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Test Rig

for Analog and Switching Distance Sensors

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0. Safety Procedures

Before opening the machine (e.g. when changing components) the mains plug must be disconnected.

By-passing the cover is not permitted. Safety switches should not be by-passed. The high voltage generated in the sorting machine will be turned off if the load current is too heavy (15 mA). For testing purposes it is located on the outside of the sensor housing against the appliance body.

There is a maximum of 80 V / 2A DC or 300 V / 1.0 A AC applied to the test sockets for the sensors.

The machine is intended for constant use in dry areas. The electronic loads are turned off when the cooling unit temperature reaches 80°C.

Operation in damp surroundings is not permitted.

Improper editing of input and parameter files other than the operating programs supplied with the machine can cause serious damage to hardware and incorrect test results and is therefore not permitted.

Routine for start-up and shut-down:

- Turn on the PC
- Turn on the sorting machine
- Open the control program (see 2.1. Starting the program)

Shut-down of the sorting area takes place in the reverse order!

- Exit the program
- Turn off the sorting machine
- Turn off the PC

If this routine is not followed, the control program must be called and exited once with the sorting machine turned off before operation of the sorting machine is resumed, in order to reset all PC outputs.

After activating the EMERGENCY OFF button the whole test station must be turned off and the testing program must be exited.

During calibration the light grid (or door) is inactive. Calibration may only be carried out by properly trained and authorized personnel.

1. General Remarks

The test rig for distance sensors consists of a PC, a mechanical displacement unit based on ISEL linear axes with test specimen and nominal cam switch adapter and the sorting machine in 19'' technology. A printer is included for printing the test protocols.

Software and hardware are modular, so that expansion and adaptation to future testing tasks can take place without problem.

A PC INTEL PENTIUM, expanded with slot cards for A/D conversion and for reading in digital signals, is used as the control computer.

The test rig for distance sensors permits the complex testing of distance sensors in relation to the following relevant parameters:

- Insulation resistance
- Distance performance (switching point and hysteresis)
- Input current
- Load performance
- Polarity reversal
- Protective ground terminal
- Short circuit check
- Residual current check

2. Operating Instructions

2.1. Opening and shutting down the control software

The test facility software starts automatically when the PC is turned on. It can be started manually using the icon "Sensor-Pruefplatz" ("Sensor test station"). The program is shut down via File and Quit or with Ctrl + Q.

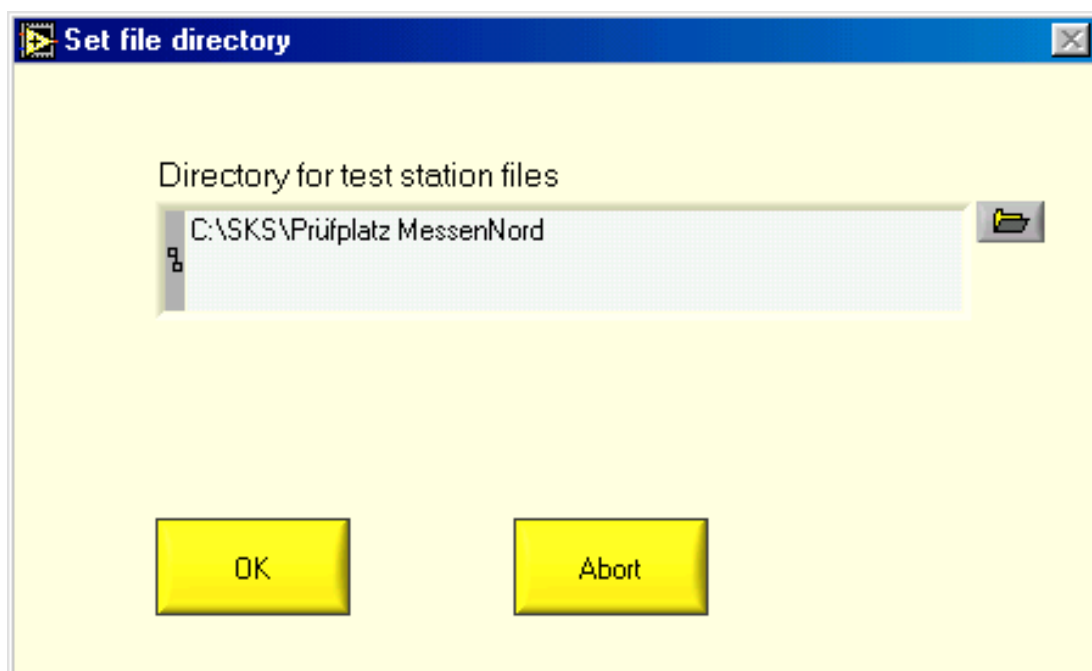
2.2. Menu and window control / Keyboard reference

The program package Testing Facilities Control operates within the quasi-standard set by WINDOWS for graphic user interfaces.

