PT 1500

Electronic force gauge for the measurement of tensile forces, primarily on cable-crimp connections or cable-weld connections

Operation Manual
English
Version 1.0.0

Quality Management
Environmental Management
ISO 9001
ISO 14001
www.dekra-seal.com

Made by:	09/2020 L. S.		Version:	1.0.0
Changed by:	03/2023 M. Egginger		Checked by:	C.Schuhbaum
Datei:	BA-PT 1500-EN-2023			

Content

Please study this handbook carefully before initial use of the equipment. Keep this handbook at the working place, where you can easily find it and hand it over with the equipment to other persons.

1 Safety Regulations for Electrical Machines in Industrial Use

Danger

This electrical machine is an equipment for use in industrial plants. During operation of the machine dangers may arise through rotating parts and/or high voltage. In case of improper use of the machine during commissioning, operation and maintenance **severe injuries to persons and damage of property** may arise. The machine may only be used under the provisions stated in the instruction manual, additionally the local working conditions should be considered.

Warning

- Transportation, installation, commissioning, electrical connection, operation and maintenance may only be carried out by authorized and qualified specialist staff.
- Knowledge of the regulations for the prevention of industrial accidents and first aid measures is a prerequisite for safe and trouble-free operation of this system.
- This instruction manual contains the most important notes for operation of the system in accordance with safety requirements.
- This instruction manual and especially the safety notes contained herein must be observed by all the persons working with the system.
- **Non-observance is a safety risk!**
  Our “general sales and supply conditions” always apply as these are available to the user under www.cable-tec.net at any time. Any claims for warranty or liability in case of personal injury or property damage are excluded, if they can be traced back to one or several of the following causes.
    - The equipment was not used according to the intended purpose.
    - Improper installation, commissioning, operation, and maintenance of the equipment.
    - Operation of the equipment with defective safety devices or with improperly mounted or non-functional safety and protection devices.
    - Non-observance of the information in the operating instructions concerning installation, commissioning, operation and maintenance of the equipment.
    - Unauthorized modifications of the equipment.
    - Repair work performed improperly (no original spare parts) by unauthorized personnel.
    - Events caused by the effect of foreign bodies and force majeure.

Hotline

In case of breakdown of the machine or in case of danger please call our service hotline:
Tel. +49 (0) 8554 94 23 9-0, Fax + 49 (0) 8554 94 23 9-20, eMail info@cable-tec.net

i	Please be aware that the Pulltester PT 1500 is a high precision gauge. Handle it with care and provide a clean working environment.

2 Function of the equipment

The Pulltester PT 1500 is an electromechanical measuring device for destructive testing of crimp or welded connections of electrical cable connections. During the test, a test specimen is pulled uniformly until a pre-set limit is reached or until the connection point (weak point) comes loose. By means of high-precision sensor technology, the force path and the distance covered is precisely recorded and stored until the next measurement. Due to this precise sensor technology the finest deviations can be detected immediately.
The result of the tensile test can either be shown as a maximum force value or as a curve on the display. It is also possible to automatically compare the test result with a table of standard values stored in the device, so that a decision on the test result with OK or NOK can be made by the device. The result values can be transferred via various interfaces to a PC for further archiving.
At the PC the force values are further processed by using the C-tec Software PT Viewer or Microsoft Excel. The device also offers a connection for a small printer (receipt printer with real paper), on which the most important result data can be printed out in small format.

Of course, before delivery the PT 1500 itself is calibrated with high quality measuring gauges which are released by a calibration laboratory accredited by the German Accreditation Body (DAkkS). This calibration should be repeated annually.

3 Intended use

The Pulltester PT 1500 is designed for testing the pull-out force of electrical crimp connectors. With the device pull tests up to a force of 1500 N and with a maximum pull speed of 350 mm/min can be performed. Via different interfaces it is possible to transfer the test results to a PC or to print them out.

The requirements for temperature and humidity have to be carefully observed. Ignoring these rules can cause accidents or damages. Other use as described in this manual is not allowed and can lead to the loss of warranty claims and liability exclusion of the supplier. Any unauthorized modification of the equipment carried out by user will invalidate the manufacturer's liability to any resulting damage or injury to personnel. This statement also applies for any changes or conversions of the device.

4 Technical specification

Type	Pulltester PT 1500
Power supply	100 – 240 VAC 50/60 Hz
Power consumption	Max. 100 VA
Device fuse protection	Microfuse 2 AT
Interfaces	RS 232, USB 2.0, Ethernet, digital I/O
Force range	15 – 1500 N
Speed range	25 - 350 mm/min., variable in steps of 1mm/min
Pull stroke	60 mm
Resolution force measurement	0.01 N
Resolution path measurement	0.1 mm
Measurement accuracy	15 – 150 N: +/- 1.5 N, 150 – 1500 N +/- 3.75 N
Min. cable length of sample	80 mm
Recommended room temperature	22°C +/- 5°
Protection class (against foreign substances)	IP 40
Dimensions (W x D x H)	151 mm x 260 mm x 500 mm
Weight	16.5 kg

5 Scope of delivery

Standard delivery must include:

- Main unit Pulltester PT 1500
- Clamping crown for samples
- Power cable EU standard, 2 m
- USB cable USB 2.0 type-A to USB 2.0 type-Mini-B, 2 m
- USB flash drive 16 GB
- Operation manual
- Certificates of ISO factory calibration

Optional available accessories:

- PC Software PT Viewer for analysis of measuring results on PC
- Receipt printer EPSON M188D

6 Packing

The device is packed in a special transportation packing. Please re-use this package again or recycle it according to your local rules.

7 Transportation

The transportation of the unit must be free of vibration and shock. The normal packaging is not seaworthy and cannot be used for water carriage. The packing does not protect against wet conditions. Tumbling of the unit during transportation is not allowed.
Handle with care! Throwing or falling down of the packed unit can cause damages or total demolition.

8 Storing

The device has to be stored in a dry and well-tempered room. The optimum storage temperature is at 20°C. Too high humidity can cause corrosion on important precision parts.

9 Set-up

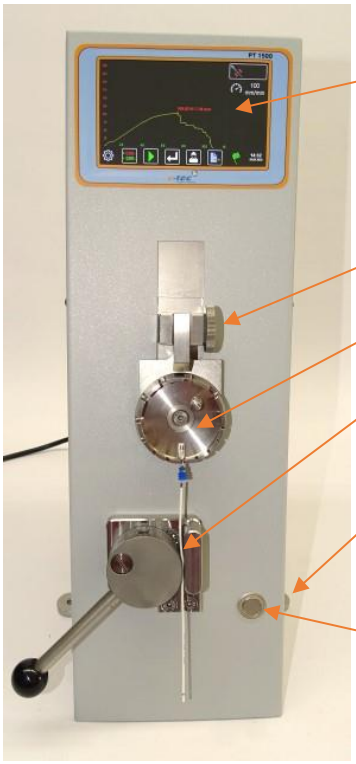
The Pulltester PT 1500 has to be set up in a dry, dust free and well-tempered room. It must be protected from improper environment conditions like high or low temperature, direct sun light, vibrations and other mechanical influences, electromagnetic or magnetic fields, humidity or dust.
A stable, undamaged work table should be used as a base. The device is equipped with rubber feet, a screwing on the table top is possible with the two lateral straps. The assembly instructions in the operating manual of the PT 1500 must be observed.
If any defects, improper functions, damages or problems occur, which cannot be solved by the instructions in this handbook, please set the device out of operation and contact C-tec for support.

DANGER TO LIFE: For safety reasons, only operate the device at grounded power connections or sockets. Before opening the device, disconnect the device from the power supply. Never open the device during operation.

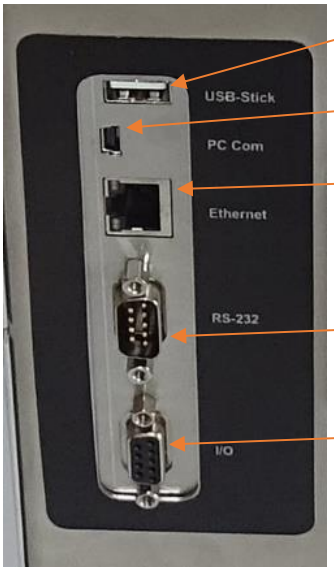
10 Start-up

10.1 Parts and operating controls

Front



Back

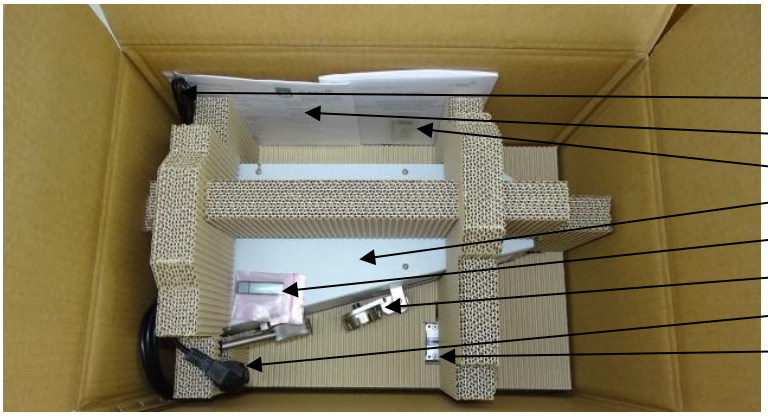


10.2 Preparations

Remove the Pulltester PT 1500 from the transport packaging. Please proceed in the following order:

Set up the packing carton with the arrows pointing upwards and cut open the adhesive tape.

Attention: Do not cut too deep into the cardboard box to avoid damaging the device!



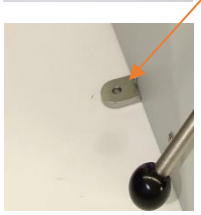
USB interface cable
Certificate for ISO factory calibration
Operation manual
Pulltester PT 1500
USB flash drive
Clamping crown
Power supply cable
Compartment for optional wedge gripper

Take out accessories

Take out fixing frame

Remove all remaining parts and the pulltester itself.

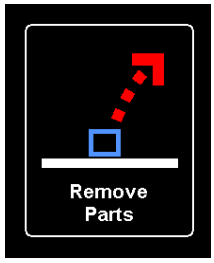
Put the Pulltester PT 1500 on a stable work surface.



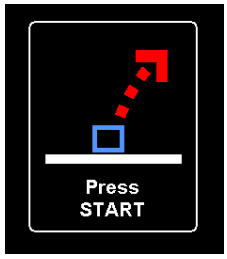
By means of the left and right fastening strap, the device can also be screwed to the working surface in case of an unfavorable installation position.
(Ø mounting hole: 6.5 mm)

Plug the supplied power cable into the back of the device and connect it to the factory power supply.
The factory power supply must be properly grounded (green/yellow protective conductor).
The device can be supplied with voltages from 100V AC to 240V AC 50/60Hz.

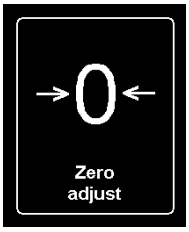
Switch on the main switch (button lights up in red).



The touch colour display now alternately shows the messages "Remove parts" and "Press START".



After ensuring that the cable clamp and the clamp for the contact elements are free, press the start button or briefly touch the touch colour display.



The unit now automatically performs a short reference run and then shows these two pictograms in the display.

After a successful reference run, the Pulltester is ready for measurement.

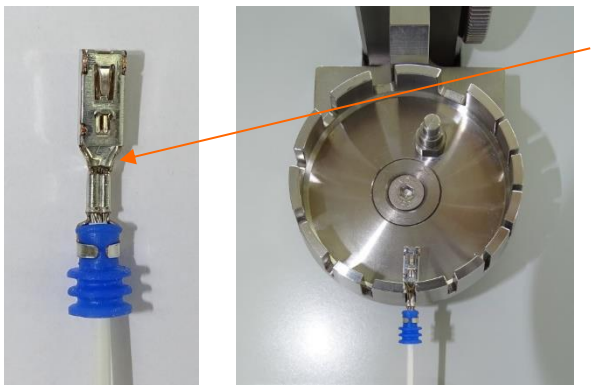
11 Display and Operation

Display field for maximum force
Display of test mode
Display of test speed
Display of force threshold value as per schedule
Display field for actual force
Counter for OK, NOK and total
Display CpK for serial measurement
Display time and date
Display process status
Touch button for output options
User level (Operator/Supervisor)
Display for return drive option
Touch button Start/Stop
Display switch numeric / graph
Touch button for system parameter

12 Prepare a pull test

Before a pull test is started, this symbol should be shown in the display. The "green house symbol" indicates that the pull tester is in home position. If this is not the case, the start button must be pressed first.

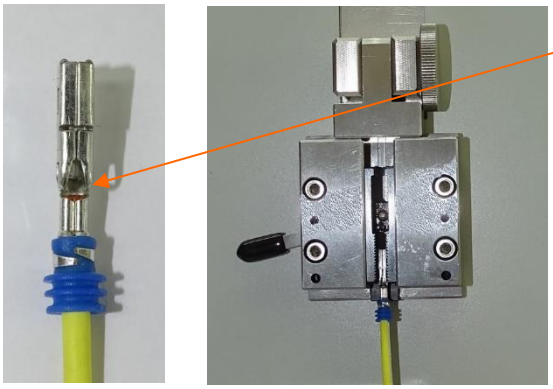
Clamping crown



Pronounced contact neck

Crimp elements with a pronounced contact neck can be accommodated very well with the clamping crown.

Wedge gripper (optional)



Small contact neck

Crimp elements with a less pronounced contact neck can be easily picked up with the wedge gripper.

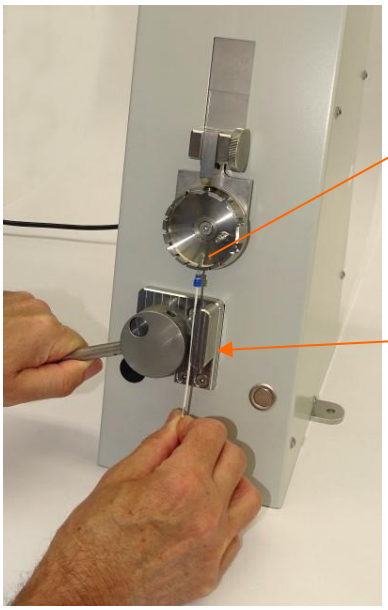
12.1 Changing the clamping system (Clamping crown – Wedge gripper)

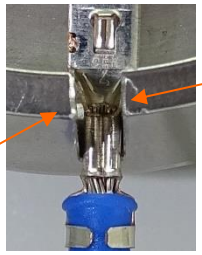
Loosen and remove knurled screw for clamping system

Remove the clamping element

Insert new contact clamping element and screw in knurled screw again.

12.2 Taking up the contact with the clamping crown

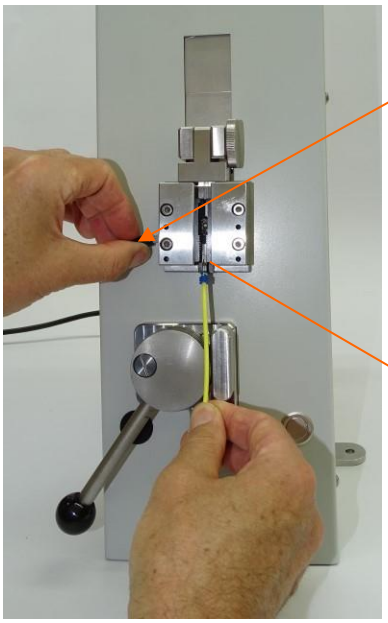




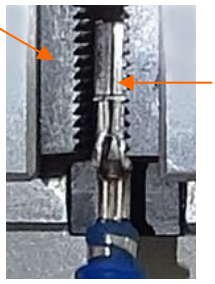
Insert the terminal into the appropriate opening on the clamping crown

Open the cable quick-clamping device with the left hand, insert the cable and close the lever again (closes automatically when the lever is released).

