

Integrated Stroke Measuring System

INWEST



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symbol explanation:



keep attention -
dangerous!



keep attention -
malfunction!

RoHS Compliance

This product is in compliance with Directive 2011/65/EU of the European Parliament and of the Council of 8. June 2011, on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) and its amendments.



Presumption of conformity

The general function of our components does usually not require additional equipment such as noise filters or the likes. Compliance with the required limit values described in the applying EMC guidelines results in the application of shielded control cabinets and additional noise filtering measures in order to achieve a sufficient level of noise immunity. Only if all instructions in this documentation are followed identically, may the presumption apply that the corresponding protection requirements of the EMC guidelines are fulfilled.

1 SAFETY NOTES

Consider always the following points:



- Follow the operating instructions
- Avoid impacts and vibrations to the system
- The system has to be connected following the safety directions for electrical equipment
- Protect cables against damage
- Check the correct wiring on all connections before starting the system
- Power supply may not exceed indicated values
- Allow 2 minutes for the system to warm up before operating
- Observe the notes about shielding! → # 3.2.4 // 10
- The system may be operated only within the specified technical values and limits.
- Commissioning, adjustments and operation is allowed only by qualified personnel.
- In the cases of improper system adjustment or use, the OTT-JAKOB company will not accept any liability.

1.1 INTENDED USE

The stroke measuring system INWEST that is integrated in the unclamp unit detects the position of the drawbar shaft and thus the current tool position.

This sensor technology is designed for industrial use only.

The measuring system may be operated only within the values given in the technical data.

The corresponding technical and safety related regulations apply to assembly, commissioning and the consecutive operation. All thus related EC laws and guidelines and all necessary EMC, TAB, VDE and accident prevention regulations.

The measuring system must be programmed in such a way that during malfunction or total failure of the measuring system, no persons are harmed or machines are damaged.

The Sensor System is not a safety device per the EG-Manufactures Standards, and because of this reason, it is not allowed to be used in safety related parts of the machine controls!

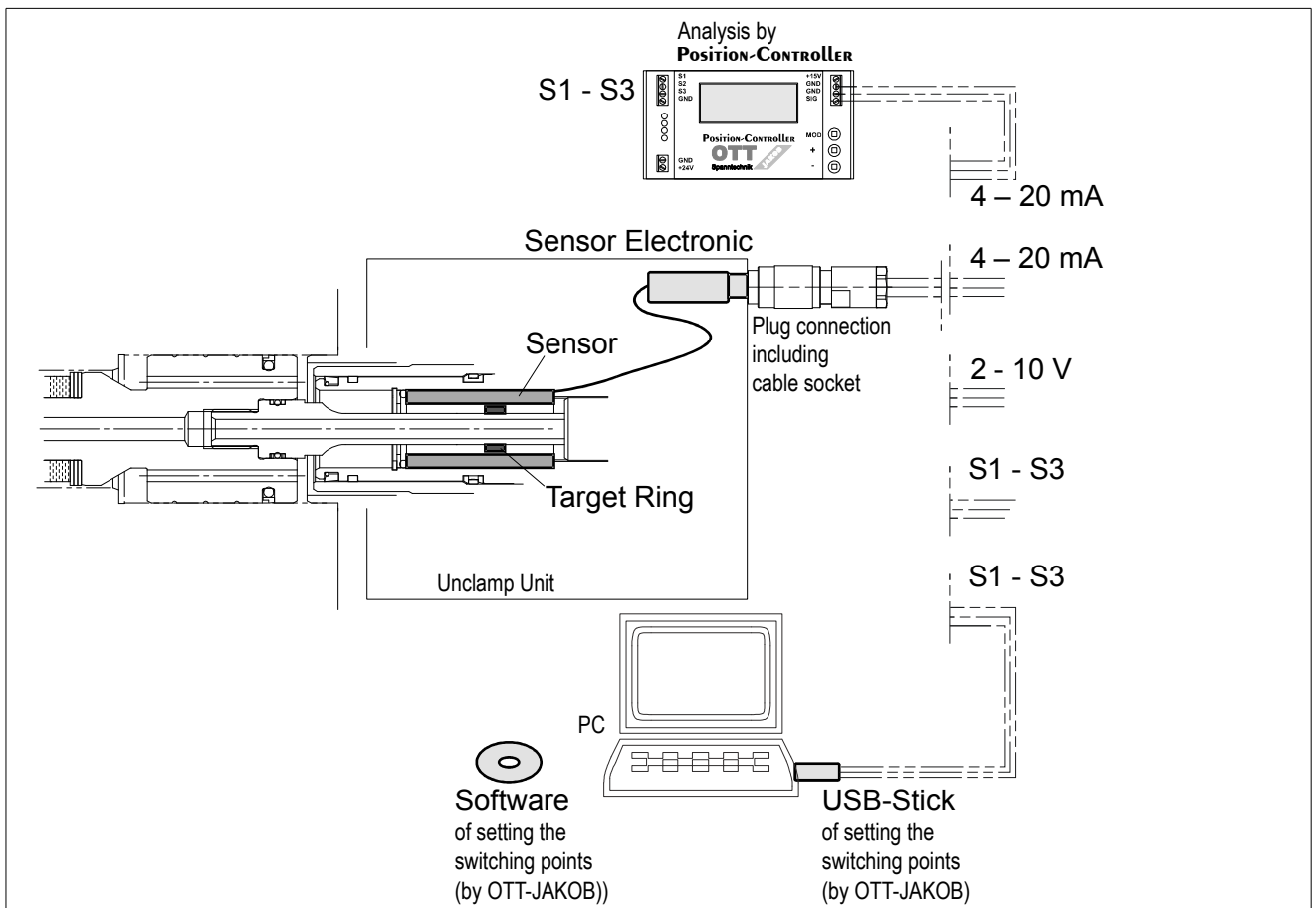
The limit values may be adjusted only by instructed specialists.

