

## Current Transducer HMS 5..20-P

For the electronic measurement of currents: DC, AC, pulsed..., with galvanic isolation between the primary circuit (high power) and the secondary circuit (electronic circuit).



All data are given with a  $R_L = 10 \text{ k}\Omega$

### Electrical data

| Primary nominal current rms | Primary current measuring range                  | Primary Conductor Size x Turns (mm) | Type                                      |
|-----------------------------|--------------------------------------------------|-------------------------------------|-------------------------------------------|
| $I_{PN}$ (A)                | $I_{PM}$ (A)                                     |                                     |                                           |
| 5                           | $\pm 15$                                         | 0.65 x 1.6 x 4T                     | <b>HMS 05-P</b>                           |
| 10                          | $\pm 30$                                         | 0.65 x 1.6 x 4T                     | <b>HMS 10-P</b>                           |
| 15                          | $\pm 45$                                         | 1.2 x 2.2 x 2T                      | <b>HMS 15-P</b>                           |
| 20                          | $\pm 60$                                         | 1.2 x 2.2 x 2T                      | <b>HMS 20-P</b>                           |
| $V_{OUT}$                   | Output voltage (Analog) @ $I_P$                  |                                     | $V_{OE} \pm (0.625 \cdot I_P / I_{PN}) V$ |
| $G_{TH}$                    | Theoretical sensitivity                          |                                     | 0.625 $V/I_{PN}$                          |
| $V_{REF}$                   | Reference voltage <sup>1)</sup> - Output voltage |                                     | $2.5 \pm 0.025 V$                         |
|                             | $V_{REF}$ Output impedance                       | typ. 200                            | $\Omega$                                  |
|                             | $V_{REF}$ Load impedance                         | $\geq 200$                          | $k\Omega$                                 |
| $R_L$                       | Load resistance                                  |                                     | $\geq 2$ $k\Omega$                        |
| $R_{OUT}$                   | Output internal resistance                       |                                     | $< 5 \Omega$                              |
| $C_L$                       | Capacitive loading                               |                                     | $= 4.7 nF$                                |
| $V_C$                       | Supply voltage ( $\pm 5 \%$ ) <sup>3)</sup>      |                                     | 5 V                                       |
| $I_C$                       | Current consumption @ $V_C = 5 V$                |                                     | 19 mA                                     |

### Accuracy - Dynamic performance data

|                     |                                                                                 |                     |               |
|---------------------|---------------------------------------------------------------------------------|---------------------|---------------|
| $X$                 | Accuracy <sup>2)</sup> @ $I_{PN}$ , $T_A = 25^\circ C$                          | $\leq \pm 1$        | % of $I_{PN}$ |
| $\epsilon_L$        | Linearity error 0 .. $I_{PN}$                                                   | $\leq \pm 0.5$      | % of $I_{PN}$ |
|                     | .. $3 \times I_{PN}$                                                            | $\leq \pm 1$        | % of $I_{PN}$ |
| $TCV_{OUT}$         | Temperature coefficient of $V_{OUT}$ @ $I_P = 0$                                | $\leq \pm 0.4$      | mV/K          |
| $TCV_{REF}$         | Temperature coefficient of $V_{REF}$ (25 .. 85 °C)                              | $\leq \pm 0.01$     | %/K           |
|                     | (-40 .. 25 °C)                                                                  | $\leq \pm 0.015$    | %/K           |
| $TCV_{OUT/V_{REF}}$ | Temperature coefficient of $V_{OUT}/V_{REF}$ @ $I_P = 0$                        | $\leq \pm 0.2$      | mV/K          |
| $TCG$               | Temperature coefficient of $G$                                                  | $\leq \pm 0.07 \%$  | of reading/K  |
| $V_{OE}$            | Electrical offset voltage @ $I_P = 0$ , $T_A = 25^\circ C$                      | $V_{REF} \pm 0.025$ | V             |
| $V_{OM}$            | Magnetic offset voltage @ $I_P = 0$ , after an overload of $3 \times I_{PN DC}$ | $< \pm 1.2$         | % of $I_{PN}$ |
| $t_{ra}$            | Reaction time @ 10 % of $I_{PN}$                                                | $< 3$               | $\mu s$       |
| $t_r$               | Response time to 90 % of $I_{PN}$ step                                          | $< 5$               | $\mu s$       |
| $di/dt$             | di/dt accurately followed                                                       | $> 50$              | A/ $\mu s$    |
| $V_{no}$            | Output voltage noise (DC .. 10kHz)                                              | $< 20$              | mVpp          |
|                     | (DC .. 1MHz)                                                                    | $< 40$              | mVpp          |
| <b>BW</b>           | Frequency bandwidth (-3 dB) <sup>4)</sup>                                       | DC .. 50            | kHz           |

