User manual

TESA-MODUL

TESA-BUS modules for TESA display units



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1 INTRODUCTION

1.1 Acknowledgements

Dear user,
TESA thanks you very much for selecting us as your metrology partner. We are very proud of the confidence you have placed in us by purchasing a TESA-BUS module for TESA display units.
Because your metrological concerns are also ours, we are confident that this instrument will meet your expectations because we are committed to developing solutions tailored to your requirements.
The result? Your satisfaction throughout many years. Our pleasure? Knowing that our products help you resolve effectively, quickly and in the long term, the constraints and problems that emerge from your research, development or production.
The entire TESA team would like to welcome you to the large family of TESA product users.

The TESA team

1.2 Caution

This manual must be read in its entirety by all technicians or operators before any installation, maintenance or use of the instrument. Failure to comply with certain rules of use could result in the malfunction of the instrument or even damage to it.

1.3 Copyright (document)

The contents of this document are subject to change without notice. All rights reserved.

The French language version serves as the reference. All other language versions are translations only.

1.4 Preamble

The TESA-MODUL range permits multiple connection configurations for TESA display units via the TESA-BUS port.
These modules enable different sensors and signals to be interfaced in order to automate the measurement process.

The TESA-BUS lets the sensors be moved away (i.e. remote) from the display unit without loss of signal with simplified wiring.

The modules have robust aluminium housings suitable for use in harsh industrial environments.
Quick and easy DIN rail integration.

1.5 Symbols

Several different types of symbols are used in this document. They indicate important information to take into account for correct use of the measuring instrument.

Location	Description
	Failure to follow this information may result in an incorrect measurement result.
	Corresponds to aids for better use.

2 INSTALLATION, SAFETY AND MAINTENANCE

2.1 Cleaning

Use a dry, lint-free cloth only to clean the module. Do not use aggressive solvents.

2.2 Unauthorised intervention on the device

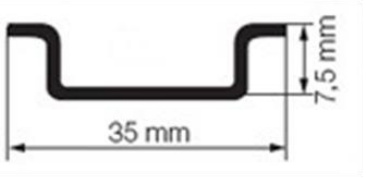
The warranty period is automatically invalidated if the device is opened by an unauthorised person.

2.3 Recycling

Do not dispose of this type of equipment in household waste. Follow the regulations for end-of-life electronic equipment.

2.4 DIN mounting rail

TESA-MODULs are suitable for mounting on standard DIN rails with a width of 35 mm and a height of 7.5 mm.
It is recommended to use DIN rail mounting to ensure proper mounting.





3 CONNECTION A MODULE

3.1 Limitations

The limitation of connections is dictated by the number of inputs.
A TESA-MODUL uses a different number of inputs depending on the type of module.

A TESA-MODUL for the connection of instruments that have 4 probe inputs uses 4 inputs (e.g. TESA-MODUL HB-4A).

The TESA-MODUL IO-8 has 8 digital inputs, but counts as 1 input.

Display unit	Measurement screen	Connections	TESA-MODUL
TWIN-T20 nano	Max. 2 measurements	**Max. 6 inputs:** • 2x DIN 45322 • 2x USB • 2x TESA-BUS	Max. 4 TESA-MODUL
TWIN-T40	Max. 4 measurements	**Max. 12 inputs:** • 4x DIN 45322 • 4x USB • 4x TESA-BUS	Max. 6 TESA-MODUL
TT100	Max. 32 measurements	Max. 99 inputs	Depending on the number of channels of the TESA-MODUL connected

3.2 Cabling

The connection is made via a standard D-Sub 9p/f to D-Sub 9p/m cable (TESA item no. 04761052).



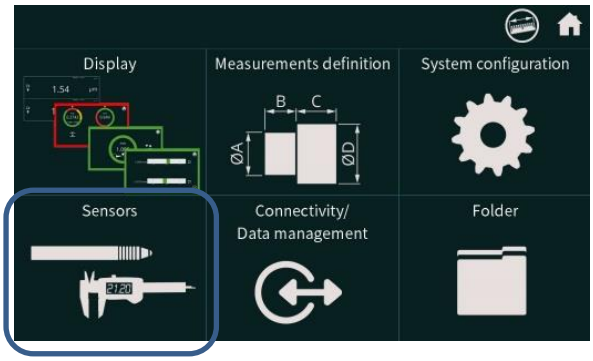
3.3 Adding a module

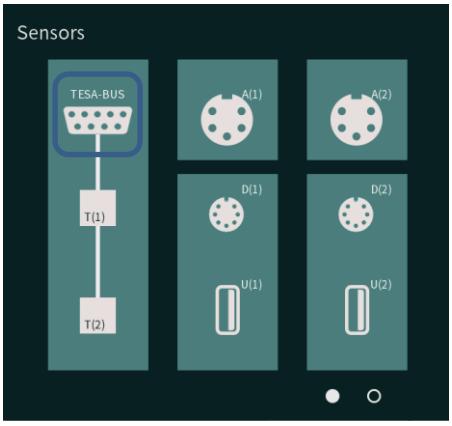
All TESA-MODULs are connected according to the following procedure:

1. Connect the module via the TESA-BUS connector using a D-Sub 9p/f to D-Sub 9p/m cable (04761052). The LED on the module flashes.

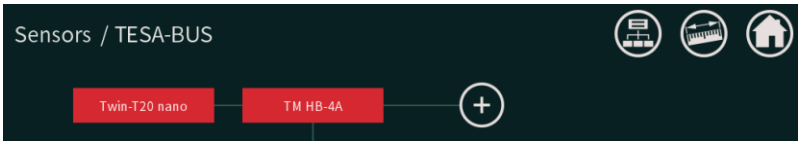


2. Enter the “Sensors” menu. Press the “TESA-BUS” connector.





3. Press the “+” button displayed to the right of the box with the display name. Confirm with “Yes” in the window that opens to add a module.



