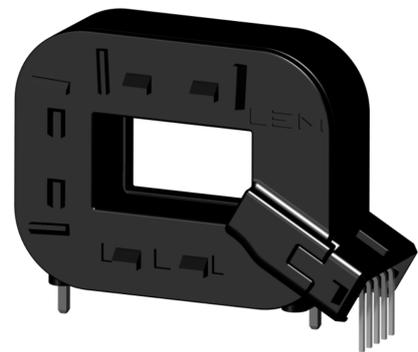


## Current Transducer HOF-PW series

$$I_{PN} = 150 \dots 540 \text{ A}$$

**Ref: HOF 150-PW; HOF 200-PW; HOF 250-PW; HOF 270-PW; HOF 300-PW;  
HOF 400-PW; HOF 540-PW**

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



### Features

- Open loop multi-range current transducer
- Bitstream output from 2<sup>nd</sup> order Sigma-Delta modulator, (PDM) Pulse Density Modulation
- Single supply +5 V
- EEPROM Control
- Galvanic separation between primary and secondary circuit
- Low power consumption
- Compact design for THT PCB mounting
- Aperture: 16 × 10 mm
- Factory calibrated
- $D_{out} = 80 \% @ I_{PN}$
- Dedicated to customer
- Potted.

### Advantages

- Low offset drift
- Creepage / clearance 8 mm
- Fast response.

### Applications

- AC variable speed and servo motor drives
- Static converters for DC motor drives
- Battery supplied applications
- Uninterruptible Power Supplies (UPS)
- Switched Mode Power Supplies (SMPS)
- Power supplies for welding applications
- Combiner box
- Solar inverter on DC side of the inverter (MPPT).

### Standards

- IEC 61800-2: 2015
- IEC 61800-3: 2017
- IEC 61800-5-1: 2007
- IEC 61010-1: 2010
- UL 508: 2013.

### Application Domain

- Industrial.

**Safety**

**Caution**

If the device is used in a way that is not specified by the manufacturer, the protection provided by the device may be compromised. Always inspect the electronics unit and connecting cable before using this product and do not use it if damaged. Mounting assembly shall guarantee the maximum primary conductor temperature, fulfill clearance and creepage distance, minimize electric and magnetic coupling, and unless otherwise specified can be mounted in any orientation.


**Caution, risk of electrical shock**

This transducer must be used in limited-energy secondary circuits SELV according to IEC 61010-1, in electric/electronic equipment with respect to applicable standards and safety requirements in accordance with the manufacturer's operating specifications.

Use caution during installation and use of this product; certain parts of the module can carry hazardous voltages and high currents (e.g. power supply, primary conductor).

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

De-energize all circuits and hazardous live parts before installing the product.

All installations, maintenance, servicing operations and use must be carried out by trained and qualified personnel practicing applicable safety precautions.

This transducer is a build-in device, whose hazardous live parts must be inaccessible after installation.

This transducer must be mounted in a suitable end-enclosure.

Besides make sure to have a distance of minimum 30 mm between the primary terminals of the transducer and other neighboring components.

Main supply must be able to be disconnected.

Always inspect the flexible probe for damage before using this product.

Never connect or disconnect the external power supply while the primary circuit is connected to live parts.

Never connect the output to any equipment with a common mode voltage to earth greater than 30 V.

Always wear protective clothing and gloves if hazardous live parts are present in the installation where the measurement is carried out.

This transducer is a built-in device, not intended to be cleaned with any product. Nevertheless if the user must implement cleaning or washing process, validation of the cleaning program has to be done by himself.

When defining soldering process, please use no cleaning process only.


**ESD susceptibility**

The product is susceptible to be damaged from an ESD event and the personnel should be grounded when handling it.

Do not dispose of this product as unsorted municipal waste. Contact a qualified recycler for disposal.

Although LEM applies utmost care to facilitate compliance of end products with applicable regulations during LEM product design, use of this part may need additional measures on the application side for compliance with regulations regarding EMC and protection against electric shock. Therefore LEM cannot be held liable for any potential hazards, damages, injuries or loss of life resulting from the use of this product.



Underwriters Laboratory Inc. recognized component

**Absolute maximum ratings**

Parameter	Symbol	Unit	Value
Maximum supply voltage (not destructive)	$U_{C\ max}$	V	8
Maximum supply voltage (not entering non standard modes)	$U_{C\ max}$	V	6.5
Maximum primary conductor temperature	$T_{B\ max}$	°C	120
Electrostatic discharge voltage (HBM - Human Body Model)	$U_{ESD\ HBM}$	kV	2

Stresses above these ratings may cause permanent damage. Exposure to absolute maximum ratings for extended periods may degrade reliability.

**UL 508: Ratings and assumptions of certification**

File # E189713 Volume: 2 Section: 15

**Standards**

- CSA C22.2 NO. 14-18 INDUSTRIAL CONTROL EQUIPMENT - Edition 18
- UL 508 STANDARD FOR INDUSTRIAL CONTROL EQUIPMENT - Edition 18

**Ratings**

Parameter	Symbol	Unit	Value
Primary involved potential		V AC/DC	600
Ambient operating temperature	$T_A$	°C	105
Primary current	$I_P$	A	According to series primary current
Supply voltage	$U_C$	V DC	5
Output voltage	$U_{out}$	V	0 to 5

**Conditions of acceptability**

- 1 - These devices have been evaluated for overvoltage category III and for use in pollution degree 2 environment or better.
- 2 - A suitable enclosure shall be provided in the end-use application.
- 3 - The terminals have not been evaluated for field wiring.
- 4 - These devices are intended to be mounted on a printed wiring board of end use equipment. The suitability of the connections (including spacings) shall be determined in the end-use application.
- 5 - Any surface of polymeric housing have not been evaluated as insulating barrier.
- 6 - Low voltage control circuit shall be supplied by an isolating source (such as a transformer, optical isolator, limiting impedance or electro-mechanical relay).

**Marking**

Only those products bearing the 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.