2 PRODUCT DESCRIPTION

2.1 APPLICATION

The stroke measuring system INWEST that is integrated in the unclamp unit detects the position of the drawbar shaft and thus the current tool position.

- Tool released
- Tool clamped
- Clamped without tool



2.1.1 Sensor

The unclamp unit contains a cylindrical, inductive analog sensor.

The drawbar connection moves axially through the analog sensor. A target ring on the drawbar connection triggers the output signal. The signal increases the further the target ring enters the sensor (view from the cable exit).

The signal is also available during rotation.

2.1.2 Sensor Electronics

The sensor electronics transform the sensor signal into an analogue signal. The follow output signals are available:

Current-signal 4 - 20 mA

For the following reasons, a currency signal is recommended:

- The 4 - 20 mA current-signal compared to a voltage-signal is less sensitive to electromagnetism (e.g. Linear drives, motors, power cable, HF-technology ...)
- the analog current-signal can be transferred over longer distances (up to 50 m cable length)
- the Ott-Jakob Position Controller can only be read with 4 – 20 mA Input!

Voltage-signal 2 – 10 V

The voltage signal depends upon the total resistance. If the spindle manufacturer gives certain values for adjustment, the following factors must be considered

- cable resistance / cable length
- inner resistance of the measuring devices and the controls

These factors may falsify the predefined setting values; may result in system failure.

Digital switching points (S1 - S3)

In addition, the sensor electronic is able to transmit digital switching points (S1 - S3). This requires in addition:

- our USB stick for setting the switching points
- our software for setting the switching points
- a windows PC (with Windows XP and higher)

Analyzing with **Position-Controller**

The analogue output signal can also be analyzed with our **Position-Controller** (digital switching points S1 - S3) (possible only with current signal).