4. Press the “Id” button on the front of the TESA-MODUL to be added to your configuration.



5. The newly added module now appears on the display (box TM X.X).
The LED of the module is now permanently lit.

In order to connect more than one module, please use the D-Sub 9p connection on the side of the module for series connection.

3.4 Deleting a module

On the “TESA-BUS” menu, press the box with the name of the module to be deleted. Once the window is open, press “Delete”.

3.5 Troubleshooting

If a module does not respond, the LED flashes. A red exclamation mark appears in the “Sensors” window on the T(x) display unit of the unresponsive module.
Please restart the display unit and check the connection of the module to the display unit.
If the module still does not respond, please delete it and repeat the procedure for adding a module.

4 TESA-MODUL IOSUB

4.1 Introduction

The TESA-MODUL IOSUB is used to connect the output classification Good, Reject, Rework to a PLC, for example.

The TESA-MODUL IOSUB is designed for downwards compatibility with applications connected to the D-Sub 15p/f connector of the earlier TESATRONIC TT20 and TT60.

The wiring diagram of the module is identical to the earlier D-Sub 15p/f connector connection of the earlier TESATRONICs. No changes are required to the existing installation.

Only the analogue output available on the TESATRONIC TT60 is not available with this module.



4.2 Specifications

Item no.	04130300
Dimensions	Width 82 mm, height 41 mm, depth 77 mm

D-Sub 15-pin female connector:

Terminal	**Signal**
1	Strobe
2	DATA
3	CLOCK
4	Relay contact classification: Rework, yellow LED
5	Relay contact classification: Reject, red LED
6	Output +5 V DC (max. 100 mA)
7	GND return for R-M (Reset-Measure)
8	Analogue earth
9	Digital earth
10	Not occupied
11	Common point of the 3 relays
12	Digital earth
13	Relay contact classification: Good, green LED
14	R-M (Reset-Measure) control input
15	Not used

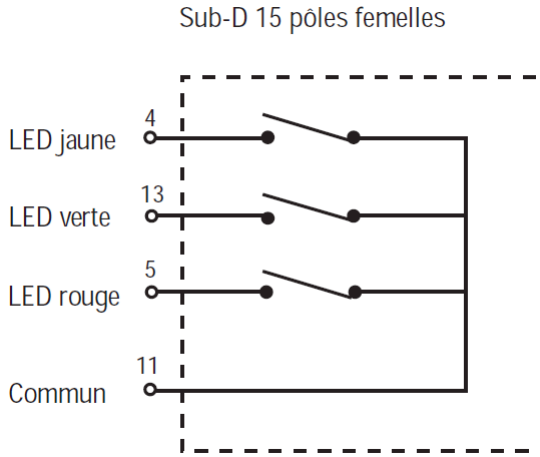
The TESA-MODUL IOSUB must be connected alone on the TESA-BUS (without any other TESA-MODUL) to avoid errors in reading the information from the TWIN-TESATRONIC.

The TESA-MODUL IOSUB works only with the result given by Measurement 1 in Sequence 1.
Measurement 2 and Sequence 2 cannot be used on this module. This is to reproduce the same operation as the earlier TESATRONIC TT20/TT60.

4.3 Output classification schematic

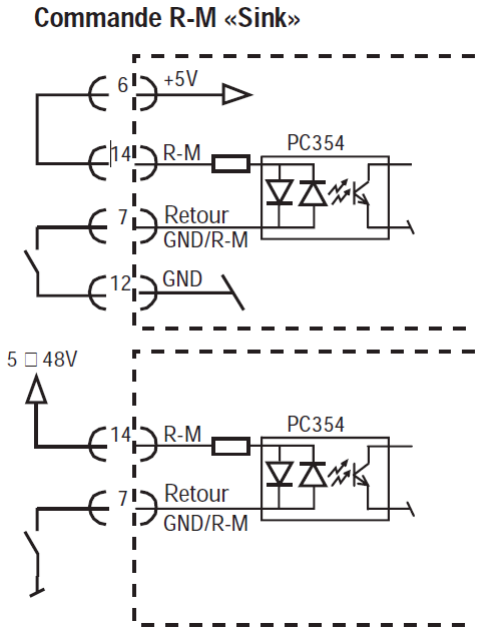
To enable the connection of all the different types of PLC, the output classification Good, Reject, Rework is made on the relay contacts. This allows a connection to either Vcc (internal or external) or to GND.

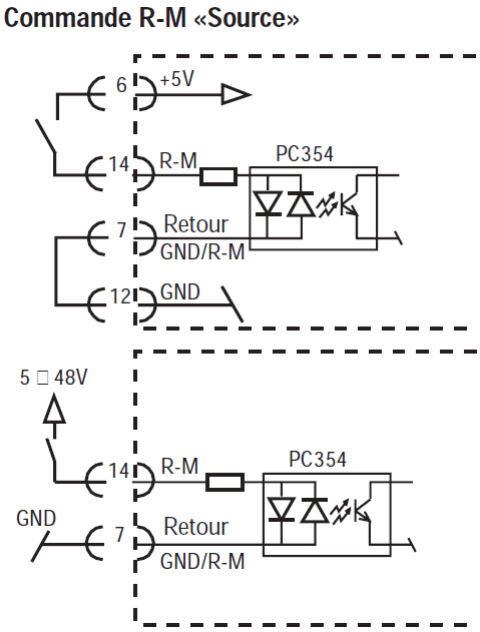
Vcc max. 50 V
Imax = 2 A



4.4 Connection diagram for the R-M (Reset-Measure) control input

The R-M (Reset-Measure) command, which is on the 15-pin female connector, allows the instrument to be controlled from a PLC. This R-M (Reset-Measure) command has the same function as the “Transfert” button.
As for the output classification relay, this command is provided as standard to connect PLCs to either Vcc or to GND.