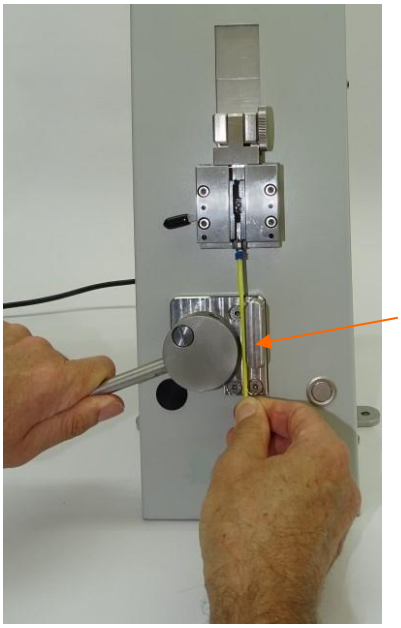
12.3 Taking up the contact with the wedge gripper



Use your left hand to push the lever of the wedge gripper upwards, thereby opening it.

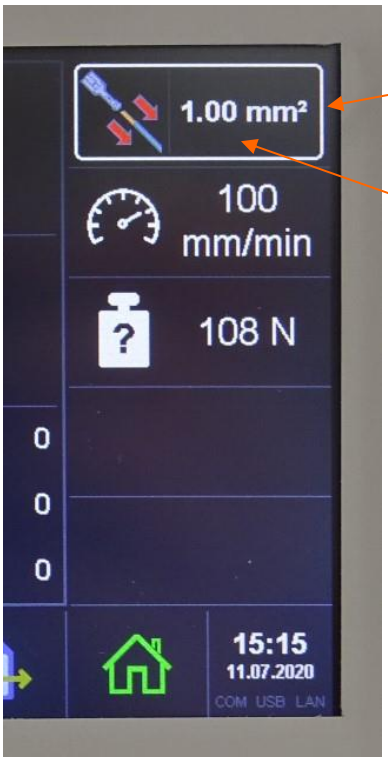


Insert the terminal into the open toothing of the gripper and let the lever close again (closes automatically when the lever is released).



Open the clamping device with the left hand, insert the cable and close the lever again (closes automatically when the lever is released).

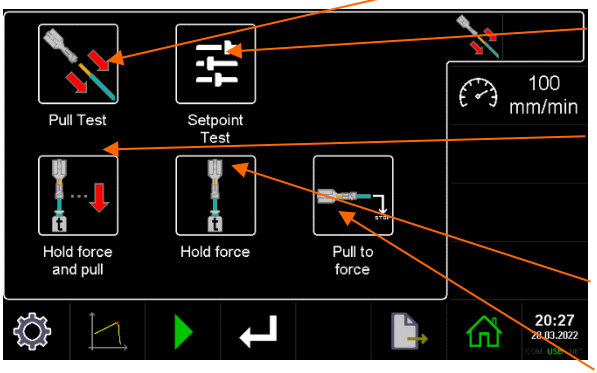
12.4 Choose a test routine



Sign Test mode shows the chosen test routine

By pressing on the framed field Test mode opens a menu to select the different test routines.

Possible test routines:



Pull Test: The test specimen is pulled until it tears.

Setpoint Test: Pull test in connection with nominal values for cross section and holding force.

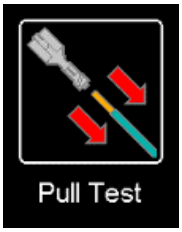
Hold force and pull: A determined force is held for a certain time. Then the force is increased until the test specimen tears.

Hold force: Pull till defined force and hold it for a target time, then release.

Pull to force: A predetermined force is built up and then immediately released.

12.4.1 Pull Test

In the Pull test mode, the pull tester pulls the clamped test specimen until it tears.



Press on **Pull Test**.

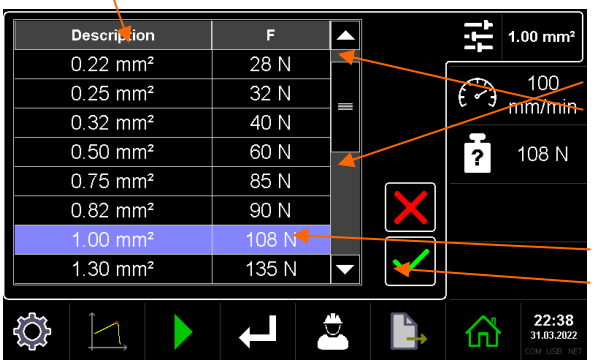
Test mode Pull test is set

12.4.2 Setpoint Test

In the test mode setpoint test, the Pulltester works in the pull test mode. However, the actual force values are compared with a nominal value, resulting in an OK / NOK decision. The results are furthermore subject to statistical analysis.

Press on **Setpoint Test**.

A table with ascending cable cross-sections and the corresponding force values opens.



With the display slider or the arrow keys the values in the lower table area can be displayed.

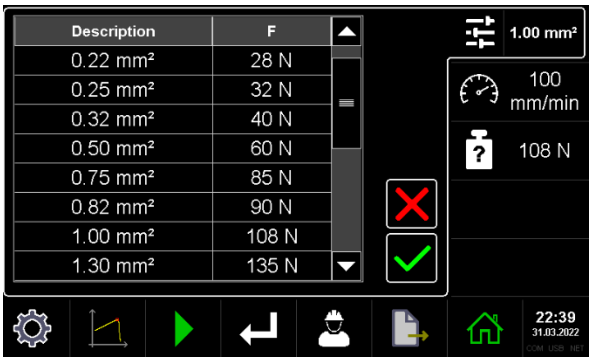
By pressing the cross section value to be tested and the green confirmation key, the corresponding force value is loaded into the working memory.

The test mode target value test and the cross section of the test specimen (1.00 mm²) are set.

The minimum required holding force (108 N) of the test specimen is selected.

OK-, NOK- and total counter are active.
Statistical calculation of the results is activated.

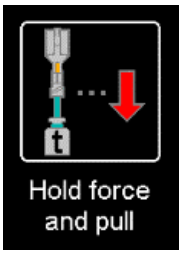
Setpoint check without cross-section specification



If a selected field is deselected by pressing it again and then pressing the green confirmation key, a setpoint test without cross-section selection is loaded into the working memory.

Test mode Setpoint Test without cable cross section is selected.

12.4.3 Hold force and pull



Press on **Hold force and pull**.

The test mode Hold force and pull is set.

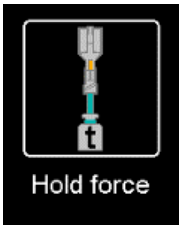
Minimum target holding force before tear-off

Holding force for the predetermined time period.

Predetermined time period

Note: The test parameters can only be changed by a supervisor (password) (see chapter 15).

12.4.4 Hold force



Press on **Hold force** .

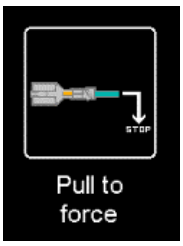
The test mode Hold force is set.

Holding force for a predetermined time period

Predetermined time period

Note: The test parameters can only be changed by a supervisor (password) (see chapter 15).

12.4.5 Pull to force



Press on **Pull to force**.

The test mode Pull to force is set.

Force, up to which is pulled

Note: The test parameters can only be changed by a supervisor (password) (see chapter 15).

12.5 Further settings

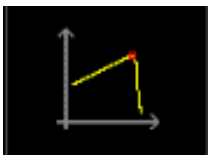
Shift key Force display

Start/stop measurement

Automatic return after end of measurement on/off

Access for Supervisor

12.5.1 Force display



Press on **Force display**.

The touch colour display switches to the graphical representation of the tear-off curve.

By pressing the Force display symbol again, the display switches back to the numeric force representation.

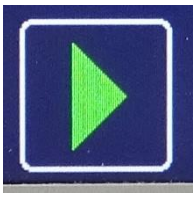
To zoom in on a detail of the tear-off curve, hold 2 fingers down on the area you want to zoom in on and move your fingers apart.

The displayed section of the tear-off curve can be moved. Press and hold a finger on the point you want to shift and move the finger in the direction in which the section should be shifted.

To display a larger area of the curve again, hold 2 fingers down on the area to be reduced and move the fingers together.

By tapping twice in the center of the graphic display (double-click), the tear-off curve is automatically scaled so that the curve fills the entire display area.

12.5.2 Start/stop pulling process



Press the Start button for approx. 1 second.
Note: The time delay of 1 second is built in for safety reasons, so that a start is not triggered by accidental "wiping" across the keypad.

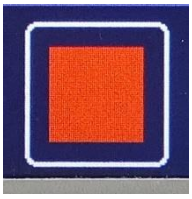
Or:

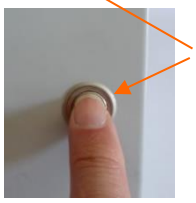
The start/stop process can also be initiated by pressing the mechanical button. Here is only a short "touch" necessary.

The pull test starts.

The red value shows the previous maximum value of this measurement.
The green value shows the currently measured force value.

Rotating arrows indicate that a measuring process is in progress.





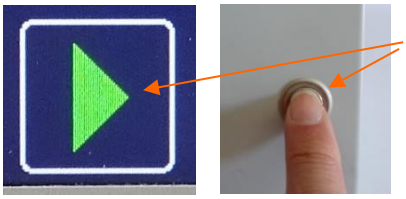
By briefly touching the red stop field or the mechanical start/stop button, the device can be stopped at any time and the measuring process will be aborted.

If the currently measured force drops by a predetermined value from the maximum value, the pull tester stops the measuring process automatically.

The red value now shows the highest force value which has been reached during the measuring process.

The STOP symbol indicates that the device is standing still but it is not in the start position for a new measurement.

Return to the start position for a new measurement.



Return travel is initiated by pressing the green start field for approx. 1 second or by briefly pressing the mechanical start button.

The inverted arrow symbolises that the Pulltester returns to the start position.

The maximum measured force value remains in the display until a new measurement is started, another test mode is selected or the device is switched off and on again.

The "green house" symbolises that the pull tester is now in the start position again.

Note: Also after the pull force test has been completed, the display can be switched between showing the tear-off curve and the numerical values by pressing the field Force display.

12.5.3 Automatic return to start position

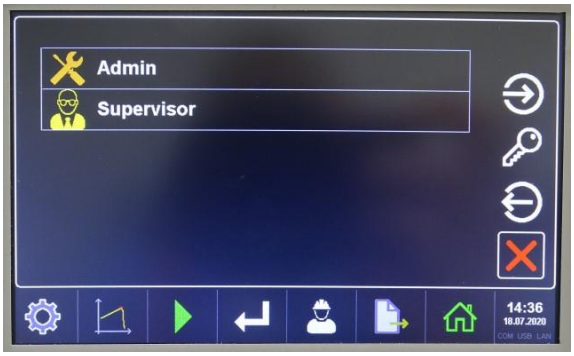
By pressing the "Return" field, it will be highlighted in light blue.

If the "Return" field is highlighted in light blue, the Pulltester will immediately return to the start position after the measurement is completed.

Note: To reduce the risk of injury, the return travel is also monitored.

12.5.4 Access control

You can switch to a higher access level by pressing the "Operator" field.



The level supervisor or administrator can be selected (password required).
For more information, see chapters 15 and 16.

12.5.5 Data export

Press on field **Data export**

If a measurement has been performed completely (force has reached a maximum value and then dropped), the Data Export button is framed and thus activated.

By pressing the Data export button, a selection menu opens.

Close selection menu

Save force curve in CSV format (Excel) on a USB stick

Save force curve as image (BMP) on a USB stick

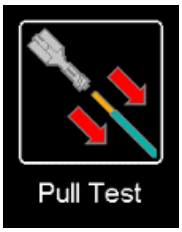
Print result values

12.5.6 System setup

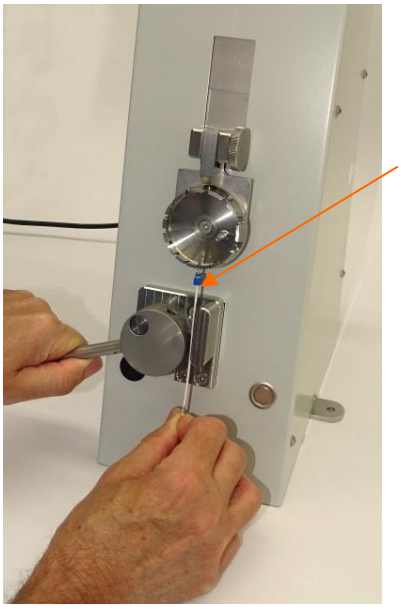
The button can only be activated if you are logged in as Supervisor or Admin.
For explanations see chapter 15 and 16.

13 Performing the tests

13.1 Perform a Pull test

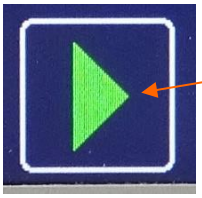


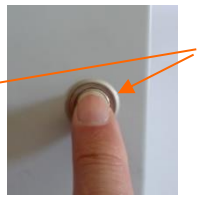
Select **Pull Test mode** (see 11.4)



Insert the cable as shown in the picture.

or





Press Start button

The Pulltester pulls on the cable until the crimp connection breaks.

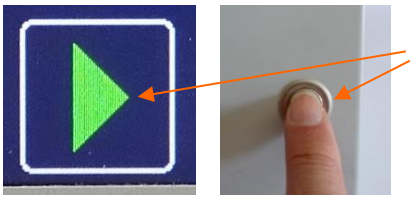
The maximum holding force of the crimp connection is shown.
The display can be switched to curve representation by pressing the force display field.

The target flag symbol indicates that the measurement is complete.

Display of the force curve with maximum value, pulling distance to the maximum value and position of the maximum value on the force curve.

If the function “Automatic return to start position” is deselected (see 11.5.3), the start button must be pressed again to activate the return movement.

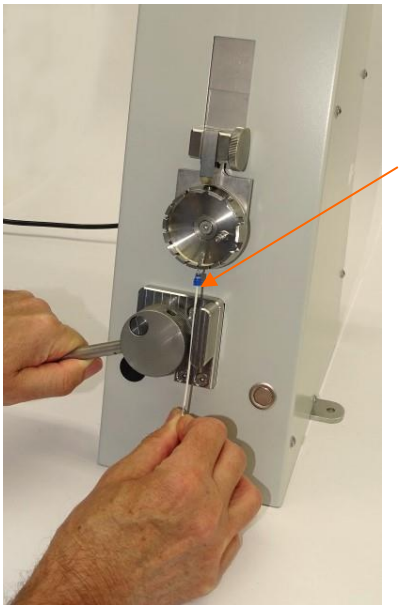
or



Press Start button

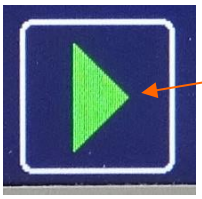
13.2 Perform a Setpoint test

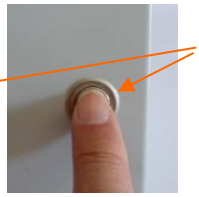
Select test mode **Setpoint Test** and select the suitable cable cross section or determine a target force value (see 11.4 / 11.4.2)



Insert the cable as shown in the picture.

or



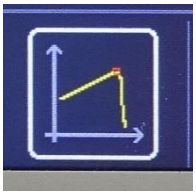


Press Start button

The Pulltester pulls on the cable until the crimp connection breaks.

