Pretravel and Pretravel Adjustment

This application note describes the pretravel of HIRT transducers, its function and benefits, as well as the possibilities and limits of pretravel adjustment. It is intended for users, design engineers, application engineers, and sales staff and serves as a technical reference guide.

Not all HIRT transducers have a pretravel setting. Adjustability depends on size, transducer type, measurement principle, and interface. Miniature transducers and digital RS485 or IO-Link transducers typically do not feature an adjustable pretravel. In these models, the pretravel is fixed by design and cannot be mechanically adjusted.

Key terms and distinctions

Depending on transducer type and size, the stroke ranges and adjustment options differ. The terms are explained below. A schematic principle diagram is shown on the following page. Typical practical questions are covered in the FAQ section.

Total Stroke

The total stroke describes the maximum possible mechanical travel of the transducer between the front and rear mechanical stops. It consists of the **pretravel to the electrical zero point**, the **measuring stroke** as the **active measuring range**, and the **remaining overtravel to the rear mechanical stop**. The total stroke is a mechanical quantity and can be asymmetrical relative to the electrical zero point.
The position and ranges of the pretravel, measuring stroke, and overtravel vary depending on the transducer type and size.

Measuring stroke

The measuring stroke is the **active measuring range of the transducer** in which the measuring signal is recorded within the specified accuracy. The measuring stroke is usually symmetrical around the mechanical zero point (e.g., ± 1.0 mm), but may vary depending on the transducer type.

Pretravel

The pretravel is the mechanical distance **from the front mechanical stop** to the **electrical zero point** and is located before the measuring stroke. It includes a **rest stroke safety reserve** outside the measuring stroke, which ensures that the measuring range is safely reached during workpiece probing (typically 0.2-0.5 mm). Depending on the transducer type, the pretravel is either fixed by design or adjustable via the counter ring.

Pretravel – Factory setting

The pretravel factory setting describes the **factory-set position of the measuring range** relative to the electrical zero point and thus **the position of the measuring stroke within the total stroke**, for example ±1 mm around the zero point with a factory setting of -1.2 mm. It determines **how much pretravel is available in the factory delivery condition** and, depending on the transducer type, is either adjustable or fixed by design.

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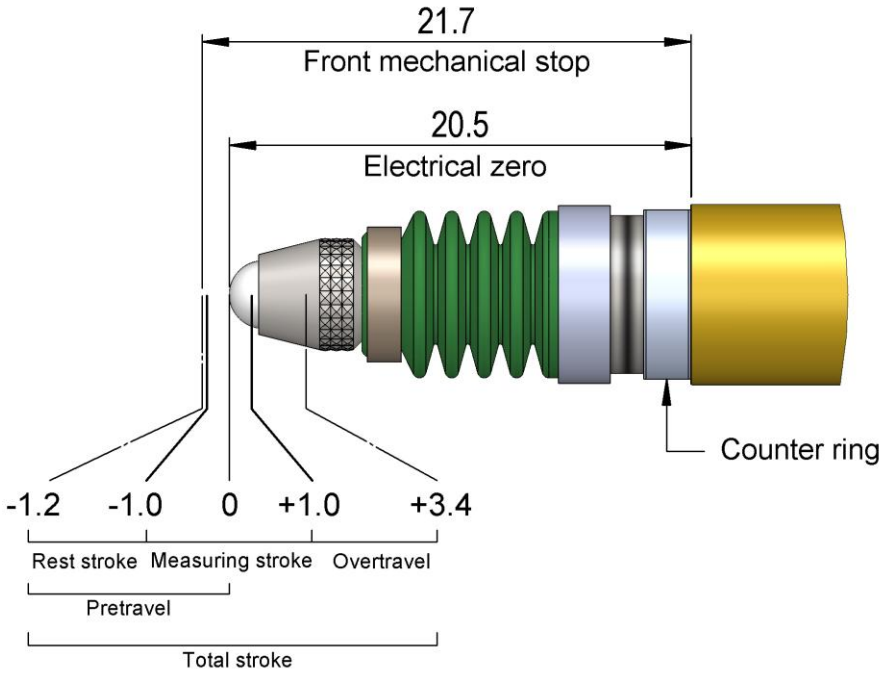
Schematic diagram explaining the stroke ranges

For clarification purposes, a principle schematic diagram is used in this application note. It shows the stroke ranges of the transducer and the functional division into **measuring stroke**, **rest stroke**, **pretravel**, **overtravel** and the **total stroke** within the mechanical and electrical operating ranges.

The schematic diagram and dimensions are given as an example for the T101F measuring transducer. The values and stroke ranges depend on the type and size and may vary depending on the model. The dimensions are subject to manufacturing and type-related tolerances.



Legend:

- **Measuring stroke**: Active measuring range, ± 1.0 mm
- **Rest stroke:** Safety reserve outside the measuring stroke, 0.2 mm
- **Pretravel:** Range before the measuring stroke, factory preset to -1.2 mm
- **Overtravel:** Mechanical reserve up to the rear stop, +2.4 mm
- **Total stroke:** Mechanical stroke from the front to the rear mechanical stop, 4.6 mm
- **Electrical zero:** Electrical reference point of the measuring system
- **Front mechanical stop**: Front end stop from the end of the housing, 21.7 mm
- **Counter ring:** Ring for pretravel adjustment (adjustable versions only)

Note:
All drawings and 3D STEP models of HIRT transducers are shown at the electrical zero position.
Type-specific technical data and specifications are available at: www.peterhirt.ch

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FAQ – Frequently asked questions

The following questions and answers provide technical clarification of frequently asked questions regarding the application, design, and integration of measuring transducer in connection with the stroke ranges and the electrical zero point.

What does a measuring stroke of ±1 mm mean?

The measuring stroke covers the active measuring range from –1.0 mm to +1.0 mm around the electrical zero point. The usable measuring range is therefore 2.0 mm.

Is the measuring stroke always symmetrical to the electrical zero point?

Yes. The measuring stroke is set around the electrical zero point. A pretravel adjustment only shifts the mechanical position of the measuring range, not the internal zero point of the transducer.

Is the total stroke symmetrical to the electrical zero point?

No. The total stroke is a mechanical dimension between the front and rear stops. The electrical zero point may be asymmetrical within this range due to the design.

What does a pretravel of, for example, -1.2 mm mean?

The electrical zero point is 1.2 mm behind the front mechanical stop. The pretravel provides a reserve before the active measuring stroke and includes an safety reserve of 0.2 mm outside the measuring range, ensuring that the measuring range is reliably reached during workpiece probing.

How is the front dimension determined when the measuring transducer is extended?

All drawings and 3D STEP models show the measuring transducer in the electrical zero position. For the dimension when the transducer is fully extended, the pretravel dimension must be added.
Front dimension (extended) = drawing dimension at electrical zero point + pre-stroke

How is the pretravel adjusted?

On adjustable models, the adjustment is made using the counter ring. Adjustments may only be made by trained personnel using the supplied key (T100/62000) in accordance with the instructions.

Is the pretravel adjustable on all HIRT transducers?

No. On non-adjustable transducers (e.g., miniature, digital, and IO-Link types), the pretravel is fixed by design and must not be changed.

Does a pretravel setting change the electrical zero point of the transducer?

No. The internal electrical zero point of the transducer remains unchanged. The pretravel setting merely shifts its mechanical position within the total stroke.

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What can happen if the pretravel setting is changed?

The measuring range shifts within the total mechanical stroke. Excessive deviation from the factory setting can reduce accuracy or cause premature contact with the mechanical stop.

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