Brake Test Unit

BTU-100

Edition 06/2021

D-04-B-51602-EN-00

INSTALLATION AND OPERATING INSTRUCTIONS

Product philosophy

Thank you for placing your trust in IGEMA and deciding in favour of one of our high-quality products.

For more than 100 years, measuring and control systems have been developed, produced and sold worldwide under the IGEMA brand name.

“Steam is our passion” and we offer you the entire programme for the safe and economic operation of your plants, especially in the steam and condensate sector.

Please read the installation and operating instructions carefully to ensure a safe and reliable operation.

In addition to the information on installation and operation, you will also find important information on maintenance, care, safety and value retention of your measuring and control system.

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1. Important safety instructions

KEEP THESE INSTALLATION AND OPERATING INSTRUCTIONS IN A SAFE PLACE!

Commissioning as well as maintenance and repair work may only be carried out by qualified persons in compliance with the installation instructions given in this operating manual. The correct installation, commissioning, maintenance and operation of the device presupposes that the person in charge is familiar with the „Brake Test Unit“ and complies with the general installation and safety instructions. In addition, the correct and intended use of tools and the handling of safety devices must be ensured. Unqualified persons must not be assigned the above tasks!

IGEMA GmbH accepts no liability for damage to property or personal injury caused by unqualified persons or by failure to observe these installation and operating instructions. If no sufficiently qualified person can be found, IGEMA GmbH can be commissioned with the installation/maintenance.

1.1 Symbols used in these instructions

In the following installation and operating instructions, safety instructions are marked with the following symbols:

 Danger	This symbol and signal word refer to a potentially hazardous situation which could result in death or injuries if ignored.
 Caution electrical voltage	This symbol and signal word indicate live parts with an immediate danger of death from electric shock.
 Caution hot	This symbol with a signal word indicates a potentially hazardous situation that can result in severe burns and scalds all over the body.

 Caution	This symbol and signal word refer to a potentially hazardous situation which could result in personal injury, property and environmental damage if ignored.
 Caution	This symbol and signal word refer to a potentially hazardous situation which could result in damage to the equipment if ignored.
 Info	This symbol indicates useful information and recommendations as well as measures that will prolong the value of your measuring and control system.

1.2 General safety instructions

The simulation device "Brake Test Unit" is identified below with the abbreviation "BTU".

1.2.1 Avoidance of risks to persons and property

- The BTU device may only be used for the intended purpose of brake testing.
- Modifications and changes to the BTU device are not permitted.
- Observe accident prevention regulations and system-specific safety instructions.
- Read and observe the commissioning and operating instructions.
- The device may only be used and put into operation by appropriate trained persons.
- The BTU may only be used for dynamic brake tests in specially designated and secure test areas. The operator/user of the BTU, or the person responsible for testing, is solely responsible for safeguarding and averting danger.
- The BTU must be secured for the driving tests and all the forces that occur during them (in particular those resulting from acceleration, deceleration and distance travelled) so that secure attachment to the vehicle is ensured in all driving situations.
- Before starting test drives/test series, check that the BTU is functioning properly. In addition to deactivating the BTU via the key function of the control unit, the safety shutdown by means of brake pressure activation (vehicle service brake) must be checked in particular.

1.2.2 Limitations of use

- The device may only be used in accordance with the information in these operating details or for the parameters agreed in the supply contract (see appliance rating plate) and the application.
- Approval for this device loses its validity if modifications not agreed with us have been made.
- If this device is inserted incorrectly, the function/protection expected from this device may be impaired.

1.2.3 Avoidance of risks and damage

- The commissioning and operating instructions must be made available to the responsible authorities.
- The current commissioning and operating instructions and the valid additional information are available via the manufacturer portal.
- If the device is given to a third party, the commissioning and operating instructions in the national language of the third party must also be handed over without fail.
- The BTU may only be commissioned and operated by trained personnel with special authority and expertise.
- Read and observe the commissioning and operating instructions carefully and keep them in a safe place.
- Take note of and follow the commissioning and operating instructions printed in bold and highlighted in the individual sections!
- During transport, avoid knocks and carelessly setting down the device etc. as this can lead to damage.
- For intermediate storage, ensure that the storage location is suitable for the device.
- The storage location must be dry, and the device must be secured against damage.
- This device must not be used in potentially explosive atmospheres.