The maximum holding force of the crimp connection is displayed (actual value).
Display of the minimum target value, which is necessary according to the table.
The target/actual value comparison has shown that the test sample is OK.
The counting module shows that one “OK measurement” was made out of a total number of one measurement.
The CPK value appears after the 3rd measurement.

The target flag symbol indicates that the measurement is complete.

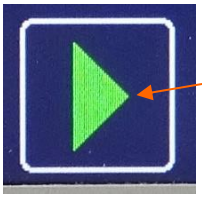


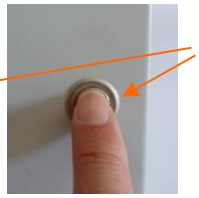
The display can be switched to curve representation by pressing the Force Display field.

Display of the force curve with maximum value, pulling distance to the maximum value and the position of the maximum value on the force curve.

If the function “Automatic return to start position” is deselected (see 11.5.3), the start button must be pressed again to activate the return movement.

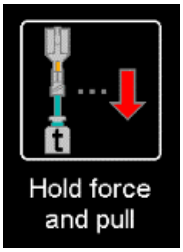
or





Press Start button

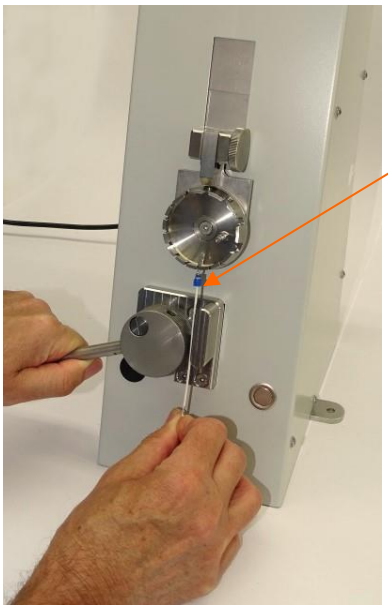
13.3 Perform a test with test routine Hold force and pull



Choose test mode **Hold force and pull** (see 11.4 / 11.4.3).

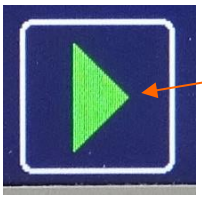
The following test parameters are selected:
The sample must have at least 150 N holding force before it tears.
The test sample is preloaded with 100 N for 30 sec.

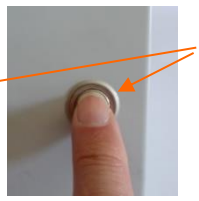
Note: The test parameters can only be changed by a supervisor (password) (see chapter 15).



Insert the cable as shown in the picture.

or

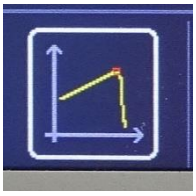




Press Start button

The device pulls up to 100 N after the start and maintains the pulling force for the predefined time.

Previous highest force value
Actual force value
Timer for the test time



The display can be switched to curve representation by pressing the Force Display field

The graph shows how the controller maintains the force value over the specified time.

After the preload time has expired, the tensile force is increased again until the connection breaks. The maximum holding force is shown.

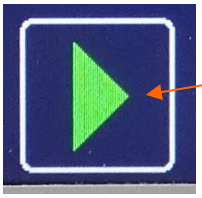
By swiping on the display, the force curve can be shifted to the left or right.

The display can be switched to numeric representation by pressing the Force Display field.

Symbol for force test passed

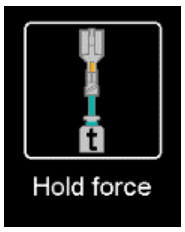
If the function “Automatic return to start position” is deselected (see 11.5.3), the start button must be pressed again to activate the return movement.

or



Press Start button

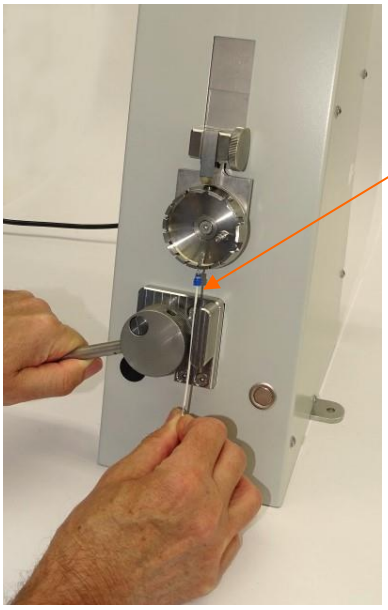
13.4 Perform a test with test routine Hold force



Choose test mode **Hold force** (see 11.4 / 11.4.4).

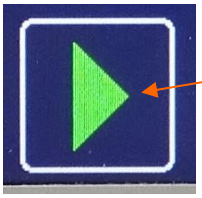
The following test criteria are selected:
The test sample is preloaded with 100 N for 30 sec.

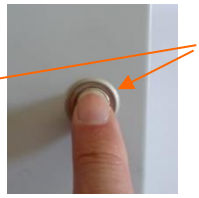
Note: The test parameters can only be changed by a supervisor (password) (see chapter 15).



Insert the cable as shown in the picture.

or

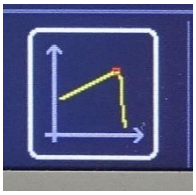




Press Start button

After starting, the device pulls to 100 N and maintains the pulling force for the predefined time.

Previous highest force value
Actual force value
Timer for the test time



The display can be switched to curve representation by pressing the Force Display field.

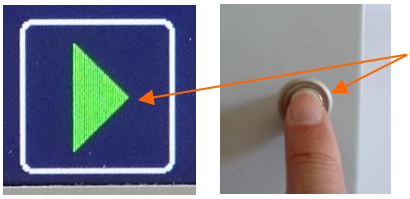
The graph shows how the controller maintains the force value over the specified time.

After the loading time has elapsed, the test sample is unloaded again.
The test is completed.

The display can be switched to numeric representation by pressing the Force Display field.

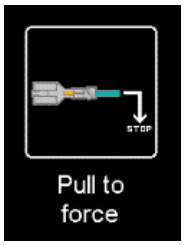
If the function “Automatic return to start position” is deselected (see 11.5.3), the start button must be pressed again to activate the return movement.

or



Press Start button

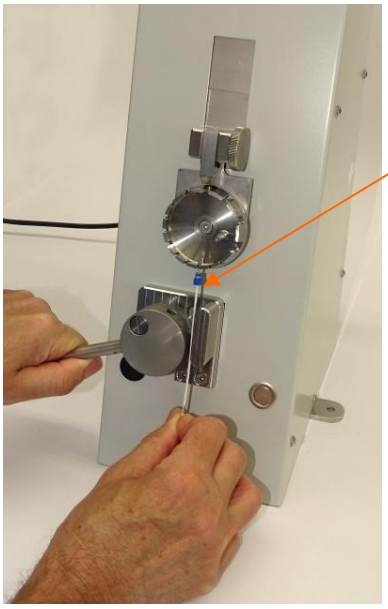
13.5 Perform a test with test routine Pull to force



Select test mode **Pull to force** (see 11.4 / 11.4.5).

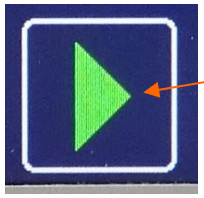
The following test criteria are selected:
The test sample is loaded up to 100 N and immediately unloaded again.

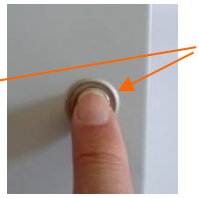
Note: The test parameters can only be changed by a supervisor (password) (see chapter 15).



Insert the cable as shown in the picture.

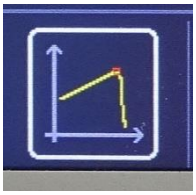
or





Press Start button

In this example the cable was loaded with 100 N.

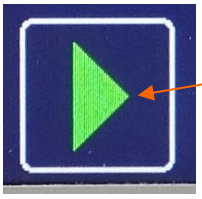


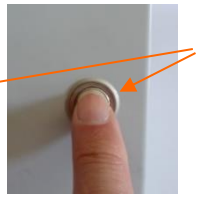
The display can be switched to curve representation by pressing the Force Display field.

The graph shows the increase in tensile force up to the set limit value.

If the function “Automatic return to start position” is deselected (see 11.5.3), the start button must be pressed again to activate the return movement.

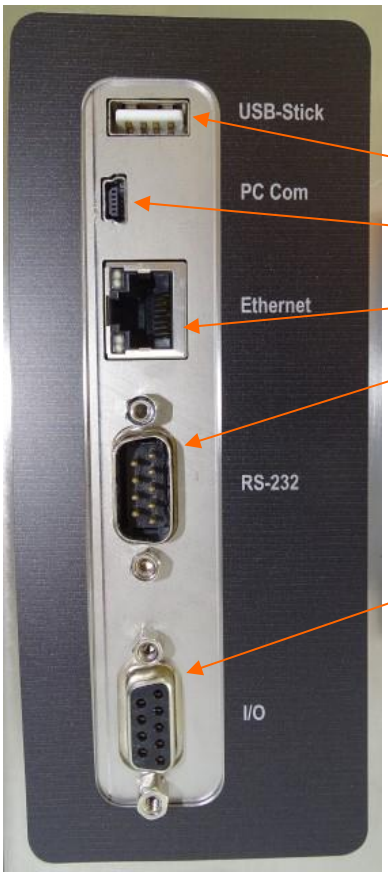
or





Press Start button

14 Transmitting test results



For the export of the test results, different interfaces are available on the rear side of the device.

Slot for USB data carrier (stick)

Communication port for PC transmission

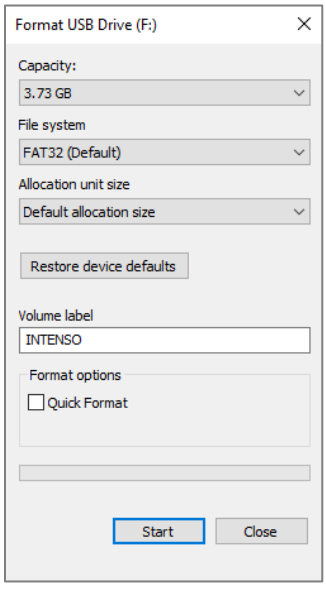
LAN connection via Ethernet connector

RS 232 interface for (receipt) printers

Digital interface:
4 inputs, opto-decoupled
4 outputs, potential-free relay contacts

14.1 Data output to a USB stick

For data storage on the Pulltester, only USB 2.0 sticks are currently permitted!



Before using the device, the USB stick must be formatted to the FAT32 file system (data storage devices supplied by C-tec are already formatted).
Attention: All data on the stick will be deleted during formatting!

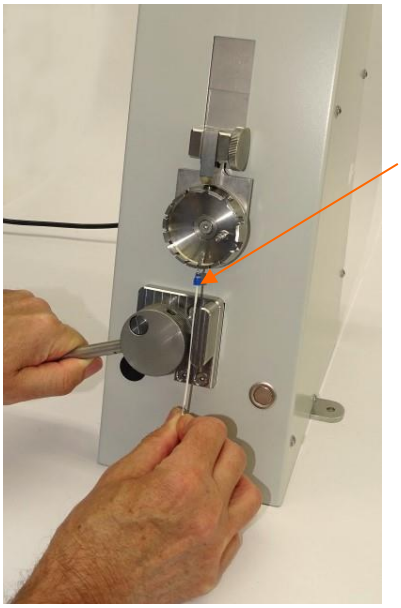
Proceed as follows:
Plug the stick into the USB port of a PC. In Windows Explorer, click on the USB stick with the right mouse button. Then click on Format, select **FAT32** from the drop-down menu for File System, **deselect** Quick Formatting and select **standard size** for Size of Assignment. Click on Start.
The stick is reformatted.

Insert the USB stick into the Pulltester

The ready-for-use stick is indicated by the green "USB" in the Time/Date field.

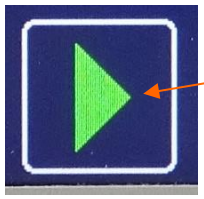
Perform the pull test.

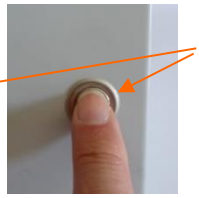
It is not relevant for the transmission of the measurement which test mode is selected. The data for the measurement are transferred according to the selection.



Insert the cable as shown in the picture.

or





Press Start button

Press field Data export

By pressing "CSV" a file with the extension .csv (Excel) is saved to the USB stick.
Pressing "bmp" saves an image with the extension .bmp to the USB stick.

If you press **X**, the selection menu closes.

The files are stored on the USB stick.

Content of file:

	A	B
1	s in mm	F in N
2	0	10,45
3	0,02	11,43
4	0,04	12,51
5	0,06	13,2
6	0,08	13,95
7	0,1	14,48
8	0,12	14,92
9	0,14	15,23
10	0,16	15,66
11	0,18	15,81
12	0,2	15,85
13	0,22	16,21
14	0,24	16,67
15	0,26	17,09
16	0,28	17,98
17	0,3	19,03
18	0,32	19,98
19	0,34	20,53
20	0,36	21,73
21	0,38	23,2
22	0,4	25,21
23	0,42	26,94
24	0,44	28,82
25	0,46	30,08
26	0,48	31,46
27	0,5	32,4
28	0,52	33,28
29	0,54	33,88
30	0,56	34,39

Screenshot of the pull test

Column A for measured pull stroke

Column B for measured tensile force

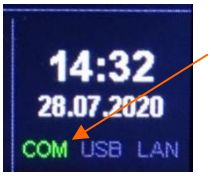
The data on the USB stick can then be transferred to a PC or opened from the stick on a PC.

14.2 Direct data transfer to a PC (with PT Viewer PC software installed)

Note: PT Viewer PC software is not included in the standard scope of delivery.

Connect the supplied USB cable with the USB 2.0 type Mini-B side to the pulltester at the PC Com port.

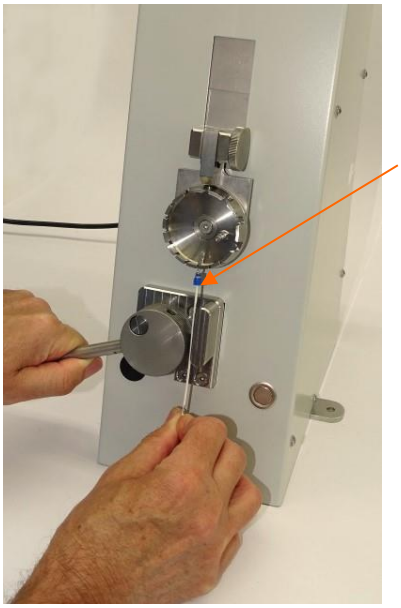
If the device is connected to a PC, the lettering COM is displayed in light blue.



If the PT Viewer PC software is ready to communicate with the device, the COM label turns green.