2.2 TECHNICAL DATA

supply voltage UB	12 ... 30 V DC	polarity-safe
supply current JB	< 80 mA	(without switch outputs)
voltage output UA	2 ... 10 V	(UB > 13 V)
permitted load	> 1 kΩ	
switch output JA	4 ... 20 mA	
load resistance RL	< (UB - 8 V) / 0,02 A	
dependence on RL	< 0,02 % at ΔRL = 100 Ω	
dependence UA, JA on UB	< 0,05 % at ΔUB = 1 V	
switch outputs S1, S2, S3 (HIGH-SIDE-SWITCHES)	each max. 100 mA	
temperature range	0° C +80° C	
Max. cut-off frequency	fg = 160 Hz	
Safety standard	IP 67	
EMC according to	DIN EN 61000-6-4 interference emission DIN EN 61000-6-2 interference immunity	

Scale

length	current	voltage
0 mm	4 mA	2 V
25 mm (at target ring diameter 8 / 10) 15 mm (at target ring diameter 5) 20 mm (at target ring diameter 22,5)	20 mA	10 V

2.3 ORDER NUMBERS

Designation	Order number
Integrated Stroke Measuring System INWEST	depending on the unclamp unit used
USB interface, cable (3,5 m) including cable socket and software for setting the switching points (optional)	95.103.348.3.2
USB cable extension 3 m * (optional)	0.960001.003
Position-Controller (optional)	0.966900.005
Adapter cable (l = 2 m) for current signal**	95.103.234.3.2
Adapter cable (l = 2 m) for voltage signal**	95.103.236.3.2
On request: assembled feed line deliverable	

* maximum permissible length of the USB cables: 6,5 m (3,5 + 3 m)

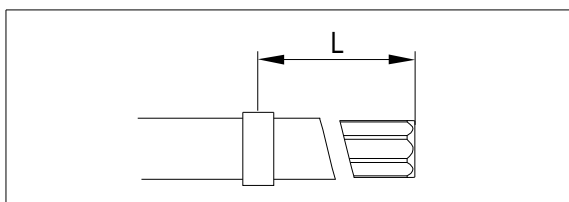
** This cable must be used if a system with a regular stroke measuring system (original version FS) is to be exchanged against a system with an integrated stroke measuring system.

3 START-UP

3.1 ASSEMBLY

3.1.1 Sensor

The sensor is already pre-mounted in the unclamp unit and connected with the sensor electronics. The target ring is in most cases pre-mounted on the drawbar connection; if this is not the case, the following steps are to be taken:



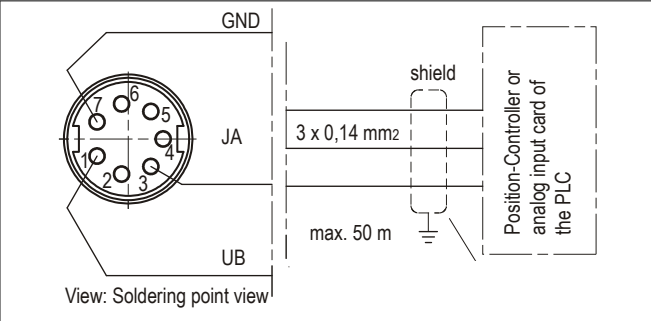
- ▲ Apply Loctite 638 on the drawbar connection (Follow the Loctite manual!)
- ▲ Push the target ring over the drawbar connection and position it according to the illustration (Follow the instructions regarding the drying time in the Loctite manual!)
- ▲ Remove excessive adhesive

3.2 WIRING

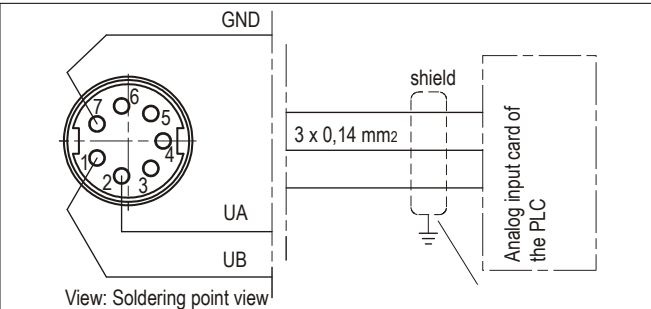
The sensor is pre-assembled in the unclamp unit and connected with the sensor electronics. A connector is supplied at the output of the sensor electronics unit.