1.3 Exclusion of liability

IGEMA GmbH Mess- und Regelsysteme will assume no liability if the above regulations, instructions and safety precautions are not observed and followed. If they are not expressly listed in the installation and operating instructions, changes to an IGEMA device are carried out at the risk of the user.

2. General information

Routine service must be carried out regularly:

- Pressure sensor maintenance including characteristic curve adjustment
- Pressure switch test/maintenance including switching point
- Checking all the functional areas of the safety shutdown

3. Introduction

The simulation device "Brake Test Unit" (hereinafter referred to as BTU) has been developed for testing the brakes of trailers with pneumatic braking systems. The BTU is coupled into the pneumatic brake line between the tractor and trailer. The desired brake pressure for the towed vehicle can be set and controlled electronically using BTU, independent of the tractor.

The BTU is used by experts, inspectors and other specialists entrusted with the inspection of vehicle brakes to assess the vehicle brake in dynamic road tests.

In accordance with the regulations listed below, BTU allows the control of the service brake system in the towed vehicle during the practical brake test.

- In particular ECE Regulation No. 13; Supplement 13 to the 11 series of amendments - Date of entry into force: 8 October 2015.
Annex 4 - Brake tests and performance of braking systems -> 1.4.4. type 0 test for motor vehicles of category O with compressed air braking systems

- Or with reference to DELEGATED REGULATION (EU) 2015/68 of 15 October 2014 Annex II - Requirements for the testing and performance of braking systems and trailer braking coupling and vehicles equipped therewith -> 2.2.3. type 0 test for vehicles of categories R and S

Due to the defined test procedure (generation of the braking effect now by the towed vehicle), driving situations can arise which can usually only be mastered by trained and experienced test drivers. In addition, the BTU can only be used for test drives on a specially designed and secured test site.

In order to avoid critical driving situations, the default values for the controlled brake pressures, especially with regard to road conditions, load condition, etc., should always be increased in small steps from the lowest pressure value.

High brake pressures can cause the wheels of the vehicle to lock. This can result in uncontrolled driving behavior.

For this reason, the brake test by means of BTU is only permissible for "straight" driving and "stretched" complete vehicle.

The BTU may only be used in conjunction with technically perfect vehicles. In particular, the overall functionality of the braking system and the homogeneous and symmetrical development of the braking forces of the vehicle must be tested and ensured before the BTU is used.

