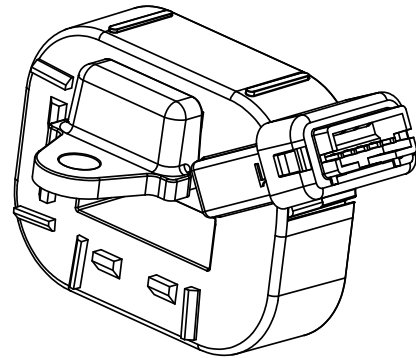


Ref: HO 50-S/SP30, HO 100-S/SP30, HO 150-S/SP30, HO 200-S/SP30, HO 250-S/SP30

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



Features

- Open loop multi-range current transducer
- Voltage output
- Single power supply +5 V
- Over-current detect $2.93 \times I_{PN}$ (peak value)
- Galvanic separation between primary and secondary circuit
- Low power consumption
- Compact design for panel mounting
- Aperture: $15 \times 8 \text{ mm}$
- Factory calibrated
- Connection mating with JST:
 - housing PHR-5
 - contact SPH-00xT.
- **Dedicated parameter settings available on request (see page 11).**

Special feature

- Pre-mounted fixation foot, busbar configuration.

Advantages

- Low offset drift
- Over-drivable V_{ref}
- 8 mm creepage /clearance
- Fast response
- Low profile 2 mm pitch connector for 24 to 32 AWG wire.

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
- MPPT.

Standards

- EN 50178: 1997
- IEC 61010-1: 2010
- IEC 61326-1: 2012
- UL 508: 2010.

Application Domain

- Industrial.

Absolute maximum ratings

| Parameter | Symbol | Unit | Value |
|--|-----------|------|-------|
| Supply voltage (not destructive) | U_C | V | 8 |
| Supply voltage (not entering non standard modes) | U_C | V | 6.5 |
| Primary conductor temperature | T_B | °C | 120 |
| ESD rating, Human Body Model (HBM) | U_{ESD} | 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: 5

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

Ratings

| Parameter | Symbol | Unit | Value |
|---------------------------------|-----------|---------|-------------------------------------|
| Primary involved potential | | V AC/DC | 600 |
| Max surrounding air temperature | T_A | °C | 105 |
| Primary current | I_P | A | According to series primary current |
| Secondary supply voltage | U_C | V DC | 5 |
| Output voltage | V_{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.
- 2 - A suitable enclosure shall be provided in the end-use application.
- 3 - The terminals have not been evaluated for field wiring.
- 5 - Primary terminals shall not be straightened since assembly of housing case depends upon bending of the terminals.
- 6 - Any surface of polymeric housing have not been evaluated as insulating barrier.
- 7 - 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 50/60 Hz/1 min | U_d | kV | 4.3 | |
| Impulse withstand voltage 1.2/50 μ s | \dot{U}_w | kV | 8 | |
| Partial discharge extinction rms voltage @ 10 pC | U_e | V | > 1200 | 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.) | - | mm | > 8 | When mounted on PCB with recommended layout |
| Case material | - | - | V0 according to UL 94 | |
| Comparative tracking index | <i>CTI</i> | | 600 | |
| Application example | - | - | 600 V CAT III PD2 | Reinforced insulation, non uniform field according to EN 50178, EN 61010 |
| Application example | - | - | 1000 V CAT III PD2 | Based insulation, non uniform field according to EN 50178, EN 61010 |
| Application example | - | - | 600 V CAT III PD2 | Simple insulation, non uniform field according to UL 508 |

Environmental and mechanical characteristics

| Parameter | Symbol | Unit | Min | Typ | Max | Comment |
|-------------------------------|--------|--------------|-----|-----|-----|---------|
| Ambient operating temperature | T_A | $^{\circ}$ C | -40 | | 105 | |
| Ambient storage temperature | T_s | $^{\circ}$ C | -40 | | 105 | |
| Mass | m | g | | 32 | | |