In accordance with this, the whole program can operate both by means of the keyboard and by means of the PC mouse. Every open window is treated as an independent object, whose position and size can be changed, and to whose elements the various program functions are assigned.

2.3. Working with files

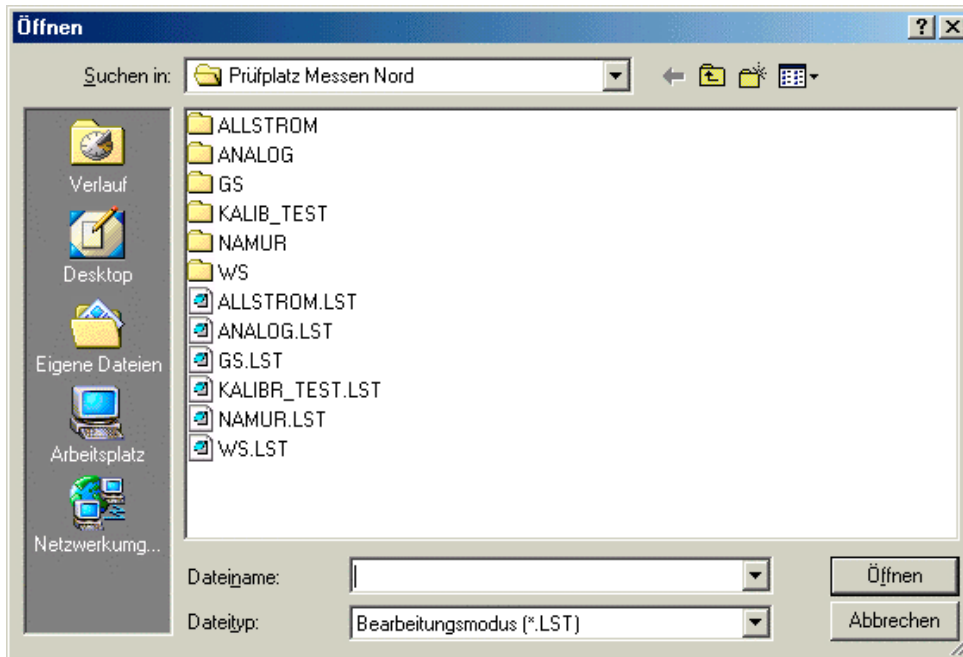
2.3.1. Creating a file directory



All test station files (such as: sensor parameter files, configuration file, protocol files) are located in this directory.