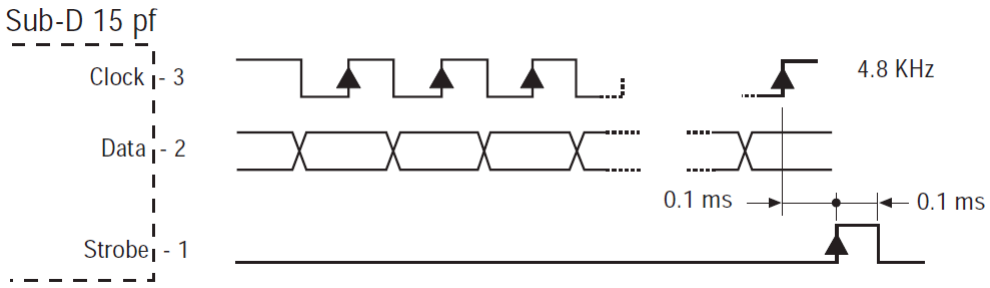




4.5 Output classification

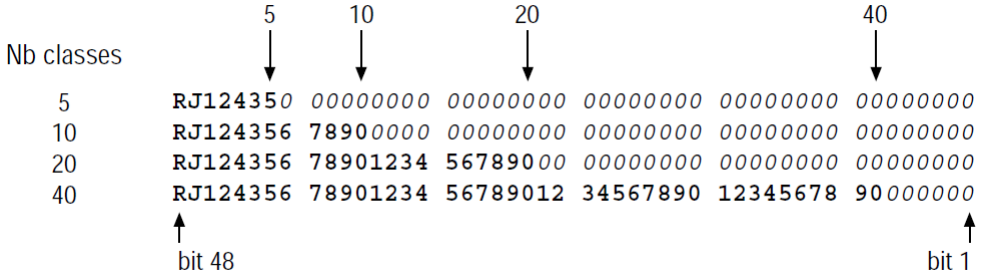
In addition to the optical classification system “Good” (green), “Rework” (yellow), “Reject” (red) with the respective internal relay output signals, the IOSUB module allows the classification outputs of the TWIN-T20/TWIN-T40 display (from 1 to 16 depending on the display unit).
The operation is identical to the TT60 with the difference that the sorting terminals can now be defined (fixed on the TT60).

Form of the output signals:



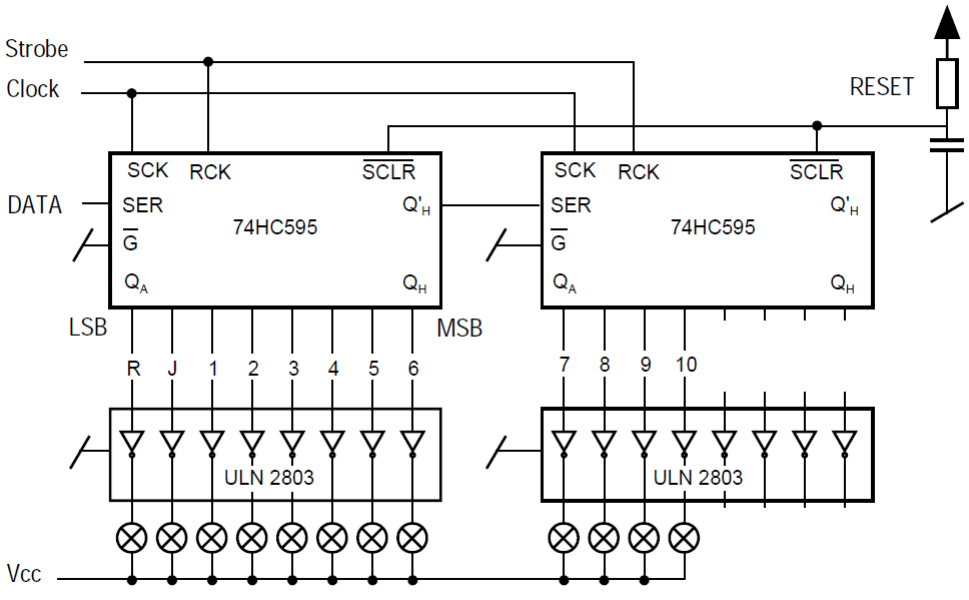
4.6 Data format for the different class types

The data is always sent in 48-bit words, regardless of the number of classes selected.
The transfer takes the following form: first, the bits are set to zero, the X classes “Good” (green),
“Rework” (yellow) and “Scrap” (red).



4.7 Example of a circuit

Circuit type, shift register type 74HC595 – Number of selected classes = 10.
The bit of the corresponding class changes from 0 to 1.