Hints to the signal types → # 2.1.2 // 6

3.2.1 Pin assignment for current signal

 <p>View: Soldering point view</p> <p>Connect shield at plug housing → # 3.2.4 // 10</p> <p>Connect shield to GND / PE in the control cabinet</p>	<p>Requirements to the connection cable (not in the scope of delivery):</p> <ul style="list-style-type: none"> ● exterior diameter 3.5 - 5 mm ● 3 x 0,14 mm² (AWG 26) ● shielded ● highly flexible suitable for use in drag chains ● maximum length with corresponding interference elimination: 50 m
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3.2.2 Pin assignment for voltage signal

 <p>View: Soldering point view</p> <p>Connect shield at plug housing → # 3.2.4 // 10</p> <p>Connect shield to GND / PE in the control cabinet</p>	<p>Requirements to the connection cable (not in the scope of delivery):</p> <ul style="list-style-type: none"> ● exterior diameter 3.5 - 5 mm ● 3 x 0,14 mm² (AWG 26) ● shielded ● highly flexible suitable for use in drag chains
--	---

3.2.3 Pin assignment for digital switching points (S1 - S3)

<p>View: Soldering point view</p>	<p>Requirements to the connection cable (not in the scope of delivery):</p> <ul style="list-style-type: none"> • exterior diameter 3.5 - 5 mm • 5 x 0,14 mm² (AWG 26) • shielded • highly flexible suitable for use in drag chains
<p>Connect shield at plug housing → # 3.2.4 // 10</p>	<p>Connect shield to GND / PE in the control cabinet</p>

It is possible to use the current signal or the voltage signal together with the digital analysis; the pin assignment then is a combination of the wirings described above.