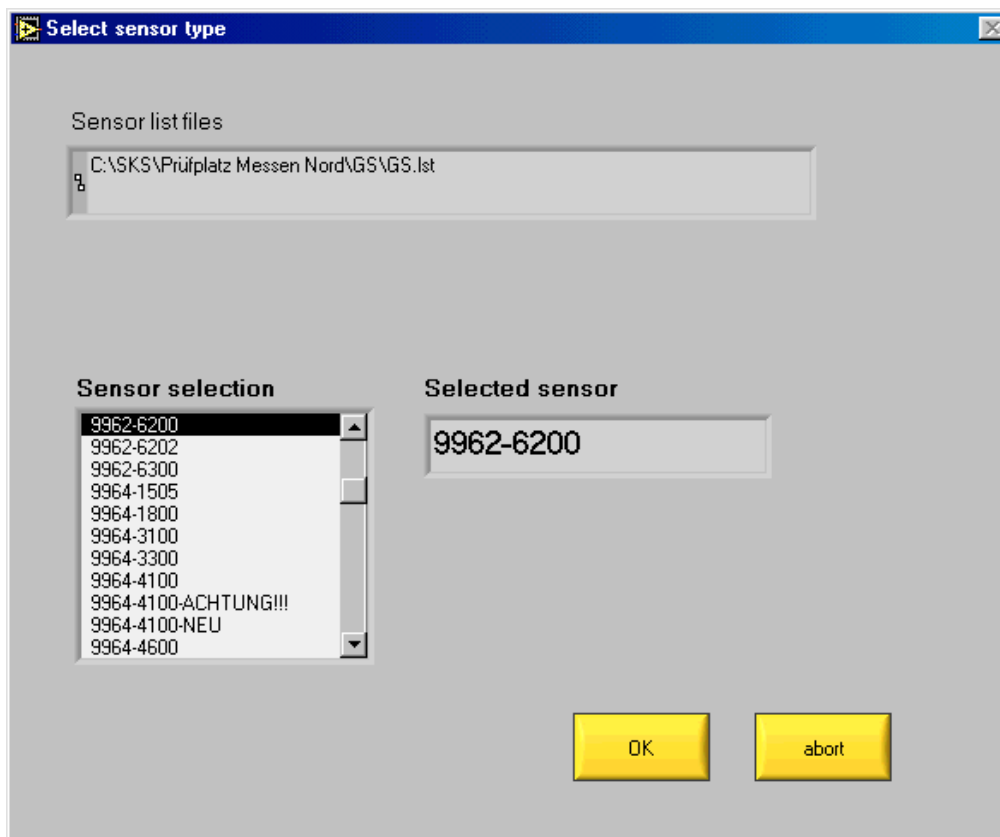
When the file directory is changed, all test facility files must be moved to the new file directory beforehand.

2.3.2. Loading the sensor type



The sensors are structured according to their types.

To select a sensor type, highlight the corresponding .LST file (e.g. GS.LST) and then open it. After opening the .LST file the desired sensor can be selected from the following dialog field.



After "Select sensor type" the initial state is automatically assumed.

2.4. Execution of the test program

2.4.1. Test modes available

Two methods are available for carrying out the sensor test:

a) Automatic

In this test mode the steps of the test are worked through without interruption to the end of the program, or until a sensor error occurs (test not passed) and the option "Interrupt in case of error" is selected (see 2.5.1.).

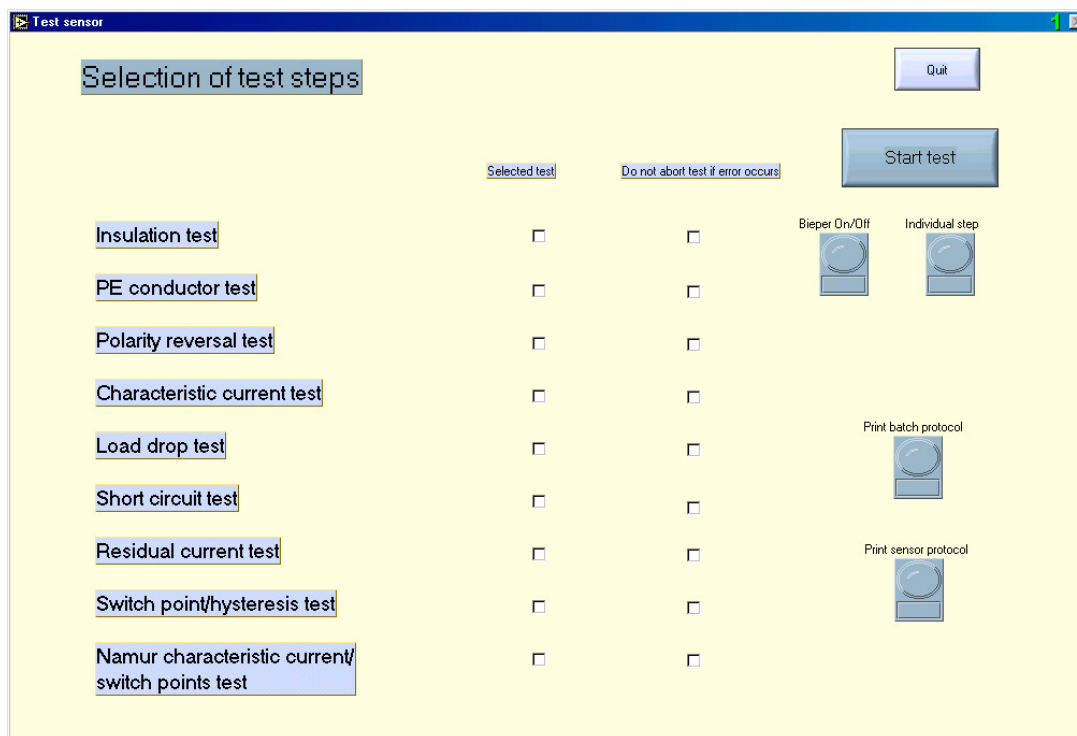
For every sensor tested a protocol can be printed, if the corresponding function is activated.

b) SINGLE STEP

The test program is interrupted after each step of the test and can be continued by pressing the START button; otherwise it works the same way as **a)** above. This method permits manual control of the values measured by the test station.

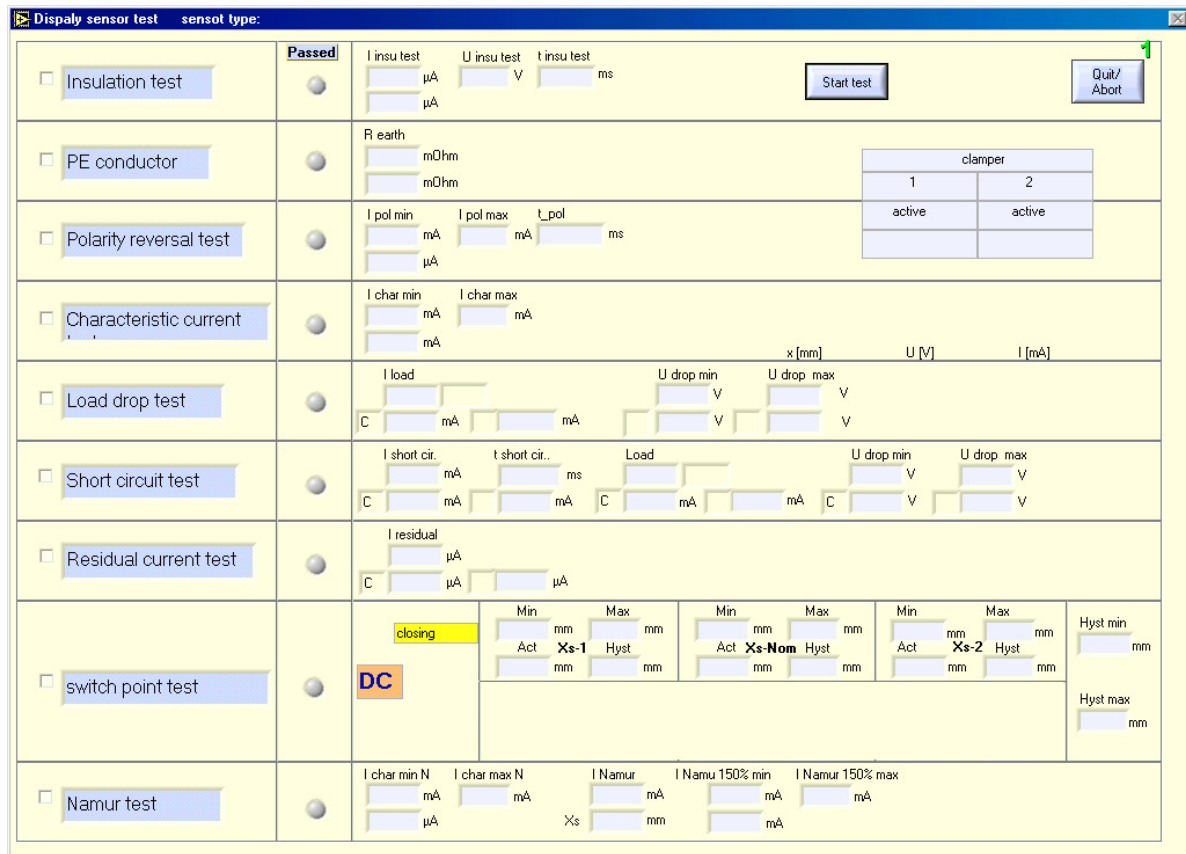
2.4.2. Test screen display and operating elements

Before the test is begun by means of "Start sensor test", the testing steps that will be carried out are displayed.