Electrical data HO 50-S/SP30-0100

At $T_A = 25\text{ °C}$, $U_C = +5\text{ V}$, $R_L = 10\text{ k}\Omega$ 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 | | 50 | | |
| Primary current, measuring range | I_{PM} | A | -125 | | 125 | @ $U_C \geq 4.6\text{ V}$ |
| Number of primary turns | N_P | - | | 1 | | See application information |
| Supply voltage | U_C | V | 4.5 | 5 | 5.5 | |
| Current consumption | I_C | mA | | 19 | 25 | |
| Reference voltage (output) | V_{ref} | V | 2.48 | 2.5 | 2.52 | Internal reference |
| Reference voltage (input) | V_{ref} | V | 0.5 | | 2.65 | External reference |
| Output voltage range @ I_{PM} | $V_{out} - V_{ref}$ | V | -2 | | 2 | Over operating temperature range |
| V_{ref} output resistance | R_{ref} | Ω | 130 | 200 | 300 | Series |
| V_{out} output resistance | R_{out} | Ω | | 2 | 5 | Series |
| Allowed capacitive load | C_L | nF | 0 | | 6 | |
| OCD output: On resistance | R_{on} | Ω | 70 | 95 | 150 | Open drain, active low Over operating temperature range |
| OCD output: Hold time | t_{hold} | ms | 0.7 | 1 | 1.4 | Additional time after threshold has released |
| EEPROM control | V_{out} | mV | 0 | | 50 | V_{out} forced to GND when EEPROM in an error state ¹⁾ |
| Electrical offset voltage @ $I_P = 0\text{ A}$ | V_{OE} | mV | -5 | | 5 | $V_{out} - V_{ref}$ @ $V_{ref} = 2.5\text{ V}$ |
| Electrical offset current referred to primary | I_{OE} | A | -0.3125 | | 0.3125 | |
| Temperature coefficient of V_{ref} | TCV_{ref} | ppm/K | -170 | | 170 | -40 °C ... 105 °C |
| Temperature coefficient of V_{OE} | TCV_{OE} | mV/K | -0.075 | | 0.075 | -40 °C ... 105 °C |
| Offset drift referred to primary @ $I_P = 0\text{ A}$ | TCI_{OE} | mA/K | -4.69 | | 4.69 | -40 °C ... 105 °C |
| Theoretical sensitivity | G_{th} | mV/A | | 16 | | 800 mV @ I_{PN} |
| Sensitivity error @ I_{PN} | ϵ_G | % | -0.5 | | 0.5 | Factory adjustment (straight bus-bar) |
| Temperature coefficient of G | TCG | ppm/K | -350 | | 350 | -40 °C ... 105 °C |
| Linearity error 0 ... I_{PN} | ϵ_L | % of I_{PN} | -0.75 | | 0.75 | |
| Linearity error 0 ... I_{PM} | ϵ_L | % of I_{PM} | -0.5 | | 0.5 | |
| Magnetic offset current (@ $10 \times I_{PN}$) referred to primary | I_{OM} | A | -0.92 | | 0.92 | One turn |
| Reaction time @ 10 % of I_{PN} | t_{ra} | μs | | | 2.5 | @ 50 A/ μs |
| Response time @ 90 % of I_{PN} | t_r | μs | | | 3.5 | @ 50 A/ μs |
| Frequency bandwidth (-3 dB) | BW | kHz | | 100 | | Small signals |
| Output rms voltage noise (spectral density) (100 Hz ... 100 kHz) | e_{no} | $\mu\text{V}/\sqrt{\text{Hz}}$ | | | 10.2 | |
| Output voltage noise (DC ... 10 kHz) (DC ... 100 kHz) (DC ... 1 MHz) | V_{no} | mVpp | | 5.6 16.3 30.6 | | |
| Over-current detect | | A | $2.64 \times I_{PN}$ | $2.93 \times I_{PN}$ | $3.22 \times I_{PN}$ | Peak value $\pm 10\%$ |
| Accuracy @ I_{PN} | X | % of I_{PN} | -1.25 | | 1.25 | |
| Accuracy @ I_{PN} @ $T_A = +105\text{ °C}$ | X | % of I_{PN} | -4.80 | | 4.80 | See formula note ²⁾ |
| Accuracy @ I_{PN} @ $T_A = +85\text{ °C}$ | X | % of I_{PN} | -3.91 | | 3.91 | See formula note ²⁾ |

Notes: ¹⁾ EEPROM in an error state makes the transducer behave like a reverse current saturation. Use of the OCD may help to differentiate the two cases.

$$\sup>2) Accuracy @ X_{TA} (% of I_{PN}) = $X + \left(\frac{TCG}{10000} \times (T_A - 25) + \frac{TCI_{OE}}{1000 \times I_P} \times 100 \times (T_A - 25) \right)$$$

