | % |
| | | | Typ | Max | |
| $I_O$ | Offset current @ $I_P$ = 0, $T_A$ = 25 °C | | | ± 0.15 | mA |
| $I_{OT}$ | Temperature variation of $I_O$ | 0 °C .. + 25 °C | ± 0.06 | ± 0.25 | mA |
| | | + 25 °C .. + 70 °C | ± 0.10 | ± 0.35 | mA |
| $t_r$ | Step response time [1] to 90 % of $I_{PN}$ | | 40 | | µs |

## General data

| | | | | |
|---|---|---|---|---|
| $T_A$ | Ambient operating temperature | | 0 .. + 70 | °C |
| $T_S$ | Ambient storage temperature | | - 25 .. + 85 | °C |
| $R_P$ | Resistance of primary winding | @ $T_A$ = 70 °C | 250 | Ω |
| $R_S$ | Resistance of secondary winding | @ $T_A$ = 70 °C | 110 | Ω |
| $m$ | Mass | | 22 | g |
| | Standards | | EN 50178: 1997 | |
| | | | UL 508: 2010 | |

Note: [1] $R_1$ = 25 kΩ (L/R constant, produced by the resistance and inductance of the primary circuit).

## Features

- Closed loop (compensated) current transducer using the Hall effect
- Insulating plastic case recognized according to UL 94-V0.

## Principle of use

- For voltage measurements, a current proportional to the measured voltage must be passed through an external resistor $R_1$ which is selected by the user and installed in series with the primary circuit of the transducer.

## Advantages

- Excellent accuracy
- Very good linearity
- Low thermal drift
- Low response time
- High bandwidth
- High immunity to external interference
- Low disturbance in common mode.

## Applications

- AC variable speed drives and servo motor drives
- Static converters for DC motor drives
- Battery supplied applications
- Uninterruptible Power Supplies (UPS)
- Power supplies 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

## Voltage Transducer LV 25-P

### Insulation coordination

| | | | |
|---|---|---|---|
| $U_d$ | Rms voltage for AC insulation test, 50 Hz, 1 min | 2.5 [1)] | kV |
| $\hat{U}_W$ | Impulse withstand voltage 1.2/50 µs | 16 | kV |
| | | Min | |
| $d_{Cp}$ | Creepage distance | 19.5 | mm |
| $d_{Cl}$ | Clearance | 19.5 | mm |
| *CTI* | Comparative tracking index (group IIIa) | 175 | |

Note: [1)] Between primary and secondary.

## 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 | 1600 V | 1600 V |
| Reinforced insulation | 800 V | 800 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.

## UL 508:Ratings and assumptions of certification

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 | 600 |
| Max surrounding air temperature | $T_A$ | °C | 85 |
| Primary current | $I_P$ | mA | 0 to 10 |
| Secondary supply voltage | $U_C$ | V DC | ± 12 to ±15 |
| Secondary nominal rms current | $I_{SN}$ | mA | 25 |

### Conditions of acceptability

*When installed in the end-use equiment, 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 - The LV 25-P series are intended to be mounted on the printed wiring board of the end-use equipment (with a minimum CTI of 100).*

*4 - The LV 25-P series shall be used in a pollution degree 2 environment when the Printed Wiring Board has not been coated.*

*5 - The LV 25-P series shall be mounted on the load side of line filters.*

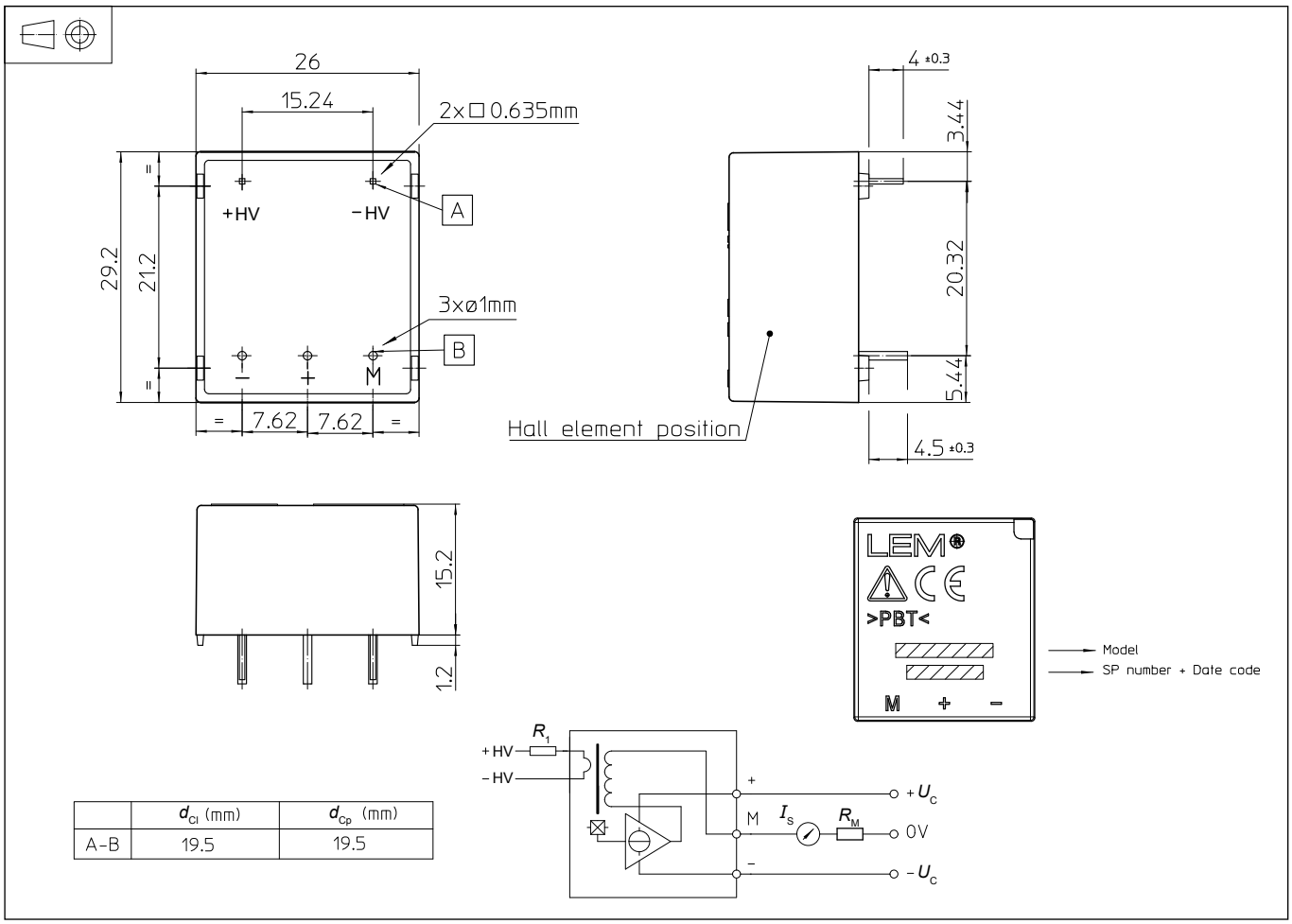
*6 - Low voltage circuits are intended to be powered by a circuit derived from an isolating source (such as a transformer,optical isolator,limiting impedance or electro-mechanical relay) and having no direct connection back to the primary circuit (other than through the grounding means).*

*7 - Base on results of temperature tests, int he 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 evaludated 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.

## Dimensions LV 25-P (in mm)




| | $d_{Cl}$ (mm) | $d_{Cp}$ (mm) |
|---|---|---|
| A-B | 19.5 | 19.5 |

## Mechanical characteristics

- General tolerance ± 0.2 mm
- Fastening & connection of primary 2 pins
  0.635 × 0.635 mm
- Fastening & connection of secondary 3 pins Ø 1 mm
- Recommended PCB hole Ø 1.2 mm

## Remarks

- $I_S$ is positive when $V_P$ is applied on terminal + HV.
- 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**.
- This is a standard model. For different versions (supply voltages, turns ratios, unidirectional measurements...), please contact us.

## Instructions for use of the voltage transducer model LV 25-P

Primary resistor $R_1$: the transducer's optimum accuracy is obtained at the nominal primary current. As far as possible, $R_1$ should be calculated so that the nominal voltage to be measured corresponds to a primary current of 10 mA.

Example: Voltage to be measured $V_{PN}$ = 250 V
a) $R_1$ = 25 kΩ / 2.5 W, $I_P$ = 10 mA Accuracy = ± 0.9 % of $V_{PN}$ (@ $T_A$ = + 25 °C)
b) $R_1$ = 50 kΩ / 1.25 W, $I_P$ = 5 mA Accuracy = ± 1.5 % of $V_{PN}$ (@ $T_A$ = + 25 °C)

Operating range (recommended): taking into account the resistance of the primary windings (which must remain low compared to $R_1$, in order to keep thermal deviation as low as possible) and the insulation, this transducer is suitable for measuring nominal voltages from 10 to 500 V.