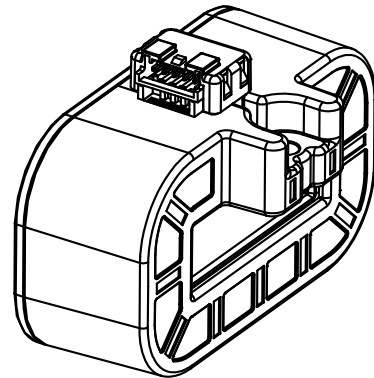


For the electronic measurement of current: DC, AC, pulsed..., with galvanic separation between the primary and the secondary circuit.



Features

- Open loop multi-range current transducer
- Voltage output
- Overcurrent detection $2.92 \times I_{PN}$ (peak value)
- Galvanic separation between primary and secondary circuit
- Low power consumption
- For busbar mounting
- Aperture: $40 \times 13 \text{ mm}$
- Factory calibrated
- Mating JST connector:
 - housing PAP-05V-S
 - contact SPHD-00xT-P0.5.

Special feature

- Single power supply +3.3 V.

Advantages

- Low offset drift
- Overdrivable U_{ref}
- Creepage / clearance $> 10.5 \text{ mm}$
- Fast response
- Low profile 2 mm pitch connector for 22 to 28 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
- Solar inverter on DC side of the inverter (MPPT).

Standards

- IEC 61800-2: 2015
- IEC 61800-3: 2004
- IEC 61800-5-1: 2007
- IEC 62109-1: 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/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.



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) | $U_{ESD \text{ HBM}}$ | 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: 5

Standards

- CSA C22.2 NO. 14-10 INDUSTRIAL CONTROL EQUIPMENT - Edition 12
- UL 508 STANDARD FOR INDUSTRIAL CONTROL EQUIPMENT - Edition 17

Ratings

| Parameter | Symbol | Unit | Value |
|-------------------------------|-----------|---------|-------------------------------------|
| Primary involved potential | | V AC/DC | 600 |
| Ambient operating temperature | T_A | °C | 100 |
| 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.
- 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 | 5.1 | |
| Impulse withstand voltage 1.2/50 μ s | U_{Ni} | kV | 9.6 | |
| Partial discharge RMS test voltage ($q_m < 10$ pC) | U_t | V | 1650 | Busbar/secondary. According to: IEC 61800-5-1 IEC 62109-1 |
| Clearance (pri. - sec.) | d_{Cl} | mm | > 10.5 | Shortest distance through air |
| Creepage distance (pri. - sec.) | d_{Cp} | mm | > 10.5 | Shortest path along device body |
| 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, non uniform field according to IEC 61800-5-1 CAT III PD2 |
| Application example | - | V | 600 | According to UL 508 CAT III PD2 |

Environmental and mechanical characteristics

| Parameter | Symbol | Unit | Min | Typ | Max | Comment |
|-------------------------------|-----------|------|-----|-----|-----|---------|
| Ambient operating temperature | T_A | °C | -40 | | 105 | |
| Ambient storage temperature | T_{Ast} | °C | -40 | | 105 | |
| Mass | m | g | | 232 | | |

Electrical data HOYL 200-S/SP33-1106

At $T_A = 25\text{ °C}$, $U_C = +3.3\text{ V}$, $R_L = 10\text{ k}\Omega$ unless otherwise noted (see Min, Max, typ. definition paragraph in page 13).