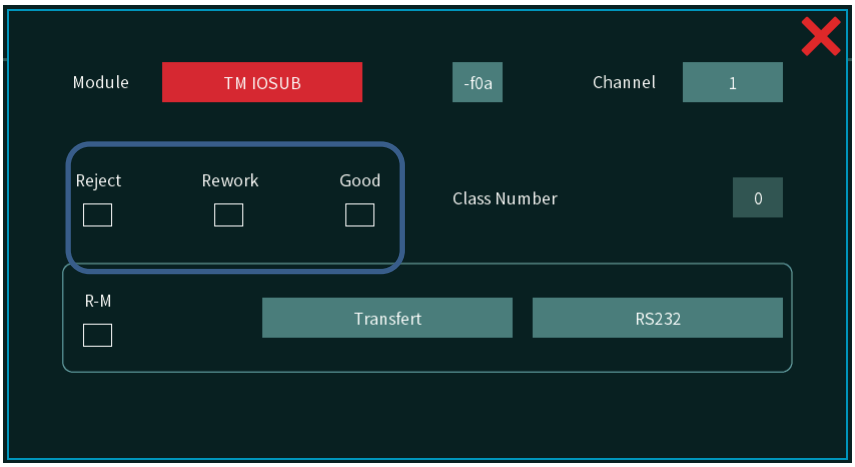
4.8 Simulation of the output classifications

The output classifications can be activated manually via the display unit connected to the modules.

1. Access the “Sensors” menu. Press the “TESA-BUS” connector.

2. Click on the TM X.X box under the box with the designation TM IOSUB.

3. Press one of the following outputs to activate it:
   - “Reject” (red), terminal 5
   - “Rework” (yellow), terminal 4
   - “Good” (green), terminal 13



5 TESA-MODUL IO-8

5.1 Introduction

The TESA-MODUL IO-8 is equipped with 8 opto-coupler-isolated digital inputs and outputs for interfacing automation components to TESA display units.

The intuitive assignment of the actions of each channel via the TESA display allows the definition of automation sequences, depending on the inputs and the results on the TESA display.
Each terminal is freely assignable in input or output mode:

This module allows the automation of measurements by acquiring information from a PLC (input mode), for example.

The functions in output mode allow a measurement result to be displayed on a light signal, for example.

⚠ Up to 4 TESA-MODUL IO-8 can be connected to a TESA display.



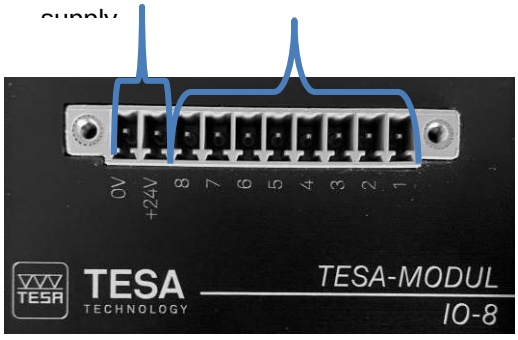
5.2 Specifications

Item no.	04130301
Dimensions	Width 82 mm, height 41 mm, depth 77 mm

The 8 terminals correspond to opto-coupler-isolated digital inputs and outputs.
The outputs are equivalent to the “PNP open collector” type and can be used with an external DC power supply from 12 to maximum 30 volts.
The maximum current drawn by each output is **30 mA**.
The inputs represent a 2.2 kohm load connected to 0 volts.

12–30 V DC power supply

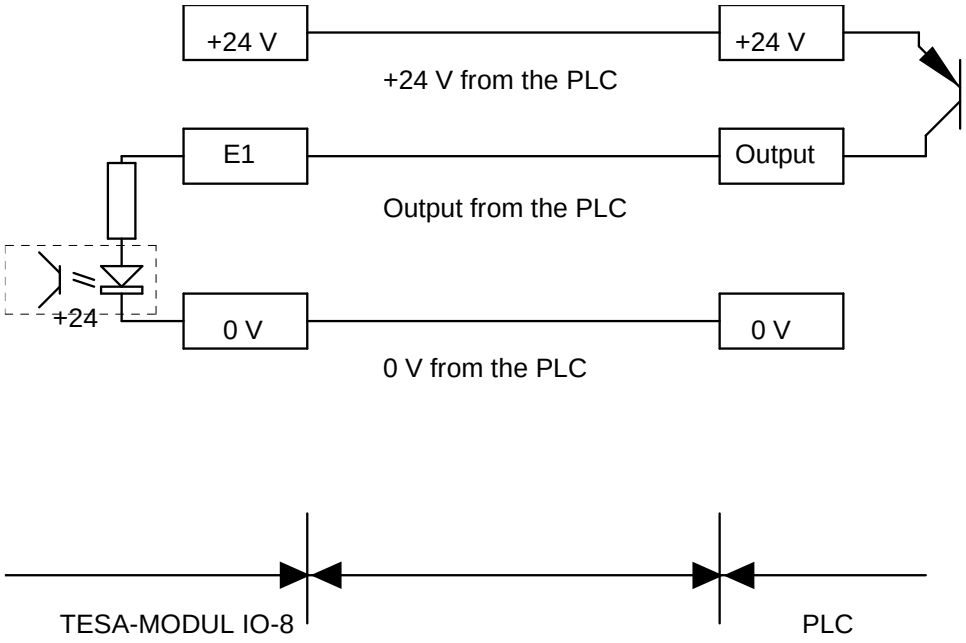
Terminals 1 to 8
Assignment according to function allocation