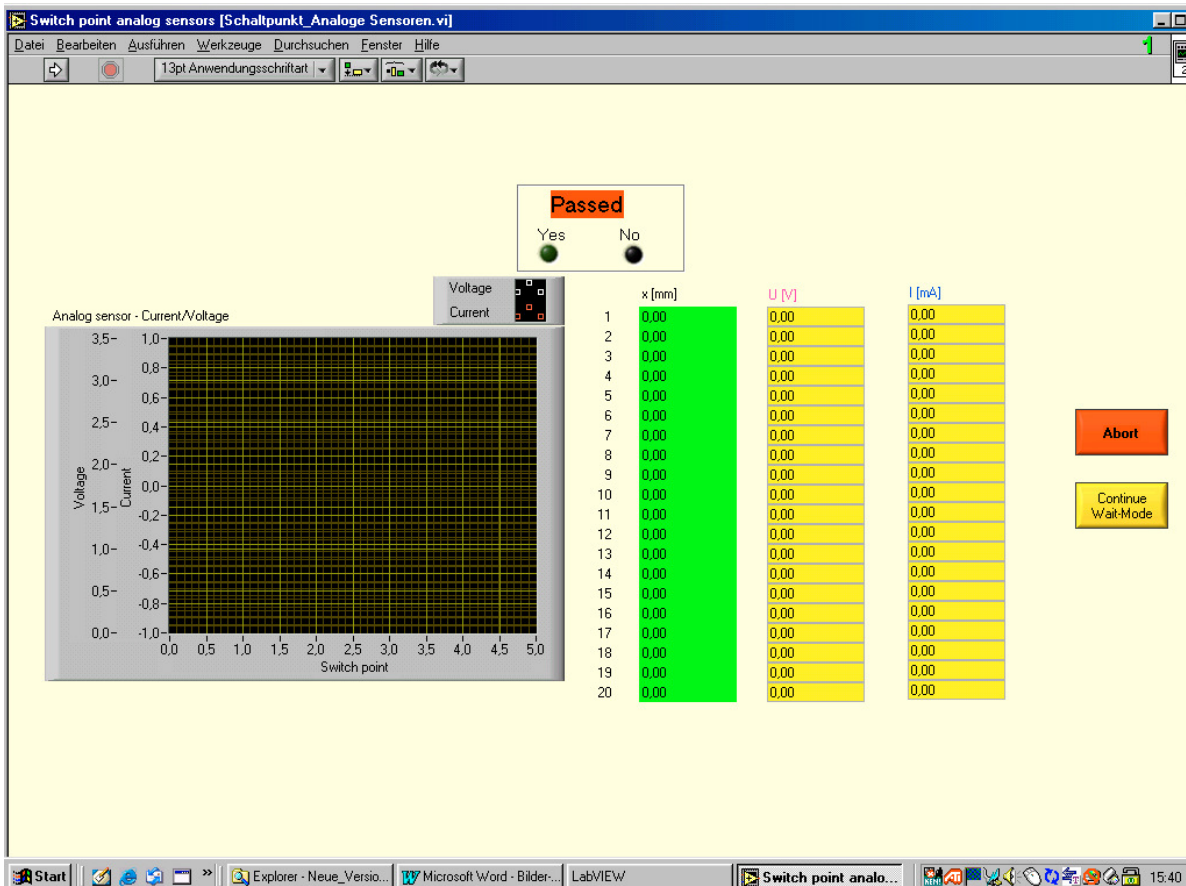


During the test the nominal value(s) and the measured values for each step of the test are displayed. After each step has finished, the result of that step is evaluated. After all the steps have been carried out, the result for the test specimen is given (Position 1 or 2).

While the test is running, the light grid (or door) of the position in use must not be interrupted. The activity of the position in use is marked with a red light in addition to the monitor display.



In the case of analog sensors, during switch point testing the following additional window appears:



2.4.3. Pointers for sensor adjustment

The zero point of the linear axle is set by the configuration file at a point before the maximum movement path.

The sensor is inserted into the holding device and pushed manually against the activating element. After the test has begun, the axle pushes the sensor back a little in the holder. The position it is then in is taken to be a distance of 0.0 mm. By means of this procedure, manual errors are excluded to the greatest possible extent.

2.5. Parameter and test program editor

You must enter the **password** requested at program start correctly in order to receive authorization to make changes to the parameter and test program.

If the user is not authorized to edit the parameters, the edit menu appears as a simple parameter view, so that the current sensor and test parameters and the sensor specifications can be determined.

2.5.1. Test parameters

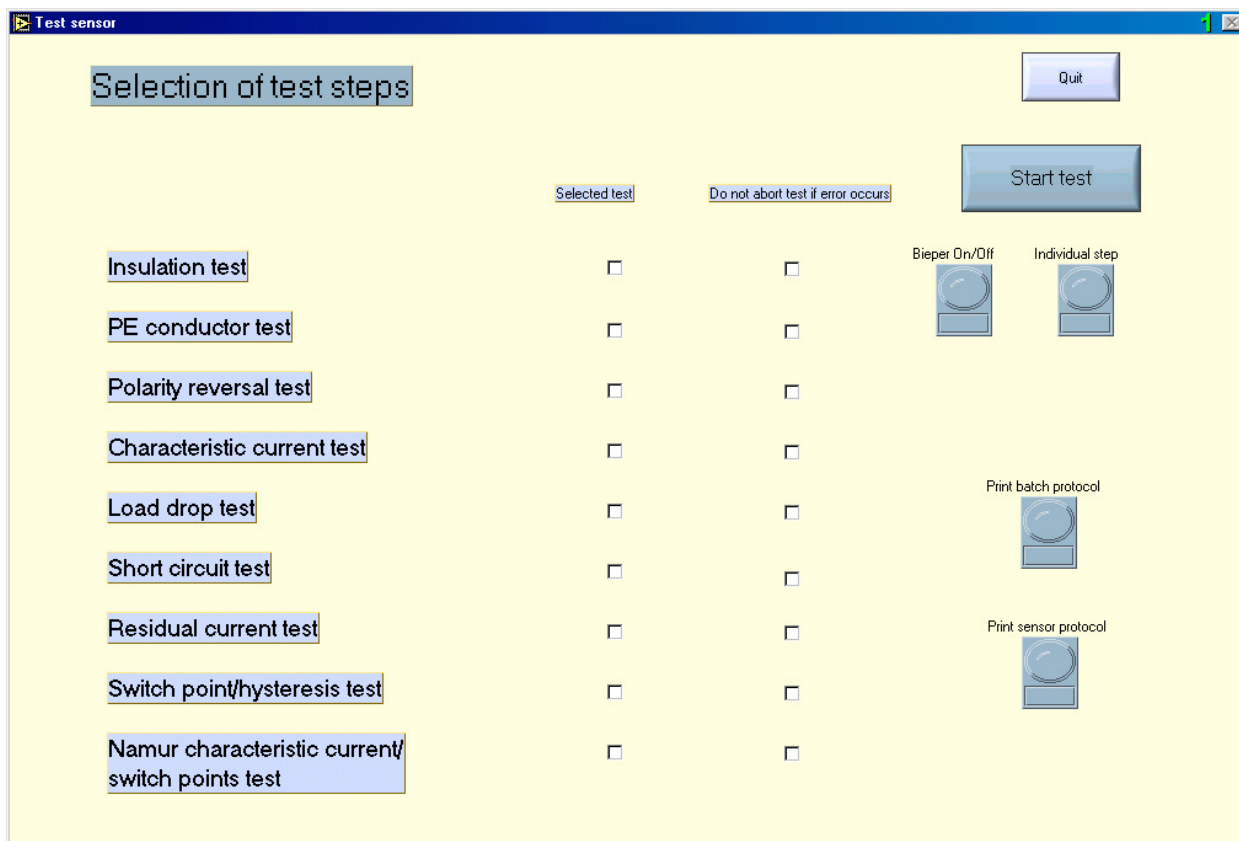
Clicking on “Edit sensor type” calls up Test Parameters.

After calling up this menu item, first the dialog fields for loading the sensor types and then the dialog field “Edit sensor type” appear.

Here either an old sensor type can be loaded and then edited, or a new sensor type can be edited, or a sensor type available can be deleted.

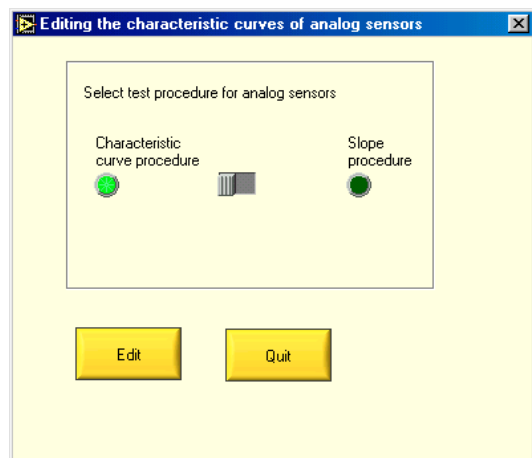
After the sensor type has been edited, it can be saved.

Depending on the sensor type (GS, WS, etc.) it will be saved in the assigned .LST. After activating the button "Save sensor type", the following dialog field will be called up for all sensor types for the editing of the test steps:

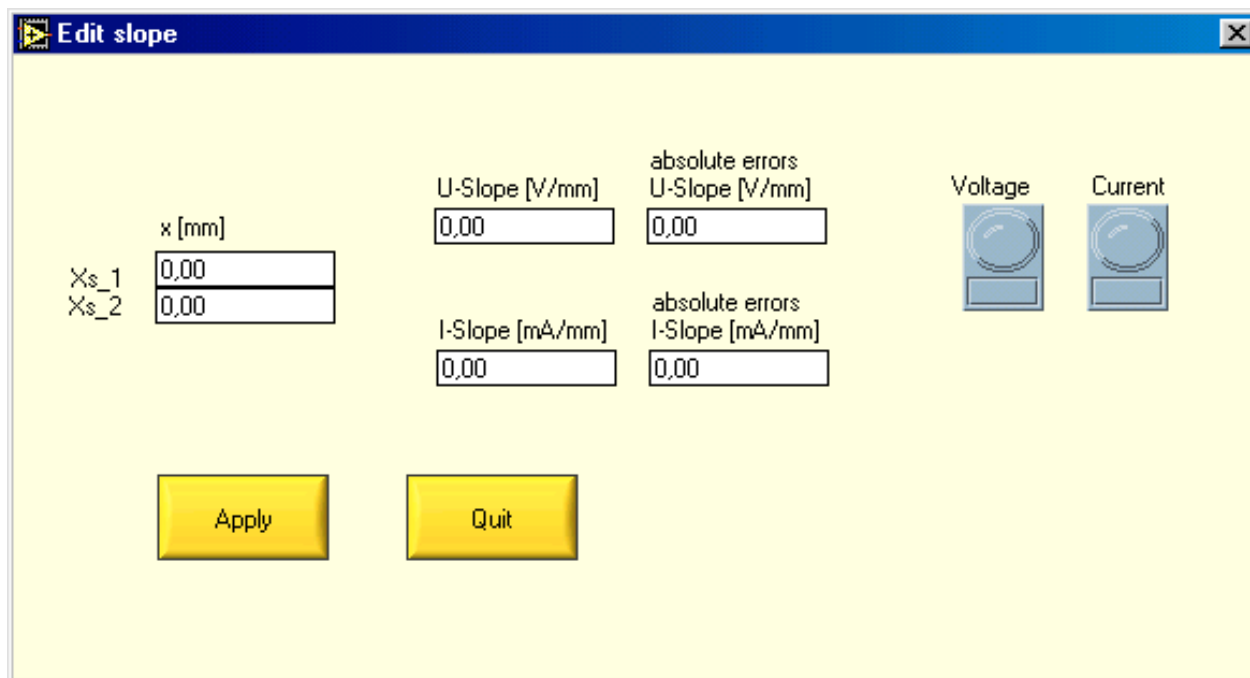


In addition the following dialog field will be called up for analog sensors:

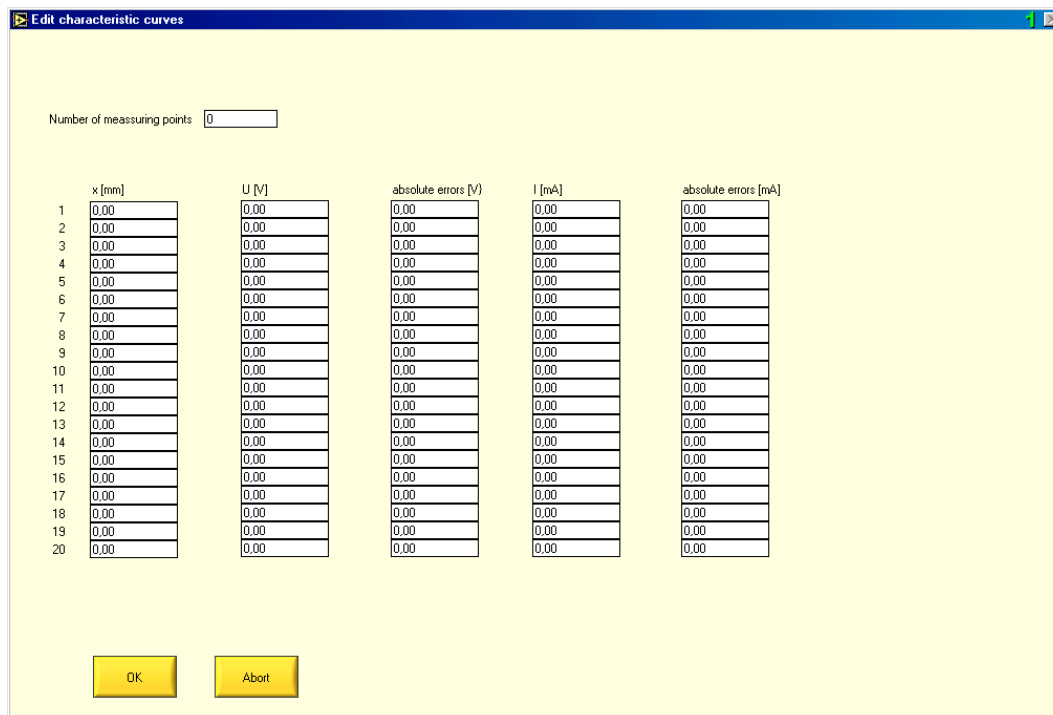
Here you can toggle between completely measuring the characteristic curve and checking the slope.



The slope is determined and measured between two points on the characteristic curve. The slope can be edited for current or voltage outputs.



By means of the characteristic curve editor, the U or I nominal value is inputted for the characteristic curve points to be checked plus the related absolute errors.



Sensors with U (0...10V), I (0...20mA) or both types of output can be tested simultaneously. The adapter for analog sensors should be used to connect analog sensors.

3. Nominal Values

3.1. List of item parameters

Item Parameters

Descriptor	Values range	Remarks
Sensor type	GS/ GS2/ WS/ WS2/ NAMUR / ANALOG/AC/DC	
Switch function	Closing contacts /break contacts / 2 closing contacts / Antivalence/ 2 break contacts	
Output type	NPN / PNP	
Distance measuring mode	20...1,000 paces/s	
Distance offset (mm)	0 .. 100.00 mm	
U-operation 1 (V)	4 .. 300 V (AC) bzw. 0 .. 80 V (DC)	corresponding sensor type
U-operation 2 (V)	ditto	
U-operation 3 (V)	ditto	
Load type I/R	R (Ohm) or I (mA)	
Load (Ohm/mA)	10..3,000 Ohm or 10..3,000 mA	depending on load type
Short circuit current (mA)	10 .. 2 000 mA	
Short circuit time (ms)	10 .. 10,000 ms	max. 10 s
Insulation voltage (V)	100 .. 2500 V AC	
Insulation time (ms)	10 .. 10,000 ms	max. 10 s
Polarity reversal time (ms)	10 .. 10,000 ms	
Switch spacing 1 (mm)	0 .. 240 mm MIN / MAX	Vorzugsbel. S1 < S2
Switch spacing 2 (mm)	0 .. 240 mm MIN / MAX	
Switch spacing 3 (mm)	0 .. 240 mm MIN / MAX	
Hysteresis (mm)	0 .. 240 mm MIN / MAX	
Voltage drop (V)	0 .. 300 V MIN / MAX	AC \pm 0,5 V / DC \pm 0,05 V
Characteristic current (mA)	0 .. 2,000 mA MIN / MAX	\pm 20 μ A
Polarity reversal current (mA)	0 .. 20 mA MIN / MAX	\pm 20 μ A
Namur current 150% (mA)	0 .. 1,000 mA MIN / MAX	\pm 20 μ A
Namur current (mA)	1.0000 .. 2,000 mA	\pm 20 μ A
Residual current (μ A)	0 .. 10,000 μ A	max. 10 mA
Insulation current (μ A)	0 .. 10,000 μ A	\pm 2,5 μ A
Earth resistance (Ohm)	0 .. 0.4 Ohm	\pm 5 mOhm
Switch point (mm)	0 .. 240 mm	
Calibration measurement mode	20...1,000 paces/s	optional
Target on GND	yes / no	manual