**Insulation coordination**

Parameter	Symbol	Unit	Value	Comment
RMS voltage for AC insulation test, 50 Hz, 1 min	$U_d$	kV	4.3	IEC 61800-5-1
Impulse withstand voltage 1.2/50 $\mu$ s	$U_{Ni}$	kV	8	@ 2000 m
Partial discharge RMS test voltage ( $q_m < 10$ pC)	$U_t$	V	1500	Busbar/Secondary
Clearance (pri. - sec.)	$d_{Cl}$	mm	> 8	Shortest distance through air
Creepage distance (pri. - sec.)	$d_{Cp}$	mm	> 8	Shortest path along device body
Clearance (pri. - sec.)	$d_{Cl}$	mm	> 8	When mounted on PCB with recommended layout
Case material	-	-	V0	According to UL 94
Comparative tracking index	$CTI$		600	
Application example		V	600	Reinforced insulation, according to IEC 61800-5-1 CAT III PD2
Application example		V	1000	Basic insulation, according to IEC 61800-5-1 CAT III PD2
Application example		V	300	Reinforced insulation, according to IEC 61010-1 CAT III PD2

**Environmental and mechanical characteristics**

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Ambient operating temperature	$T_A$	$^{\circ}$ C	-40		105 <sup>1)</sup>	
Ambient storage temperature	$T_{Ast}$	$^{\circ}$ C	-40		105	
Mass	$m$	g		33		

**Note:** <sup>1)</sup> 85  $^{\circ}$ C and 5 % RH to 95 % RH is applied in LVD certification.

**Electrical data HOF 150-PW**

 At  $T_A = 25\text{ °C}$ ,  $U_C = +5\text{ V}$ , unloaded, unless otherwise noted (see Min, Max, typ. definition paragraph in page 12).

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal RMS current	$I_{PN}$	A		150		
Primary current, measuring range	$I_{PM}$	A	-199.5		199.5	
Supply voltage	$U_C$	V	4.5	5	5.5	
Current consumption	$I_C$	mA		24 53		$I_C$ unloaded $I_C$ with $R_L = 100\text{ Ohm}$
Density of ones @ $I_P = 0\text{ A}$	$D_{out}$	%		50		
Density of ones @ $\pm I_{PN}$	$D_{out}$	%		50 $\pm$ 30		
Density of ones @ $\pm I_{PM}$	$D_{out}$	%		50 $\pm$ 40		
Load capacitance	$C_L$	pF	0		30	
Output duty cycle or density of ones	$D_{out}$	%		0		Forced to 0 when EEPROM in an error state
Electrical offset for PWM or PDM output referred to primary	$D_{OE}$	%	-0.1		0.1	Relative to $D_{out} = 50\%$
Electrical offset current referred to primary	$I_{OE}$	A	-0.5		0.5	
Temperature coefficient of $I_{OE}$ @ $I_P = 0\text{ A}$	$TCI_{OE}$	mA/K	-7		7	-40 °C ... 105 °C
Nominal sensitivity	$S_N$	%/A		0.2		30 % @ $I_{PN}$
Sensitivity error @ $I_{PN}$	$\varepsilon_S$	%	-1		1	Factory adjustment
Temperature coefficient of $S$	$TCS$	ppm/K	-350		350	-40 °C ... 105 °C
Linearity error 0 ... $I_{PN}$	$\varepsilon_L$	% of $I_{PN}$	-0.6		0.6	
Linearity error 0 ... $I_{PM}$	$\varepsilon_L$	% of $I_{PM}$	-0.6		0.6	
Magnetic offset current (@ $10 \times I_{PN}$ ) referred to primary	$I_{OM}$	A		$\pm 1$		One turn
Delay time to 90 % of the final output value for $I_{PN}$ step	$t_{D90}$	$\mu\text{s}$				Determined by digital filter and OSR <sup>1)</sup>
Sum of sensitivity and linearity error @ $I_{PN}$	$\varepsilon_{SL}$	% of $I_{PN}$	-1.6		1.6	
Sum of sensitivity and linearity error at 105 °C @ $I_{PN}$	$\varepsilon_{SL105}$	% of $I_{PN}$	-4.65		4.65	See formula note <sup>2)</sup>
Sum of sensitivity and linearity error at 85 °C @ $I_{PN}$	$\varepsilon_{SL85}$	% of $I_{PN}$	-3.89		3.89	
Effective Resolution						
	sinc3osr64	bits		11.5		
	sinc3osr128	bits		12.2		
	sinc3osr256	bits		12.7		

 Notes: <sup>1)</sup> See page 15.

$$\text{Total error @ } T_A (\% \text{ of } I_{PN}) = \varepsilon + \left( \frac{TCS}{10000} \times (T_A - 25) + \frac{TCI_{OE}}{1000 \times I_{PN}} \times 100 \times (T_A - 25) \right).$$

**Electrical data HOF 200-PW**

 At  $T_A = 25\text{ °C}$ ,  $U_C = +5\text{ V}$ , unloaded, unless otherwise noted (see Min, Max, typ. definition paragraph in page 12).

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal RMS current	$I_{PN}$	A		200		
Primary current, measuring range	$I_{PM}$	A	-266		266	
Supply voltage	$U_C$	V	4.5	5	5.5	
Current consumption	$I_C$	mA		24 53		$I_C$ unloaded $I_C$ with $R_L = 100\text{ Ohm}$
Density of ones @ $I_P = 0\text{ A}$	$D_{out}$	%		50		
Density of ones @ $\pm I_{PN}$	$D_{out}$	%		50 ±30		
Density of ones @ $\pm I_{PM}$	$D_{out}$	%		50 ±40		
Load capacitance	$C_L$	pF	0		30	
Output duty cycle or density of ones	$D_{out}$	%		0		Forced to 0 when EEPROM in an error state
Electrical offset for PWM or PDM output referred to primary	$D_{OE}$	%	-0.1		0.1	Relative to $D_{out} = 50\%$
Electrical offset current referred to primary	$I_{OE}$	A	-0.67		0.67	
Temperature coefficient of $I_{OE}$ @ $I_P = 0\text{ A}$	$TCI_{OE}$	mA/K	-10		10	-40 °C ... 105 °C
Nominal sensitivity	$S_N$	%/A		0.15		30 % @ $I_{PN}$
Sensitivity error @ $I_{PN}$	$\varepsilon_S$	%	-1		1	Factory adjustment
Temperature coefficient of $S$	$TCS$	ppm/K	-350		350	-40 °C ... 105 °C
Linearity error 0 ... $I_{PN}$	$\varepsilon_L$	% of $I_{PN}$	-0.6		0.6	
Linearity error 0 ... $I_{PM}$	$\varepsilon_L$	% of $I_{PM}$	-0.6		0.6	
Magnetic offset current (@ $10 \times I_{PN}$ ) referred to primary	$I_{OM}$	A		±1		One turn
Delay time to 90 % of the final output value for $I_{PN}$ step	$t_{D90}$	µs				Determined by digital filter and OSR <sup>1)</sup>
Sum of sensitivity and linearity error @ $I_{PN}$	$\varepsilon_{SL}$	% of $I_{PN}$	-1.6		1.6	
Sum of sensitivity and linearity error at 105 °C @ $I_{PN}$	$\varepsilon_{SL105}$	% of $I_{PN}$	-4.59		4.59	See formula note <sup>2)</sup>
Sum of sensitivity and linearity error at 85 °C @ $I_{PN}$	$\varepsilon_{SL85}$	% of $I_{PN}$	-3.84		3.84	
Effective Resolution	sinc3osr64 sinc3osr128 sinc3osr256	bits bits bits		11.7 12.5 13.0		