Electrical data HO 100-S/SP30-0100

At $T_A = 25\text{ °C}$, $U_C = +5\text{ V}$, $R_L = 10\text{ k}\Omega$ 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 | | 100 | | |
| Primary current, measuring range | I_{PM} | A | -250 | | 250 | @ $U_C \geq 4.6\text{ V}$ |
| Number of primary turns | N_p | - | | 1 | | See application information |
| Supply voltage | U_C | V | 4.5 | 5 | 5.5 | |
| Current consumption | I_C | mA | | 19 | 25 | |
| Reference voltage (output) | V_{ref} | V | 2.48 | 2.5 | 2.52 | Internal reference |
| Reference voltage (input) | V_{ref} | V | 0.5 | | 2.65 | External reference |
| Output voltage range @ I_{PM} | $V_{out} - V_{ref}$ | V | -2 | | 2 | Over operating temperature range |
| V_{ref} output resistance | R_{ref} | Ω | 130 | 200 | 300 | Series |
| V_{out} output resistance | R_{out} | Ω | | 2 | 5 | Series |
| Allowed capacitive load | C_L | nF | 0 | | 6 | |
| OCD output: On resistance | R_{on} | Ω | 70 | 95 | 150 | Open drain, active low Over operating temperature range |
| OCD output: Hold time | t_{hold} | ms | 0.7 | 1 | 1.4 | Additional time after threshold has released |
| EEPROM control | V_{out} | mV | 0 | | 50 | V_{out} forced to GND when EEPROM in an error state ¹⁾ |
| Electrical offset voltage @ $I_p = 0\text{ A}$ | V_{OE} | mV | -5 | | 5 | $V_{out} - V_{ref}$ @ $V_{ref} = 2.5\text{ V}$ |
| Electrical offset current referred to primary | I_{OE} | A | -0.625 | | 0.625 | |
| Temperature coefficient of V_{ref} | TCV_{ref} | ppm/K | -170 | | 170 | -40 °C ... 105 °C |
| Temperature coefficient of V_{OE} | TCV_{OE} | mV/K | -0.075 | | 0.075 | -40 °C ... 105 °C |
| Offset drift referred to primary @ $I_p = 0\text{ A}$ | TCI_{OE} | mA/K | -9.375 | | 9.375 | -40 °C ... 105 °C |
| Theoretical sensitivity | G_{th} | mV/A | | 8 | | 800 mV @ I_{PN} |
| Sensitivity error @ I_{PN} | ϵ_G | % | -0.5 | | 0.5 | Factory adjustment (straight bus bar) |
| Temperature coefficient of G | TCG | ppm/K | -350 | | 350 | -40 °C ... 105 °C |
| Linearity error 0 ... I_{PN} | ϵ_L | % of I_{PN} | -0.5 | | 0.5 | |
| Linearity error 0 ... I_{PM} | ϵ_L | % of I_{PM} | -0.5 | | 0.5 | |
| Magnetic offset current (@ $10 \times I_{PN}$) referred to primary | I_{OM} | A | -0.92 | | 0.92 | One turn |
| Reaction time @ 10 % of I_{PN} | t_{ra} | μs | | | 2.5 | @ 50 A/ μs |
| Response time @ 90 % of I_{PN} | t_r | μs | | | 3.5 | @ 50 A/ μs |
| Frequency bandwidth (-3 dB) | BW | kHz | | 100 | | Small signals |
| Output rms voltage noise (spectral density) (100 Hz ... 100 kHz) | e_{no} | $\mu\text{V}/\sqrt{\text{Hz}}$ | | | 6 | |
| Output voltage noise (DC ... 10 kHz) (DC ... 100 kHz) (DC ... 1 MHz) | V_{no} | mVpp | | 3.6 8.7 16.9 | | |
| Over-current detect | | A | $2.64 \times I_{PN}$ | $2.93 \times I_{PN}$ | $3.22 \times I_{PN}$ | Peak value $\pm 10\%$ |
| Accuracy @ I_{PN} | X | % of I_{PN} | -1 | | 1 | |
| Accuracy @ I_{PN} @ $T_A = +105\text{ °C}$ | X | % of I_{PN} | -4.55 | | 4.55 | See formula note ²⁾ |
| Accuracy @ I_{PN} @ $T_A = +85\text{ °C}$ | X | % of I_{PN} | -3.66 | | 3.66 | See formula note ²⁾ |

Notes: ¹⁾ EEPROM in an error state makes the transducer behave like a reverse current saturation. Use of the OCD may help to differentiate the two cases.

$$^2) \text{ Accuracy @ } X_{TA} (\% \text{ of } I_{PN}) = X + \left(\frac{TCG}{10000} \times (T_A - 25) + \frac{TCI_{OE}}{1000 \times I_p} \times 100 \times (T_A - 25) \right).$$

Electrical data HO 150-S/SP30-0100

At $T_A = 25\text{ °C}$, $U_C = +5\text{ V}$, $R_L = 10\text{ k}\Omega$ 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 | -375 | | 375 | @ $U_C \geq 4.6\text{ V}$ |
| Number of primary turns | N_p | - | | 1 | | See application information |
| Supply voltage | U_C | V | 4.5 | 5 | 5.5 | |
| Current consumption | I_C | mA | | 19 | 25 | |
| Reference voltage (output) | V_{ref} | V | 2.48 | 2.5 | 2.52 | Internal reference |
| Reference voltage (input) | V_{ref} | V | 0.5 | | 2.65 | External reference |
| Output voltage range @ I_{PM} | $V_{out} - V_{ref}$ | V | -2 | | 2 | Over operating temperature range |
| V_{ref} output resistance | R_{ref} | Ω | 130 | 200 | 300 | Series |
| V_{out} output resistance | R_{out} | Ω | | 2 | 5 | Series |
| Allowed capacitive load | C_L | nF | 0 | | 6 | |
| OCD output: On resistance | R_{on} | Ω | 70 | 95 | 150 | Open drain, active low Over operating temperature range |
| OCD output: Hold time | t_{hold} | ms | 0.7 | 1 | 1.4 | Additional time after threshold has released |
| EEPROM control | V_{out} | mV | 0 | | 50 | V_{out} forced to GND when EEPROM in an error state ¹⁾ |
| Electrical offset voltage @ $I_p = 0\text{ A}$ | V_{OE} | mV | -5 | | 5 | $V_{out} - V_{ref}$ @ $V_{ref} = 2.5\text{ V}$ |
| Electrical offset current referred to primary | I_{OE} | A | -0.94 | | 0.94 | |
| Temperature coefficient of V_{ref} | TCV_{ref} | ppm/K | -170 | | 170 | -40 °C ... 105 °C |
| Temperature coefficient of V_{OE} | TCV_{OE} | mV/K | -0.075 | | 0.075 | -40 °C ... 105 °C |
| Offset drift referred to primary @ $I_p = 0\text{ A}$ | TCI_{OE} | mA/K | -14.1 | | 14.1 | -40 °C ... 105 °C |
| Theoretical sensitivity | G_{th} | mV/A | | 5.333 | | 800 mV @ I_{PN} |
| Sensitivity error @ I_{PN} | ϵ_G | % | -0.5 | | 0.5 | Factory adjustment (straight bus-bar) |
| Temperature coefficient of G | TCG | ppm/K | -350 | | 350 | -40 °C ... 105 °C |
| Linearity error 0 ... I_{PN} | ϵ_L | % of I_{PN} | -0.5 | | 0.5 | |
| Linearity error 0 ... I_{PM} | ϵ_L | % of I_{PM} | -0.5 | | 0.5 | |
| Magnetic offset current (@ $10 \times I_{PN}$) referred to primary | I_{OM} | A | -0.92 | | 0.92 | One turn |
| Reaction time @ 10 % of I_{PN} | t_{ra} | μs | | | 2.5 | @ 50 A/ μs |
| Response time @ 90 % of I_{PN} | t_r | μs | | | 3.5 | @ 50 A/ μs |
| Frequency bandwidth (-3 dB) | BW | kHz | | 100 | | Small signals |
| Output rms voltage noise (spectral density) (100 Hz ... 100 kHz) | e_{no} | $\mu\text{V}/\sqrt{\text{Hz}}$ | | | 4.5 | |
| Output voltage noise (DC ... 10 kHz) (DC ... 100 kHz) (DC ... 1 MHz) | V_{no} | mVpp | | 2.9 6.2 12.3 | | |
| Over-current detect | | A | $2.64 \times I_{PN}$ | $2.93 \times I_{PN}$ | $3.22 \times I_{PN}$ | Peak value $\pm 10\%$ |
| Accuracy @ I_{PN} | X | % of I_{PN} | -1 | | 1 | |
| Accuracy @ I_{PN} @ $T_A = +105\text{ °C}$ | X | % of I_{PN} | -4.55 | | 4.55 | See formula note ²⁾ |
| Accuracy @ I_{PN} @ $T_A = +85\text{ °C}$ | X | % of I_{PN} | -3.66 | | 3.66 | See formula note ²⁾ |