| Parameter | Symbol | Unit | Min | Typ | Max | Comment |
|--|---------------------|--------------------------------|----------------------|----------------------|----------------------|---|
| Primary nominal RMS current | I_{PN} | A | | 200 | | |
| Primary current, measuring range | I_{PM} | A | -500 | | 500 | |
| Number of primary turns | N_P | - | | 1 | | Busbar |
| Supply voltage | U_C | V | 3.14 | 3.3 | 3.47 | |
| Current consumption | I_C | mA | | 19 | 25 | |
| Reference voltage (output) | U_{ref} | V | 1.63 | 1.65 | 1.67 | Internal reference |
| External reference voltage (input) | U_{Eref} | V | 0.5 | | 1.7 | |
| Output voltage range @ I_{PM} | $U_{out} - U_{ref}$ | V | -1.15 | | 1.15 | Over operating temperature range |
| Internal series resistance of reference voltage source | R_{ref} | Ω | 130 | 200 | 300 | Series |
| Output internal resistance | R_{out} | Ω | | 2 | 5 | Series |
| Load capacitance | C_L | nF | 0 | | 6 | |
| OCD output on resistance | R_{onOCD} | Ω | 70 | 95 | 150 | Open drain, active low Over operating temperature range |
| OCD detection hold time | $t_{holdOCD}$ | ms | 0.7 | 1 | 1.4 | Additional time after threshold has released |
| EEPROM control | U_{out} | mV | 0 | | 50 | U_{out} forced to GND when EEPROM in an error state ¹⁾ |
| Electrical offset voltage @ $I_P = 0\text{ A}$ referred to primary | U_{OE} | mV | -5 | | 5 | $U_{out} - U_{ref} @ U_{ref} = 1.65\text{ V}$ |
| Electrical offset current referred to primary | I_{OE} | A | -2.17 | | 2.17 | |
| Temperature coefficient of U_{ref} | TCU_{ref} | ppm/K | -170 | | 170 | -40 °C ... 105 °C |
| Temperature coefficient of U_{OE} referred to primary | TCU_{OE} | mV/K | -0.075 | | 0.075 | -40 °C ... 105 °C |
| Temperature coefficient of I_{OE} referred to primary | TCI_{OE} | mA/K | -32.61 | | 32.61 | -40 °C ... 105 °C |
| Nominal sensitivity | S_N | mV/A | | 2.3 | | 460 mV @ I_{PN} |
| Sensitivity error @ I_{PN} | ϵ_s | % | -0.5 | | 0.5 | Factory adjustment |
| Temperature coefficient of S | TCS | ppm/K | -250 | | 250 | -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 | -1.86 | | 1.86 | One turn |
| Delay time to 10 % of the final output value for I_{PN} step | t_{D10} | μs | | 3 | 3.5 | @ 100 A/ μs |
| Delay time to 90 % of the final output value for I_{PN} step | t_{D90} | μs | | 3 | 3.5 | @ 100 A/ μs |
| Frequency bandwidth (-3 dB) | BW | kHz | | 140 | | Small signal |
| Noise voltage spectral density referred to primary 100 Hz ... 100 kHz | u_{no} | $\mu\text{V}/\sqrt{\text{Hz}}$ | | 6.3 | | |
| RMS noise voltage referred to primary (DC ... 10 kHz) (DC ... 100 kHz) (DC ... 1 MHz) | U_{no} | mVpp | | 4.3 6.6 10.1 | | |
| Primary current, detection threshold | I_{PTh} | A | $2.63 \times I_{PN}$ | $2.92 \times I_{PN}$ | $3.21 \times I_{PN}$ | Peak value $\pm 10\%$, overcurrent detection OCD |
| Sum of sensitivity and linearity error @ I_{PN} | ϵ_{SL} | % of I_{PN} | -1 | | 1 | |
| Sum of sensitivity and linearity error at 85 °C @ I_{PN} | ϵ_{SL85} | % of I_{PN} | -3.48 | | 3.48 | See formula note ²⁾ |
| Sum of sensitivity and linearity error at 105 °C @ I_{PN} | ϵ_{SL105} | % of I_{PN} | -4.3 | | 4.3 | |

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

$$\text{Sum of sensitivity and linearity error @ } T_A \text{ (\% of } I_{PN}) = \epsilon_{SL} + \left(\frac{TCS}{10000} \times (T_A - 25) \right) + \frac{TCI_{OE}}{1000 \times I_{PN}} \times 100 \times (T_A - 25).$$

Electrical data HOYL 400-S/SP33-1106

 At $T_A = 25\text{ °C}$, $U_C = +3.3\text{ V}$, $R_L = 10\text{ k}\Omega$ unless otherwise noted (see Min, Max, typ. definition paragraph in page 13).