**Notes:** <sup>1)</sup> See page 15.

$$^2) \text{ Total error @ } T_A \text{ (\% of } I_{PN}) = \varepsilon + \left( \frac{TCS}{10000} \times (T_A - 25) \right) + \frac{TCI_{OE}}{1000 \times I_{PN}} \times 100 \times (T_A - 25).$$

**Electrical data HOF 250-PW**

 At  $T_A = 25\text{ °C}$ ,  $U_C = +5\text{ V}$ , unloaded, unless otherwise noted (see Min, Max, typ. definition paragraph in page 12).

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal RMS current	$I_{PN}$	A		250		
Primary current, measuring range	$I_{PM}$	A	-332.5		332.5	
Supply voltage	$U_C$	V	4.5	5	5.5	
Current consumption	$I_C$	mA		24 53		$I_C$ unloaded $I_C$ with $R_L = 100\text{ Ohm}$
Density of ones @ $I_P = 0\text{ A}$	$D_{out}$	%		50		
Density of ones @ $\pm I_{PN}$	$D_{out}$	%		50 $\pm$ 30		
Density of ones @ $\pm I_{PM}$	$D_{out}$	%		50 $\pm$ 40		
Load capacitance	$C_L$	pF	0		30	
Output duty cycle or density of ones	$D_{out}$	%		0		Forced to 0 when EEPROM in an error state
Electrical offset for PWM or PDM output referred to primary	$D_{OE}$	%	-0.1		0.1	Relative to $D_{out} = 50\%$
Electrical offset current referred to primary	$I_{OE}$	A	-0.83		0.83	
Temperature coefficient of $I_{OE}$ @ $I_P = 0\text{ A}$	$TCI_{OE}$	mA/K	-12		12	-40 °C ... 105 °C
Nominal sensitivity	$S_N$	%/A		0.12		30 % @ $I_{PN}$
Sensitivity error @ $I_{PN}$	$\epsilon_S$	%	-1		1	Factory adjustment
Temperature coefficient of $S$	$TCS$	ppm/K	-350		350	-40 °C ... 105 °C
Linearity error 0 ... $I_{PN}$	$\epsilon_L$	% of $I_{PN}$	-0.6		0.6	
Linearity error 0 ... $I_{PM}$	$\epsilon_L$	% of $I_{PM}$	-0.6		0.6	
Magnetic offset current (@ $10 \times I_{PN}$ ) referred to primary	$I_{OM}$	A		$\pm 1$		One turn
Delay time to 90 % of the final output value for $I_{PN}$ step	$t_{D90}$	$\mu\text{s}$				Determined by digital filter and OSR <sup>1)</sup>
Sum of sensitivity and linearity error @ $I_{PN}$	$\epsilon_{SL}$	% of $I_{PN}$	-1.6		1.6	
Sum of sensitivity and linearity error at 105 °C @ $I_{PN}$	$\epsilon_{SL105}$	% of $I_{PN}$	-4.55		4.55	See formula note <sup>2)</sup>
Sum of sensitivity and linearity error at 85 °C @ $I_{PN}$	$\epsilon_{SL85}$	% of $I_{PN}$	-3.81		3.81	
Effective Resolution	sinc3osr64 sinc3osr128 sinc3osr256	bits bits bits		11.9 12.7 13.2		

**Notes:** <sup>1)</sup> See page 15.

$$^2) \text{ Total error @ } T_A \text{ (\% of } I_{PN}) = \epsilon + \left( \frac{TCS}{10000} \times (T_A - 25) \right) + \frac{TCI_{OE}}{1000 \times I_{PN}} \times 100 \times (T_A - 25).$$

**Electrical data HOF 270-PW**

 At  $T_A = 25\text{ °C}$ ,  $U_C = +5\text{ V}$ , unloaded, unless otherwise noted (see Min, Max, typ. definition paragraph in page 12).

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal RMS current	$I_{PN}$	A		270		
Primary current, measuring range	$I_{PM}$	A	-359.1		359.1	
Supply voltage	$U_C$	V	4.5	5	5.5	
Current consumption	$I_C$	mA		24 53		$I_C$ unloaded $I_C$ with $R_L = 100\text{ Ohm}$
Density of ones @ $I_P = 0\text{ A}$	$D_{out}$	%		50		
Density of ones @ $\pm I_{PN}$	$D_{out}$	%		50 $\pm$ 30		
Density of ones @ $\pm I_{PM}$	$D_{out}$	%		50 $\pm$ 40		
Load capacitance	$C_L$	pF	0		30	
Output duty cycle or density of ones	$D_{out}$	%		0		Forced to 0 when EEPROM in an error state
Electrical offset for PWM or PDM output referred to primary	$D_{OE}$	%	-0.1		0.1	Relative to $D_{out} = 50\%$
Electrical offset current referred to primary	$I_{OE}$	A	-0.9		0.9	
Temperature coefficient of $I_{OE}$ @ $I_P = 0\text{ A}$	$TCI_{OE}$	mA/K	-13		13	-40 °C ... 105 °C
Nominal sensitivity	$S_N$	%/A		0.1111		30 % @ $I_{PN}$
Sensitivity error @ $I_{PN}$	$\varepsilon_S$	%	-1		1	Factory adjustment
Temperature coefficient of $S$	$TCS$	ppm/K	-350		350	-40 °C ... 105 °C
Linearity error 0 ... $I_{PN}$	$\varepsilon_L$	% of $I_{PN}$	-0.6		0.6	
Linearity error 0 ... $I_{PM}$	$\varepsilon_L$	% of $I_{PM}$	-0.6		0.6	
Magnetic offset current (@ $10 \times I_{PN}$ ) referred to primary	$I_{OM}$	A		$\pm 1$		One turn
Delay time to 90 % of the final output value for $I_{PN}$ step	$t_{D90}$	$\mu\text{s}$				Determined by digital filter and OSR <sup>1)</sup>
Sum of sensitivity and linearity error @ $I_{PN}$	$\varepsilon_{SL}$	% of $I_{PN}$	-1.6		1.6	
Sum of sensitivity and linearity error at 105 °C @ $I_{PN}$	$\varepsilon_{SL105}$	% of $I_{PN}$	-4.54		4.54	See formula note <sup>2)</sup>
Sum of sensitivity and linearity error at 85 °C @ $I_{PN}$	$\varepsilon_{SL85}$	% of $I_{PN}$	-3.8		3.8	
Effective Resolution	sinc3osr64 sinc3osr128 sinc3osr256	bits bits bits		11.9 12.7 13.2		