3.2.4 Shielding

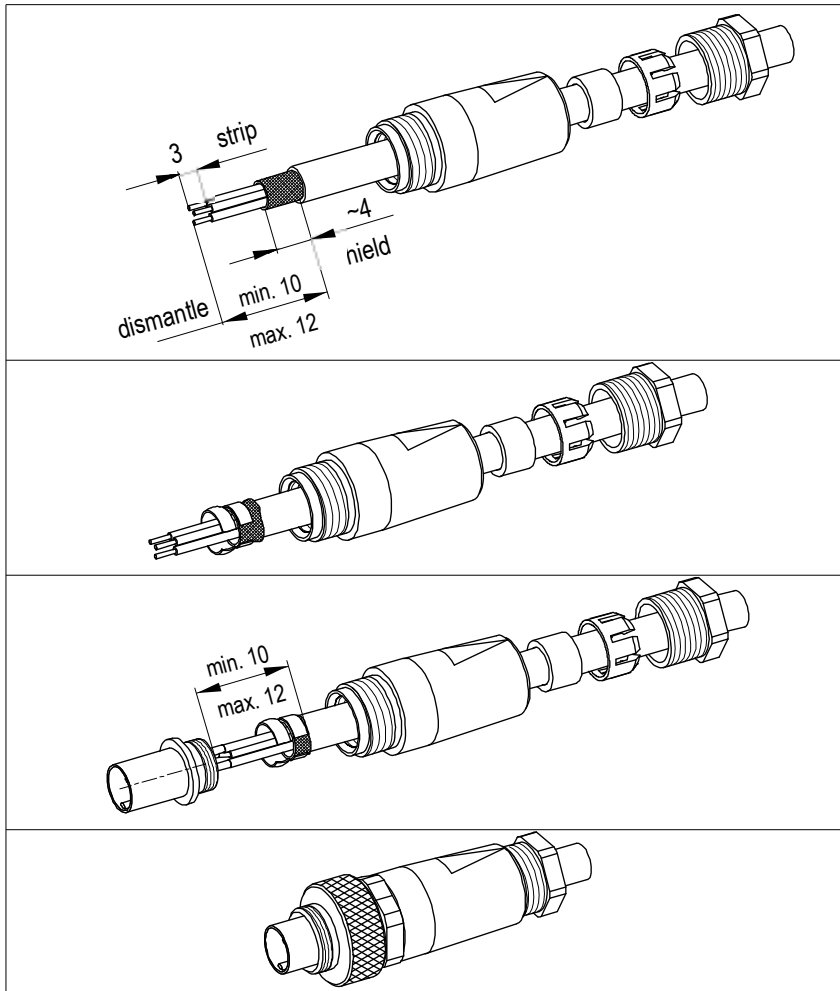
Recommendation

<p>Important! spindle housing must be properly grounded</p>	<p>connect PE + shield</p>
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A shieldable EMC female cable connector are included with the delivery.

When using non-conductive bearings (between rotor shaft and spindle) the shield must be connected to the plug of the unclamp unit. The other end must be connected to GND / PE in the control cabinet.

Correct shield wiring



- ▲ Bead parts
- ▲ dismantle cable
- ▲ shorten shield
- ▲ strip wire

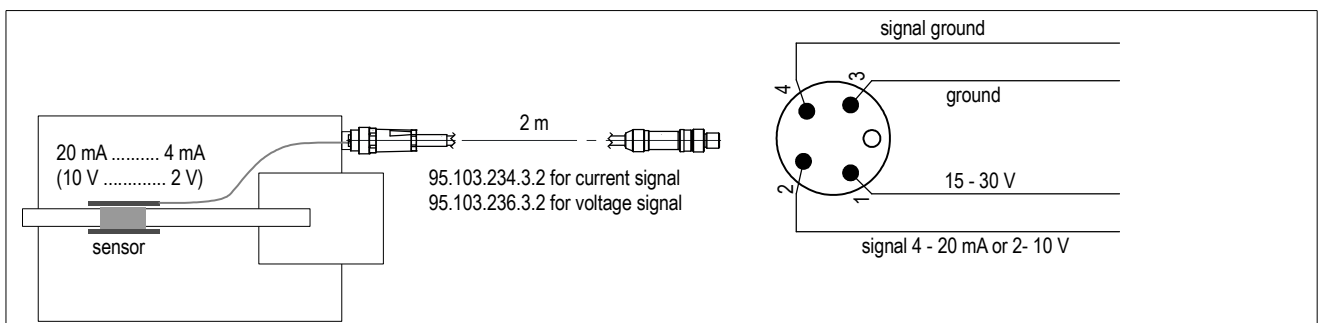
- ▲ Fold shield back
- ▲ fit collar to cable diameter and solder with shield

- ▲ Cut off projecting shielding braid
- ▲ solder insert

- ▲ Mount remaining parts acc. to figure

3.3 ADAPTER CABLE

This cable must be used if a system with a regular stroke measuring system (original version FS / cable 4-pin) is to be exchanged against a system with an integrated stroke measuring system (cable 7-pin).



3.4 OPERATING VOLTAGE

12 -30 V DC (see also Technical Data)

Before starting the system, check for proper connections

Allow 2 minutes for the system to warm up before operating.