3.1 Scope of delivery

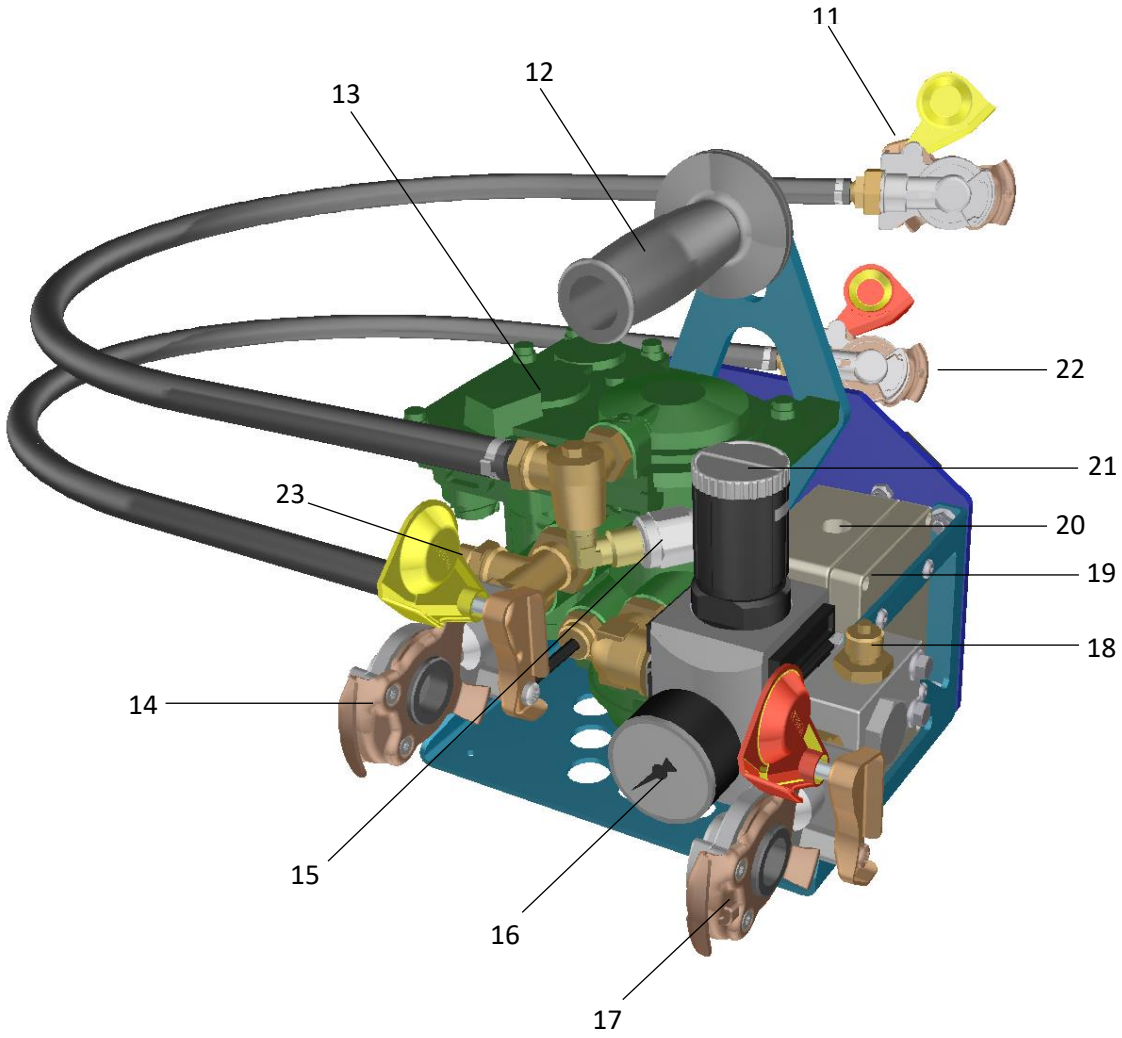
Number	Description	Index
1x	Control unit (hand-held)	a
1x	Pneumatic unit	b
1x	Connection cable control unit <-> pneumatic unit 5m	c
1x	Power supply cable 2m	d
1x	External start/stop button 1.5m	e
1x	VBox connection cable 1.5m	f
1x	Adapter cable power supply DIN9680 <-> standard vehicle plug 0.2m	g
1x	Protection and transport case Hand-held/Control unit and accessories	

4. Design

4.1 Control unit (a)

Index	Description
1	Display
2	Button 1 (Red)
3	Button 3 (Yellow)
4	External start/stop button connection
5	Power supply connection 12-24V DC
6	VBox connection
7	ECU connection
8	LED attention
9	Button 4 (Green)
10	Button 2 (Purple)