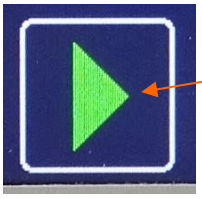
Perform a tensile test

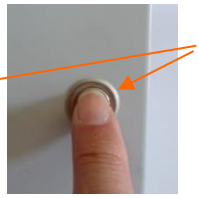
For the transmission of the measurement, it is irrelevant which test mode is selected. The data for the measurement is transferred in the correct form according to the selection.



Insert the cable as shown in the picture.

or

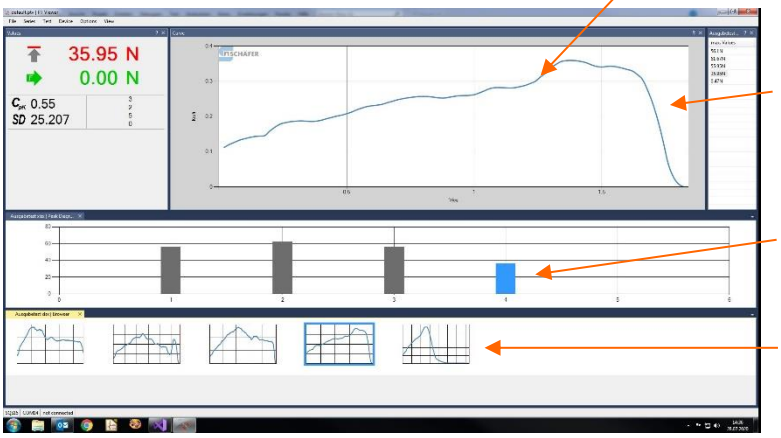




Press Start button

Already during the measurement, the curve values are automatically transferred to the PC.

PC software PT Viewer 3.1



Pull curve

Bar graph of the last measurements (maximum value)

Last measurements with curve preview

For further information, see PT Viewer operating manual.

14.3 LAN connection of the pulltester

If the pulltester is connected to the company's internal LAN, the LEDs on the port will start flashing.

When LAN communication is active, the LAN label turns green.

Note: Application programs for LAN communication are still under development. Individual customer wishes can be implemented here!

14.4 Printer connection

Only a few printers are suitable for connection to the pull tester. A tested and approved device ist the model EPSON, type M188D for cash register rolls 76mm wide plain paper and with serial data connection.

The printer is optionally available as an accessory.

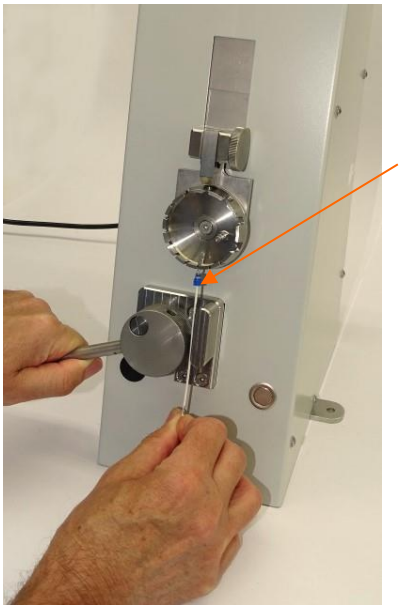
Connect the serial printer cable to the RS232 input.

The correct connection of the printer is not shown in the display of the pulltester, because only one-way communication is possible here.

The secure connection is only shown when the printer responds after the print command.

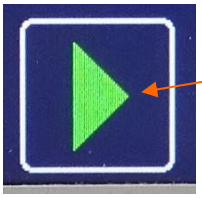
Perform tensile test

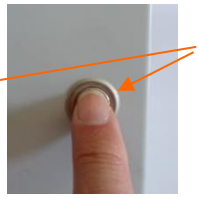
For the transmission of the result to the printer, it is irrelevant which test mode was selected. The printout is standardized in the view.



Insert the cable to be tested as shown.

oder





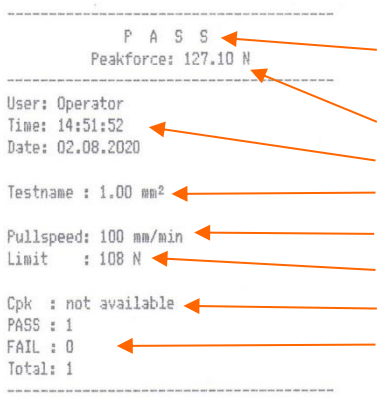
Press Start button

Press field Data export

Pressing the printer symbol starts a printout

Pressing **X** closes the selection menu.

Example for a printout:



PASS or FAIL describe whether the result was above the limit or below.
Peakforce is the largest measured tensile force during the test.
Operator level, time and date
Cross section tested
Tensile speed (constant)
Limit value for the selected cross section
Process capability index for a series of measurements
Counter for OK, NOK and total tests

14.5 Connection to machine control

Communication connections to higher-level machine controls are also possible via the serial RS 232 interface.
Alternatively, communication to other controls can also be realized via the USB 2.0 interface (PC Com).

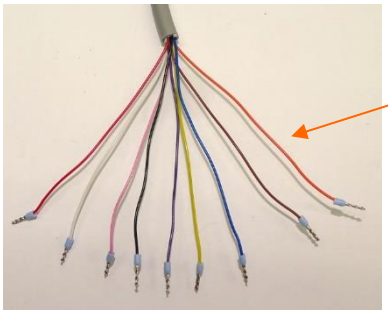
Communication with fully automatic cable processing machines can be mentioned here as an example.

14.6 Digital inputs and outputs

4 digital inputs and 2 digital outputs can be connected to the 9-pin I/O connector.
The inputs have 24 V +/- 10% level and are optically decoupled.
The outputs are relay contacts, approved for 24 V AC/DC and a switching current of max. 1 A.

Assignment of the 9-pin I/O connector (female)

Pin	Name	Function	Colour
1	IN - GND	Ground for inputs	black
2	OUT 2 - NO	Output 2 - switch contact	red
3	OUT 2 - COM	Output 2 - relay input	brown
4	OUT 1 - NO	Output 1 - switch contact	orange
5	OUT 1 - COM	Output 1 - relay input	white
6	IN4	Input 4 +24V	blue
7	IN3	Input 3 +24V	purple
8	IN2	Input 2 +24V	yellow
9	IN1	Input 1 +24V	pink



15 Changing the user level

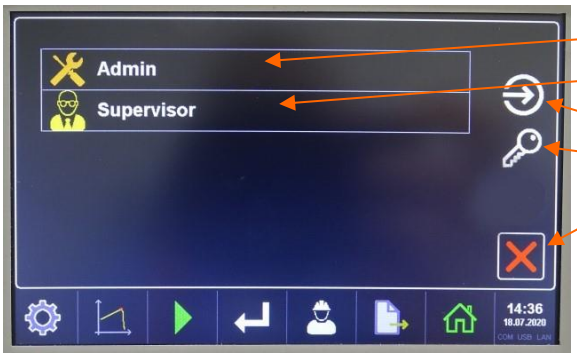
There are 3 access levels available for device operation.

- Level 1: Operator level; no password is required.
- Level 2: Supervisor level; the initial password is “password“
- Level 3: Admin(istrator)-level; the password is given only on request.

To change the user level, please proceed as follows:

Touch the "User level" field.

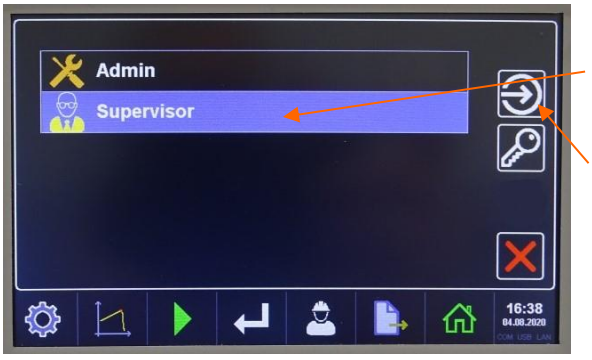
A selection menu for higher access shares opens.



Touch field for admin level
Touch field for supervisor level
Touch field for level login
Button for password change

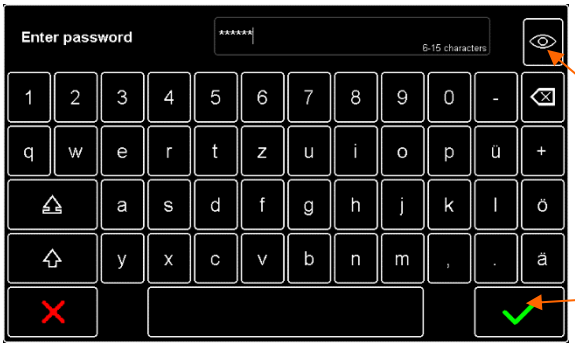
Press **X** to close the menu

15.1 Selecting the supervisor level



Activate the Supervisor field by touching it.

Touch the Register level field.



The window for entering the password opens.

By pressing on the “eye symbol” the entered password becomes visible”.

Enter the password for the supervisor level and confirm it with the green check mark.

The icon shows that supervisor level is logged in.

Setting functions Pulling speed, maximum holding force, preload force and holding time can now be set.

It is now also possible to set the system parameters.

To exit the supervisor level, press this symbol.

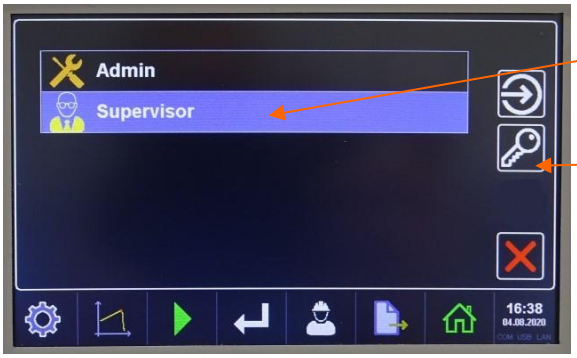
The device is back in the operator level.

15.2 Change Supervisor password

To change the password, please proceed as follows:

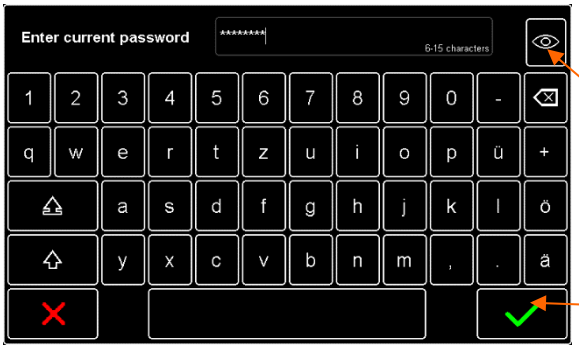
Important: Start from operator level!

Press the "User Level" field.



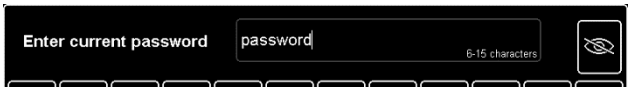
Activate the Supervisor by touching it.

Press onto the field with the key symbol.

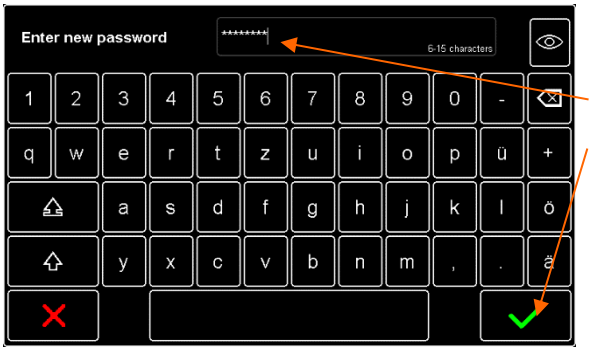


The window for password entry opens.

By pressing on the “eye symbol” the entered password becomes visible.

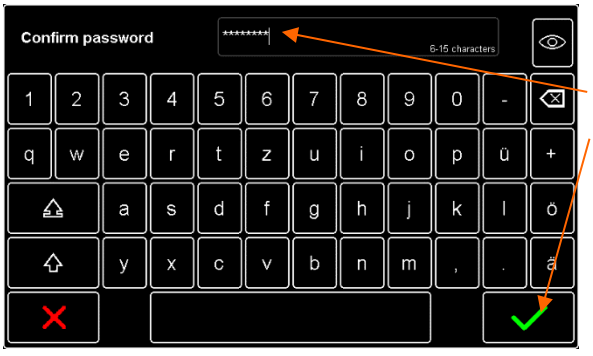


Enter the current (old) password for the Supervisor level and confirm with the green tick.



Enter the new password (**at least 6 digits**) and confirm with the green tick.

Attention: Choose a password which you can remember easily!



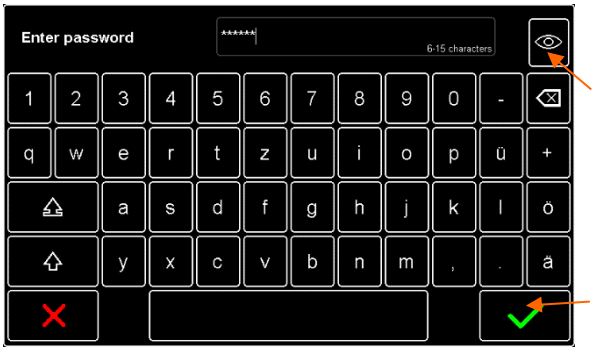
Enter the newly selected password again for confirmation and confirm with the green tick.

The new password is active from now on and the old one is deleted.

15.3 Select Admin level

Activate the Admin field by touching it.

Touch the Log on field.



The window for entering the password opens.

By pressing on the “eye symbol” the entered password becomes visible.

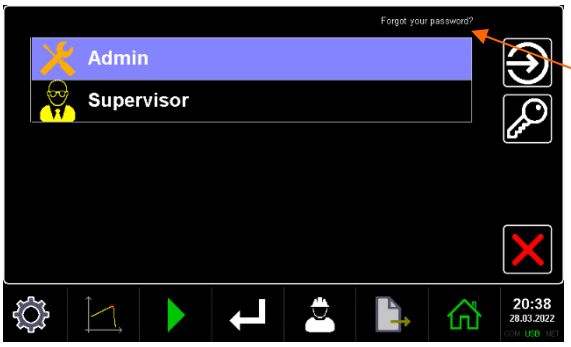
Enter the password for the admin level and confirm it with the green tick.

Icon indicates that the admin level is logged in.

To exit the admin level, press this icon.

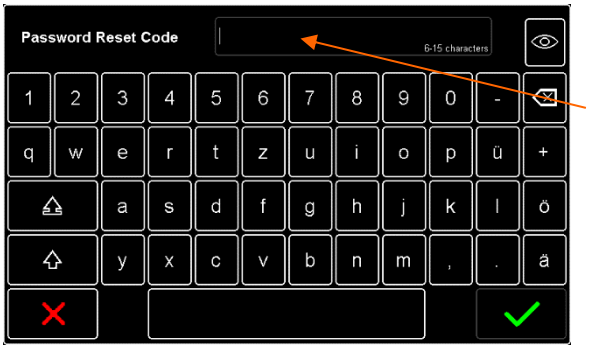
Device is again at operator level.

15.4 Forgot Admin password



Press on the text "Forgot your password?"

A menu for password entry opens.