| Parameter | Symbol | Unit | Min | Typ | Max | Comment |
|--|---------------------|--------------------------------|----------------------|----------------------|----------------------|---|
| Primary nominal RMS current | I_{PN} | A | | 400 | | |
| Primary current, measuring range | I_{PM} | A | -1000 | | 1000 | |
| Number of primary turns | N_P | - | | 1 | | Bus bar |
| Supply voltage | U_C | V | 3.14 | 3.3 | 3.47 | |
| Current consumption | I_C | mA | | 19 | 25 | |
| Reference voltage (output) | U_{ref} | V | 1.63 | 1.65 | 1.67 | Internal reference |
| External reference voltage (input) | U_{Eref} | V | 0.5 | | 1.7 | |
| Output voltage range @ I_{PM} | $U_{out} - U_{ref}$ | V | -1.15 | | 1.15 | Over operating temperature range |
| Internal series resistance of reference voltage source | R_{ref} | Ω | 130 | 200 | 300 | Series |
| Output internal resistance | R_{out} | Ω | | 2 | 5 | Series |
| Load capacitance | C_L | nF | 0 | | 6 | |
| OCD output on resistance | R_{onOCD} | Ω | 70 | 95 | 150 | Open drain, active low Over operating temperature range |
| OCD detection hold time | $t_{holdOCD}$ | ms | 0.7 | 1 | 1.4 | Additional time after threshold has released |
| EEPROM control | U_{out} | mV | 0 | | 50 | U_{out} forced to GND when EEPROM in an error state ¹⁾ |
| Electrical offset voltage @ $I_P = 0\text{ A}$ | U_{OE} | mV | -5 | | 5 | $U_{out} - U_{ref}$ @ $U_{ref} = 1.65\text{ V}$ |
| Electrical offset current referred to primary | I_{OE} | A | -4.35 | | 4.35 | |
| Temperature coefficient of U_{ref} | TCU_{ref} | ppm/K | -170 | | 170 | -40 °C ... 105 °C |
| Temperature coefficient of U_{OE} referred to primary | TCU_{OE} | mV/K | -0.075 | | 0.075 | -40 °C ... 105 °C |
| Temperature coefficient of I_{OE} referred to primary | TCI_{OE} | mA/K | -65.22 | | 65.22 | -40 °C ... 105 °C |
| Nominal sensitivity | S_N | mV/A | | 1.15 | | 460 mV @ I_{PN} |
| Sensitivity error @ I_{PN} | ϵ_s | % | -0.5 | | 0.5 | Factory adjustment |
| Temperature coefficient of S | TCS | ppm/K | -250 | | 250 | -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 (@ $10 \times I_{PM}$) referred to primary | I_{OM} | A | -1.86 | | 1.86 | One turn |
| Delay time to 10 % of the final output value for I_{PN} step | t_{D10} | μs | | 3 | 3.5 | @ 100 A/ μs |
| Delay time to 90 % of the final output value for I_{PN} step | t_{D90} | μs | | 3 | 3.5 | @ 100 A/ μs |
| Frequency bandwidth (-3 dB) | BW | kHz | | 140 | | Small signal |
| Noise voltage spectral density referred to primary 100 Hz ... 100 kHz | u_{no} | $\mu\text{V}/\sqrt{\text{Hz}}$ | | 5.6 | | |
| RMS noise voltage referred to primary (DC ... 10 kHz) (DC ... 100 kHz) (DC ... 1 MHz) | U_{no} | mVpp | | 4.2 5.9 8.5 | | |
| Primary current, detection threshold | I_{PTh} | A | $2.63 \times I_{PN}$ | $2.92 \times I_{PN}$ | $3.21 \times I_{PN}$ | Peak value $\pm 10\%$, overcurrent detection OCD |
| Sum of sensitivity and linearity error @ I_{PN} | ϵ_{SL} | % of I_{PN} | -1 | | 1 | |
| Sum of sensitivity and linearity error at 85 °C @ I_{PN} | ϵ_{SL85} | % of I_{PN} | -3.48 | | 3.48 | |
| Sum of sensitivity and linearity error at 105 °C @ I_{PN} | ϵ_{SL105} | % of I_{PN} | -4.3 | | 4.3 | 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

$$\text{Sum of sensitivity and linearity error @ } T_A \text{ (\% of } I_{PN}) = \epsilon_{SL} + \left(\frac{TCS}{10000} \times (T_A - 25) \right) + \frac{TCI_{OE}}{1000 \times I_{PN}} \times 100 \times (T_A - 25).$$

Electrical data HOYL 600-S/SP33-1106

 At $T_A = 25\text{ °C}$, $U_C = +3.3\text{ V}$, $R_L = 10\text{ k}\Omega$ unless otherwise noted (see Min, Max, typ. definition paragraph in page 13).