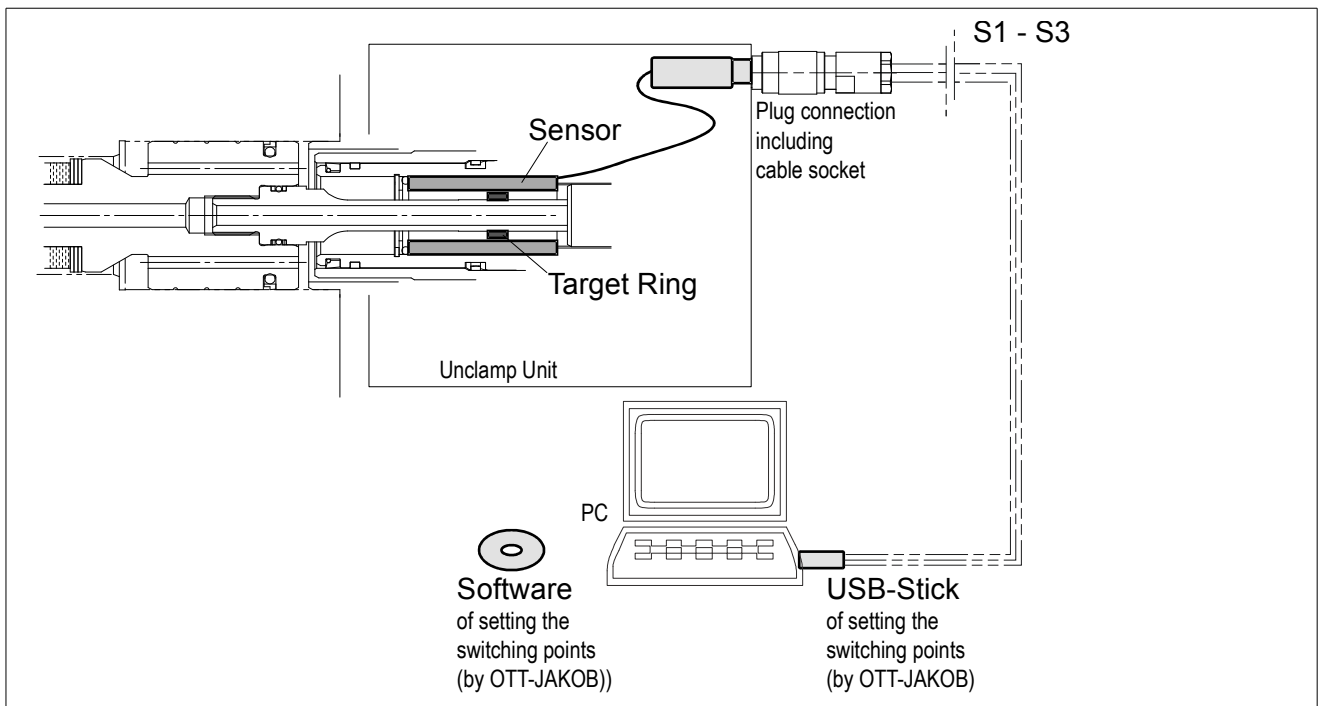
4 DIGITAL SIGNAL ANALYSIS

Option

The sensor electronic may transmit digital switching points (S1 - S3) when the corresponding cabling has been installed (→ # 3.2.3 // ☞ 10) This also requires:

- our USB stick for setting the switching points
- our software for setting the switching points
- a windows PC (with Windows XP and higher)

In order to receive digital signals, the switching points have to be set first: This is performed using our USB stick and the corresponding software. The software may be used to read the operating hours and cycles.



4.1 START-UP

4.1.1 Software installation

System requirements::

- a windows PC (with Windows XP and higher)
- CD drive (for software installation)
- USB interface (for our USB stick)

The software is delivered on the enclosed media.

▲ Installation is performed via the exe file. Observe instructions in the Windows user menu.

The program is installed. A program start symbol is created on the desktop. A directory is created in the start menu. OTT-JAKOB / INWEST. In addition, a driver for the USB stick is installed.

After successful installation:

- ▲ Connect INWEST-USB-Stick with the USB interface of the Windows PC.
- ▲ Start INWEST program
 - USB-connection ok appears in the status bar located on the bottom left corner of the screen

If the USB stick is not yet connected to or not connected correctly to the PC, the status bar displays the message USB connect error, push the refresh button. The program will retry to connect to the USB stick.

The installation is now completed.

4.1.2 LEDs on the stick

- LED 1 (cable side): Sensor voltage supply
only shines if the supply voltage for the sensor is provided by the PC
- LED 2 (USB side): USB driver
only shines correctly if the driver was installed properly; if the light intensity is reduced, the installation process must be repeated once more.