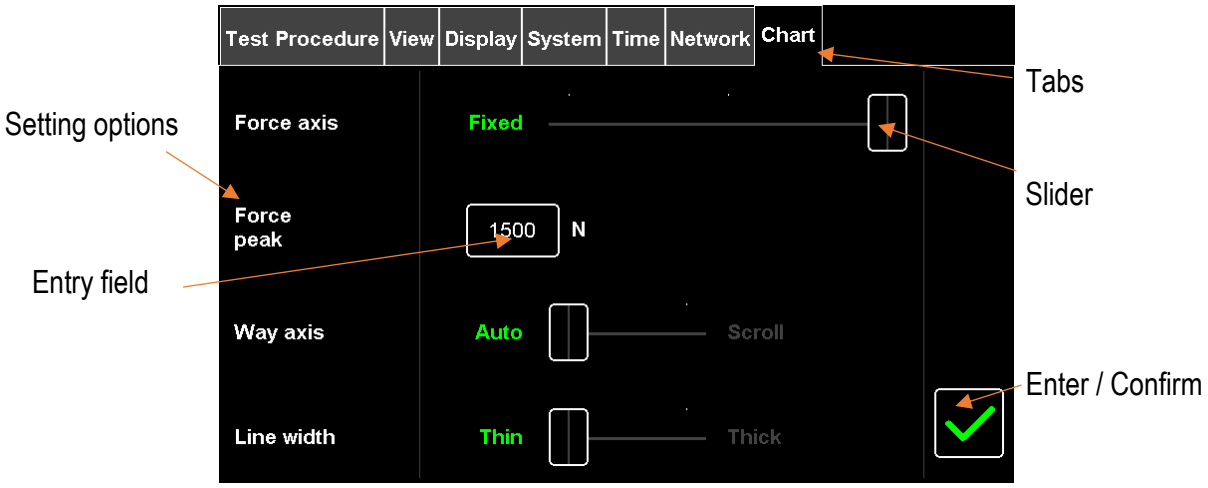


A "Password Reset Code" can be requested from the supplier of the device, which must be entered here. The device is then reset to the initial password.

Note: The Password Reset Code can only be used once and is invalid afterwards.

16 System parameter

After pressing the button  the "System settings" window is displayed. The number of available tabs depends on the permissions of the logged-in user.



By touching the tabs at the top, you can switch between the different menus of the system settings. Changes that have already been made don't get lost.

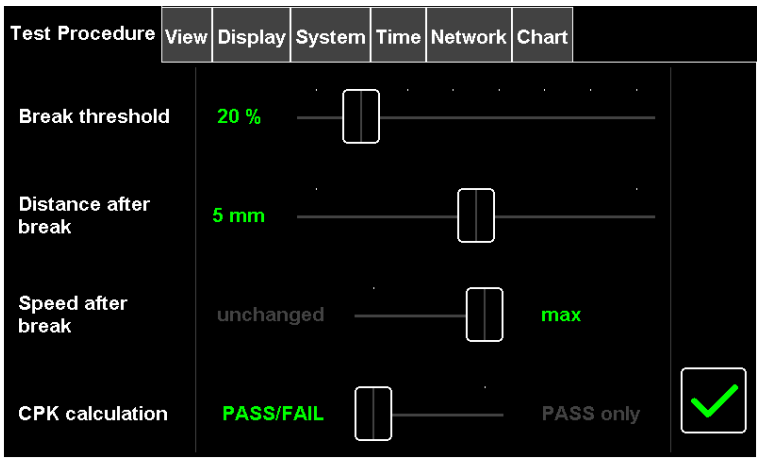
After pressing the "Enter" button  , the "System settings" window is closed and the changes are saved. This button is available in the same position in all menus.

In the left part of the menus, the setting options for the respective tab are displayed.

By dragging the slider (left / right) the corresponding setting can be changed. The selected value is highlighted in colour.

Some values must be entered via the on-screen keyboard. In this case, an input field  is displayed. After pressing the input field, the on-screen keyboard is displayed and the value can be entered.

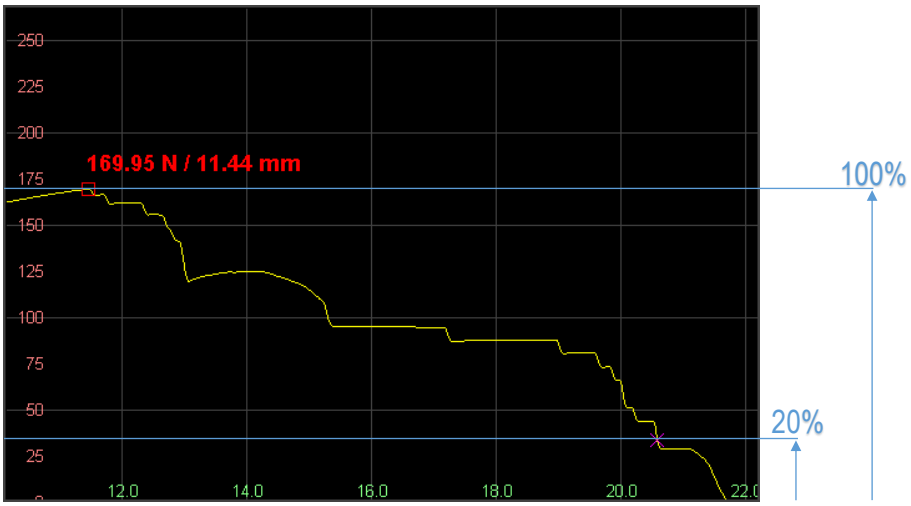
16.1 Menu “Test procedure“



16.1.1 Break threshold

Setting range: 10 – 80 % in steps of 10 %
Factory setting: 20 %

During the pull-off test, the instrument continuously compares the measured peak force with the currently applied force. If the current applied force falls below the percentage of the peak force set here, this is interpreted by the device as the conductor being pulled out of the crimp barrel, or as the breaking of wire or test piece. The following example shows the force curve of a pull-off test from peak value to the end of the measurement. The break detection was set to "20 %":



The red mark indicates the peak value of the force, the purple mark the point at which the force has fallen below the set break detection threshold.

The formula for calculating the threshold is as follows:
Threshold = peak force x break detection setting / 100 %

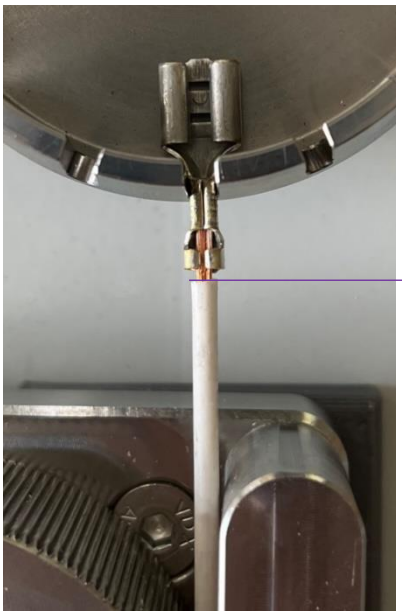
For this example: 169.95 N x 20 % / 100 % = 33.99 N

16.1.2 Distance after break

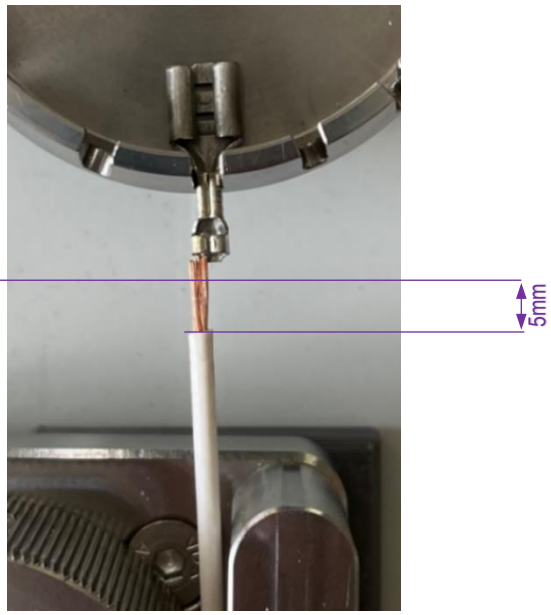
Settings: 0 mm, 5 mm, 10 mm
Factory setting: 5 mm

To improve the visibility of the break or the pulling out of the conductor, the instrument can be set to pull out the conductor further by a certain distance after the break detection has been triggered.

The following pictures show the test specimen of the pull-out test from 16.1.1:



Test specimen at the time of triggering the breakage detection (purple marking). The defect of the crimp connection is barely visible.
Setting "Distance after break": 0 mm.



Test specimen after a further 5 mm has been pulled. The defect of the crimp connection is clearly visible.

Setting "Distance after break": 5 mm.

16.1.3 Speed after break

Settings: equal, max
Factory setting: max

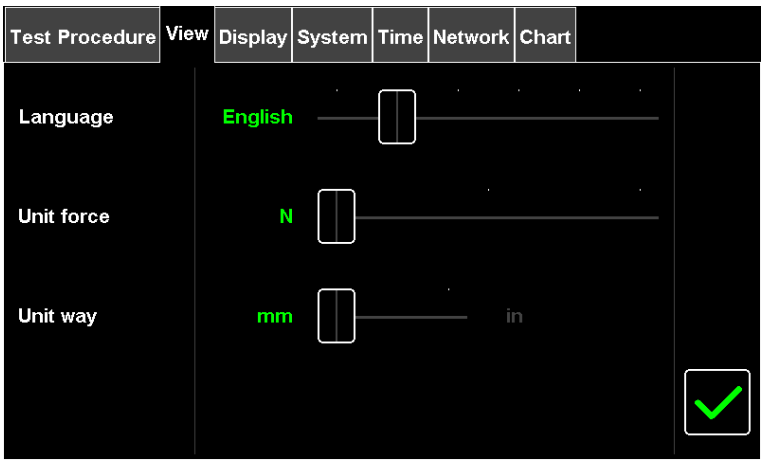
The distance set under "Distance after break" (16.1.2) can be drawn either with the set pull-off speed or with the maximum possible speed.

16.1.4 CPK calculation

Settings: PASS/FAIL, PASS only
Factory settings: PASS/FAIL

In some measuring programs the process capability index CpK is calculated. With this setting it can be selected whether only the tests rated as "good" (PASS only) or also the tests rated as "insufficient" (PASS/FAIL) should be included in the calculation.
A test is evaluated as "good" if the measured peak value of the pull-off force is above the set target value.

16.2 Menu “View”



16.2.1 Language

Settings: Deutsch, English, Italiano, Français, Español, Romana
Factory setting: English

Setting of the system language.

16.2.2 Unit Force

Settings: N, kgf, lbf
Factory setting: N

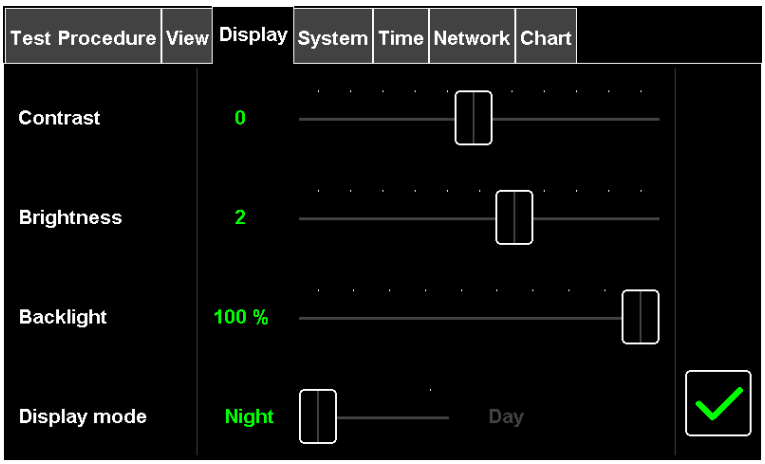
Selection of the unit system for the force: Newton (N) / force kilogram (kgf) / force pound (lbf)

16.2.3 Unit way

Settings: mm, in
Factory setting: mm

Selection of the unit system for the length: millimetre (mm) / inch (in)

16.3 Menu “Display”



16.3.1 Contrast

Settings: -10 to +10
Factory setting: 0
Adjustment of the colour contrast of the display.

16.3.2 Brightness

Settings: -10 to +10
Factory setting: 2

Adjustment of the brightness of the display.

16.3.3 Backlight

Settings: 10 % bis 100 %
Factory setting: 100 %

Setting of the intensity of the backlight of the display.

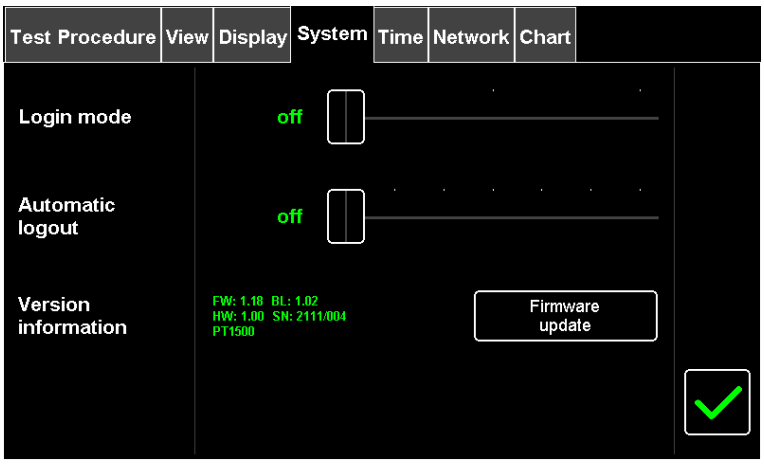
16.3.4 Display mode

Settings: night, day
Factory setting: night

With this setting, the colour scheme of the display can be changed. Two different display modes are available:

- Setting “night” → pleasant working indoors with artificial lighting.
- Setting “day” → better readability in sunlight.

16.4 Menu “System”



16.4.1 Login mode

Settings: off, levels, user
Factory setting: off

The operation options of the unit can be restricted for certain users if desired. In this case, the access level or the name of the user performing the check is noted on the printout and, if necessary, transmitted to the connected PC.

Setting “off”

In this mode, all unit functions, with the exception of user administration, are available without restriction. A password entry is not necessary.

Setting “Levels”

If the button ☑ is pressed after changing the login mode to "Levels", the password restriction can only be switched off after entering the administrator password.

In the delivery state, the administrator password is: **access**

After the changeover, three access levels are available for operating the unit:

	**User**	The "User" may select the test mode and perform deduction tests. He only has access to the menus "View" and "Chart". He cannot change any test settings such as setpoint or take-off speed. No password is required for the "User" level. After switching on, the unit starts in the "User" access level.
	**Supervisor**	The "Supervisor" also has access to all test settings, e.g. setpoint or pull-off speed, and to the "Test procedure" menu. The menus "System", "Time" and "Network" are not available to him. In the delivery state, the supervisor password is: **password**
	**Admin**	The "Administrator" has full access to all unit functions. In the delivery state, the administrator password is: **access**

Setting „User"

If the button is pressed after changing the login mode to "User", the operation of the unit is only possible after successful login. The password of the respective user is required for logging in.

If the button ☑ is pressed after changing the login mode to "User", the operation of the unit is only possible after successful login. The password of the respective user is required for logging in.

In the delivery state, the password for the user Admin is: **access**

Up to 100 users can be registered in the unit. The following data can be entered individually for each user: Name, ID (e.g. personnel number), password, photo, access rights, signal colour.