| Parameter | Symbol | Unit | Min | Typ | Max | Comment |
|--|---------------------|--------------------------------|----------------------|----------------------|----------------------|---|
| Primary nominal RMS current | I_{PN} | A | | 600 | | |
| Primary current, measuring range | I_{PM} | A | -1500 | | 1500 | |
| Number of primary turns | N_p | - | | 1 | | Bus bar |
| Supply voltage | U_C | V | 3.14 | 3.3 | 3.47 | |
| Current consumption | I_C | mA | | 19 | 25 | |
| Reference voltage (output) | U_{ref} | V | 1.63 | 1.65 | 1.67 | Internal reference |
| External reference voltage (input) | U_{Eref} | V | 0.5 | | 1.7 | |
| Output voltage range @ I_{PM} | $U_{out} - U_{ref}$ | V | -1.15 | | 1.15 | Over operating temperature range |
| Internal series resistance of reference voltage source | R_{ref} | Ω | 130 | 200 | 300 | Series |
| Output internal resistance | R_{out} | Ω | | 2 | 5 | Series |
| Load capacitance | C_L | nF | 0 | | 6 | |
| OCD output on resistance | R_{onOCD} | Ω | 70 | 95 | 150 | Open drain, active low Over operating temperature range |
| OCD detection hold time | $t_{holdOCD}$ | ms | 0.7 | 1 | 1.4 | Additional time after threshold has released |
| EEPROM control | U_{out} | mV | 0 | | 50 | U_{out} forced to GND when EEPROM in an error state ¹⁾ |
| Electrical offset voltage @ $I_p = 0\text{ A}$ | U_{OE} | mV | -5 | | 5 | $U_{out} - U_{ref} @ U_{ref} = 1.65\text{ V}$ |
| Electrical offset current referred to primary | I_{OE} | A | -6.53 | | 6.53 | |
| Temperature coefficient of U_{ref} | TCU_{ref} | ppm/K | -170 | | 170 | -40 °C ... 105 °C |
| Temperature coefficient of U_{OE} referred to primary | TCU_{OE} | mV/K | -0.075 | | 0.075 | -40 °C ... 105 °C |
| Temperature coefficient of I_{OE} referred to primary | TCI_{OE} | mA/K | -97.83 | | 97.83 | -40 °C ... 105 °C |
| Nominal sensitivity | S_N | mV/A | | 0.767 | | 460 mV @ I_{PN} |
| Sensitivity error @ I_{PN} | ϵ_s | % | -0.5 | | 0.5 | Factory adjustment |
| Temperature coefficient of S | TCS | ppm/K | -250 | | 250 | -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 | -1.86 | | 1.86 | One turn |
| Delay time to 10 % of the final output value for I_{PN} step | t_{D10} | μs | | 3 | 3.5 | @ 100 A/ μs |
| Delay time to 90 % of the final output value for I_{PN} step | t_{D90} | μs | | 3 | 3.5 | @ 100 A/ μs |
| Frequency bandwidth (-3 dB) | BW | kHz | | 140 | | Small signal |
| Noise voltage spectral density referred to primary 100 Hz ... 100 kHz | u_{no} | $\mu\text{V}/\sqrt{\text{Hz}}$ | | 5.3 | | |
| RMS noise voltage referred to primary (DC ... 10 kHz) (DC ... 100 kHz) (DC ... 1 MHz) | U_{no} | mVpp | | 4.2 5.6 8.0 | | |
| Primary current, detection threshold | I_{PTh} | A | $2.63 \times I_{PN}$ | $2.92 \times I_{PN}$ | $3.21 \times I_{PN}$ | Peak value $\pm 10\%$, overcurrent detection OCD |
| Sum of sensitivity and linearity error @ I_{PN} | ϵ_{SL} | % of I_{PN} | -1 | | 1 | |
| Sum of sensitivity and linearity error at 85 °C @ I_{PN} | ϵ_{SL85} | % of I_{PN} | -3.48 | | 3.48 | See formula note ²⁾ |
| Sum of sensitivity and linearity error at 105 °C @ I_{PN} | ϵ_{SL105} | % of I_{PN} | -4.3 | | 4.3 | |

 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

$$\text{Sum of sensitivity and linearity error @ } T_A \text{ (% of } I_{PN}) = \epsilon_{SL} + \left(\frac{TCS}{10000} \times (T_A - 25) \right) + \frac{TCI_{OE}}{1000 \times I_{PN}} \times 100 \times (T_A - 25).$$