4.1.3 Program interface

The screenshot shows the 'Inwest Configurator' software interface. It is divided into several sections:

- Device information:** A list of parameters including A1 (5.00 mA), A2 (5.50 mA), A3 (7.46 mA), and A4 (8.02 mA). Other fields include Operating hours (48 h), Cycles (60), Sensor serial number (Error), Electronic serial number (Error), Adapter version (0306), and Adapter serial number (020003).
- Configuration:** A central area titled 'Set thresholds A1-A4' showing a schematic diagram of a sensor with four threshold points (A1, A2, A3, A4) and arrows indicating 'max.' and 'min.' settings.
- Sensor signal:** A vertical scale from 0 mA to 20 mA. A red horizontal line indicates the current output signal at 12.36 mA. A legend shows three colored circles (green, yellow, red) corresponding to thresholds A1, A2, and A3.
- Manual Input:** A section with an 'Enable' checkbox and a fine adjustment knob.
- Buttons:** 'Refresh' (under USB connection), 'Start', and 'Save value and continue'.

Annotations on the image point to the following features:

- Instructions for the individual steps of the setting process:** Points to the top of the configuration area.
- Device parameter display:** Points to the 'Device information' section.
- USB interface activation and information:** Points to the 'USB connection' section.
- Program start:** Points to the 'Start' button.
- Program steps:** Points to the 'Save value and continue' button.
- Target ring position display:** Points to the 'Sensor signal' scale.
- Switching conditions display:** Points to the legend for thresholds A1, A2, and A3.
- Signal fine adjustment:** Points to the 'Manual Input' section.

4.2 SWITCHING POINT SETTING



- Setting of limit values A1 to A4 must be performed individually for every tool spindle.
- This setting process has to be repeated after exchanging the clamp set!

- ▲ Connect sensor electronics to PC: Connect INWEST-USB-Stick with the USB interface of the Windows PC.
- ▲ Start INWEST program
The status bar on the lower left corner displays "USB connection ok - sensor connection ok"
- ▲ Press start

- ▲ Position tool in **clamped without tool**
- ▲ Press Save position **A1**

- ▲ Position tool in **clamped with maximum admissible tool**.
Use a corresponding reference tool for this.
Our recommendation: Use **Power-Check** with the corresponding setting.
- ▲ Press Save position **A2**

- ▲ Position tool in **clamped with minimum admissible tool**.
Use reference tool. Our recommendation: **Power-Check**
- ▲ Press Save position **A3**

- ▲ Position tool in **tool unclamped**
- ▲ Press Save position **A4**

- ▲ The values are displayed under the graphics. The program checks the plausibility of the values (A correct setting will result in increasing values from A1 to A4).
- ▲ Press **Save values** in order to accept the values:
the values are accepted and displayed in the **Device** information column

Done! The USB connection can now be interrupted and connected with the next unclamp unit Press the refresh button again if a new setting is required.

4.3 SIGNAL FINE ADJUSTMENT

Certain reasons may require a correction of the values. This may be performed via Manual Input.

- ▲ Press start
- ▲ Push Enable if the displayed value should be changed.
- ▲ Increase the value with +, decrease with -
- ▲ Confirm the value with Save Position

4.4 EVALUATION

The program links the trigger points and sets the outputs S1 - S3.

Only "S1" is active if the value has fallen below limit "A1" (clamped without tool).

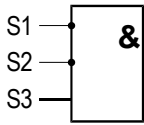
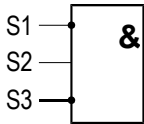
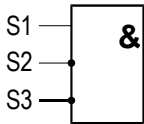
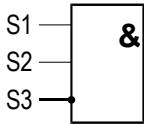
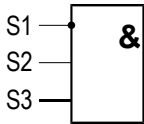
"S1" and "S2" are active in the transient area between "A1" and "A2".

Only "S2" is active in the range between "A2" and "A3" (clamped with tool).

"S2" and "S3" are active in the transient area between "A3" and "A4".

Only "S3" is active if "A4" is exceeded (tool released).