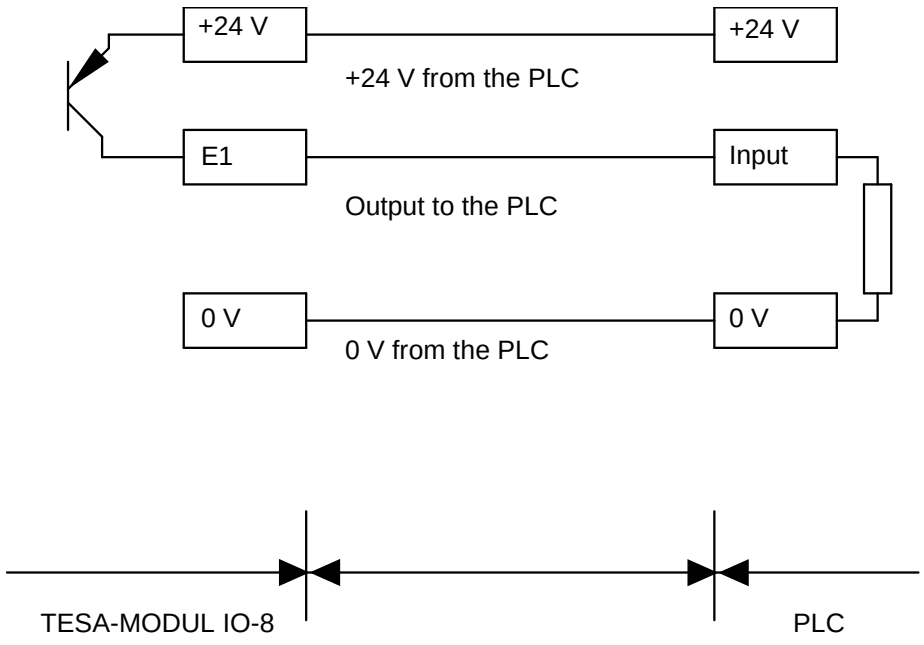
5.3 Connection diagram to a PLC

The following diagram is an example of a connection between a TESA-MODUL IO-8 and a PLC.

Module in input mode Receiving a signal from a PLC



Module in output mode Signal transmission to a PLC



5.4 Assigning functions to the terminals

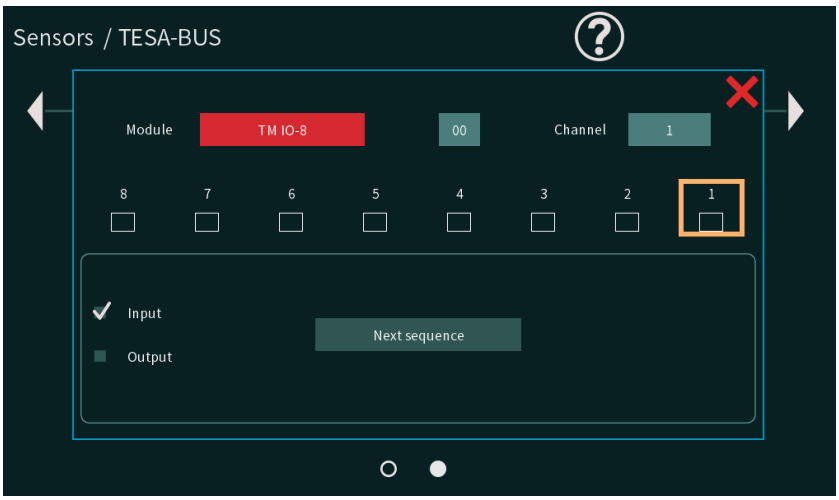
The assignment of functions to terminals 1 to 8 is carried out via the display unit connected to the modules.

1. Access the “Sensors” menu. Press the “TESA-BUS” connector.
2. Click on the TM X.X box below the box with the designation TM IO-8.
3. Select the terminal for which the function is to be assigned (Terminal 1 in the example below)
4. Select “Input” or “Output” according to the required function
5. List of functions:

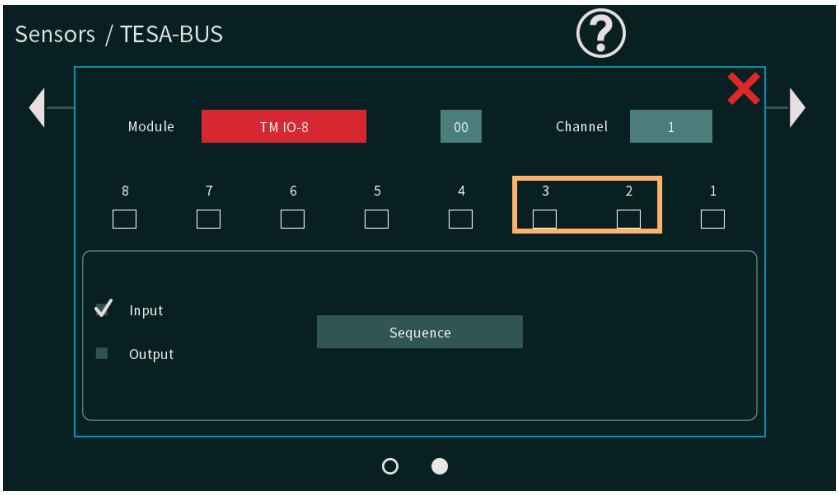
Function	Mode	Description
Next sequence	**Input**	Action to move to the next sequence
Transfert	**Input**	Action for data transfer according to the data transfer setting of the display unit
Init. Dyn	**Input**	Action to initialise the value of dynamic mode
Zero	**Input**	Action to zero the display unit
Zero Clear (removes calibration)	**Input**	Action of deleting the calibration or setting the probe to raw value.
Calibration	**Input**	Action to set the displayed measurements to the standard value
Sequence	**Input**	Activation of the selected sequence (2 terminal reserve, binary counting)
Part	**Input**	Activation of the selected part (2 terminal reserve, binary counting)
Sequence OK	**Output**	Activation of the terminal if the result of the sequence is within the tolerances
Dimension OK	**Output**	Activation of the terminal if the selected measurement is within the tolerances. Choose the measurement if several are available,
Class number of the measurement	**Output**	Activation of the terminals according to the active class number of the measurement. Choose the measurement if several are available, 4 terminal reserve for the TWIN-T20 5 terminal reserve for the TWIN-T40. Select the upper terminal, making sure that the 3 lower terminals are free, binary counting)