**Notes:** <sup>1)</sup> See page 15.

$$\text{<sup>2)</sup> Total error @ } T_A \text{ (% of } I_{PN}) = \varepsilon + \left( \frac{TCS}{10000} \times (T_A - 25) \right) + \frac{TCI_{OE}}{1000 \times I_{PN}} \times 100 \times (T_A - 25).$$

**Electrical data HOF 300-PW**

 At  $T_A = 25\text{ °C}$ ,  $U_C = +5\text{ V}$ , unloaded, unless otherwise noted (see Min, Max, typ. definition paragraph in page 12).

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal RMS current	$I_{PN}$	A		300		
Primary current, measuring range	$I_{PM}$	A	-399		399	
Supply voltage	$U_C$	V	4.5	5	5.5	
Current consumption	$I_C$	mA		24 53		$I_C$ unloaded $I_C$ with $R_L = 100\text{ Ohm}$
Density of ones @ $I_P = 0\text{ A}$	$D_{out}$	%		50		
Density of ones @ $\pm I_{PN}$	$D_{out}$	%		50 $\pm$ 30		
Density of ones @ $\pm I_{PM}$	$D_{out}$	%		50 $\pm$ 40		
Load capacitance	$C_L$	pF	0		30	
Output duty cycle or density of ones	$D_{out}$	%		0		Forced to 0 when EEPROM in an error state
Electrical offset for PWM or PDM output referred to primary	$D_{OE}$	%	-0.1		0.1	Relative to $D_{out} = 50\%$
Electrical offset current referred to primary	$I_{OE}$	A	-1		1	
Temperature coefficient of $I_{OE}$ @ $I_P = 0\text{ A}$	$TCI_{OE}$	mA/K	-14		14	-40 °C ... 105 °C
Nominal sensitivity	$S_N$	%/A		0.1		30 % @ $I_{PN}$
Sensitivity error @ $I_{PN}$	$\varepsilon_S$	%	-1		1	Factory adjustment
Temperature coefficient of $S$	$TCS$	ppm/K	-350		350	-40 °C ... 105 °C
Linearity error 0 ... $I_{PN}$	$\varepsilon_L$	% of $I_{PN}$	-0.6		0.6	
Linearity error 0 ... $I_{PM}$	$\varepsilon_L$	% of $I_{PM}$	-0.6		0.6	
Magnetic offset current (@ $10 \times I_{PN}$ ) referred to primary	$I_{OM}$	A		$\pm 1$		One turn
Delay time to 90 % of the final output value for $I_{PN}$ step	$t_{D90}$	$\mu\text{s}$				Determined by digital filter and OSR <sup>1)</sup>
Sum of sensitivity and linearity error @ $I_{PN}$	$\varepsilon_{SL}$	% of $I_{PN}$	-1.6		1.6	
Sum of sensitivity and linearity error at 105 °C @ $I_{PN}$	$\varepsilon_{SL105}$	% of $I_{PN}$	-4.53		4.53	See formula note <sup>2)</sup>
Sum of sensitivity and linearity error at 85 °C @ $I_{PN}$	$\varepsilon_{SL85}$	% of $I_{PN}$	-3.79		3.79	
Effective Resolution	sinc3osr64 sinc3osr128 sinc3osr256	bits bits bits		11.8 12.6 13.1		

 Notes: <sup>1)</sup> See page 15.

$$^2) \text{ Total error @ } T_A \text{ (\% of } I_{PN}) = \varepsilon + \left( \frac{TCS}{10000} \times (T_A - 25) \right) + \frac{TCI_{OE}}{1000 \times I_{PN}} \times 100 \times (T_A - 25).$$

**Electrical data HOF 400-PW**

 At  $T_A = 25\text{ °C}$ ,  $U_C = +5\text{ V}$ , unloaded, unless otherwise noted (see Min, Max, typ. definition paragraph in page 12).

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal RMS current	$I_{PN}$	A		400		
Primary current, measuring range	$I_{PM}$	A	-532		532	
Supply voltage	$U_C$	V	4.5	5	5.5	
Current consumption	$I_C$	mA		24 53		$I_C$ unloaded $I_C$ with $R_L = 100\text{ Ohm}$
Density of ones @ $I_P = 0\text{ A}$	$D_{out}$	%		50		
Density of ones @ $\pm I_{PN}$	$D_{out}$	%		50 $\pm$ 30		
Density of ones @ $\pm I_{PM}$	$D_{out}$	%		50 $\pm$ 40		
Load capacitance	$C_L$	pF	0		30	
Output duty cycle or density of ones	$D_{out}$	%		0		Forced to 0 when EEPROM in an error state
Electrical offset for PWM or PDM output referred to primary	$D_{OE}$	%	-0.1		0.1	Relative to $D_{out} = 50\%$
Electrical offset current referred to primary	$I_{OE}$	A	-1.33		1.33	
Temperature coefficient of $I_{OE}$ @ $I_P = 0\text{ A}$	$TCI_{OE}$	mA/K	-19		19	-40 °C ... 105 °C
Nominal sensitivity	$S_N$	%/A		0.075		30 % @ $I_{PN}$
Sensitivity error @ $I_{PN}$	$\epsilon_S$	%	-1		1	Factory adjustment
Temperature coefficient of $S$	$TCS$	ppm/K	-350		350	-40 °C ... 105 °C
Linearity error 0 ... $I_{PN}$	$\epsilon_L$	% of $I_{PN}$	-0.6		0.6	
Linearity error 0 ... $I_{PM}$	$\epsilon_L$	% of $I_{PM}$	-0.6		0.6	
Magnetic offset current (@ $10 \times I_{PN}$ ) referred to primary	$I_{OM}$	A		$\pm 1$		One turn
Delay time to 90 % of the final output value for $I_{PN}$ step	$t_{D90}$	$\mu\text{s}$				Determined by digital filter and OSR <sup>1)</sup>
Sum of sensitivity and linearity error @ $I_{PN}$	$\epsilon_{SL}$	% of $I_{PN}$	-1.6		1.6	
Sum of sensitivity and linearity error at 105 °C @ $I_{PN}$	$\epsilon_{SL105}$	% of $I_{PN}$	-4.49		4.49	See formula note <sup>2)</sup>
Sum of sensitivity and linearity error at 85 °C @ $I_{PN}$	$\epsilon_{SL85}$	% of $I_{PN}$	-3.77		3.77	
Effective Resolution	sinc3osr64 sinc3osr128 sinc3osr256	bits bits bits		11.9 12.8 13.3		