**Notes** : <sup>1)</sup> It is possible to overdrive  $V_{REF}$  with an external reference voltage between 1.5V - 2.8V providing its ability to sink or source approximately 5 mA.

<sup>2)</sup> Excluding offset and hysteresis.

<sup>3)</sup> Maximum supply voltage (not operating)  $< 6.5 V$

<sup>4)</sup> Small signal only to avoid excessive heatings of the magnetic core.

$$I_{PN} = 5 \dots 20 A$$



### Features

- Hall effect measuring principle
- Galvanic isolation between primary and secondary circuit
- Isolation test voltage 4300V
- Low power consumption
- Extremely low profile, 12mm
- Single power supply +5V
- Fixed offset & gain
- For SMT mounting

### Advantages

- Small size and space saving
- Only one design for wide primary current range
- High immunity to external interference.
- $V_{REF}$  pin with REF OUT & REF IN modes

### Applications

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

### Application domain

- Industrial

## Current Transducer HMS 5..20-P

### General data

|       |                               |                |    |
|-------|-------------------------------|----------------|----|
| $T_A$ | Ambient operating temperature | - 40 .. + 85   | °C |
| $T_S$ | Ambient storage temperature   | - 40 .. + 85   | °C |
| $m$   | Mass                          | app. 6         | g  |
|       | UL94 Classification           | V0             |    |
|       | Standard                      | EN 50178: 1997 |    |

### Isolation characteristics

|       |                                                                                              |  |  |
|-------|----------------------------------------------------------------------------------------------|--|--|
| $V_b$ | Rated isolation voltage rms<br>with IEC EN 50178, 61010-1 standards and following conditions |  |  |
|       | - Over voltage category III                                                                  |  |  |
|       | - Pollution degree 2                                                                         |  |  |
|       | - Heterogeneous field                                                                        |  |  |

|                       | EN50178 | IEC61010-1 |
|-----------------------|---------|------------|
| Single isolation      | 1000V   | 1000V      |
| Reinforced insulation | 600V    | 300V       |

|             |                                                  |       |    |
|-------------|--------------------------------------------------|-------|----|
| $V_d$       | Rms voltage for AC isolation test, 50 Hz, 1 min  | 4.3   | kV |
| $dCp$       | Creepage distance                                | > 9.4 | mm |
| $dCl$       | Clearance distance                               | > 9.4 | mm |
| $CTI$       | Comparative tracking index (Group I )            | > 600 | V  |
| $V_e$       | Partial discharge extinction voltage rms @ 10 pC | > 750 | V  |
| $\hat{V}_w$ | Impulse withstand voltage 1.2/50 $\mu$ s         | 8     | kV |

### Safety



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).

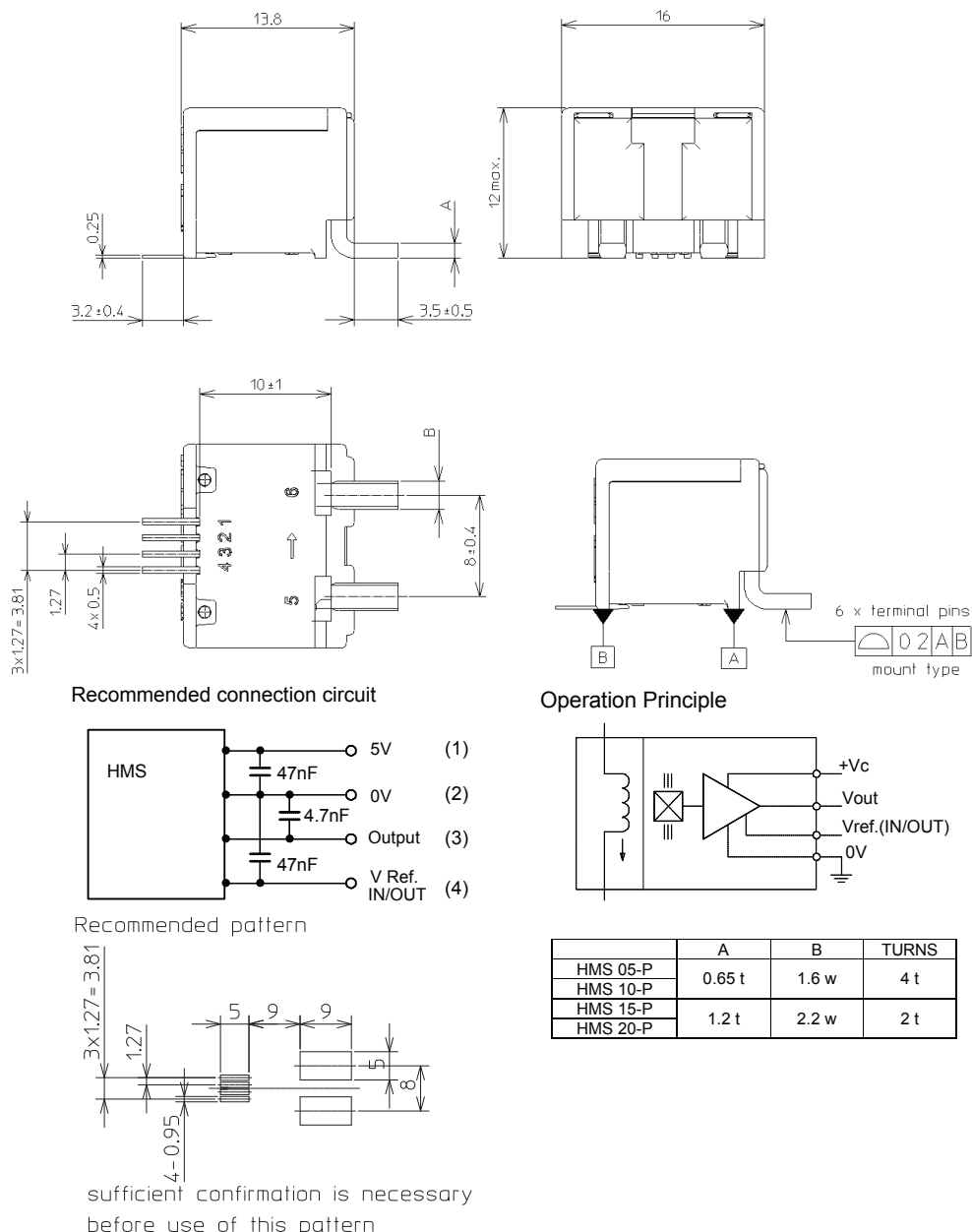
Ignoring this warning can lead to injury and/or cause serious damage.

This transducer is a built-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 HMS 5..20-P (in mm. 1 mm = 0.0394 inch)



## Mechanical characteristics

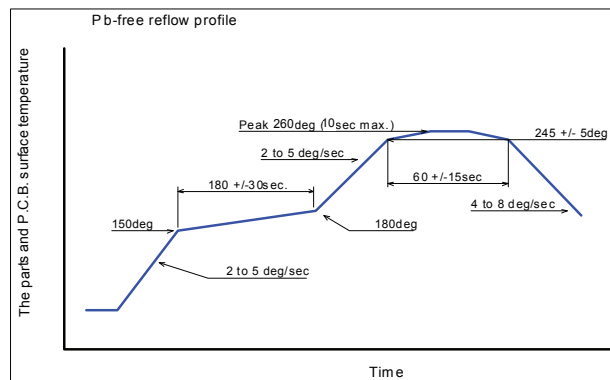
- General tolerance (unless otherwise stated)  $\pm 0.5$  mm

Dimensions do not include deformation such as warp age.