4.2 Pneumatic unit (b)



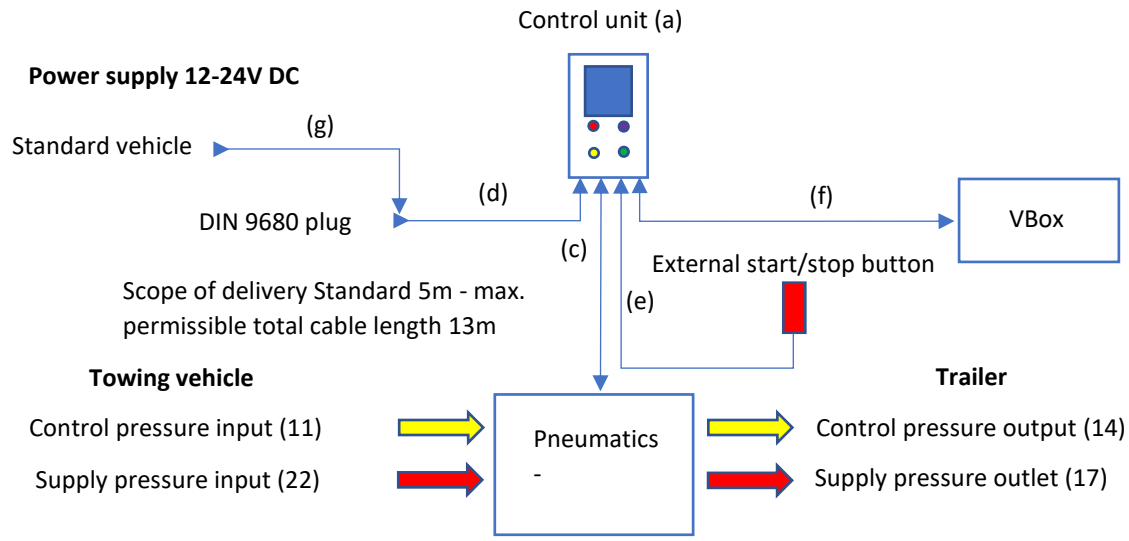
Index	Description
11	Control pressure input (Yellow)
12	Carrying handle
13	Control valve
14	Control pressure output (Yellow)
15	Pressure switch 0.3/0.5/0.8 bar (30, 50, 80 kPa)
16	Pressure gauge for supply pressure outlet
17	Supply pressure outlet (Red)
18	Test connection M16x1.5 external thread
19	Electronics box ECU
20	Cable connection to the control unit
21	Precision pressure regulator for supply pressure outlet
22	Supply pressure input (Red)
23	Test connection M16x1.5 external thread

5. Commissioning

5.1 Power supply

The device is designed for a voltage of 12-24V DC. A DIN 9680 plug and a standard vehicle plug (in the form of an adapter cable) are available as connection options.

5.2 Connection diagram



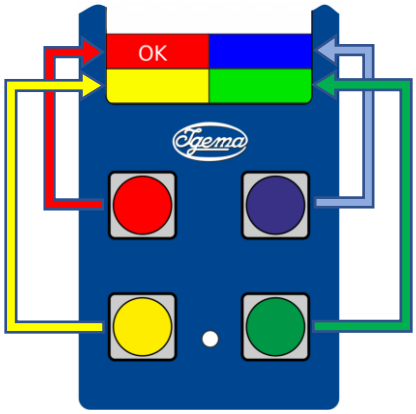
5.3 Pin assignment

Control unit (a)	Cable	Pneumatic unit (b)
(a)(7)	(c)	(b)(20)
(a)(4)	(e)	
(a)(6)	(f)	
(a)(5)	(d)	

6. Operation

6.1 Key configuration

The interactive display shows the function of each key.
The display and keys are configured as follows:



6.2 Start-up

After commissioning, the manufacturer's logo appears on the display (1) for approx. 3 seconds. Afterwards the customer's logo with the following information is displayed:

- Last service
- Serial number

This information can also be displayed later under the menu item "Info".
Press the "OK" button (2) to enter the main menu.

6.3 Main menu

The main menu has the following sub-items:

- Brake TEST
- Zero calibration
- Settings
- Info

The " ⇧ " (10) and " ⇩ " (9) keys are used to select the desired sub-item and they are confirmed by pressing the "Enter" key. To leave a sub-item, use the "Exit" key (3).

6.4 Brake TEST

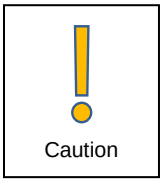
Under "brake-TEST", a predefined pressure is applied to the trailer brake line. The display (1) shows the set target brake pressure under "p target" and the current pressure in the trailer brake line under "p actual". The values have the unit [kPa]. The operating status of the device is listed under "Status".

The operating states are as follows:

- Status: Stop
- Status: Atten. (Attention)
- Status: Run

"Status: Stop.":
In the "Stop" status, no brake pressure is applied to the trailer brake line. The control valve is de-energised. The sub-item "brake-TEST" always starts in the status "Stop". It is also only possible to exit the sub-item in the "Stop" status by pressing the "Exit" key (3).

"Status: Atten.":
To activate the locking function, press the "Atten. (2) changed from status "Stop" to status "Attention". The red LED (8) in the control unit now lights up. The unit is now ready to control the set brake pressure.