 Notes: <sup>1)</sup> See page 15.

$$^2) \text{ Total error @ } T_A \text{ (\% of } I_{PN}) = \epsilon + \left( \frac{TCS}{10000} \times (T_A - 25) \right) + \frac{TCI_{OE}}{1000 \times I_{PN}} \times 100 \times (T_A - 25).$$

**Electrical data HOF 540-PW**

 At  $T_A = 25\text{ °C}$ ,  $U_C = +5\text{ V}$ , unloaded, unless otherwise noted (see Min, Max, typ. definition paragraph in page 12).

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal RMS current	$I_{PN}$	A		540		
Primary current, measuring range	$I_{PM}$	A	-718.2		718.2	
Supply voltage	$U_C$	V	4.5	5	5.5	
Current consumption	$I_C$	mA		24 53		$I_C$ unloaded $I_C$ with $R_L = 100\text{ Ohm}$
Density of ones @ $I_P = 0\text{ A}$	$D_{out}$	%		50		
Density of ones @ $\pm I_{PN}$	$D_{out}$	%		50 $\pm$ 30		
Density of ones @ $\pm I_{PM}$	$D_{out}$	%		50 $\pm$ 40		
Load capacitance	$C_L$	pF	0		30	
Output duty cycle or density of ones	$D_{out}$	%		0		Forced to 0 when EEPROM in an error state
Electrical offset for PWM or PDM output referred to primary	$D_{OE}$	%	-0.1		0.1	Relative to $D_{out} = 50\%$
Electrical offset current referred to primary	$I_{OE}$	A	-1.8		1.8	
Temperature coefficient of $I_{OE}$ @ $I_P = 0\text{ A}$	$TCl_{OE}$	mA/K	-25.2		25.2	-40 °C ... 105 °C
Nominal sensitivity	$S_N$	%/A		0.0556		30 % @ $I_{PN}$
Sensitivity error @ $I_{PN}$	$\varepsilon_S$	%	-1		1	Factory adjustment
Temperature coefficient of $S$	$TCS$	ppm/K	-350		350	-40 °C ... 105 °C
Linearity error 0 ... $I_{PN}$	$\varepsilon_L$	% of $I_{PN}$	-0.6		0.6	
Linearity error 0 ... $I_{PM}$ 0 ... 650 650 ... $I_{PM}$	$\varepsilon_L$	% of $I_{PM}$	-0.6 -1.5		0.6 1.5	
Magnetic offset current (@ $10 \times I_{PN}$ ) referred to primary	$I_{OM}$	A		$\pm 1.0$		One turn
Delay time to 90 % of the final output value for $I_{PN}$ step	$t_{D90}$	$\mu\text{s}$				Determined by digital filter and OSR <sup>1)</sup>
Sum of sensitivity and linearity error @ $I_{PN}$	$\varepsilon_{SL}$	% of $I_{PN}$	-1.6		1.6	
Sum of sensitivity and linearity error at 105 °C @ $I_{PN}$	$\varepsilon_{SL105}$	% of $I_{PN}$	-4.47		4.47	See formula note <sup>2)</sup>
Sum of sensitivity and linearity error at 85 °C @ $I_{PN}$	$\varepsilon_{SL85}$	% of $I_{PN}$	-3.75		3.75	
Effective Resolution						
sinc3osr64		bits		12.0		
sinc3osr128		bits		12.9		
sinc3osr256		bits		13.4		

 Notes: <sup>1)</sup> See page 15.

$$^2) \text{ Total error @ } T_A \text{ (\% of } I_{PN}) = \varepsilon + \left( \frac{TCS}{10000} \times (T_A - 25) \right) + \frac{TCl_{OE}}{1000 \times I_{PN}} \times 100 \times (T_A - 25).$$

### Definition of typical, minimum and maximum values

Minimum and maximum values for specified limiting and safety conditions have to be understood as such as well as values shown in “typical” graphs.

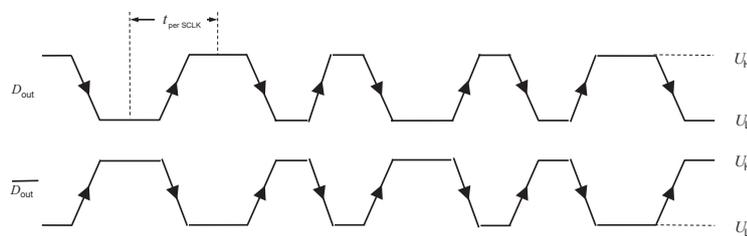
On the other hand, measured values are part of a statistical distribution that can be specified by an interval with upper and lower limits and a probability for measured values to lie within this interval.

Unless otherwise stated (e.g. “100 % tested”), the LEM definition for such intervals designated with “min” and “max” is that the probability for values of samples to lie in this interval is 99.73 %.

For a normal (Gaussian) distribution, this corresponds to an interval between  $-3\sigma$  and  $+3\sigma$ . If “typical” values are not obviously mean or average values, those values are defined to delimit intervals with a probability of 68.27 %, corresponding to an interval between  $-\sigma$  and  $+\sigma$  for a normal distribution. Typical, minimum and maximum values are determined during the initial characterization of the product.

### HOF-PW series output characteristics

#### 2 Wire RS 422 Manchester (ANSI/TIA/EIA-422-B and IEEE 802.3)



For all allowed capacitive range,  $R_L$  can be 100 Ohm.