The administration of users is described in chapter 16.8 Menu "Users"
After the login mode has been set to "User" and confirmed with the button ☑, it is necessary to log in as a user with administrator rights. In the delivery state, this is the user "Admin" with the password "access". Then the menu "User" is displayed in the unit settings.

Users without administrator rights do not have access to the "Users" menu.

The users "Admin" and "Supervisor" cannot be deleted, renamed or changed with regard to access rights. However, it is possible to change the password, signal colour and photo. It is recommended to write down the administrator password and store it in a safe place.

16.4.2 Automatic logout

Settings: off, 1 min., 5 min., 10 min., 15 min., 30 min., 60 min.
Factory settings: off

In the login modes "Levels" and "User", it can be selected after which time of non-use the logged-in user should be automatically logged out.

16.4.3 Version information

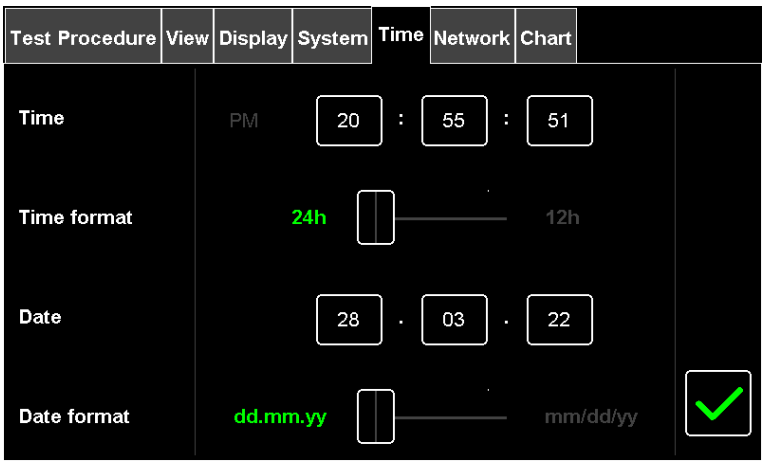
The displayed information has the following meaning:

FW: Version of device firmware
BL: Version of boot loader
HW: Version number of the electronics installed in the unit
SN: Serial number of the device
Device type

16.4.4 Button "Firmware update"

If an update of the unit firmware is required, the corresponding procedure can be started by pressing this button. It is necessary that a USB stick containing an update file has been connected to the unit beforehand (see 16.11 Firmware update).

16.5 Menu “Time”



Time and date settings are applied immediately after entry.

The unit's real-time clock is powered by a built-in battery so that the time and date settings are retained even without a power supply.

16.5.1 Time

The unit's system time can be set by pressing the corresponding buttons.
To set hours and minutes, the entry has to be made via the on-screen keyboard. The seconds setting is switched to 0 after touching the button.
If the "time format" has been set to "12h" the setting for the time of day is active. In this case, the setting switches between "AM" and "PM" after each touch of the button.

16.5.2 Time format

Settings: 24h, 12h
Factory setting: 24h

The time can be displayed either in 24-hour format or in 12-hour format with display of (AM/PM).

16.5.3 Date

The date can be set by pressing the corresponding buttons. The entry is made via the on-screen keyboard.
The year is to be entered in two digits (without the millennium), e.g. for 2022: 22.

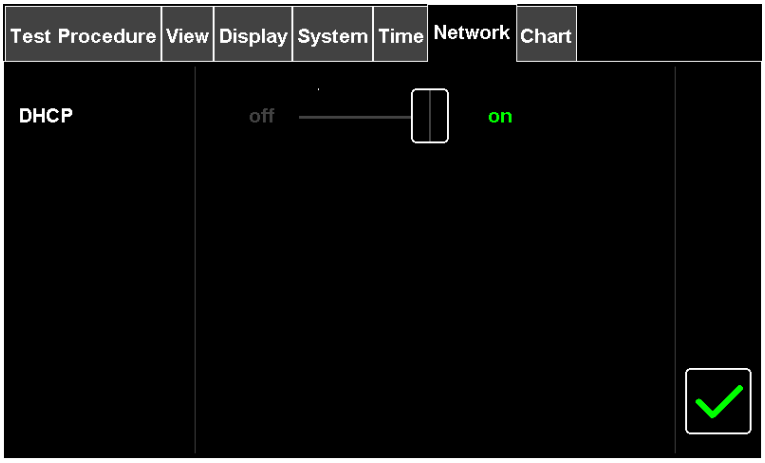
16.5.4 Date format

Settings: DD.MM.YY, MM/DD/YY
Factory setting: DD.MM.YY

The date can be displayed either in German format (DD.MM.YY) or in American format (MM/DD/YY).

16.6 Menu “Network”

Network functions are offered on a customer-specific basis. If necessary, further information can be requested from the supplier of the device.
Before connecting the device to a network (LAN), the correct settings for the network configuration must be requested from the administrator of the network.

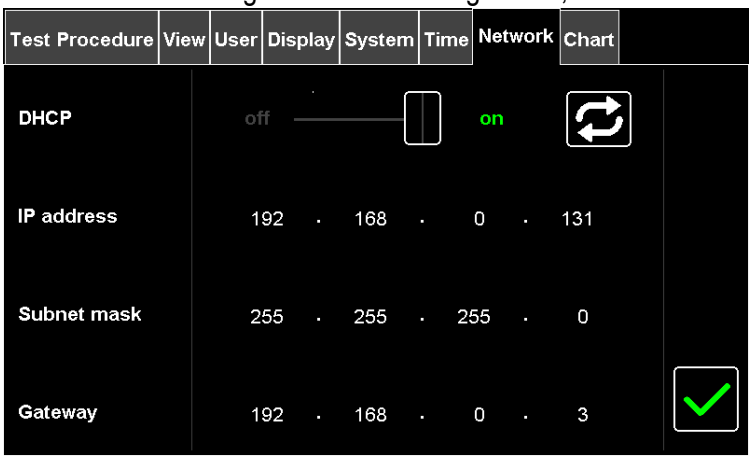


16.6.1 DHCP

Settings: off, on
Factory settings: on

Setting “on”

If the unit is connected to a network with a DHCP server, it will automatically try to obtain the network configuration from the server after connecting the network cable.
After successful assignment of the configuration, it is automatically displayed:



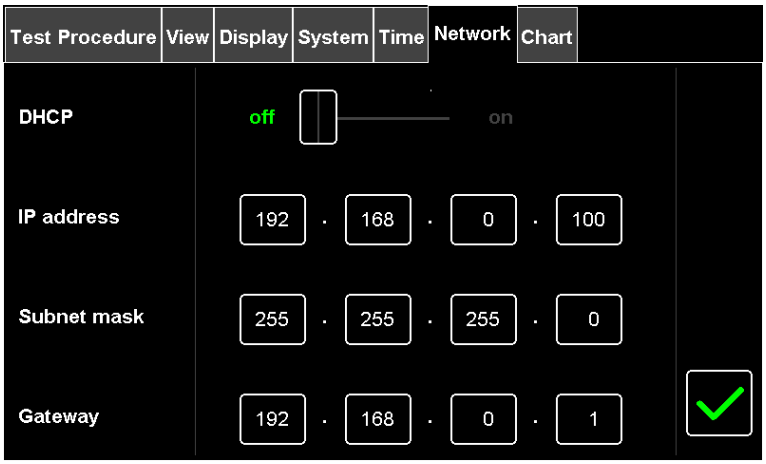
The unit has been assigned the IP address 192.168.0.176 by the DHCP server. Pressing the button disconnects the existing network connection and the unit tries again to obtain the network configuration from the DHCP server.

Setting “off”

The network configuration can be entered manually.

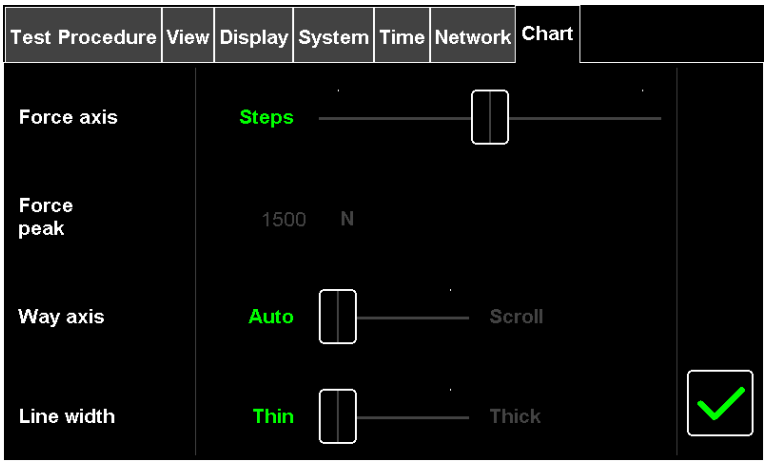
16.6.2 IP address, subnet mask and gateway

If DHCP is set to "off", the network configuration must be entered manually.



The individual values can be changed by pressing the corresponding buttons. The input is made via the on-screen keyboard.

16.7 Menu “Chart”



16.7.1 Force axis

Settings: auto, steps, fixed
Force setting: steps

The type of scaling for the force axis in the graphic display can be set as follows:

Setting "Auto"

The force axis is always scaled so that the curve fills the entire image.

Setting “Steps”

The force axis is scaled in steps. If the peak value of the force exceeds the maximum value that can be displayed, the axis is switched to the next higher display range.

Setting "Fixed"

The maximum value of the force axis is set to the value set under "Force peak value". Automatic scaling does not take place.

16.7.2 Force Peak
The maximum value of the force axis for the "Fixed" setting can be entered here.

16.7.3 Way axis
Settings: Auto, Scroll
Factory setting: Auto

Setting "Auto"
The path axis is always scaled so that the curve fills the entire image.

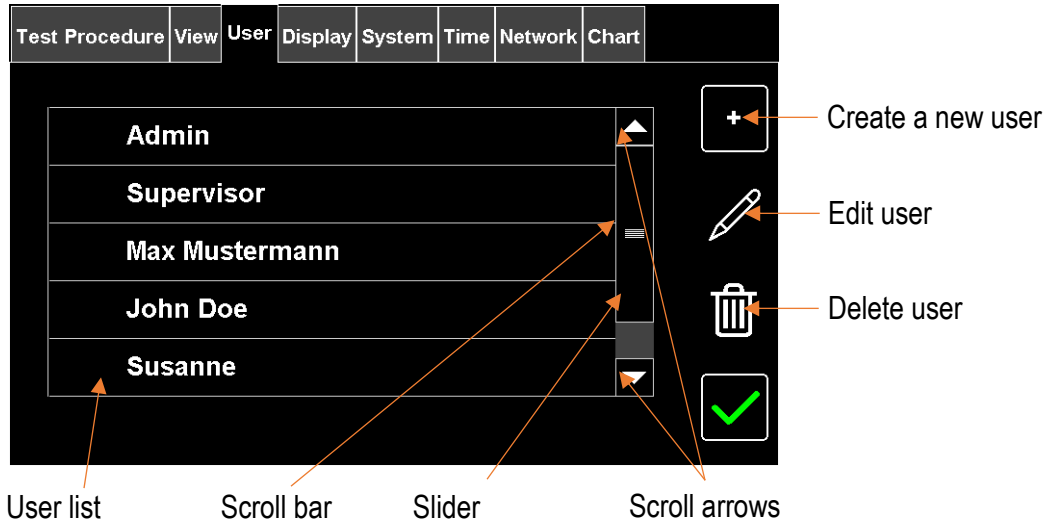
Setting „Scroll"
The scaling of the path axis is kept constant. The start and end values of the axis are carried along with the path of travel.

16.7.4 Line width
Settings: thin, thick
Factory setting: thin

The line width of the graph can be set in two steps.

16.8 Menu "User"

The user menu is only visible after the "User" setting has been selected in the "System" menu under "Login mode" (see 16.4.1) and confirmed by pressing the button ☑ .
After that, a user with administrator rights must log in. In the delivery state, this is the user "Admin" with the password "access".
Users without administrator rights have no access to the "User" menu.



16.8.1 User list

The user list shows all users stored in the unit. The users "Admin" and "Supervisor" are already created in the delivery state and cannot be deleted.

A user is selected by pressing the respective username. The selected user is marked in colour.

If the number of stored users is larger than the display area, a scroll bar is displayed at the right border of the user list.

You can navigate through the list by dragging the slider or pressing the scroll arrows.

16.8.2 Creating a new user

After pressing the button , the dialogue for creating a new user is displayed (see Chapter "16.9 Creating a new user").

16.8.3 Editing a user

Before a user can be edited, it must be selected in the user list. By pressing the button the dialogue for changing the user shows up (see Chapter "16.10 Editing users").

16.8.4 Deleting a user

Before a user can be deleted, it must be selected in the user list. Then the selected user can be deleted by pressing the button .

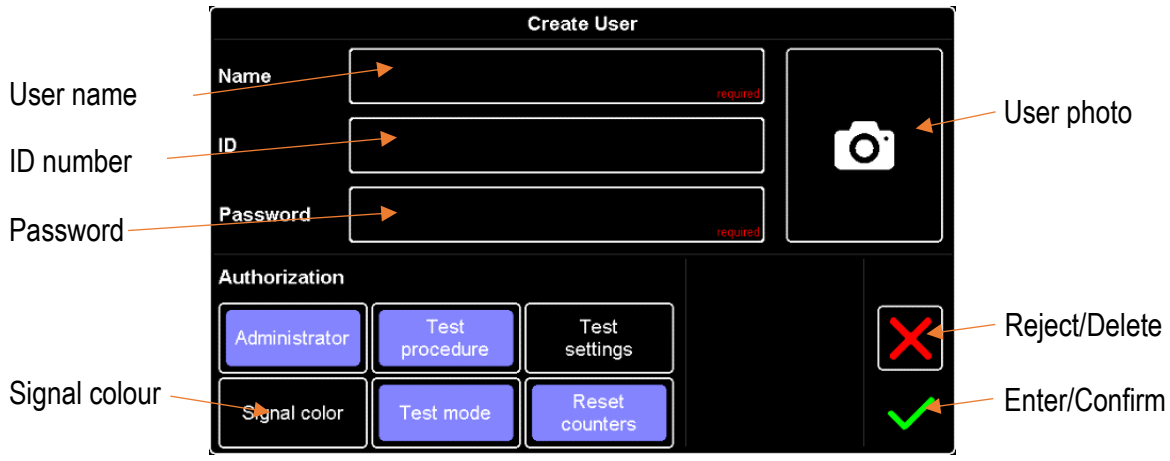
To avoid accidental deletion, a confirmation prompt appears afterwards. The user is deleted by pressing the button . It is not possible to restore the user.
The process can be cancelled by pressing the button .

The users "Admin" and "Supervisor" cannot be deleted. It is recommended to store the password of the user "Admin" (system administrator) in a safe place.

The system administrator (Admin) can reset the passwords of users if necessary. Passwords can generally not be displayed after they have been entered.

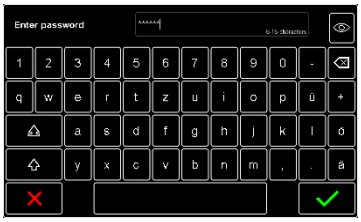
16.9 Creating a new user

The dialogue for creating a new user is displayed after pressing the button in the "User" menu.