Corresponding bit number:

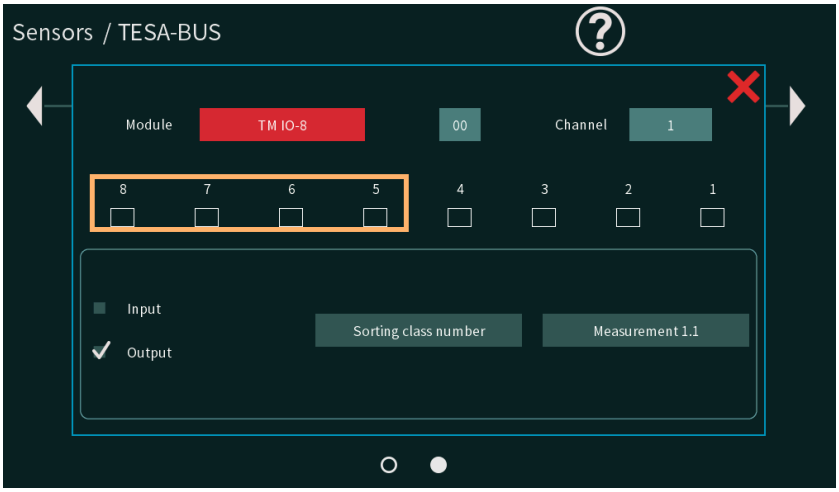
Bit number	**5**	**4**	**3**	**2**	**1**		**Bit number**	**5**	**4**	**3**	**2**	**1**
Value (decimal)	**Value (binary)**						**Value (decimal)**	**Value (binary)**				
1	**0**	**0**	**0**	**0**	**1**		**9**	**0**	**1**	**0**	**0**	**0**
2	**0**	**0**	**0**	**1**	**0**		**10**	**0**	**1**	**0**	**0**	**1**
3	**0**	**0**	**0**	**1**	**1**		**11**	**0**	**1**	**0**	**1**	**0**
4	**0**	**0**	**1**	**0**	**0**		**12**	**0**	**1**	**0**	**1**	**1**
5	**0**	**0**	**1**	**0**	**1**		**13**	**0**	**1**	**1**	**0**	**0**
6	**0**	**0**	**1**	**1**	**0**		**14**	**0**	**1**	**1**	**0**	**1**
7	**0**	**0**	**1**	**1**	**1**		**15**	**0**	**1**	**1**	**1**	**0**
8	**0**	**0**	**1**	**1**	**1**		**16**	**1**	**0**	**0**	**0**	**0**



Example: Terminal 1 is defined as the input for the action of moving to the next sequence.



Example: Terminals 2 and 3 defined as input for the activation of the selected sequence.



Example: Terminals 5 to 8 defined as output for the class number of ‘Measurement 1.1’

When setting up outputs with more than one terminal to be assigned, please place the cursor on an upper terminal and ensure that the lower terminals are free.
For example on terminal 4 for the function ‘Class Number’ of the measurement.

6 TESA-MODUL HB-4A/8A

6.1 Introduction

The TESA-MODULs HB-4A and 8A allow the connection of TESA half-bridge probes with DIN 45322 connectors
The TESA-MODUL HB-4A has 4 connectors. Compatible dummy probes and linearized probes
The TESA-MODUL HB-8A has 8 connectors. Not compatible dummy probes and linearized probes
Example linearized probes: GTL21, GT61.

The intuitive allocation of the individual channels can be set in the sensor menu of the display units.

Measurement performance is identical to TWIN-T40, with the integration of the same electronic components.
Synchronized conversion of each channel at a frequency of 6500 Hz enables dynamic measurements.
The TESA-MODUL HB-8A is not compatible with dummy probes. Multiplexed conversion at 400 Hz is reduced depending on the number of channels used. This module is dedicated to static measurements.



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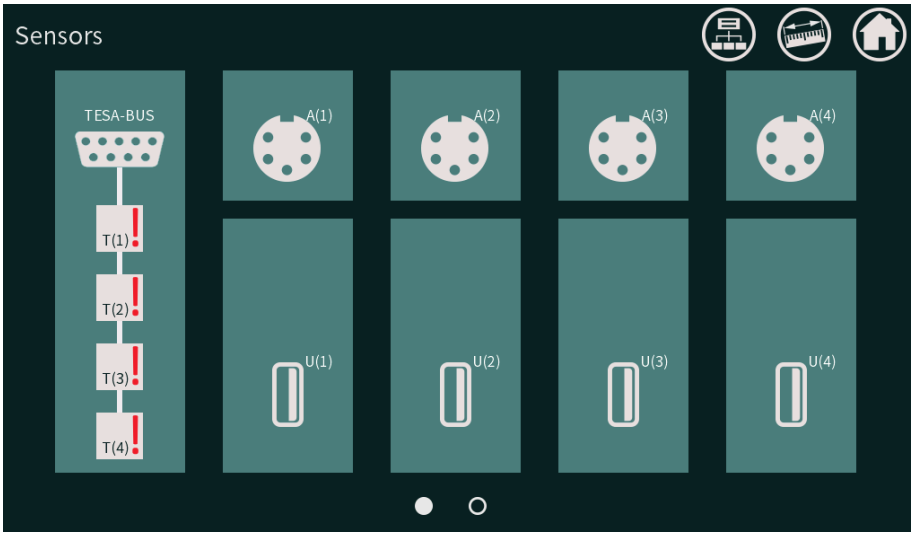
6.2 Specifications

Designation	TESA-MODUL HB-4A	TESA-MODUL HB-8A
Item no.	04130303	04130304
Dimensions	Width 82 mm, height 41 mm, depth 77 mm	Width 132 mm, height 41 mm, depth 77 mm
Error	± (0,2 % measured value + 0,3 µm)	± (1,2 % measured value + 0,3 µm)
Sampling frequency	6500 Hz Synchronized conversion	400 Hz Multiplexed conversion
Compatibility	Compatible dummy probes Compatible linearized probes	Not compatible dummy probes Not compatible linearized probes

Example linearized probes: GTL21, GT61.