Logical 1 is coding on a rising edge on  $D_{out}$ .

- Timing for mode 1

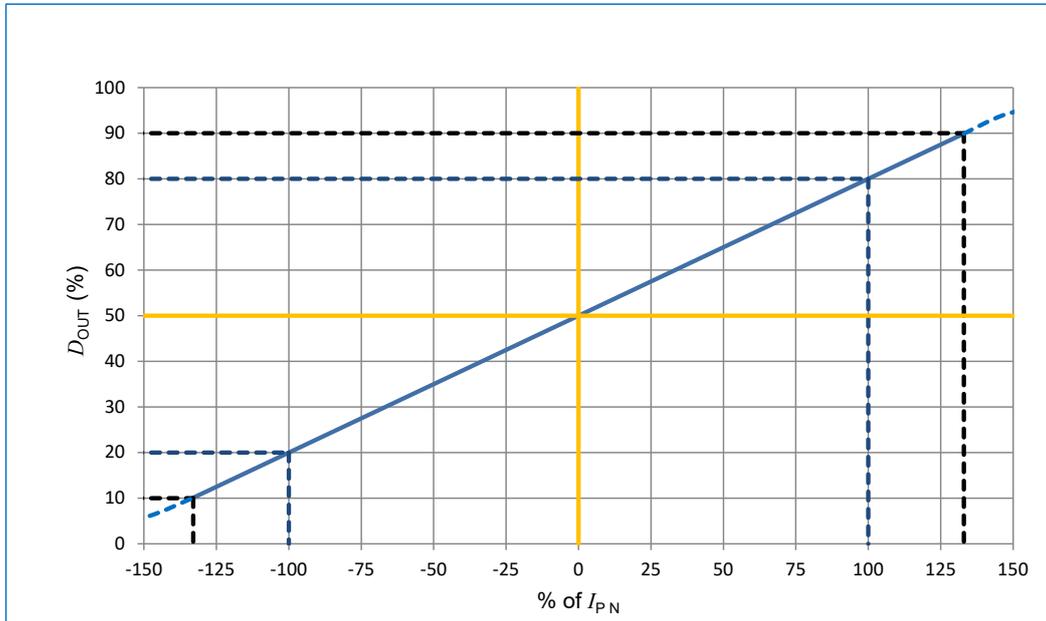
Parameter	Symbol	Unit	Min	Typ	Max	Comment
SCLK period	$t_{per\ SCLK}$	ns	89	93.5	98	$f_{CLK} = 10.7\ MHz \pm 5\ %$
Temperature coefficient of clock period	$TCt_{per\ SCLK}$	ppm/K	-400	0	400	$-40\ ^\circ C \dots 105\ ^\circ C$

- Levels

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Low voltage	$U_L$	V			0.4	with $I_{out\ L} = 4\ mA$ , unloaded
High voltage	$U_H$	V	$U_C - 0.4$			with $I_{out\ H} = -4\ mA$ , unloaded

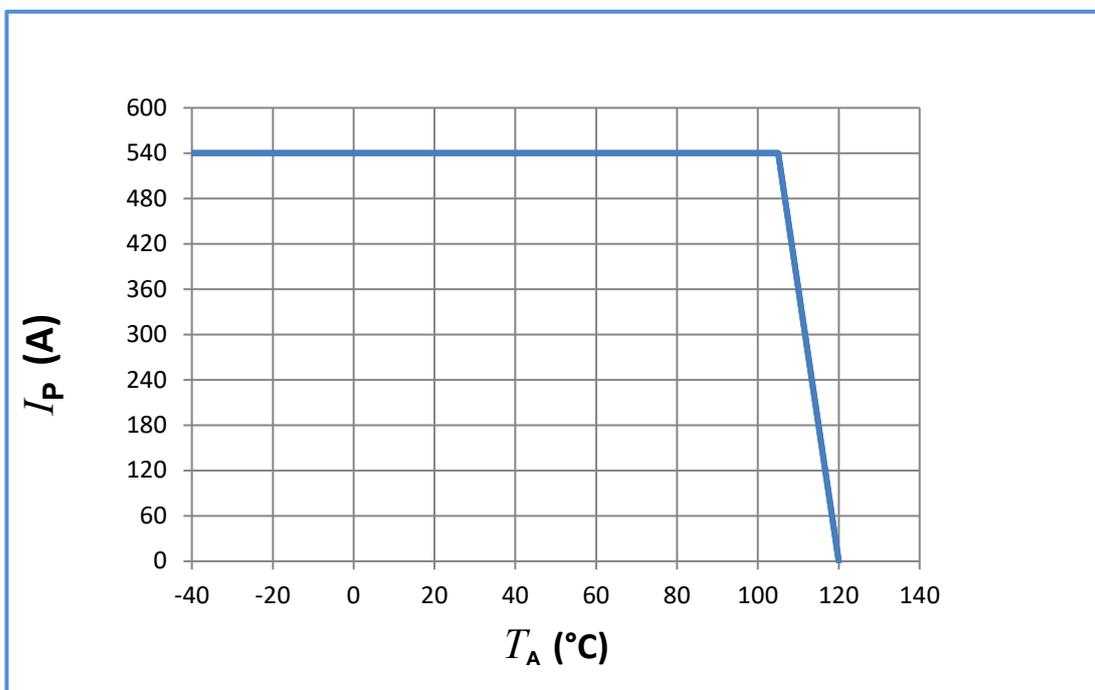
HOF-PW series output characteristics

Modulator output: Density of ones versus % of  $I_{PN}$



Maximum continuous DC current

For all ranges:

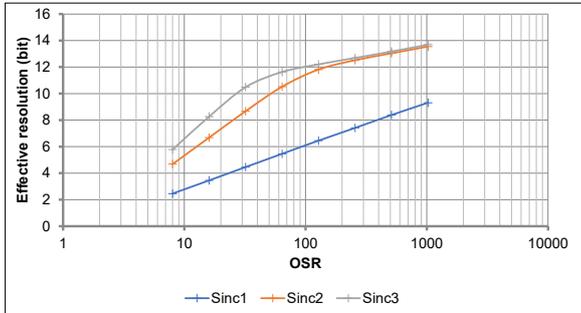


**Important notice:** Whatever the usage and/or application, the transducer primary bar / jumper temperature shall not go above the maximum rating of 120 °C as stated in page 3 of this datasheet.