## Remarks

- $V_{OUT}$  is positive when  $I_p$  flows from terminal 5 (IN) to terminal 6 (OUT).
- Temperature of the primary conductor should not exceed 100°C.

## Solder reflow patterns



## Current Transducer HMS 5..20-P

### Handling Instructions

#### Notes for Storage, Handling and Mounting the transducer

##### Storage

- (1) General storage conditions: Temperature 5 .. 30 °C Humidity 40 .. 60 %RH without dew condensation
- (2) Storage period:  
  
Storage period is within 1 year after production date in general storage conditions with dry pack dessicant.  
  
According to MSL1 (Moisture Sensitivity Level 1) requirement.
- (3) Containers must prevent electric static charge build up.

**Note.** For over storage periods of 1 year, the customer shall confirm the solderability of the part.

##### Handling and Mounting

- (1) **Do not expose the transducer to shock or vibration.**

Damage caused by shock or vibration can lead to a failure of the transducer.

- (2) **Do not wash the transducer.**

The HMS is a non-sealed type transducer. If liquids reach inside the transducer, it will cause migration or corrosion, which will influence the performance.

- (3) **Thickness of the PCB should be more than 1.5 mm.**

If the thickness is not enough, the PCB tends to warp. It makes excessive tension on the transducer, which will influence the dynamic characteristics.

- (4) **Be aware of the chucking force when mounting the transducer.**

When you use a machine for mounting the HMS transducer, make sure the chucking force is not too much because excessive force could cause damage to the parts inside the case, which will influence the dynamic characteristics of the transducer. Chucking force should not exceed 3 times the weight of the transducer.

- (5) **Do not touch the lead pins with bare hands after they are taken out of the reel.**

Lead pins of HMS are Pb free parts. If the pins are touched by bare hands, they will oxidize faster, and that could cause soldering problems.

Do not use HMS transducer other than measuring current.

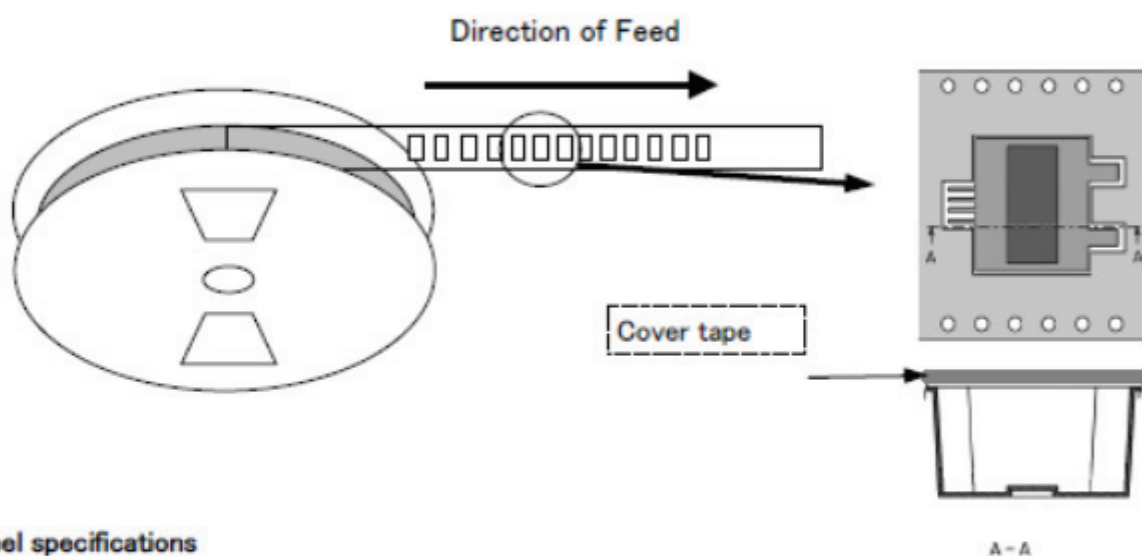


### (3) The peel back force strength

Peel force : 0.2[N]~0.7[N]  
Pulled at speed : 300[mm/min]



### (4) Number of parts per winding reel is 150.



### (5) Reel specifications

The following shows the shape and dimensions of the reel.