Notes: ¹⁾ EEPROM in an error state makes the transducer behave like a reverse current saturation. Use of the OCD may help to differentiate the two cases

$$^2) \text{ Accuracy @ } X_{TA} (\% \text{ of } I_{PN}) = X + \left(\frac{TCG}{10000} \times (T_A - 25) + \frac{TCI_{OE}}{1000 \times I_p} \times 100 \times (T_A - 25) \right).$$

Electrical data HO 200-S/SP30-0100

 At $T_A = 25\text{ °C}$, $U_C = +5\text{ V}$, $R_L = 10\text{ k}\Omega$ 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 | -500 | | 500 | @ $U_C \geq 4.6\text{ V}$ |
| Number of primary turns | N_P | - | | 1 | | See application information |
| Supply voltage | U_C | V | 4.5 | 5 | 5.5 | |
| Current consumption | I_C | mA | | 19 | 25 | |
| Reference voltage (output) | V_{ref} | V | 2.48 | 2.5 | 2.52 | Internal reference |
| Reference voltage (input) | V_{ref} | V | 0.5 | | 2.65 | External reference |
| Output voltage range @ I_{PM} | $V_{out} - V_{ref}$ | V | -2 | | 2 | Over operating temperature range |
| V_{ref} output resistance | R_{ref} | Ω | 130 | 200 | 300 | Series |
| V_{out} output resistance | R_{out} | Ω | | 2 | 5 | Series |
| Allowed capacitive load | C_L | nF | 0 | | 6 | |
| OCD output: On resistance | R_{on} | Ω | 70 | 95 | 150 | Open drain, active low Over operating temperature range |
| OCD output: Hold time | t_{hold} | ms | 0.7 | 1 | 1.4 | Additional time after threshold has released |
| EEPROM control | V_{out} | mV | 0 | | 50 | V_{out} forced to GND when EEPROM in an error state ¹⁾ |
| Electrical offset voltage @ $I_p = 0\text{ A}$ | V_{OE} | mV | -5 | | 5 | $V_{out} - V_{ref}$ @ $V_{ref} = 2.5\text{ V}$ |
| Electrical offset current referred to primary | I_{OE} | A | -1.25 | | 1.25 | |
| Temperature coefficient of V_{ref} | TCV_{ref} | ppm/K | -170 | | 170 | -40 °C ... 105 °C |
| Temperature coefficient of V_{OE} | TCV_{OE} | mV/K | -0.075 | | 0.075 | -40 °C ... 105 °C |
| Offset drift referred to primary @ $I_p = 0\text{ A}$ | TCI_{OE} | mA/K | -18.75 | | 18.75 | -40 °C ... 105 °C |
| Theoretical sensitivity | G_{th} | mV/A | | 4 | | 800 mV @ I_{PN} |
| Sensitivity error @ I_{PN} | ϵ_G | % | -0.5 | | 0.5 | Factory adjustment (straight bus-bar) |
| Temperature coefficient of G | TCG | ppm/K | -350 | | 350 | -40 °C ... 105 °C |
| Linearity error 0 ... I_{PN} | ϵ_L | % of I_{PN} | -0.5 | | 0.5 | |
| Linearity error 0 ... I_{PM} | ϵ_L | % of I_{PM} | -0.5 | | 0.5 | |
| Magnetic offset current (@ $10 \times I_{PN}$) referred to primary | I_{OM} | A | -0.92 | | 0.92 | One turn |
| Reaction time @ 10 % of I_{PN} | t_{ra} | μs | | | 2.5 | @ 50 A/ μs |
| Response time @ 90 % of I_{PN} | t_r | μs | | | 3.5 | @ 50 A/ μs |
| Frequency bandwidth (-3 dB) | BW | kHz | | 100 | | Small signals |
| Output rms voltage noise (spectral density) (100 Hz ... 100 kHz) | e_{no} | $\mu\text{V}/\sqrt{\text{Hz}}$ | | | 3.7 | |
| Output voltage noise (DC ... 10 kHz) (DC ... 100 kHz) (DC ... 1 MHz) | V_{no} | mVpp | | 2.5 5 10 | | |
| Over-current detect | | A | $2.64 \times I_{PN}$ | $2.93 \times I_{PN}$ | $3.22 \times I_{PN}$ | Peak value $\pm 10\%$ |
| Accuracy @ I_{PN} | X | % of I_{PN} | -1 | | 1 | |
| Accuracy @ I_{PN} @ $T_A = +105\text{ °C}$ | X | % of I_{PN} | -4.55 | | 4.55 | See formula note ²⁾ |
| Accuracy @ I_{PN} @ $T_A = +85\text{ °C}$ | X | % of I_{PN} | -3.66 | | 3.66 | See formula note ²⁾ |

Notes: ¹⁾ EEPROM in an error state makes the transducer behave like a reverse current saturation. Use of the OCD may help to differentiate the two cases

$$^2) \text{ Accuracy @ } X_{TA} (\% \text{ of } I_{PN}) = X + \left(\frac{TCG}{10000} \times (T_A - 25) + \frac{TCI_{OE}}{1000 \times I_p} \times 100 \times (T_A - 25) \right).$$

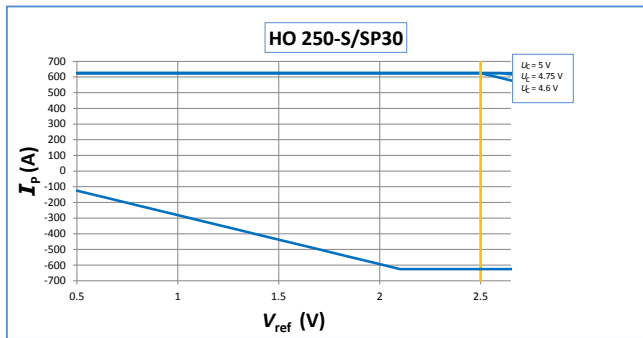
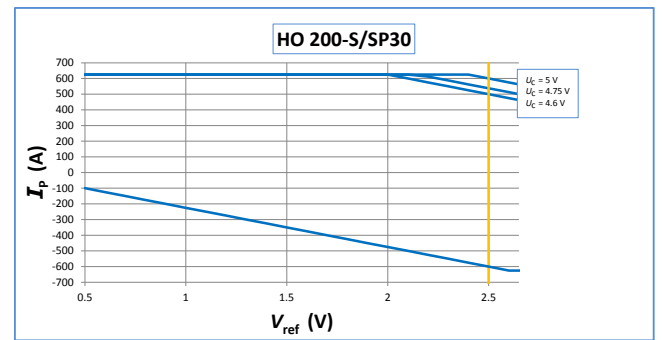
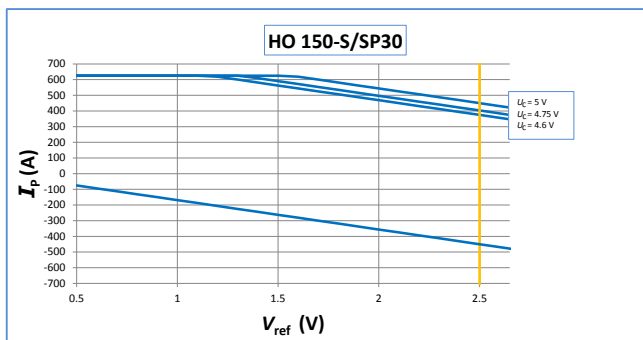
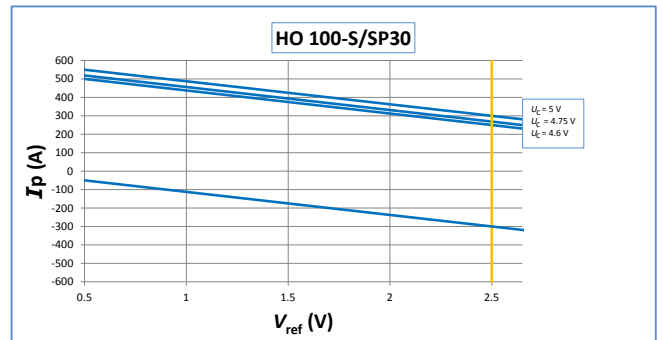
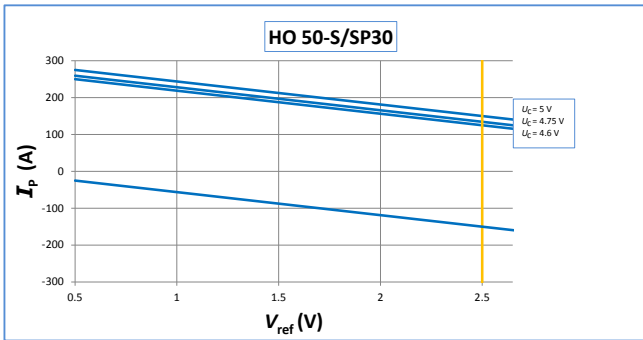
Electrical data HO 250-S/SP30-0100