If the brake is actuated in the "Atten." status, the locking function goes out and the red LED (8) switches off. Continuing by pressing the "Start" button (2) would result in an error message "Pressure switch triggered". Use the purple/yellow button (10, 3) to switch back to the "Stop" status and then reactivate the locking function

"Status: Run":
By pressing the "Start" button (2) from the "Atten." status, the set brake pressure is controlled and the VBox trigger signal is set. If an external start/stop button is connected, it is only possible to start via this button. Starting via the keyboard is only possible without a connected external start/stop button. Any key can be used to cancel the print output. Triggering the pressure switch (15) also leads to an abort and the red LED (8) switches off.

Adjust the target pressure:
The target pressure can only be changed in the "Stop" status. The two arrow keys " ⇧ " (10) and " ⇩ " (9) are used for this purpose. Briefly pressing on the button changes the value by 10 kPa and if held for longer it will change by 100 kPa. The target pressure can be adjusted in the range from 0 to 800 kPa.

Start/stop VBox recording:
Under Status "Atten." the whole recording can be started or stopped by VBox. If recording is active, "Rec ON" (green background) appears in the upper left of the display (1). By pressing the "Rec OFF" button (9) the recording is deactivated and "Rec OFF" (yellow background) is shown in the display (1)

6.5 Static TEST (stat. TEST)

The static TEST “stat. TEST“ is designed for use with roller test bench. The difference between mode “brake TEST“ and this one is, that the target pressure can be changed in run mode. The two arrow keys " ⇧ " (10) and " ⇩ " (9) are used for this purpose. Briefly pressing on the button changes the value by 10 kPa and if held for longer it will change by 20 kPa. By entering stop state, the device will automatically reset the target pressure to 0 kPa. All other features are identically with mode **6.4 Brake Test.**

6.6 Zero calibration

The internal pressure sensor should be calibrated once daily before use. Zero calibration is used for this purpose. The sub-item "Zero calibration" contains the following options:

- Type
- Start 0kPa

The adjustment type is factory set to "one point" and cannot be changed in v1.00.

Perform one-point zero calibration:
First, please make sure that the control line is de-energised. The easiest way to achieve this is by decoupling the two control lines (11) and (14) and keeping them at ambient pressure. **Secure the vehicle against "rolling away" beforehand!** Select the sub-item "Start 0kPa". Zero calibration is performed via "Enter" (3). If the calibration is successful, the message "Zero calibration successful!" appears on the display, which must be acknowledged with "OK" (3).

6.7 Pressure adjustment in the supply line

To provide a defined air pressure in the supply line (17), the BTU is equipped with an adjustable precision pressure regulator. This regulator can be used to set the required supply pressure for supplying the test vehicle. A test connection (18) for measuring and recording by means of external devices is available.

Additional information about the precision pressure regulator:
The system is set up to provide the precision pressure regulator with its own air consumption. This means that some noise is audible at the vent outlet, depending on the set pressure value.

6.8 Measuring point "control pressure"

Via the test connection (23), the pressure in the control line is available for measurement and recording using external devices.

6.9 Settings

In the settings you can define the system start-up state of the REC pin (VBox recording) to the VBox. You can choose between the following states:

Rec ON: The REC pin is open at system start-up. The VBox is recording.
Rec OFF: The REC pin is closed at system start-up. The VBox does not record.

Furthermore, the language can be changed. The following languages are available:

DE (German)
EN (English)

To change an option, the desired point is selected using "arrow keys". Press "Enter" to change the option. The changes are saved only when you exit the settings via "Exit".

Additionally, the real-time clock is displayed.

6.10 Info

Under "Info" you can safely display device information. It includes the following:

- ECU firmware version (pneumatic unit)
- HH firmware version (control unit)
- Serial number
- Last service

7. External start/stop button

The device has an external start/stop button connection. This can be used to start or stop the braking process.

To prevent a braking process from being triggered both by the control unit and the external start/stop button, the device has a cable connection detection feature. If the external start/stop button is connected, the device blocks triggering via the control unit.

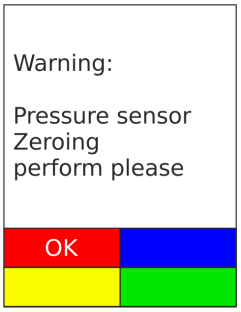
8. Alerts

The following alerts may appear on the display during operation:

- Warning: Perform zero calibration of the pressure sensor
- Beware: Pressure switch triggered!
- Error: Timeout on receiving ECU

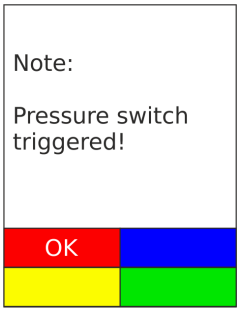
8.1 Alert: "Warning: Perform zero calibration of pressure sensor".

This alert appears if the last zero calibration was made more than 24 hours ago. The alert serves exclusively as an indication and can be acknowledged with "OK" (2). If zero calibration is not carried out within the next hour, the alert appears again. For safety reasons, this alert is not displayed when a print is controlled (status: Run).



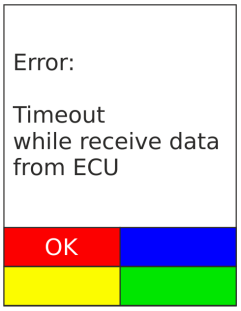
8.2 Alert: "Beware: Pressure switch triggered"

If a pressure of > 0.3/0.5/0.8 bar (30.50.80 kPa) is applied to the control line, the locking function is interrupted in the "Attention" and "Run" status. This means that during operation the active control is deactivated and the brake pressure from the towing vehicle is available in the control line.

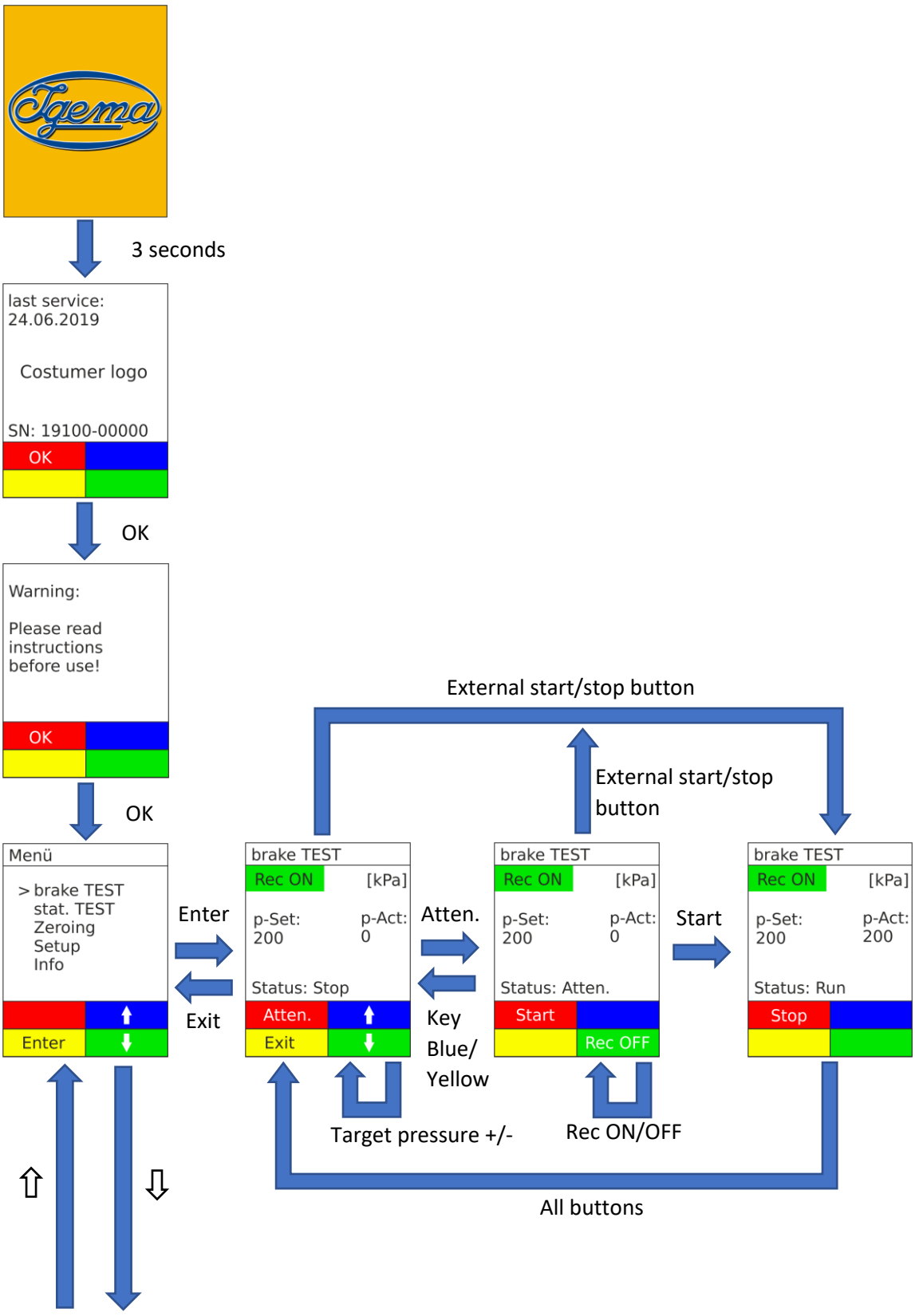


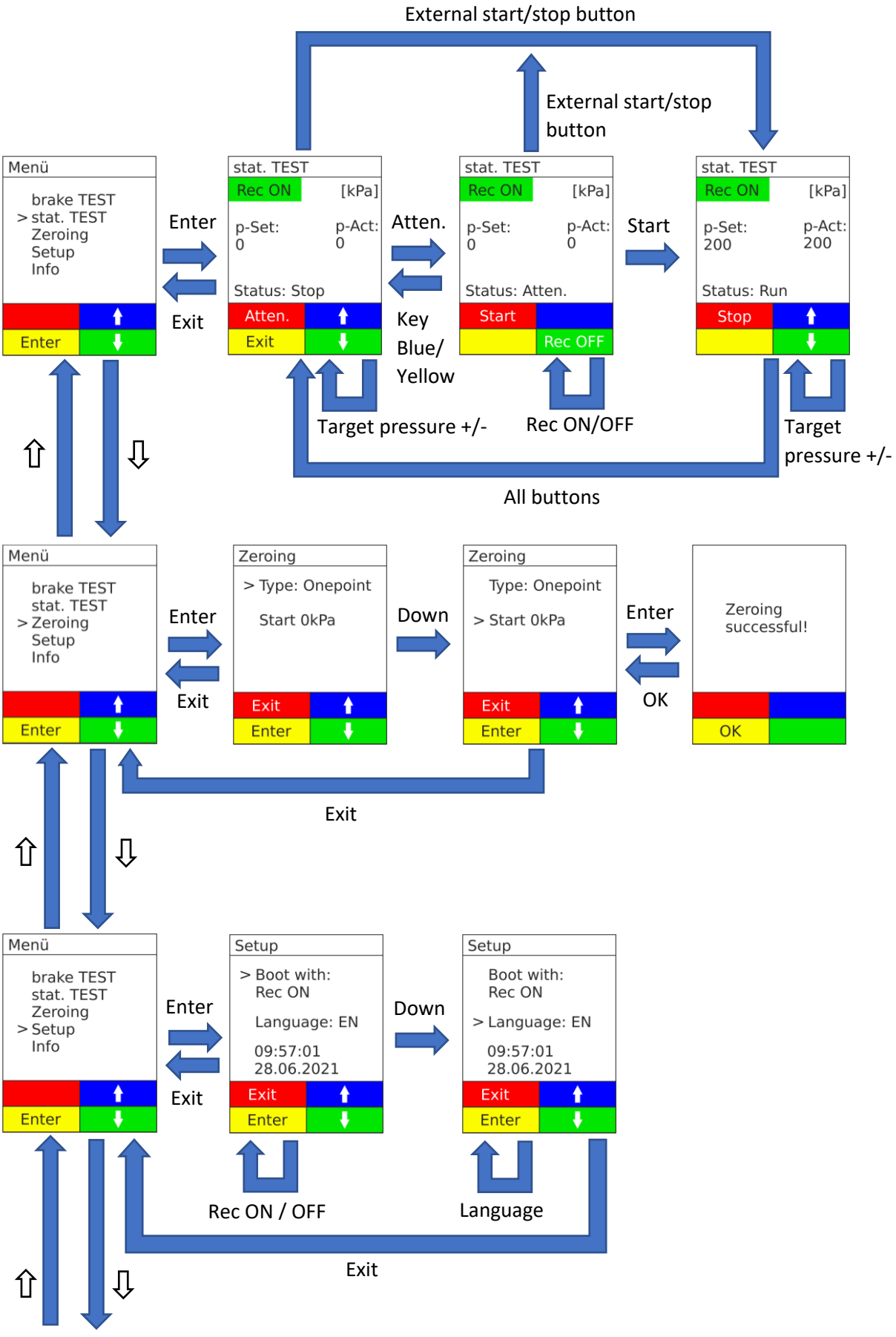
8.3 Alert: "Error: Timeout on receiving ECU"

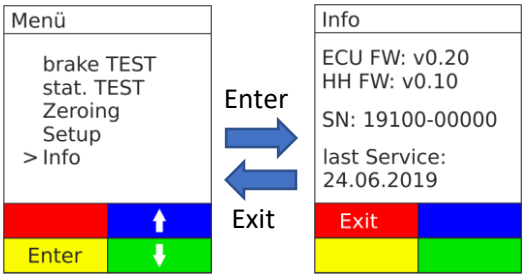
Problem with the connection between the ECU and control unit. Please check wiring (c).



9. Menu layout




External start/stop button
External start/stop button
Menü
brake TEST
> stat. TEST
Zeroing
Setup
Info
Enter
Exit
stat. TEST
Rec ON
[kPa]
p-Set:
0
p-Act:
0
Status: Stop
Atten.
Exit
Atten.
Key
Blue/
Yellow
stat. TEST
Rec ON
[kPa]
p-Set:
0
p-Act:
0
Status: Atten.
Start
Rec OFF
Start
stat. TEST
Rec ON
[kPa]
p-Set:
200
p-Act:
200
Status: Run
Stop
Target pressure +/-
Rec ON/OFF
Target
pressure +/-
All buttons
Menü
brake TEST
stat. TEST
> Zeroing
Setup
Info
Enter
Exit
Zeroing
> Type: Onepoint
Start 0kPa
Exit
Enter
Down
Zeroing
Type: Onepoint
> Start 0kPa
Exit
Enter
Enter
OK
Zeroing
successful!
OK
Exit
Menü
brake TEST
stat. TEST
Zeroing
> Setup
Info
Enter
Exit
Setup
> Boot with:
Rec ON
Language: EN
09:57:01
28.06.2021
Exit
Enter
Down
Setup
Boot with:
Rec ON
> Language: EN
09:57:01
28.06.2021
Exit
Enter
Rec ON / OFF
Language
Exit


Menü
brake TEST
stat. TEST
Zeroing
Setup
> Info
Enter
Enter
Exit
Info
ECU FW: v0.20
HH FW: v0.10
SN: 19100-00000
last Service:
24.06.2019
Exit

10. Technical data

Voltage	12-24 V DC
Power	33 W
Max. operating pressure	1000 kPa

11. Declaration of conformity

CE

EG – Konformitätserklärung

Für das folgend bezeichnete Erzeugnis:

Bezeichnung des Gerätes:	BTU 100
Artikel- Nr.:	0271-010-000

Wird hiermit bescheinigt, dass es den Anforderungen entspricht, die in den Richtlinien des Rates zur Angleichung der Rechtsvorschriften der Mitgliederstaaten festgelegt sind:

EMV- Richtlinie 2014/30/EU
RoHS- Richtlinie 2011/65/EU

Bei einer nicht mit uns abgestimmten Änderung des Gerätes verliert diese Erklärung ihre Gültigkeit

Zur Beurteilung des Gerätes wurden folgende Normen herangezogen:

- EN 61326–1:2013
- EN 55011:2009 + A1:2010

Die Störfestigkeitsprüfung wurde gemäß dem industriellen Einsatzbereich geprüft
Die Störaussendung wurde gemäß dem Einsatz im Wohnbereich geprüft

Diese Erklärung wird verantwortlich für den Hersteller

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