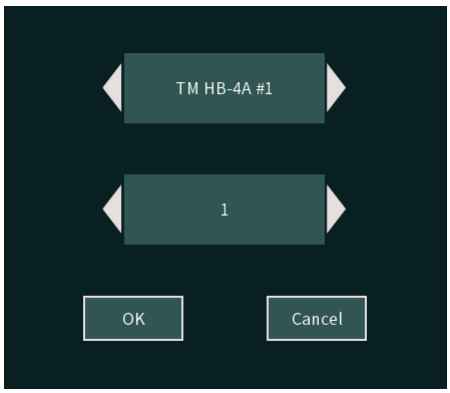
6.3 Channel assignment

After connecting the TESA-MODUL to the display unit, return to the main “Sensors” page. The T(x) inputs are displayed with an exclamation mark, as they are not assigned to a probe of a TESA-MODUL.



The TWN-T20 has 2 probe inputs via the TESA-BUS.
The TWIN-T40 has 4 probe inputs via the TESA-BUS.

Press the required T(x) input to select the TESA-MODUL sensor to be assigned and confirm with “OK”.



7 TESA-MODUL SIN-2 HD

7.1 Introduction

The TESA-MODUL SIN-2 HD allows the connection of HEIDENHAIN probes.
This module is compatible for models with a 1 Vpp or 11 µApp signal with a D-Sub 15p connector.



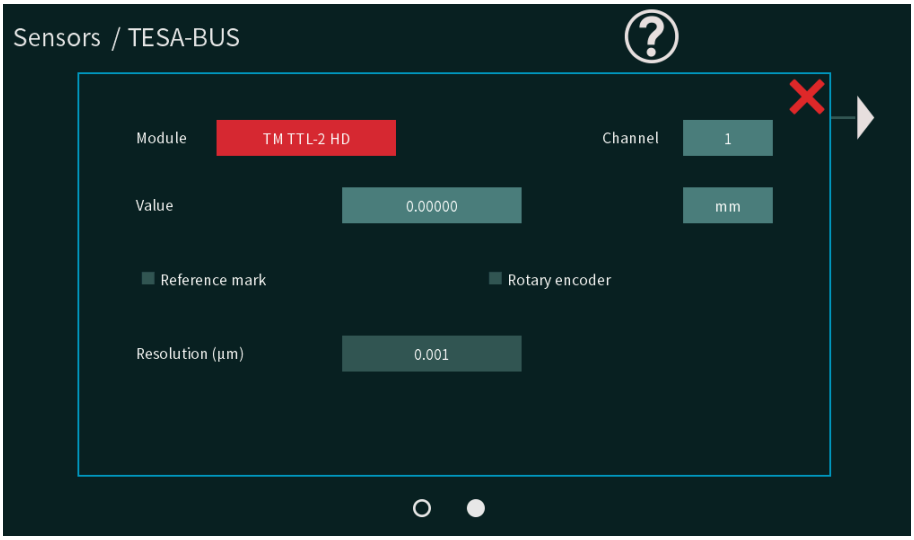
7.2 Specifications

Item no.	04130320
Dimensions	Width 82 mm, height 41 mm, depth 77 mm

7.3 Settings

The specifications of these measurement systems require special settings. The values must be entered according to the HEIDENHAIN sensor used. Depending on the type of sensor, the value of the scale pitch is different.

The following window can be found in the “Sensors” menu after connecting the TESA-MODUL SIN-2 HD.



Step:

The step is a characteristic of the sensor that has to be filled in for a good readout of its signal. It is the distance between each engraving of the incremental scale.

Sensor type	Step
MT12/25 Certo	2 µm
MT60/101 Metro	10 µm
Spectro	20 µm

Interpolation:

The interpolation defines the division rate between two steps, in order to define the resolution of the display unit reading.

The table lists the different resolutions as a function of the interpolation.
The interpolation can be chosen between 200 and 2000.

Resolution	Interpolation = 200	Interpolation = 2000
Step of the scale = 2 µm MT12/25 (Certo)	0.01 µm	0.001 µm
Step of the scale = 10 µm MT60/101 (Metro)	0.05 µm	0.005 µm
Step of the scale = 20 µm (Spectro)	0.1 µm	0.01 µm

Resolution = Step of the scale/Interpolation

Example with a SPECTRO model:
20 µm/200 = 0.1 µm

Reference mark:

The reference mark is used to restore the original points after a power failure. It is important to move the sensor after power is restored to cross the reference mark, thus resetting the origin points.

Rotary encoder:

Activate this option if using a rotary encoder.
If this option is activated, the field “Resolution (µm)” is replaced by “Pulse per revolution”.
The field is to be filled in according to the characteristic of your encoder.
For example, when the rotary encoder performs a 360° rotation, the counter returns to 0.

8 TESA-MODUL DM-4

8.1 Introduction

The TESA-MODUL DM-4 allow 4 instruments to be connected via a DIGIMATIC cable.

The intuitive allocation of the individual channels can be set in the sensor menu of the display units.