Evaluation examples:

Tool released		<input type="radio"/> S1 <input type="radio"/> S2 Tool released <input checked="" type="radio"/> S3
Tool clamped		<input type="radio"/> S1 <input checked="" type="radio"/> S2 Clamped with tool <input type="radio"/> S3
Clamped without tool		<input checked="" type="radio"/> S1 <input type="radio"/> S2 Clamped without tool <input type="radio"/> S3
Interference: clamped without and with tool: failure		<input checked="" type="radio"/> S1 <input checked="" type="radio"/> S2 Undefined state <input type="radio"/> S3
Interference: tool clamped and tool released: failure*		<input type="radio"/> S1 <input checked="" type="radio"/> S2 Undefined state <input checked="" type="radio"/> S3

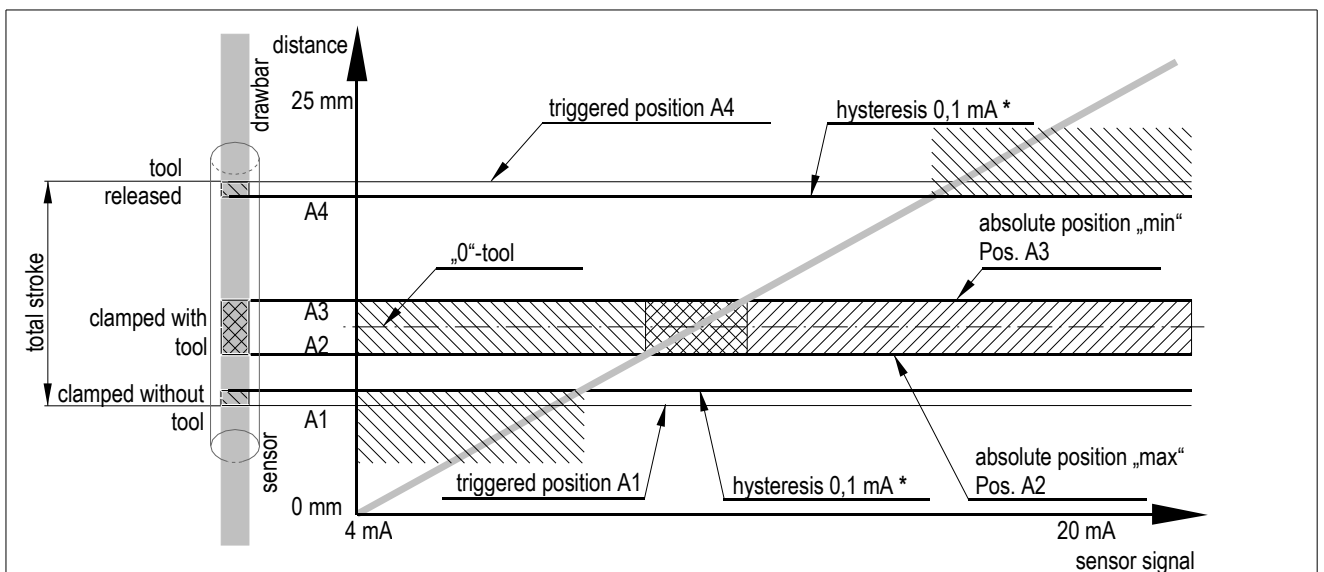
* During the working stroke the outputs S2 and S3 are briefly set!

Failure		<ul style="list-style-type: none"> ● S1 ● S2 Range error ● S3
not ready for operation		<ul style="list-style-type: none"> ○ S1 ○ S2 Range error ○ S3

● 24 V - signal

○ 0 V - signal

Position and trigger points



* The limits are exactly adjusted. A hysteresis of 0,1 mA (equals approx. 0,09 mm at a measuring range of 15 mm and 0,15 mm at a measuring range of 25 mm) accounts for existing tolerances e.g. thermal expansions. However, this hysteresis is programmed only for the positions "tool released" and "clamped without tool". No additional tolerance has to be considered!