At $T_A = 25\text{ °C}$, $U_C = +5\text{ V}$, $R_L = 10\text{ k}\Omega$ 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 | -625 | | 625 | @ $U_C \geq 4.6\text{ V}$ |
| Number of primary turns | N_P | - | | 1 | | See application information |
| Supply voltage | U_C | V | 4.5 | 5 | 5.5 | |
| Current consumption | I_C | mA | | 19 | 25 | |
| Reference voltage (output) | V_{ref} | V | 2.48 | 2.5 | 2.52 | Internal reference |
| Reference voltage (input) | V_{ref} | V | 0.5 | | 2.65 | External reference |
| Output voltage range @ I_{PM} | $V_{out} - V_{ref}$ | V | -2 | | 2 | Over operating temperature range |
| V_{ref} output resistance | R_{ref} | Ω | 130 | 200 | 300 | Series |
| V_{out} output resistance | R_{out} | Ω | | 2 | 5 | Series |
| Allowed capacitive load | C_L | nF | 0 | | 6 | |
| OCD output: On resistance | R_{on} | Ω | 70 | 95 | 150 | Open drain, active low Over operating temperature range |
| OCD output: Hold time | t_{hold} | ms | 0.7 | 1 | 1.4 | Additional time after threshold has released |
| EEPROM control | V_{out} | mV | 0 | | 50 | V_{out} forced to GND when EEPROM in an error state ¹⁾ |
| Electrical offset voltage @ $I_P = 0\text{ A}$ | V_{OE} | mV | -5 | | 5 | $V_{out} - V_{ref}$ @ $V_{ref} = 2.5\text{ V}$ |
| Electrical offset current referred to primary | I_{OE} | A | -1.57 | | 1.57 | |
| Temperature coefficient of V_{ref} | TCV_{ref} | ppm/K | -170 | | 170 | -40 °C ... 105 °C |
| Temperature coefficient of V_{OE} | TCV_{OE} | mV/K | -0.075 | | 0.075 | -40 °C ... 105 °C |
| Offset drift referred to primary @ $I_P = 0\text{ A}$ | TCI_{OE} | mA/K | -23.5 | | 23.5 | -40 °C ... 105 °C |
| Theoretical sensitivity | G_{th} | mV/A | | 3.2 | | 800 mV @ I_{PN} |
| Sensitivity error @ I_{PN} | ϵ_G | % | -0.5 | | 0.5 | Factory adjustment (straight bus-bar) |
| Temperature coefficient of G | TCG | ppm/K | -350 | | 350 | -40 °C ... 105 °C |
| Linearity error 0 ... I_{PN} | ϵ_L | % of I_{PN} | -0.5 | | 0.5 | |
| Linearity error 0 ... I_{PM} | ϵ_L | % of I_{PM} | -0.5 | | 0.5 | |
| Magnetic offset current (@ $10 \times I_{PN}$) referred to primary | I_{OM} | A | -0.92 | | 0.92 | One turn |
| Reaction time @ 10 % of I_{PN} | t_{ra} | μs | | | 2.5 | @ 50 A/ μs |
| Response time @ 90 % of I_{PN} | t_r | μs | | | 3.5 | @ 50 A/ μs |
| Frequency bandwidth (-3 dB) | BW | kHz | | 100 | | Small signals |
| Output rms voltage noise (spectral density) (100 Hz ... 100 kHz) | e_{no} | $\mu\text{V}/\sqrt{\text{Hz}}$ | | | 3.5 | |
| Output voltage noise (DC ... 10 kHz) (DC ... 100 kHz) (DC ... 1 MHz) | V_{no} | mVpp | | 2.5 5 8.7 | | |
| Over-current detect | | A | $2.64 \times I_{PN}$ | $2.93 \times I_{PN}$ | $3.22 \times I_{PN}$ | Peak value $\pm 10\%$ |
| Accuracy @ I_{PN} | X | % of I_{PN} | -1 | | 1 | |
| Accuracy @ I_{PN} @ $T_A = +105\text{ °C}$ | X | % of I_{PN} | -4.55 | | 4.55 | See formula note ²⁾ |
| Accuracy @ I_{PN} @ $T_A = +85\text{ °C}$ | X | % of I_{PN} | -3.66 | | 3.66 | See formula note ²⁾ |