Electrical data HOYL 800-S/SP33-1106

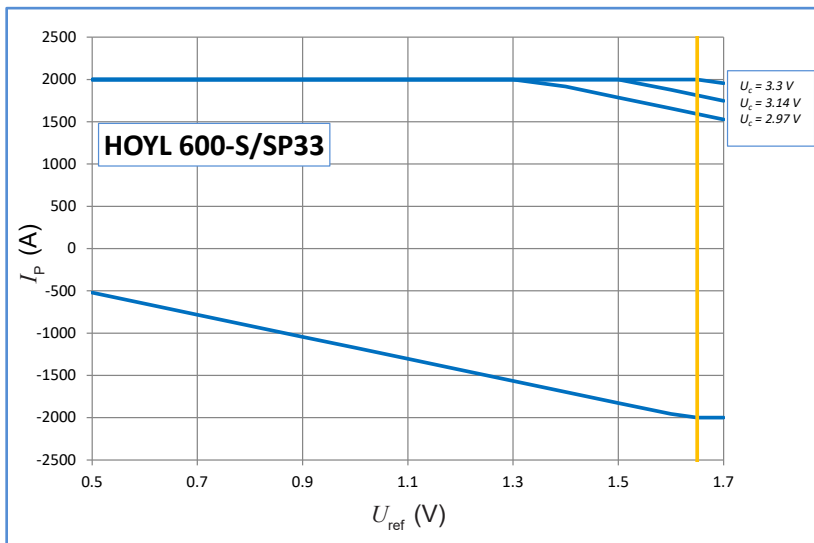
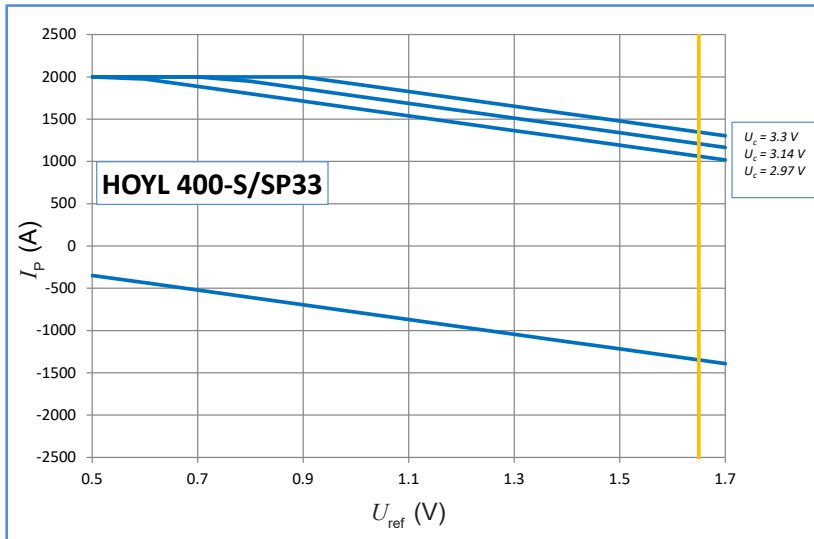
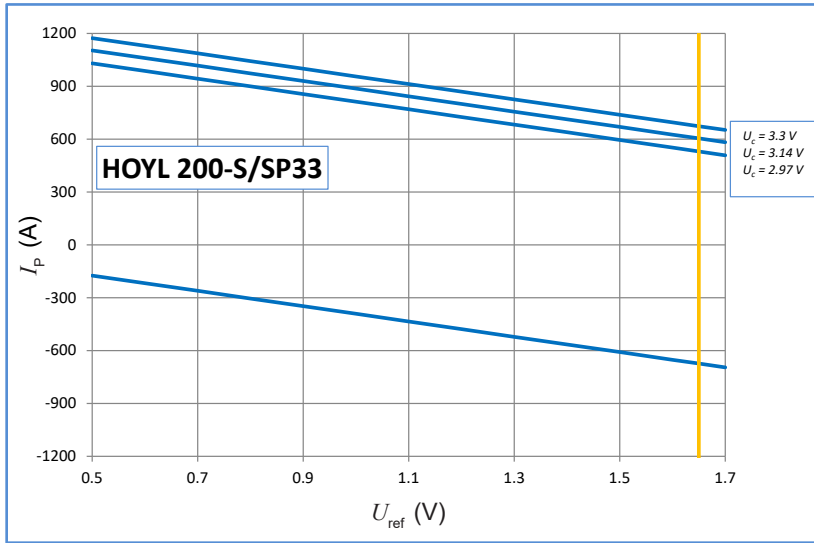
 At $T_A = 25\text{ °C}$, $U_C = +3.3\text{ V}$, $R_L = 10\text{ k}\Omega$ unless otherwise noted (see Min, Max, typ. definition paragraph in page 13).

| Parameter | Symbol | Unit | Min | Typ | Max | Comment |
|--|---------------------|--------------------------------|----------------------|----------------------|----------------------|---|
| Primary nominal RMS current | I_{PN} | A | | 800 | | |
| Primary current, measuring range | I_{PM} | A | -2000 | | 2000 | |
| Number of primary turns | N_P | - | | 1 | | Bus bar |
| Supply voltage | U_C | V | 3.14 | 3.3 | 3.47 | |
| Current consumption | I_C | mA | | 19 | 25 | |
| Reference voltage (output) | U_{ref} | V | 1.63 | 1.65 | 1.67 | Internal reference |
| External reference voltage (input) | U_{Eref} | V | 0.5 | | 1.7 | |
| Output voltage range @ I_{PM} | $U_{out} - U_{ref}$ | V | -1.15 | | 1.15 | Over operating temperature range |
| Internal series resistance of reference voltage source | R_{ref} | Ω | 130 | 200 | 300 | Series |
| Output internal resistance | R_{out} | Ω | | 2 | 5 | Series |
| Load capacitance | C_L | nF | 0 | | 6 | |
| OCD output on resistance | R_{onOCD} | Ω | 70 | 95 | 150 | Open drain, active low Over operating temperature range |
| OCD detection hold time | $t_{holdOCD}$ | ms | 0.7 | 1 | 1.4 | Additional time after threshold has released |
| EEPROM control | U_{out} | mV | 0 | | 50 | U_{out} forced to GND when EEPROM in an error state ¹⁾ |
| Electrical offset voltage @ $I_P = 0\text{ A}$ | U_{OE} | mV | -5 | | 5 | $U_{out} - U_{ref} @ U_{ref} = 1.65\text{ V}$ |
| Electrical offset current referred to primary | I_{OE} | A | -8.7 | | 8.7 | |
| Temperature coefficient of U_{ref} | TCU_{ref} | ppm/K | -170 | | 170 | -40 °C ... 105 °C |
| Temperature coefficient of U_{OE} referred to primary | TCU_{OE} | mV/K | -0.075 | | 0.075 | -40 °C ... 105 °C |
| Temperature coefficient of I_{OE} referred to primary | TCI_{OE} | mA/K | -130.43 | | 130.43 | -40 °C ... 105 °C |
| Nominal sensitivity | S_N | mV/A | | 0.575 | | 460 mV @ I_{PN} |
| Sensitivity error @ I_{PN} | ϵ_S | % | -0.5 | | 0.5 | Factory adjustment |
| Temperature coefficient of S | TCS | ppm/K | -250 | | 250 | -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_{PN} | -0.5 | | 0.5 | |
| Magnetic offset current (@ $10 \times I_{PN}$) referred to primary | I_{OM} | A | -1.86 | | 1.86 | One turn |
| Delay time to 10 % of the final output value for I_{PN} step | t_{D10} | μs | | 3 | 3.5 | @ 100 A/ μs |
| Delay time to 90 % of the final output value for I_{PN} step | t_{D90} | μs | | 3 | 3.5 | @ 100 A/ μs |
| Frequency bandwidth (-3 dB) | BW | kHz | | 140 | | Small signal |
| Noise voltage spectral density referred to primary 100 Hz ... 100 kHz | u_{no} | $\mu\text{V}/\sqrt{\text{Hz}}$ | | 5.2 | | |
| RMS noise voltage referred to primary (DC ... 10 kHz) (DC ... 100 kHz) (DC ... 1 MHz) | U_{no} | mVpp | | 4.2 5.5 7.7 | | |
| Primary current, detection threshold | I_{PTh} | A | $2.63 \times I_{PN}$ | $2.92 \times I_{PN}$ | $3.21 \times I_{PN}$ | Peak value $\pm 10\%$, overcurrent detection OCD |
| Sum of sensitivity and linearity error @ I_{PN} | ϵ_{SL} | % of I_{PN} | -1 | | 1 | |
| Sum of sensitivity and linearity error at 85 °C @ I_{PN} | ϵ_{SL85} | % of I_{PN} | -3.48 | | 3.48 | See formula note ²⁾ |
| Sum of sensitivity and linearity error at 105 °C @ I_{PN} | ϵ_{SL105} | % of I_{PN} | -4.3 | | 4.3 | |

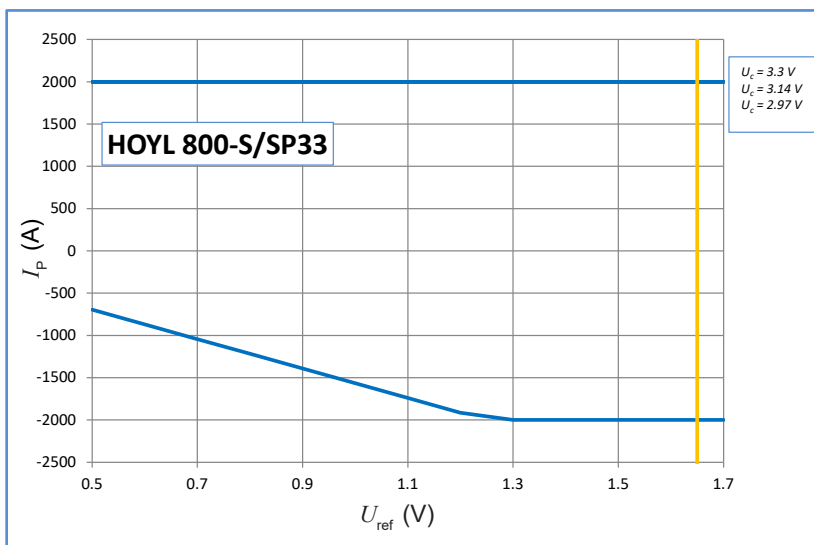
 Notes: ¹⁾ EEPROM in an error state makes the transducer behave like a reverse current saturation. Use of the OCD may help to differentiate the two cases

$$^2) \text{ Sum of sensitivity and linearity error @ } T_A (\% \text{ of } I_{PN}) = \epsilon_{SL} + \left(\frac{TCS}{10000} \times (T_A - 25) \right) + \frac{TCI_{OE}}{1000 \times I_{PN}} \times 100 \times (T_A - 25)$$

Measuring range versus external reference voltage

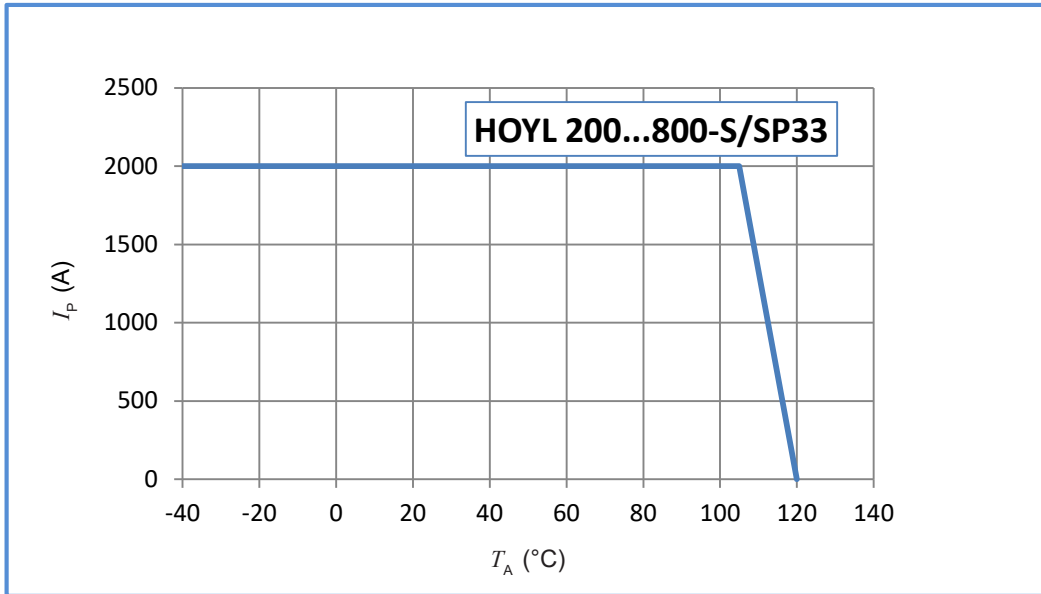


Measuring range versus external reference voltage



Maximum continuous DC current

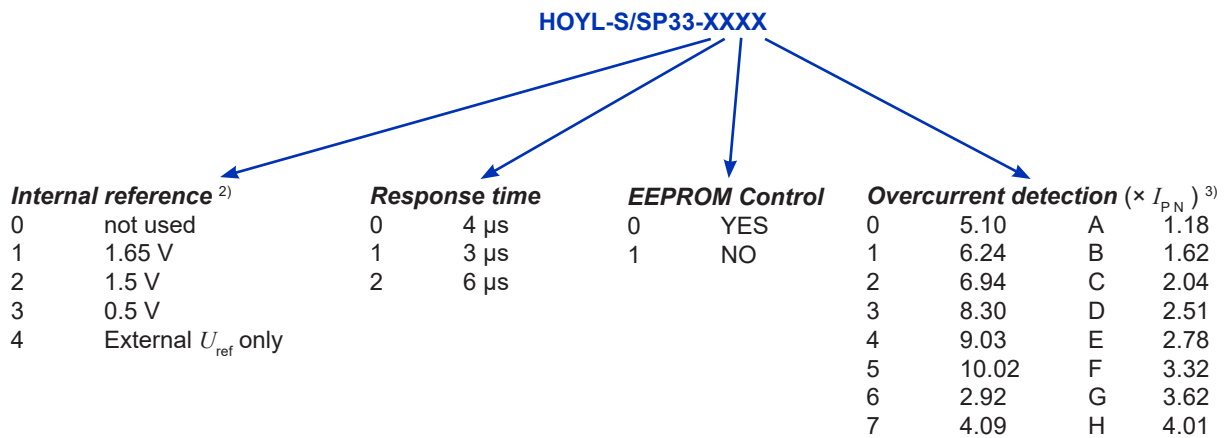
For all ranges:



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

HOYL-S/SP33 series: name and codification

HOYL-S/SP33 family products may be ordered **on request**¹⁾ with a dedicated setting of the parameters as described below (standard products are delivered with the setting 1106 according to the table).



Notes: ¹⁾ For dedicated settings, minimum quantities apply, please contact your local LEM support

²⁾ U_{ref} electrical data

| U_{ref} parameter | U_{ref} (V) | | | TCU_{ref} (ppm/K) | |
|---------------------|---------------|------|------|---------------------|-----|
| | min | typ | max | min | max |
| 0 | - | - | - | - | - |
| 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 |

³⁾ OCD ($\times I_{PN}$) correction table versus range and temperature.

All other values or empty cells: no change

| HOYL-S/SP33-010x | | | | |
|------------------|-----|-------|------|-----|
| OCD Parameter | 200 | 400 | 600 | 800 |
| A | | | | |
| B | | | | |
| C | | | | |
| D | | | | |
| E | | | | |
| 6 | | | | |
| F | | | | |
| G | | | | |
| H | | | | |
| 7 | | | | |
| 0 | | | | - |
| 1 | | | 8.71 | - |
| 2 | | | - | - |
| 3 | | | - | - |
| 4 | | 11.12 | - | - |
| 5 | | - | - | - |

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

Application information

HOYL-S/SP33 series is designed to be used with a bus-bar or cable ¹⁾ to carry the current through the aperture with a maximum cross-section of 21.5 × 13 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.