16.9.1 Name, ID and password

After pressing one of the buttons, the on-screen keyboard appears.
The characters of passwords are displayed as "*" in the dialogue for security. Passwords are stored encrypted in the unit (256 bit key) and cannot be read even by the manufacturer.



It is mandatory to enter the username and password. Otherwise, the button ✔ for confirming the entries is blocked. During password entry, the password can be displayed by pressing the button 👁. After entering the password, it must be confirmed again for security.

The entry of an ID or personnel number is optional and intended for future functions.

16.9.2 User rights

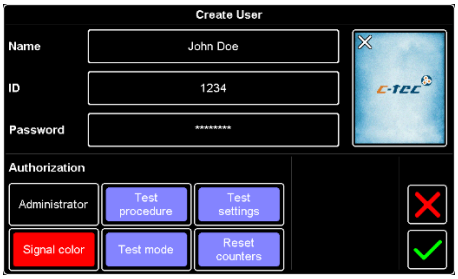
By pressing the buttons, various permissions can be granted to or withdrawn from the user. If a button is colour-coded, the corresponding permissions have been granted.

Button	Permissions
No user rights selected	• Starting trigger tests • Switching between numerical and graphic display • Switching on automatic return • Accessing the following pages of the main menu: View, Chart
Administrator	• Access to the following pages of the main menu: User, Display, System, Time, Network
Test procedure	• Access to the following page of the main menu: Test procedure
Test settings	• Access to setting of trigger speed, test force, holding force and holding time
Test mode	• Selection of the test mode
Reset counter	• Resetting the test counters and the process capability index CpK

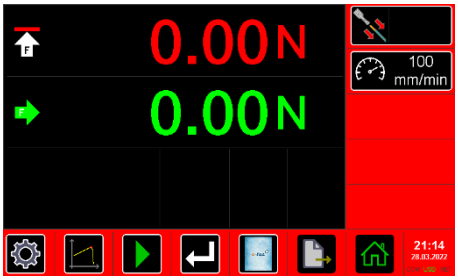
16.9.3 Signal colour

Settings: off, red, yellow, orange
Factory setting: off

The login of certain users can be signalled by selecting the background colour. For example, it can be clearly indicated that an administrator is logged in. The "Signal colour" button is marked with the selected colour. By pressing the button, it is possible to switch between the selection options.



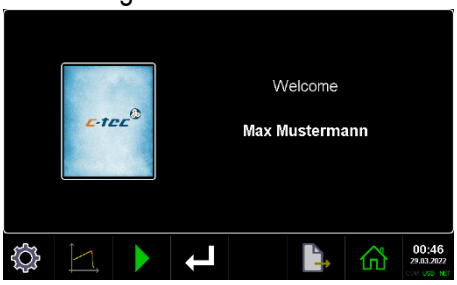
Signal colour “red” is chosen



Background when user is logged in

16.9.4 User photo

For each user a photo can be saved in the unit. The photo is displayed instead of the username in the user change button.

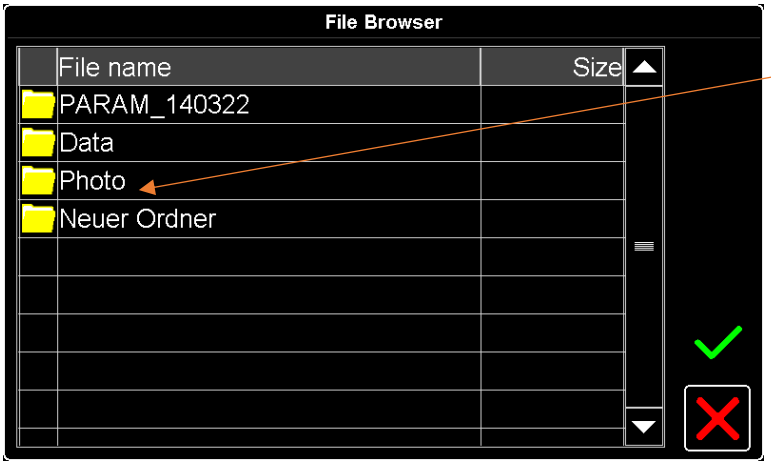


Welcome screen with user photo

Display of the user photo during operation

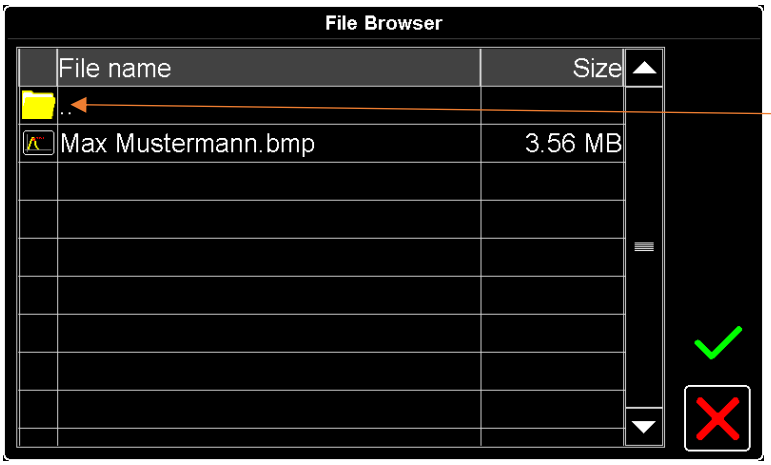
The user photo must be in the format "Windows Bitmap" with the extension ".bmp". With very large files, it is recommended to reduce the image size with an image editing program (e.g. Paint) before reading it into the unit. The "User photo" button is only active after a USB stick has been connected to the unit and recognised. The USB stick must be formatted with the file system "FAT-32". Before connecting, the image file containing the user photo must have been copied to the USB stick.

After the "User photo" button has been pressed, the file browser appears. Only directories and files with the extension ".bmp" are shown.



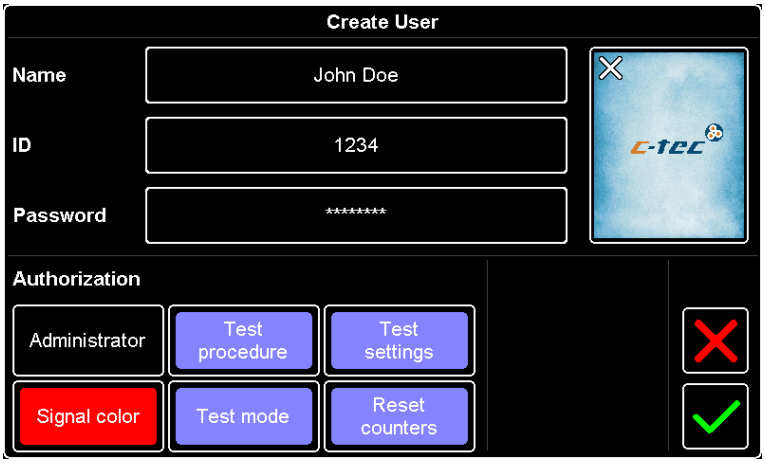
Double click to open directory

To open a directory, press the directory name twice at short intervals (double-click). To change back to the parent directory, double-click on the directory with the name "...".



Double click to get back to parent directory

Before loading an image file, it must be selected by pressing the file name once. The selected file is highlighted in colour.
Pressing the button ✔ loads the image file. The process can be cancelled by pressing the button ✘. The loading process is indicated by a progress bar and can take several seconds depending on the file size. After the image has been loaded, it is displayed in the dialogue window. The USB stick can now be removed from the unit.



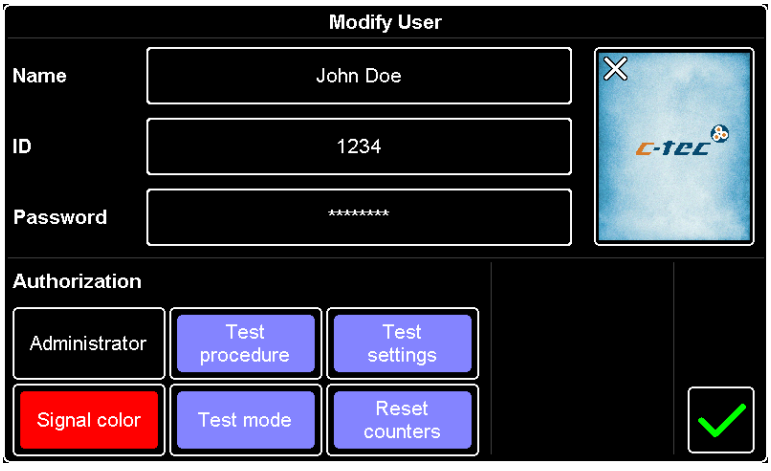
By pressing the "User photo" button again, the photo can be deleted.

16.9.5 Confirm, Reject

After entering all data for the user, the button ✔ must be pressed to save the user in the unit. The new user then appears in the user list and can be used. Pressing the button ✘ discards the entry. The user will not be saved.

16.10 Modifying a user

The dialogue for modifying a user is displayed after selecting an entry in the user list in the "Users" menu and pressing the button ✎.



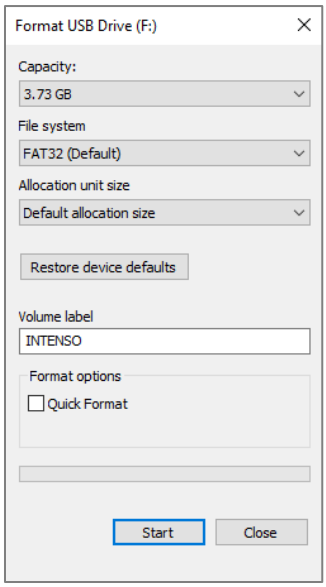
The operation is carried out in the same way as described under "16.9 Creating a new user".

Pressing the button ✔ accepts the changes. By clicking on the button ✘ the changes will be deleted.

16.11 Firmware Update

The menu "System" with the button "Update Firmware" is only visible when the user administration is switched off, after a user with administrator rights has been logged in.

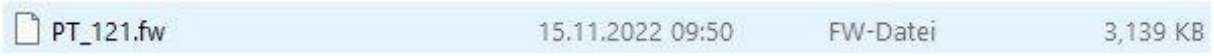
For firmware (control and display software) updates on the Pulltester only USB 2.0 sticks are allowed at the moment!



Before using the device, the USB stick must be formatted to the FAT32 file system (data storage devices supplied by C-tec are already formatted).
Attention: All data on the stick will deleted during formatting!

Proceed as follows:
Plug the stick into the USB port of a PC. In Windows Explorer, click on the USB stick with the right mouse button. Then click on Format, select **FAT32** from the drop-down menu for File System, **deselect** Quick Formatting and select **standard size** for Size of Assignment. Click on Start.
The stick is reformatted.
.

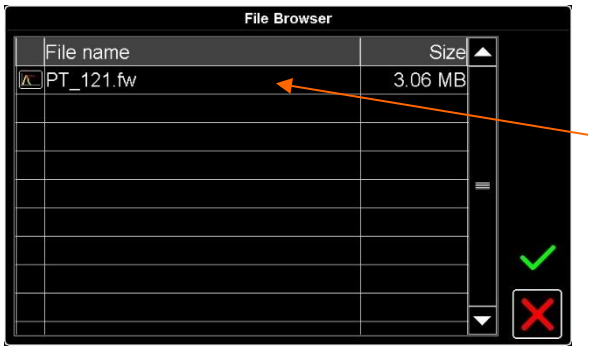
Copy the file with the new firmware on a PC to the USB drive.



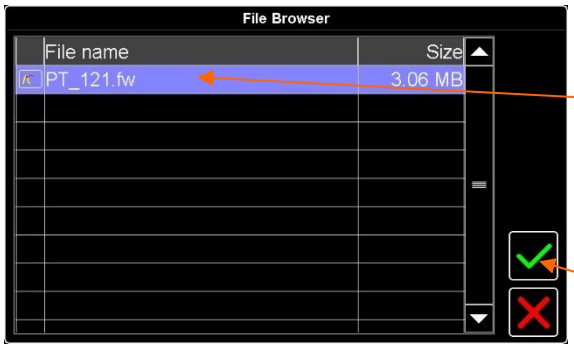
Then plug the USB stick into the Pulltester

The ready-for-use stick is indicated by the green "USB" in the Time/Date field

Press the Firmware Update button.



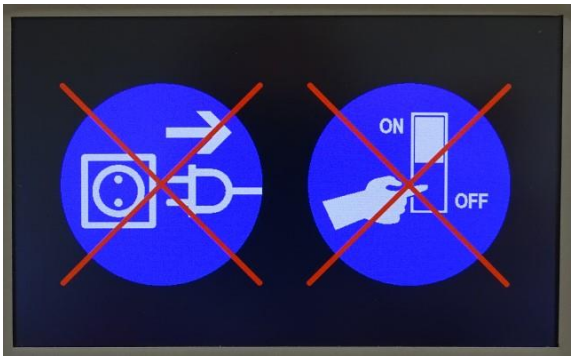
The table shows all files with ".fw" suffix stored on the stick.



Select the desired update file by touching it. The file extension .fw means Firmware. The number in front shows the version.

Confirm the selection by clicking on the green tick.

In the following step the selected file is transferred from the USB stick to the internal SD card.
Note: At this stage the update process can still be aborted by switching off the device without losing data.



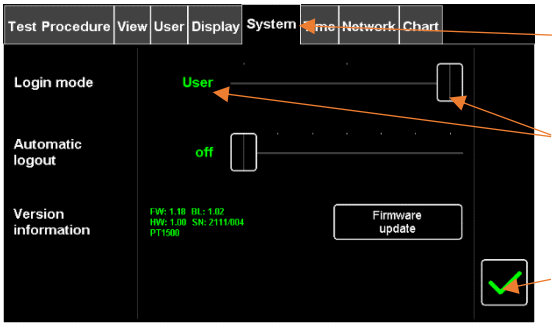
If these two symbols are shown in the display, the actual firmware update is now running. At this stage the device must by no means be disconnected from the power supply anymore.
If this should happen, the device will start an emergency program after 1 minute when the power supply is restored. In this emergency program the update can be started again.

If you can read "UPDATE COMPLETE!" in the progress bar, the process has been successfully completed.

17 Example procedure for activating the user administration and creating a user after commissioning the unit

The following instruction steps show how to activate the user administration from the delivery state. Then a new user with administrator rights is created.

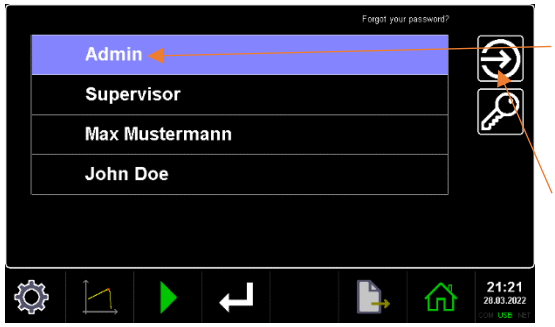
1. Click button to display system parameters



2. Click on the tab System to go the “System” menu

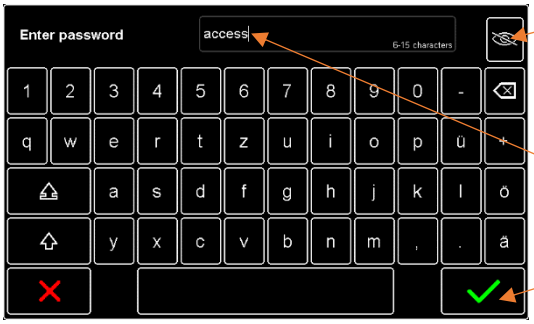
3. Put the slider “Login mode” to “User” position

4. Press ☑



5. Press the username "Admin" to select it. The field will be displayed in a different colour.

6. Click on to login



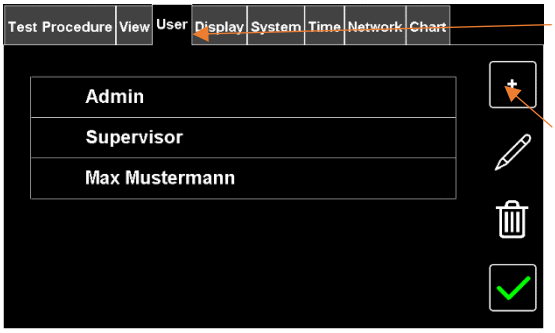
7. Press the button to display the entered characters instead of the placeholders "*".