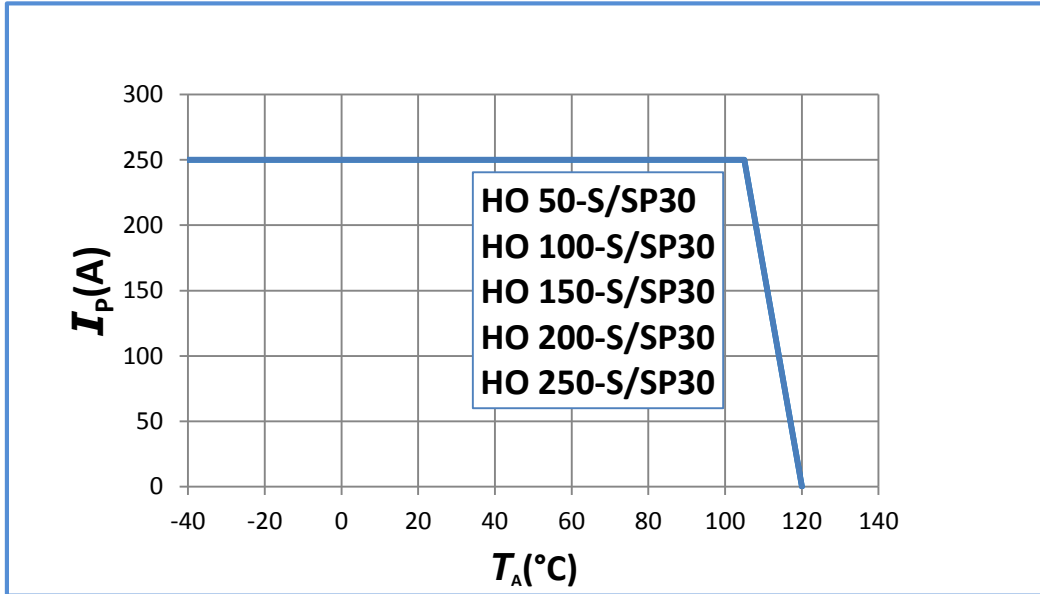
Notes: ¹⁾ EEPROM in an error state makes the transducer behave like a reverse current saturation. Use of the OCD may help to differentiate the two cases

$$\sup>2) Accuracy @ X_{TA} (% of I_{PN}) = $X + \left(\frac{TCG}{10000} \times (T_A - 25) + \frac{TCI_{OE}}{1000 \times I_P} \times 100 \times (T_A - 25) \right)$$$

HO-S/SP30 series, measuring range versus external reference voltage


Maximum continuous DC current

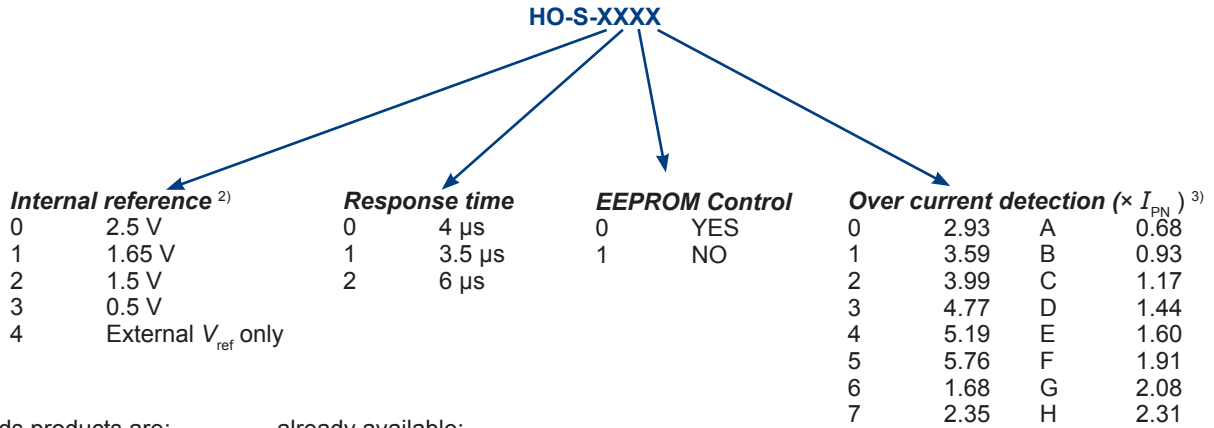
For all ranges:



Important notice: whatever the usage and/or application, the transducer primary bar temperature shall not go above the maximum rating of 120 °C as stated in page 2 of this datasheet.

HO-S series: name and codification

HO family products may be ordered **on request** ¹⁾ with a dedicated setting of the parameters as described below (standards products are delivered with the setting 0100 according to the table).



Standards products are: already available:
 - HO 50-S/SP30-0100 - HO 200-S/SP31-1100
 - HO 100-S/SP30-0100
 - HO 150-S/SP30-0100
 - HO 200-S/SP30-0100
 - HO 250-S/SP30-0100

Notes: ¹⁾ For dedicated settings, minimum quantities apply, please contact your local LEM support
²⁾ V_{ref} electrical data
³⁾ OCD ($\times I_{PN}$) correction table versus range and temperature.

| V_{ref} parameter | V_{ref} (V) | | | TCV_{ref} (ppm/K) | |
|---------------------|---------------|------|------|---------------------|-----|
| | min | typ | max | min | max |
| 0 | 2.48 | 2.5 | 2.52 | -170 | -70 |
| 1 | 1.63 | 1.65 | 1.67 | -170 | 170 |
| 2 | 1.48 | 1.5 | 1.52 | -170 | 170 |
| 3 | 0.49 | 0.5 | 0.51 | -250 | 250 |

All other values or empty cells: no change

| HO-S/SP30-010x | | | |
|----------------|-------------------------------|------|------|
| OCD Parameter | I_{PN} (A) all temperatures | | |
| | 150 | 200 | 250 |
| A | | | |
| B | | | |
| C | | | |
| D | | | |
| E | | | |
| 6 | | | |
| F | | | |
| G | | | |
| H | | | |
| 7 | | | |
| 0 | | | |
| 1 | | | |
| 2 | | | |
| 3 | | | 5.60 |
| 4 | | | 7.30 |
| 5 | | 6.25 | - |

| Tolerance on OCD value | |
|------------------------|------------|
| $\pm 20\%$ | |
| $\pm 15\%$ | |
| $\pm 10\%$ | No change |
| - | Do not use |

Application information

- HOxx-S series is designed to use a bus-bar or a cable ¹⁾ to carry the current through out the aperture with a maximum cross section of 8 × 15 mm
- Use of bare conductor is not recommended for panel mounting horizontal or vertical, insulation distance might not be respected between busbar and fixation screw head.

Insulation distance (nominal values):

| | d_{Cp} | d_{Cl} |
|--|----------|----------|
| Between primary busbar and secondary pin | 14.6 mm | - |
| Between primary busbar and core | - | 11.34 mm |
| Between core and secondary terminal | - | 1.18 mm |

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

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.

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: [Products/Product Documentation](#)

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.



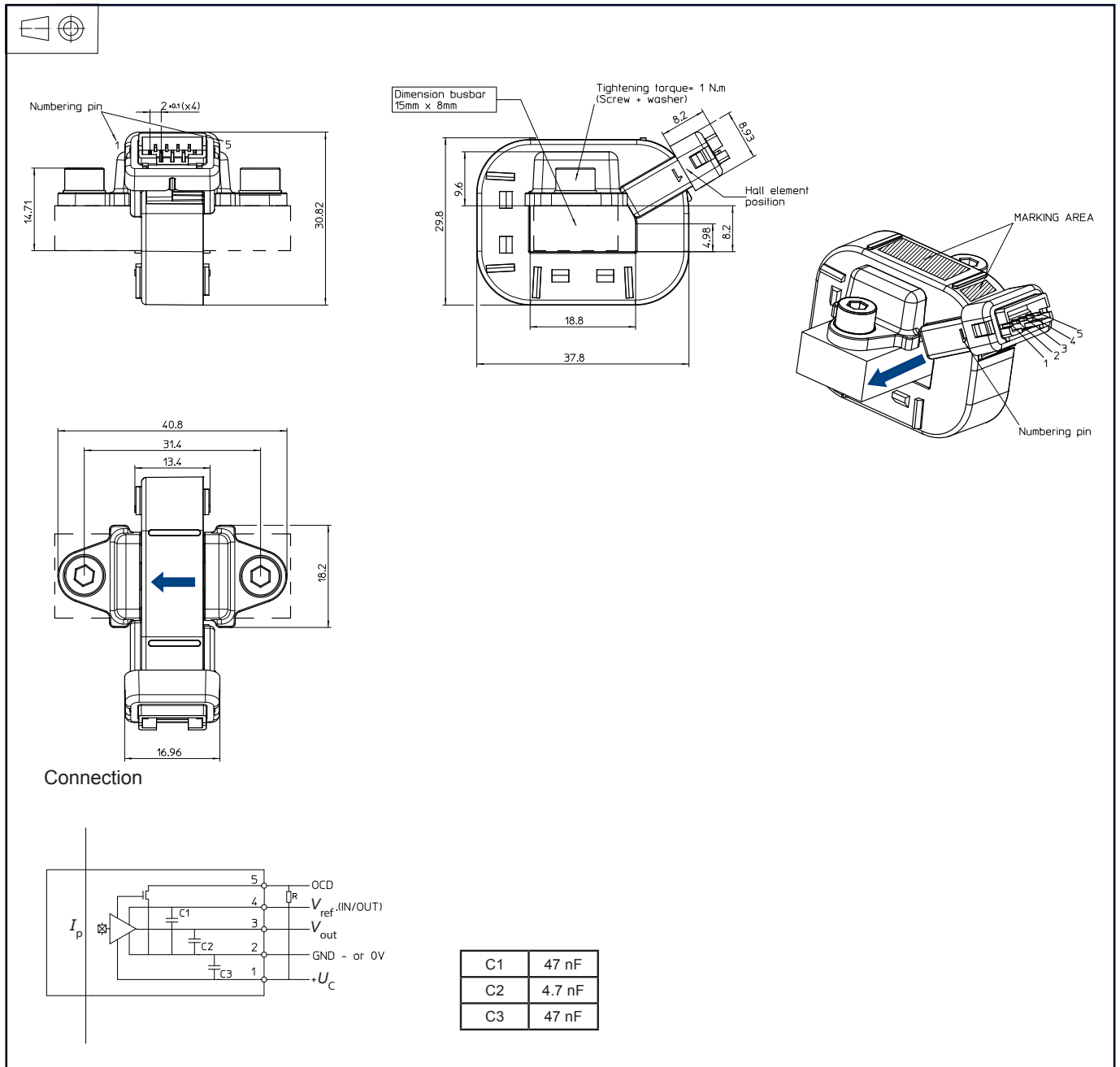
Caution, risk of electrical shock.

When operating the transducer, certain parts of the module can carry hazardous voltage (e.g. primary bus bar, 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 HO-S/SP30 and HO-S/SP31series (mm, general linear tolerance ± 0.3 mm)

Remarks:

- V_{OUT} is positive with respect to V_{ref} when positive I_p flows in direction of the arrow shown on the drawing above.
- Connection system: equivalent to JST B5B-PH type.

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