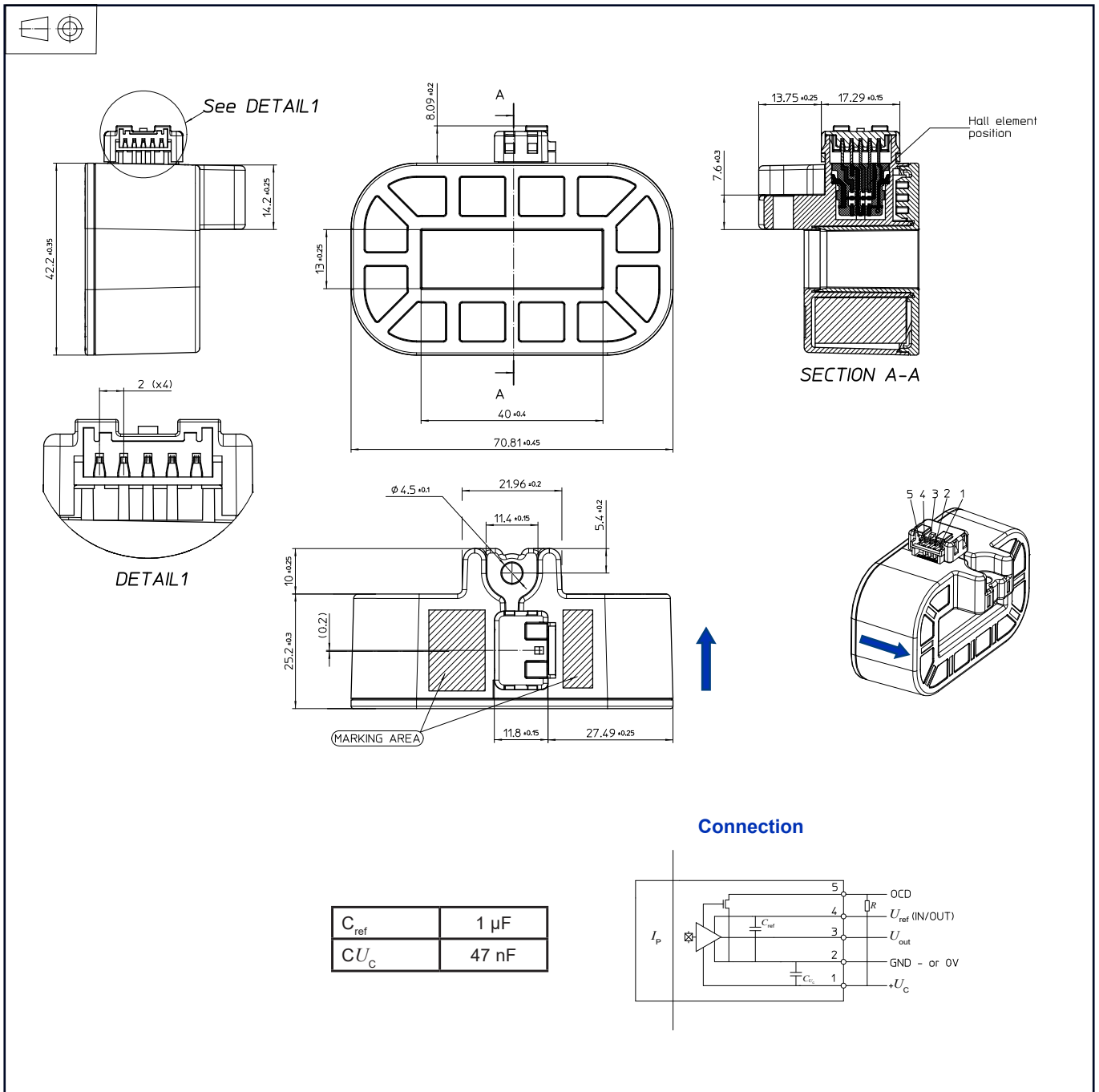
Remark

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: <https://www.lem.com/en/file/3137/download/>.

Insulation distance (nominal values):

| | d_{CP} | d_{CI} |
|---|----------|----------|
| Between primary busbar and secondary pins | 24.3 mm | 24.3 mm |
| Between primary busbar and core | 21.1 mm | - |
| Between core and secondary terminal | 12.3 mm | 12.3 mm |

Dimensions (mm, general linear tolerance ± 0.3 mm)



Remarks:

- U_{out} is positive with respect to U_{ref} when positive I_p flows in direction of the arrow shown on the drawing above.
 - Connection system equivalent to JST B05B-PASK.
 - Transducer fastening
 - 1 hole \varnothing 4.5 mm
 - 1 steel screw M4
- Recommended fastening torque 4 N·m