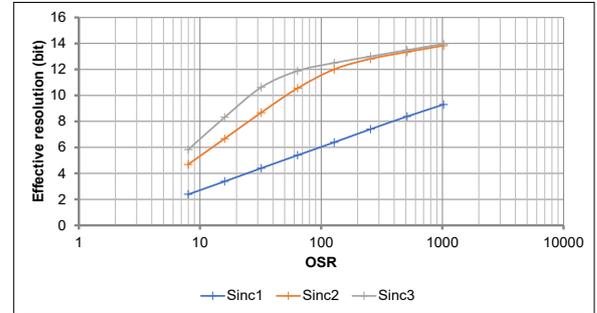
(All data is typical)

Effective resolution versus OSR

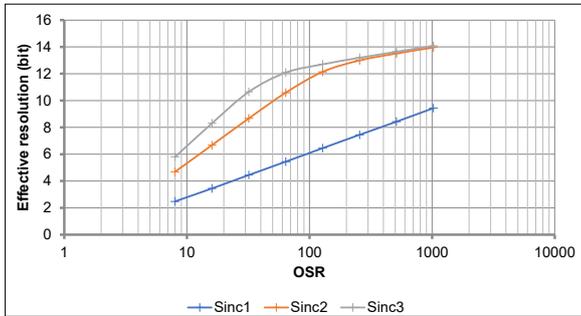
HOF 150-PW



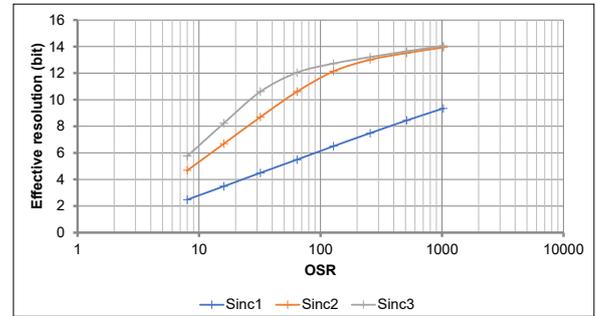
HOF 200-PW



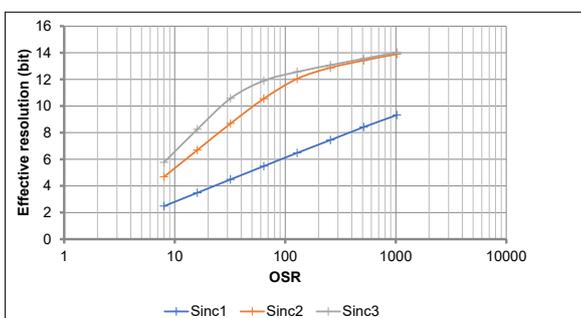
HOF 250-PW



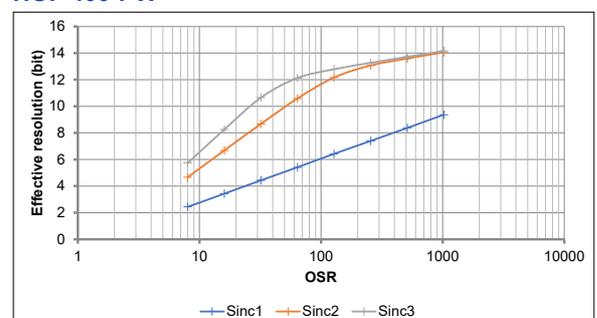
HOF 270-PW



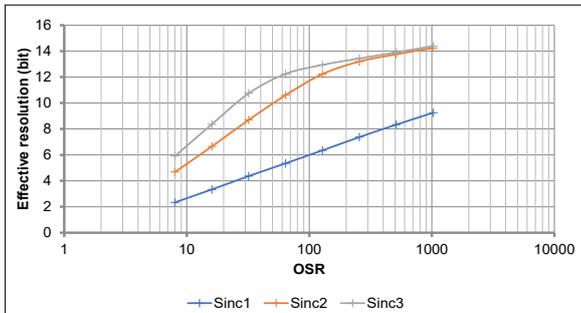
HOF 300-PW



HOF 400-PW



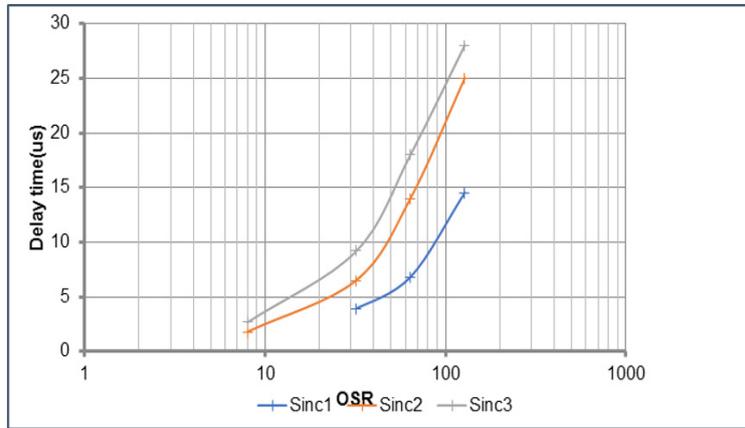
HOF 540-PW



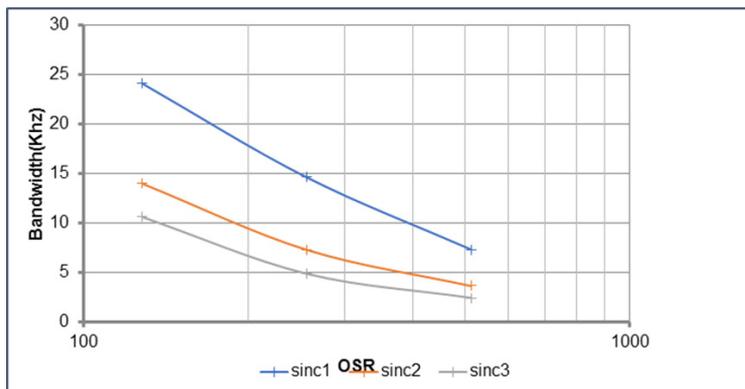
Signal to Noise Ratio

$$SNR (dB) = 20 \cdot \log_{10} (2) / \text{Effective resolution}$$

Delay time versus OSR



Bandwidth (-3 dB) versus OSR



## Application information

HOF-PW series is designed to use a bus-bar or a cable <sup>1)</sup> to carry the current through out the aperture with a maximum capacity of 16 × 10 mm.