8. Enter the password for the user "Admin". The default password is "access".

9. Press the button ☑ to confirm the entry.

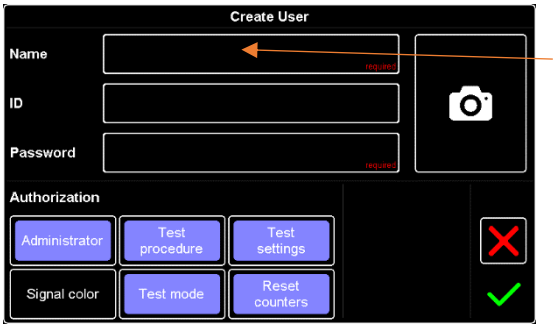
10. The successful login of the user "Admin" is confirmed by displaying the name.
If this is not the case, the password was entered incorrectly. In this case, steps 5-9 must be repeated.

11. Click here to get to System parameters

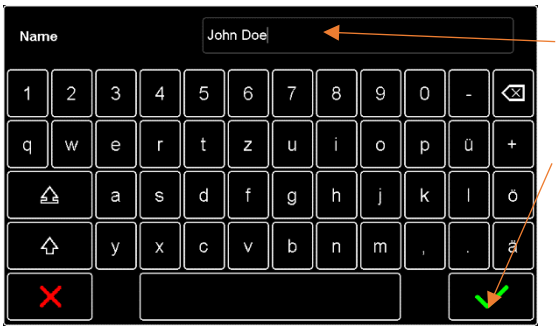


12. Press the tab “User” to switch to the User menu.

13. Click on ☐ to display the dialogue for creating a new user.

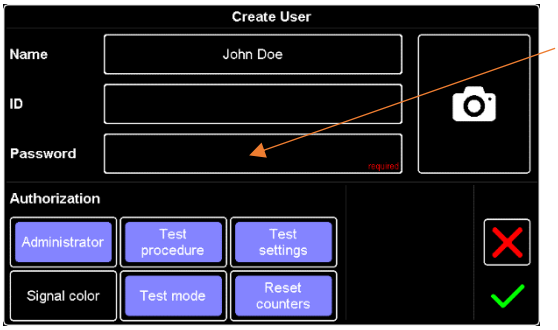


14. Touch the field for the username.

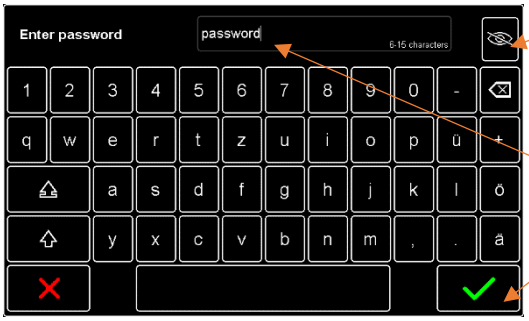


15. Enter the username using the on-screen keyboard.

16. Confirm with ☑



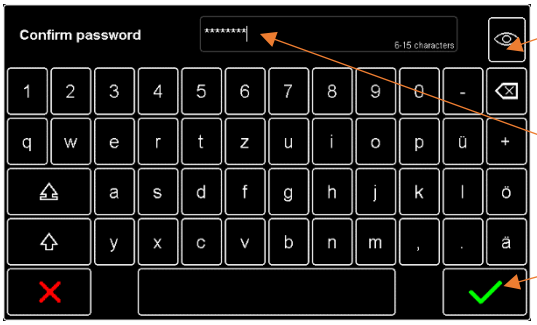
17. Touch the field for the password.



18. Press the button so that the entered characters are displayed instead of the placeholders "*".

19. Enter a password for the new user consisting of 6 - 15 characters. In this example, "password" was selected as the password.

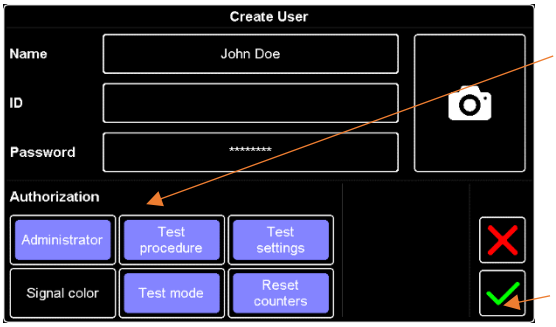
20. Confirm with the button ✓.



21. Press the button so that the entered characters are displayed instead of the placeholders "*".

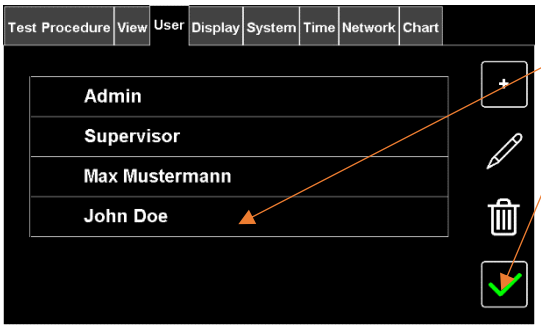
22. Enter the password again for confirmation.

23. Confirm with ✓



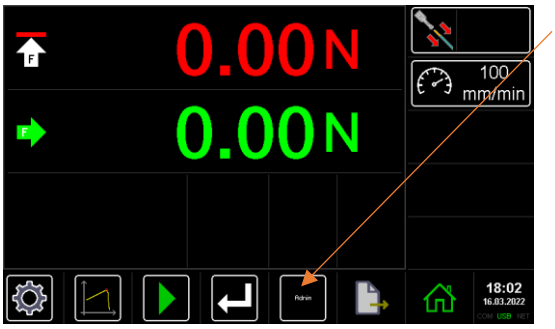
24. To give the new user the same permissions as the "Admin" user, activate the 5 fields in the "Access rights" area (colour-coded). The new user can then operate the unit without restrictions (e.g. manage users).

25. Confirm with ✓

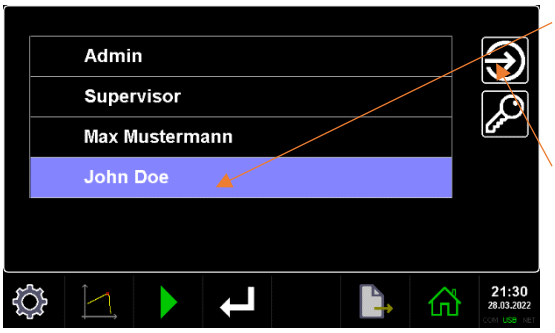


26. The new user has been saved in the unit and can now be used to log in.

27. Confirm with ✓

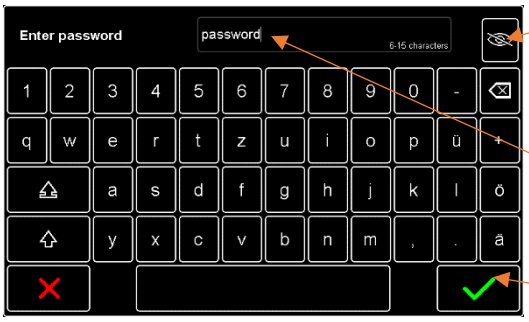


28. Press the "User" button to log off the "Admin" user.



29. On the login screen, press the name of the new user to select it. The field will be colour-coded.

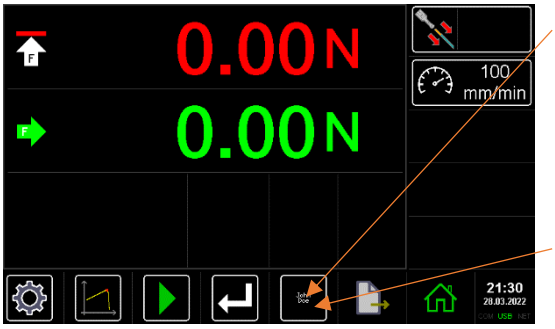
30. Press the login button



31. Press the button so that the characters entered are displayed instead of the placeholders "*".

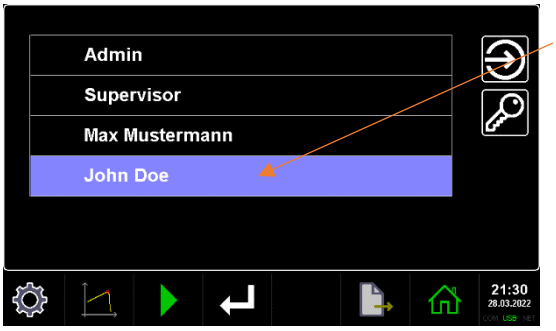
32. Enter the password that has been set for the new user. In this example: "password".

33. Confirm with



34. The successful login of the new user is confirmed by the display of his or her name. If this is not the case, the password was entered incorrectly. In this case, steps 29-33 must be repeated.

35. To log out the user again, press the User button.



36. After logging out, the login screen is displayed again. The last user to log on is automatically selected.

18 Handling, Maintenance and Servicing

To keep the unit in a proper condition the following provisions have to be observed:

- Remove destroyed test samples properly (contact element and cable).
- If necessary, clean the touch colour display only with a soft cloth.
- Do not use harsh cleaning agents or chemicals for cleaning.

Since no wearing components have been built into the pull tester, only minor maintenance work is required.

19 Periodical Inspections

The Pulltester is a high quality and precise measuring device used for quality control. It is therefore subject to a regular recurring calibration. An initial calibration is carried out before delivery of the device. Under normal use of the device, the recalibration should be done once a year. Calibration is performed exclusively by the manufacturer.

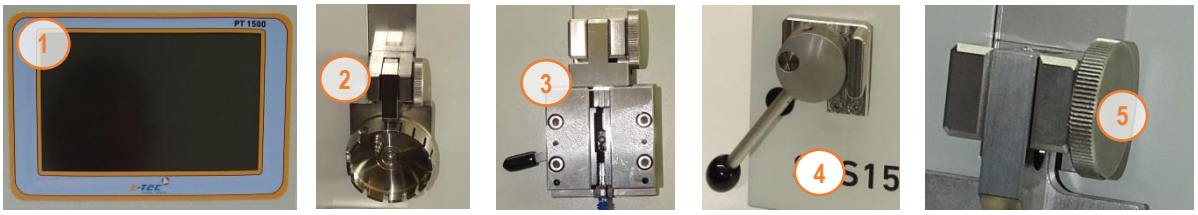
20 Decommissioning

Don’t dispose the unit with residual waste!

This unit is subject to the European Community Directive for used electrical and electronic devices and may not be disposed in regular household garbage.

After period of use the device can be returned to C-tec for duly recycling.

21 Spare parts



No	Article no.	Description
(**1**)		Touch colour display
(**2**)	800162	Clamping crown complete
(**3**)	800500	Wedge gripper complete
(**4**)	800454	Quick clamping device complete
(**5**)	303234	Locking screw for clamping crown or wedge gripper

22 Possible failures and troubleshooting

Failure description	Possible reasons	Troubleshooting measures
The display remains dark after switching on.	1) The device needs about 5 seconds to initialize the display after switching on. During this time the display remains dark. 2) The power cable is not correctly connected to the mains or to the unit. 3) The mains voltage is not available because a protection device of the power supply has been triggered. 4) The fine-wire fuse of the machine has tripped.	1) Wait 5 seconds after switching on the machine until the display shows 2) Connect the power line first to the machine and then to the power socket. 3) Have the malfunction at the power supply system remedied by an authorized specialist. If the safety device should be triggered again when connecting or switching on the machine, disconnect the machine from the power supply immediately and contact the manufacturer's service department. 4) Contact the manufacturer's service department to solve the problem.

Failure description	Possible reasons	Troubleshooting measures
The display remains dark after a firmware update.	During the update the power supply was interrupted.	The device tries to restore the firmware. The process takes about 2 minutes. During this time the display remains dark. After the recovery, the device automatically starts with an older version of the firmware. The update must be repeated. If after 5 minutes no automatic restart has taken place, switch off the device for 1 minute and then switch it on again. The recovery process starts again. The display remains dark. If the device still does not start after the 2nd attempt, the manufacturer's service must be contacted.
The device stops during the return journey and immediately moves approx. 1mm in the opposite direction. In the status field the error sign for "Travel blocked" is displayed:  This happens, if during the return journey a) pressure is applied to the lower cable support or b) no movement of the feed is measured although the drive is running The short movement in the opposite direction serves to relieve the load in case a foreign body is jammed.	1) The sample item was clamped during the return travel and presses on the lower cable support. 2) A foreign object is located between the clamping crown or gripper and the lower cable support. 3) The drive or the travel is otherwise blocked.	1) Remove the test specimen and start the return travel again. 2) Remove the blockage. Afterwards the tester can be used again. 3) If the reason is not obvious, contact the manufacturer's service department.

Failure description	Possible reasons	Troubleshooting measures
Date and time settings are reset after power is removed or the unit is turned off.	The internal battery for operating the real-time clock is empty.	Contact the manufacturer's service department so that they can replace the battery.
A connected USB memory stick is not recognized (USB display under Date remains grey), or data is not correctly transferred to the USB memory stick.	1) The USB memory stick is not formatted with the FAT32 file system 2) A memory stick was used that does not comply with USB standard 1.0, 1.1 or 2.0. 3) There is not enough free space on the memory stick.	1) Format the memory stick with the FAT32 file system. Do not use quick formatting (see 13.1). 2) Do not use a USB memory stick with a higher standard than USB2.0. 3) Delete files from the memory stick to provide enough free memory.
A connected PC is not recognized (COM display under date remains grey).	1) The connected PC is not switched on. 2) The USB cable is defective. 3) The USB port of the PC does not provide any supply voltage or has no "USB host" function.	1) Switch on the PC. The COM display changes to blue. 2) Replace the USB cable. 3) Connect the machine to a PC with a functional USB port with "USB Host" function.
No connection is established with the "X-Scan" or "PT Viewer" software. The COM display does not change to green, but remains blue. The device is not recognized by the operating system as "STMicroelectronics Virtual COM Port".	No or a wrong USB driver is installed on the PC.	In newer operating system versions the correct driver is already included. Only in case of error the driver on the supplied USB stick should be used. The old version must be removed before a new installation.

Please consider your environmental responsibility before printing this document.

Version history:

Date	Version	Responsible	Amendment
14.01.2021	1.0.0	Marlene Egginger	Original state of English version
14.04.2022	1.1.0	Marlene Egginger	Amendments in chapter 12.5.1 Complete revision of chapter 16 system parameters
14.03.2023	1.1.0	M. Egginger	Changes regarding latest firmware version

Notes: