

AccTRANS Manual

Analog acceleration sensor to measure oscillation and vibration on train bogies



AccTRANS available at Micro-Hybrid-Shop
Filter products simply by selecting the desired properties
and request your quotation.

 microhybrid.com/shop



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| Abbreviation | Meaning |
|--------------|--------------------------------|
| RMS | Root mean square |
| MEMS | Micro-electromechanical system |
| MTBF | Meantime between failures |
| GND | Ground |
| RF | Radio frequency |

1. Technical parameters

| Physical parameter | Unit | |
|--|--|--------------------|
| Sensitive axis | y-direction (additional x on request) | |
| Measurement range ¹ | ± 2 / ± 4 / ± 5 | g |
| Sensitivity ² | 2 | mA/g |
| Sensitivity error | ± 2 | % |
| Noise | 0.1 | % RMS of fullscale |
| Bandpass characteristic (-3dB) | | |
| Bandwidth | 0.5 ... 15 | Hz |
| In-band tolerance | < ± 0.5 | dB |
| Damping gradient | > 24 | dB/octave |
| Current output | 4 ... 20 | mA |
| Zero signal | 12 | mA |
| Burden (current output) | ≤ 200 | Ω |
| Housing | Stainless steel (1.4301) | |
| Applied standard | DIN EN 50155 | |
| Connector ¹ | 4 - wire cable | |
| Cable | RADOXTENUIS - TW 600 V 4 x 0.5 mm S SPEC | |
| Diameter | 8.35 | mm |
| Length | 3 | m |
| Operating temperature range | -40 ... +70, Class OT4, H1 | °C |
| Extended operating temperature at start-up | ST0 | |
| IP-class | IP68 | |
| Vibration & shock test | DIN EN 61373:2011 Cat. 2 | |
| Altitude class | DIN EN 50125 Class AX | |
| Humidity class | DIN EN 50125 Class TX | |
| Pollution degree | DIN IEC 61010-c Class PD4 | |

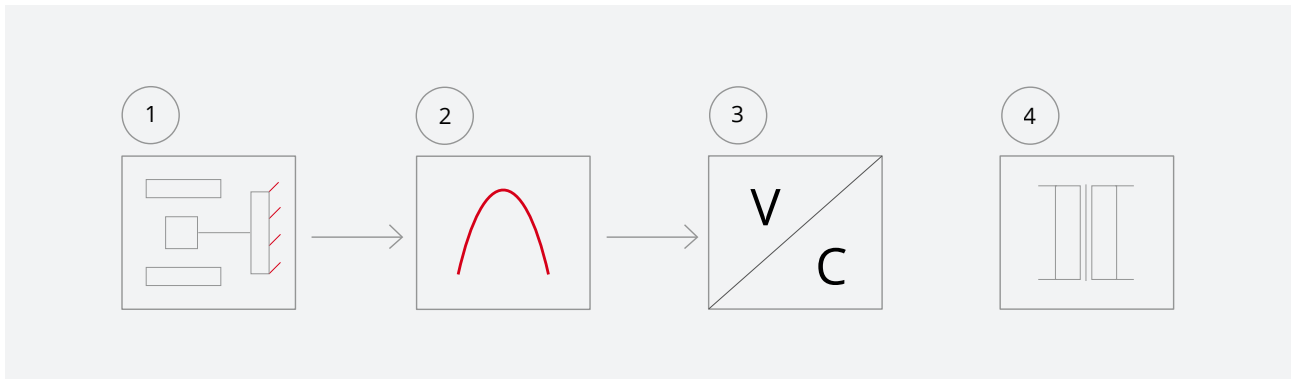
All specifications at +25 °C, unless otherwise defined.

¹ customizable

² dependent on measurement range

| Electrical parameters | Min. | Typ. | Max. | Unit |
|------------------------------------|------|------------|-------|------|
| Supply voltage | 77 | 110 | 137.5 | V |
| | 16.8 | 24 | 30 | V |
| Supply current | | 10 (110 V) | | mA |
| | | 50 (24 V) | | mA |
| Consumption | | ≤ 3 | | W |
| Insulation | | > 200 | | MΩ |
| Class of power supply interruption | | | | S1 |

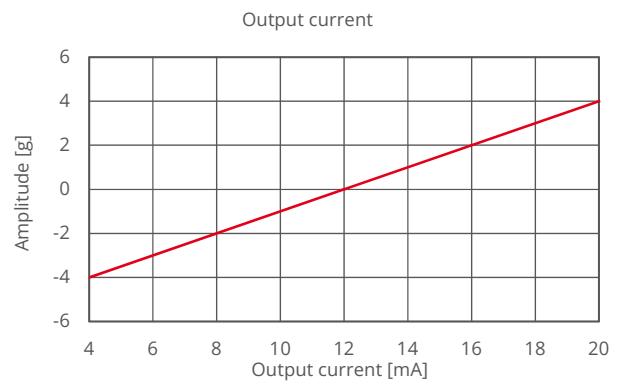
2. Functional block diagram



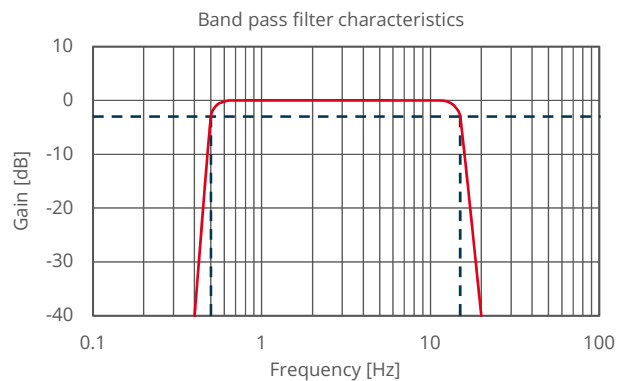
- 1 MEMS accelerometer
- 2 Band - pass filter (> 24 dB/octave)
- 3 Voltage to current converter
- 4 Isolated power supply

3. Output characteristics

| Output signal | | | |
|----------------|------|-------|-------|
| Acceleration | -4 g | 0 g | +4 g |
| Output current | 4 mA | 12 mA | 20 mA |

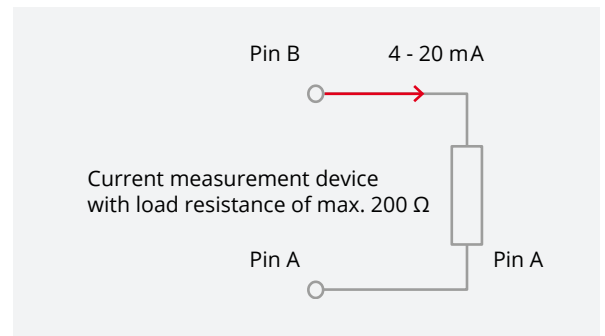


| Filter characteristics | |
|--------------------------|------------------------|
| Type and frequency range | bandpass 0.5 ... 15 Hz |
| Gradient | ≥ 24 dB/octave |



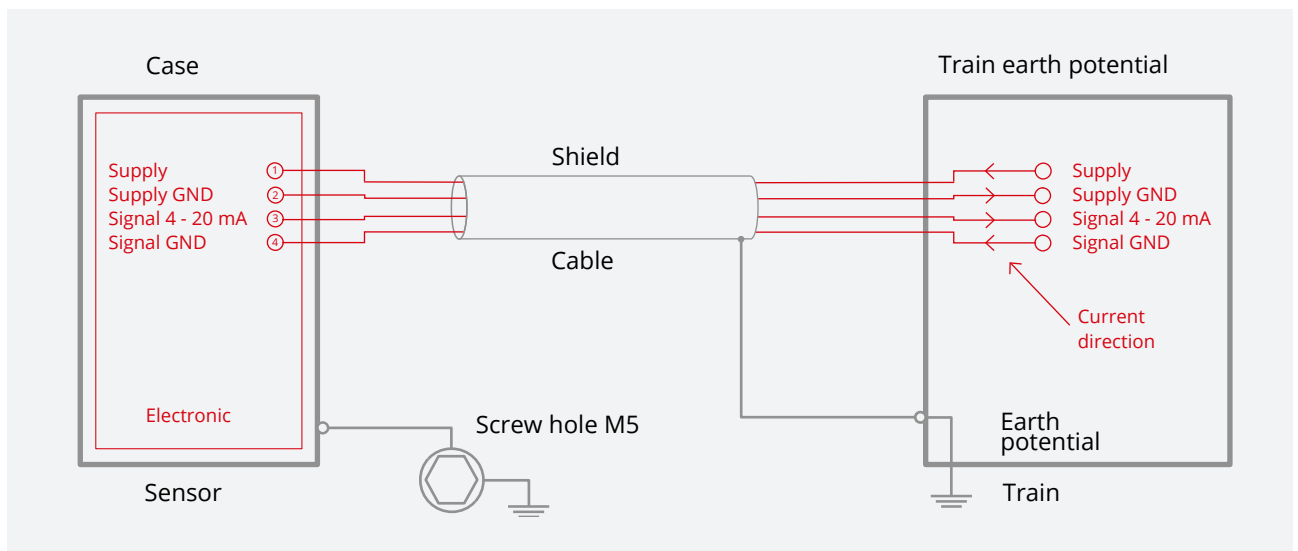
4. Current output connection

- Load resistance: max. 200 Ω



5. Shielding concept

- The shield is not connected to the housing of the sensor. Connect the housing to train earth potential.



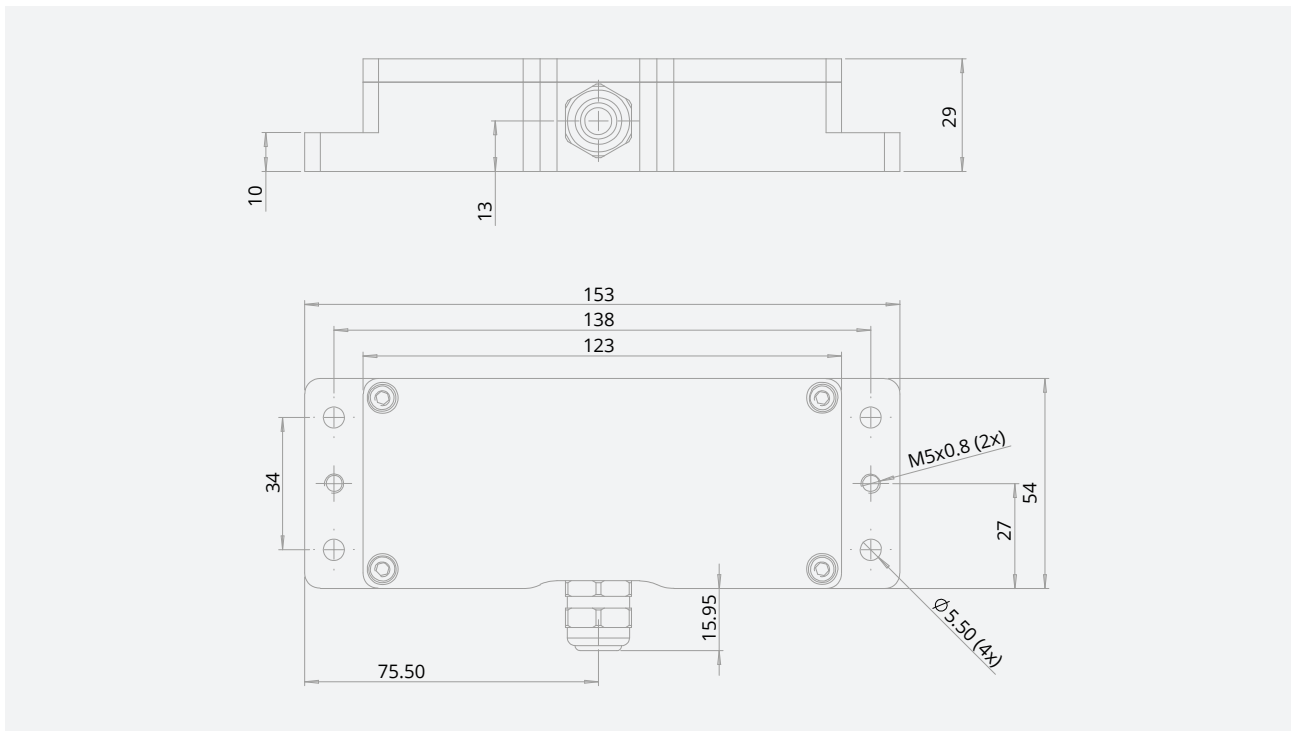
6. Wiring

| Wire No. | Assignment |
|----------|----------------------|
| 1 | Supply voltage |
| 2 | Supply ground |
| 3 | Signal output y-axis |
| 4 | Signal ground y-axis |

Connector on request

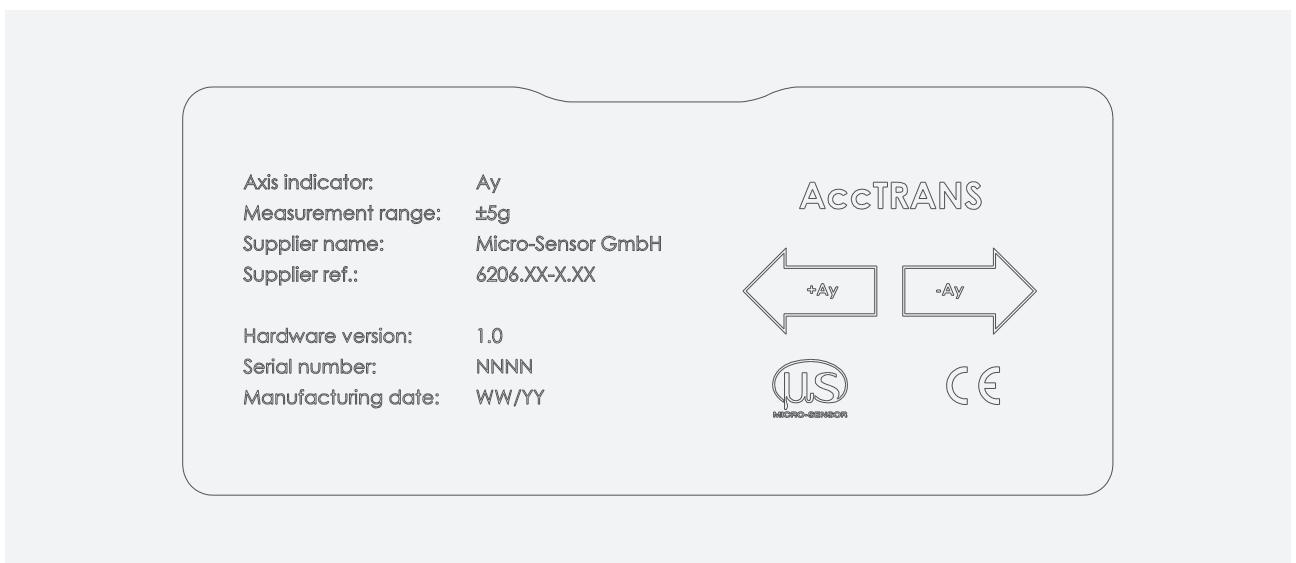
7. Mechanical dimensions

- Weight including 3 meters cable: ~ 1.3 kg



Dimensions in mm

8. Labeling



9. RAMS properties

| | | |
|-------------------------------------|---------|-----|
| MTBF ¹ | 3000000 | h |
| Failure rate λ ² | 330 | FIT |

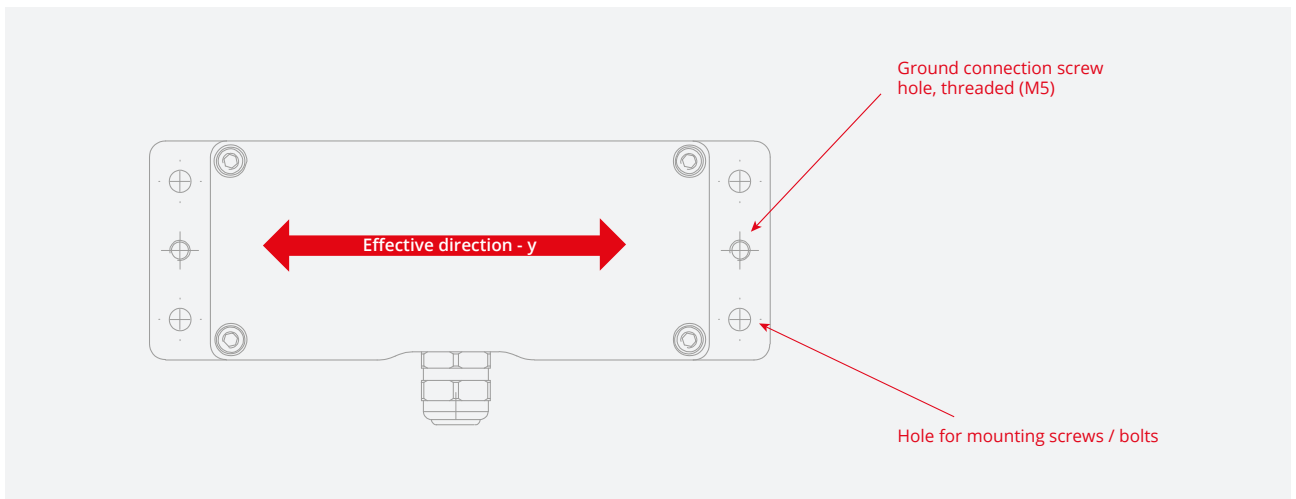
¹ MTBF = 1/ λ

² Failure rate calculated as the total sum of the failure rates of each component, with respect to operating temperature conditions.

10. Handling instructions

10.1. Assembly

The accelerometer AccTRANS is supposed to be mounted in the vicinity of the wheel axles in the outskirts area of the train. The housing of the sensor is designed as a flange with four holes for M5 screws (see subsequent drawing).



Mounting on given M4 thread rods

1. Align the device by putting the four given M4 thread rods through the corresponding long holes.
2. Tighten each rod with a matching flat washer and nut with a torque of max. 2.3 Nm (based upon strength category 8.8).
3. Take grounding cable and attach it to one of the ground connection screw holes with M5 bolt (max. shaft length 11 mm).
4. Connect the open wires at the end of the sensor's cable to the socket coming from the train side and make sure that the cable is routed along the predefined, secure way.

Mounting with M4 bolts

1. Place the device aligned along the four tapped holes in the mounting area.
2. Use four M4 bolts and matching flat washers to tighten the device in the supposed place with a torque of max. 2.3 Nm (based upon strength category 8.8).
3. Take grounding cable and attach it to one of the ground connection screw holes with M5 bolt (max. shaft length 11 mm).
4. Connect the open wires at the end of the sensor's cable to the socket coming from the train side and make sure that the cable is routed along the predefined, secure way.

10.2. Maintenance

The device is developed in a way that no maintenance actions are required during its lifetime.

10.3. Disassembly

1. Disconnect the sensor's cable from the train's connector.
2. Unscrew bolt in grounding screw hole and remove grounding cable.
3. Loosen either the four bolts or the nuts with which the device has been attached and lift off the sensor.

11. Troubleshooting

Basically two kinds of errors can occur, electrical and mechanical ones. One cause of a remediable mechanical error could be improper connection of the sensor, e.g. by contaminated connector pins or sockets. Always make sure that there is proper connection between device and train system.

In cases of any other errors it is always necessary to return the defective device to the supplier's facilities in order to investigate the cause. Therefore follow the disassembly instructions mentioned above and return the device to the address below together with a brief description of the observed error.

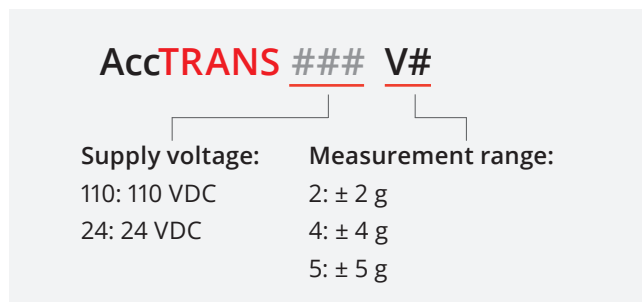
Shipping address and contact information:

| | |
|--------------------|--|
| Company | Micro-Sensor GmbH |
| Street and No. | Heinrich-Hertz-Straße 8 |
| Post code | 07629 |
| City | Hermsdorf |
| Country | Germany |
| Telephone | +49 36601 5920 |
| E-Mail for support | contact@micro-sensor.com |

12. Applied standards

| Applied standards according to DIN EN 50155 | |
|---|---|
| DIN EN 55011 | Conducted emission |
| DIN EN 55011 | Radiated emission electromagnetic field |
| DIN EN 61000-4-3 | Immunity to electromagnetic field |
| DIN EN 61000-4-4 | Immunity to electrical fast transient/burst |
| DIN EN 61000-4-5 | Immunity to electrical slow transient/surge |
| DIN EN 61000-4-6 | Immunity to conducted RF voltage |
| DIN EN 50155 | Overvoltage at power supplies |
| DIN EN 61373 | Shock and vibration tests |
| IEC60068-2-1 (Bd) | Dry heat test |
| IEC60068-2-30 (Db) | Damp heat, cyclic (2 x 24h cycle) |
| IEC60068-2-1 (Ad) | Cold test |
| DIN EN 45545 | Fire protection on railway vehicles |
| Other standards | |
| RoHS, REACH | Compliant |

13. Product key



Further options on request.

Disclaimer

All rights reserved. All information in this data sheet are based on latest knowledge, results of practical experience and tests carried out. Earlier specifications are hereby invalid. All specifications – technical included – are subject to change without notice. It is the customer’s responsibility to ensure that the performance of the product is suitable for customer’s specific application. No liability is accepted for indirect damage, in particular for the use or inability to use the product. Any liability we may have is limited to the value of the product itself.