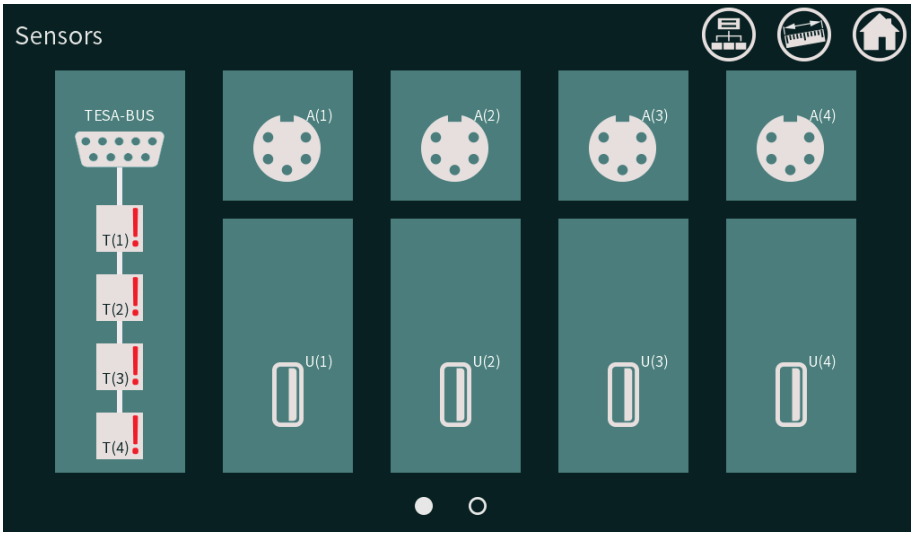


8.2 Specifications

Item no.	04130315
Dimensions	Width 107 mm, height 41 mm, depth 77 mm

8.3 Channel assignment

After connecting the TESA-MODUL to the display unit, return to the main “Sensors” page. The T(x) inputs are displayed with an exclamation mark, as they are not assigned to a probe of a TESA-MODUL.



The TWN-T20 has 2 probe inputs via the TESA-BUS.
The TWIN-T40 has 4 probe inputs via the TESA-BUS.

Press the required T(x) input to select the TESA-MODUL sensor to be assigned and confirm with “OK”.

9 TESA-MODUL TP

9.1 Introduction

The TESA-MODUL TP allows the connection of temperature sensors.
It is compatible with type K thermocouples and PT100 probes.
Only one sensor can be connected at a time.
The aim is either for the temperature to be displayed as an indication or to use the measurement as a mode of monitoring.

In monitoring mode, if the temperature is outside of the defined tolerated range, the measurement will turn red to show that the temperature is out of tolerance.
If a calibration value is defined in the characteristic, a message will appear when the temperature value is out of tolerance. If this happens, the user must position the reference part for a new calibration of the sequence in order to avoid any measurement errors resulting from variations in the ambient temperature.

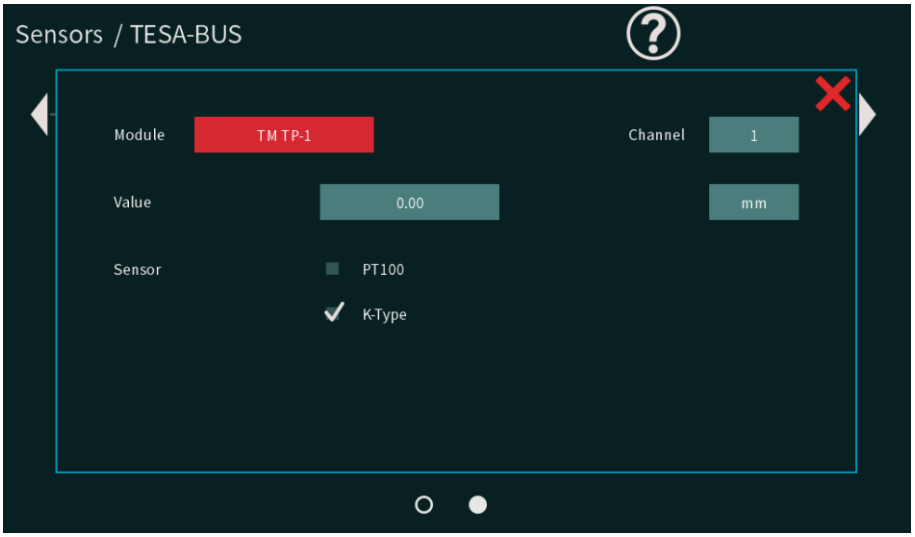


9.2 Specifications

Item no.	04130318
Dimensions	Width 57 mm, height 41 mm, depth 77 mm

9.3 Settings

The thermocouple supplied with the module is type K, sheath made from heat-resistant steel AISI 310 (1100ºC).
Please select type K sensor.



10 DECLARATION OF CONFORMITY

We hereby certify that this equipment has been manufactured and tested in our workshops. We declare under our sole responsibility that this equipment is in conformity with the standards and technical specifications indicated in our commercial documents (start-up manual, website).
We also certify that the metrology equipment used to control this equipment meets the requirements of the national reference standards. The traceability of the measured values is guaranteed by our quality assurance system.

Complies with: CE UKCA
Quality assurance

11 WARRANTY

TESA undertakes to remedy any malfunction resulting from a manufacturing defect, within the limits of the provisions below. The normal warranty covers a period of one year from the date of sale.

In justified cases of warranty, TESA will provide one of the following services at its discretion:

– free repair by TESA or an authorised TESA service workshop, or

– free replacement, or

– credit note for the product that is the subject of the complaint.

Any other benefit or compensation under the warranty is excluded.

The warranty does not cover damage caused by incorrect, incompetent or negligent use, lack of maintenance, external influences, non-observance of the operating instructions or any other circumstances as well as force majeure.

(Extract from our general conditions of sale, 2023 edition)