Note: <sup>1)</sup> The maximum magnetic offset referred to primary is inversely proportional to the number of turns, thus is divided by 2 with 2 turns.

## Remark

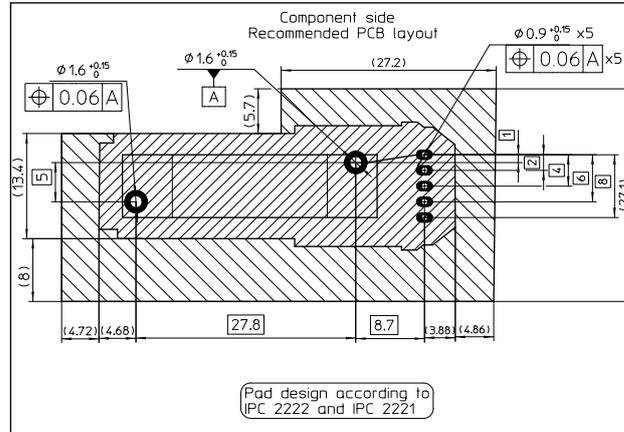
Installation of the transducer must be done unless otherwise specified on the datasheet, according to LEM Transducer Generic Mounting Rules. Please refer to LEM document N°ANE120504 available on our Web site: <https://www.lem.com/en/file/3137/download/>.

**PCB Footprint in mm**

**Assembly on PCB**

- Recommended PCB hole diameter

1.6 mm for Fixing pin



- Maximum PCB thickness
- Wave soldering profile  
No clean process only

0.9 mm for secondary pin

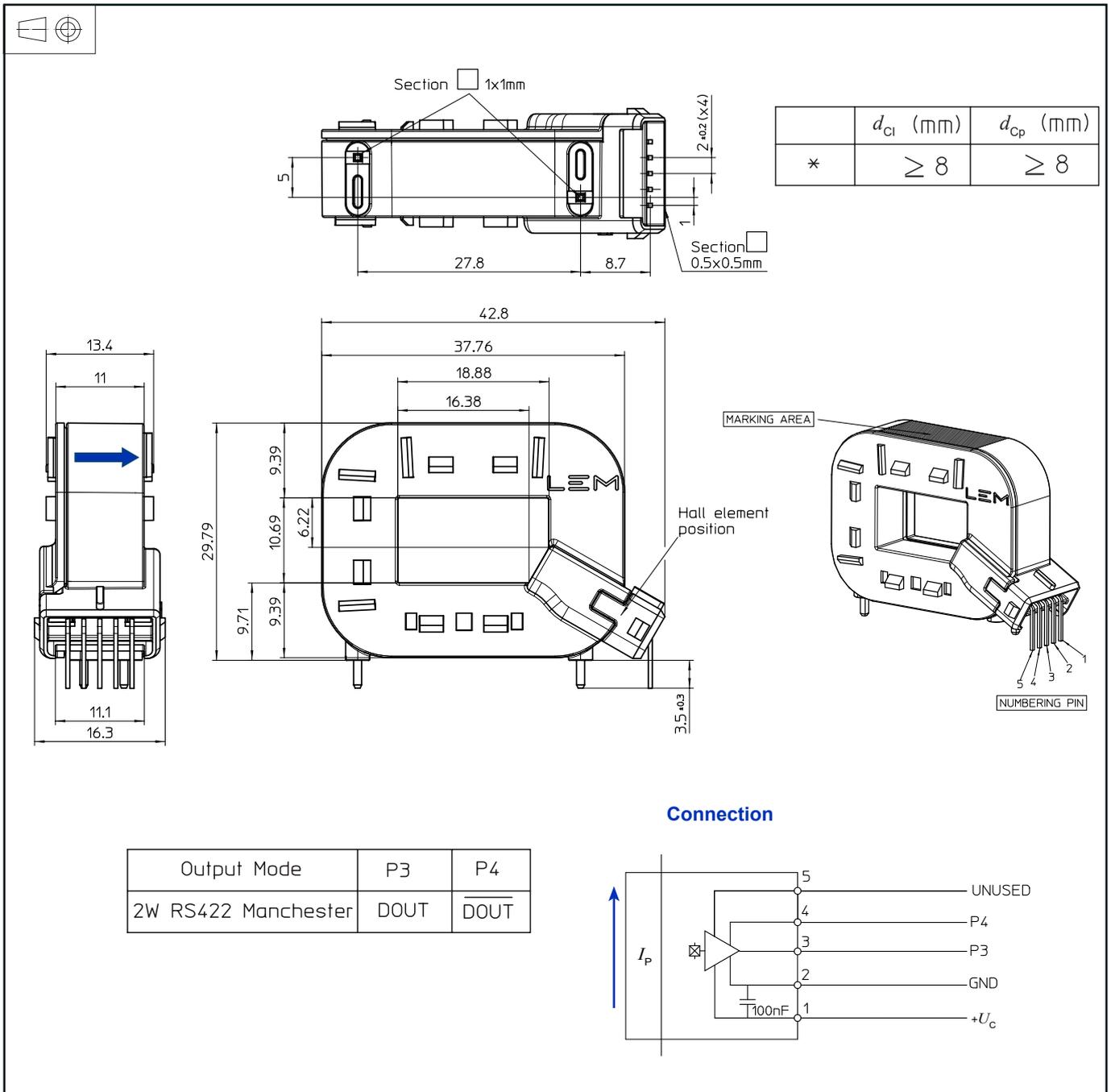
2.4 mm

maximum 260 °C, 10 s

**Insulation distance (nominal values):**

	$d_{Cp}$	$d_{Cl}$
On PCB:	8 mm	-
Between primary busbar and secondary pin	18.1 mm	-
Between primary busbar and core	-	8.10 mm

**Dimensions** (in mm, general linear tolerance  $\pm 0.5$  mm)



**Remark:**

- Density of ones is greater than 50 % when positive  $I_p$  flows in direction of the arrow shown on the drawing above.

## Mounting recommendation

Recommendation for manual mounting:  
 - Special care has to be taken during insertion to avoid any deformation or violent bending.  
 It is recommended to start with the insertion of the secondary pins (1).  
 Then the fixation pins (2) can be aligned with their mounting holes and the insertion process be easily completed.  
 Automatic insertion is not recommended for this product or may require special jigs.

