



## **SECONDARY INJECTION DC PROTECTION SYSTEMS BALTO MODULAR VERSION**

User Manual  
MAY 2016

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# Revisions.

Information about the history of this document

	<b>Revision</b>	<b>Date</b>	<b>Description</b>
[1]	01	15-05-2016	Initial version
[2]	02	15-12-2016	BaltoWin Version v1.8b
[3]	03	15-06-2017	Update Version v1.12
[4]	04	27-12-2017	Update BaltoWin v1.9
[5]	05	15-02-2020	Update redaction
[6]	06	10-08-2020	Update redaction DARE
[7]	07		

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# Introduction.

## Object of the instruction manual.

This instruction manual contains information regarding a correct use and handling in full safety of the BALTO Controller used from a BALTO Modular System version.

The BALTO Controller can be used as stand-alone or in conjunction with a BALTO Modular System (3.000A up to 30.000A or 4.000A up to 40.000A).

This user Manual must also be available when using the System.

Please consult the chapter - '**Safety Regulations**'. Information regarding your personal safety is treated there.

Read attentively the following safety regulations before using this device.

## Modifications.

This document is not contractual and the information that it contains corresponds to the technological status at the time of its compilation.

STEVO Electric reserves all rights of modification or improvement of the product which characteristics are described in this document.

## Safety regulations.

When designing the BALTO Controller part of the BALTO Modular System, special attention was given to safety, health and environment.

### Fundamental rule.

The BALTO Systems are compliant to nowadays technique and recognized technical regulations, nevertheless dangers can emerge.

The BALTO Systems can only be handled under irrefutable technical requirements and by considering this user manual.

### Information and safety symbols.



**DANGER**

#### **Danger**

indicates a dangerous situation which could lead, when not considered, to death, serious injuries or health problems.



**WARNING**

#### **Warning**

Indicates a potentially dangerous situation which could lead, when not considered, to death, serious injuries or health problems.



**ATTENTION**

#### **Attention**

Indicates a dangerous situation which could lead, when not considered, to injuries or health problems.



**IMPORTANT**

#### **Important**

Indicates a situation which could lead to damages of the equipment or environment.



**INDICATION**

#### **Indication**

Indicates important instructions, which will be able to contribute to a better process.



#### **EN ISO 7010 W001**

To indicate that caution is necessary when operating the device or control close to where the symbol is placed, or to indicate that the current situation needs operator awareness or operator action in order to avoid undesirable consequences.

## Staff Obligations.

The recognized regulations concerning the industrial safety - within the company or imposed by status laws - must be considered



### **INDICATION**

The regulations on the improvement of working conditions are determined by the European directives, which must be transposed into national law.

Controls and the calibrations are subject to these provisions which may vary for each country of the European Community. (Belgian Regulation ARAB & CODEX)

## Qualification of staff.

It's necessary to control if all the people using the BALTO Controller System are informed of all its characteristics and are qualified.

All the people using the BALTO Controller System must have received the instructions necessary relating to connections and handling of the BALTO Controller System.

Moreover, these people must be informed about the dangers and risks relating to the system.

## User manual.

Make sure each person using the BALTO Controller System has read and understood this user manual.



### **IMPORTANT**

Complete documentation must always be available near the device.

Working with an incomplete copy could lead to serious damage and injuries.

## Installation - Maintenance - Handling.

Make sure that the device will be handled, assembled, maintained and moved in a qualified way by considering the important technical standards.

To guarantee the operational safety use always original spare parts.

## Prohibition.

Neglecting any security functions regarding the functional or technical staff is not permitted.

## Requirements for irrefutable operation.

To ensure that the BALTO Controller System can achieve its contractual conditions, it's necessary to consider the following points:

- Only qualified persons are authorized to work with the device,
- These persons have read and understood this user manual,
- The environmental conditions are considered,
- A correct transport, and
- A correct storage.



**DANGER**

Do not open the Control unit with the power supply connected. Moreover, read the following safety instructions - available at the respective websites - attentively. These instructions are also part of the complete documentation:

- 🌐 Beckhoff et Pulspower

Never connect the Control Unit to a main voltage or Power Supply that is different to the one specified.



**WARNING**

Take the following remarks into account:

- When shutting down the device from Operation Mode, handle in chapter '**Operating** - section: **Exit BALTO System**' in the following cases:
- To clean the BALTO System, use a wet rag. Do not use liquid detergent products or aerosols.
- It's not allowed to throw water or other liquids on the BALTO System.
- If it is necessary to return the BALTO System to the factory - either for repair or for control - please use the original packaging or a resistant one. If not, the equipment may be damaged during transport.



**IMPORTANT**

### **Caution!**

Follow the transport instructions which are part of the delivery.



**DANGER**

### **Caution!**

Do not connect the BALTO Controller System to a DC Protection Relay before starting-up of the software, and the High Speed DC Circuit Breaker should be in OFF position, isolated and grounded.

In case of enclosed DC switchgears, the draw-out part should be in test- or service position.



## Containment.

The BALTO Controller System is applicable to any DC Protection Relay.



### INDICATION

Considering the diversity of DC Protection Relays available on the market today, this manual does not include any instructions on how to use your DC protection system.

Prior to using the BALTO Controller, consult the manual of your DC Protection Relay.

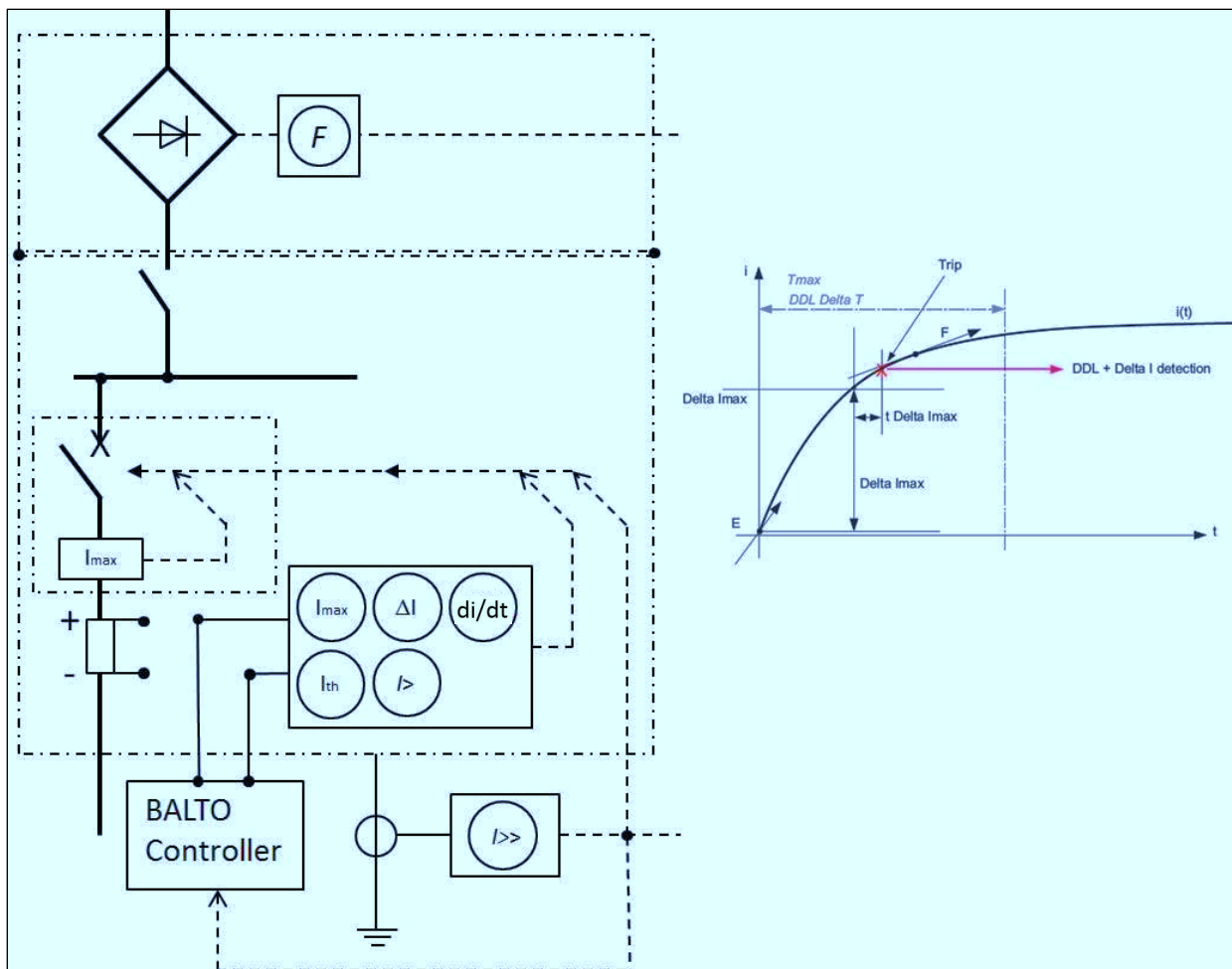


Figure 1: Principles of operation.

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# Overview.

## General information.

The BALTO Controller System can simulate the output of the shunt or Hall sensor installed in the cubicles of the High-Speed DC Circuit Breakers.

This simulation contains several fault currents to activate the trip from DC Protection Relays. The most important section in this manual to test your DC Protection Relay is the section '**DC Protection Relay Test**' which can be found under '**Testmode**' - '**Manual mode**' - '**DC Protection Relay Test**'.

The other tests, i.e. '**Quicktest Mode**' and '**Auto Mode**' may not be relevant to your DC Protection Relay.

In-depth understanding of your DC Protection Relay is required in order to perform these tests and to understand the relevance.

The secondary injection format is in accordance with IEC railway standards:

- Fixed installations - DC switchgear:  
IEC 61992-1/61992-2

The BALTO Controller can be purchased as a stand-alone unit or as part of a BALTO Modular System (3.000A up to 30.000A, 4.000A up to 40.000A).

# System Assembly.

## Control Unit.

The Control Unit consists of the following components:

- The Control Panel.
- The Control Electronics.
- Connectors.

The Control Unit contains all the functions that make it possible to test DC Protection Relays comfortably.

## Control Panel. Overview.



Figure 2: Control Panel.

1. Control Unit - Display.
2. Push button O/I and signalling PLC
3. Signalling system operational.
4. Emergency Stop.
5. External measurement.
6. USB Interface.
7. RJ45 Interface.
8. Buzzer

These functions are further elaborated below.

## Control Unit - Control Panel Display.

The Touch Screen Display CP6907 is designed for industrial applications with tactile colour screen of 5.7" with active TFT matrix (Thin Film Transistor).  
 With the possibilities given by this Control Panel, the BALTO System gives an optimal management performance.

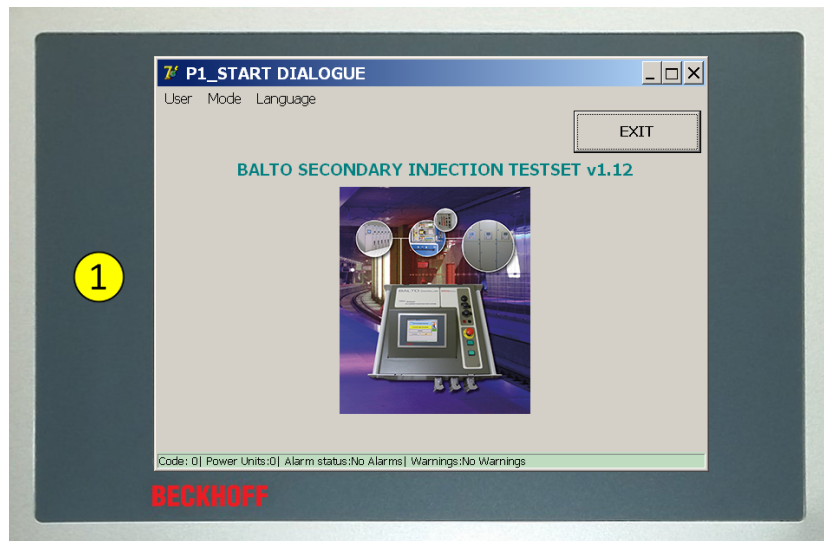


Figure 3: Control Unit: Control Panel - HMI



### INDICATION

For more information and technical assistance, please consult the chapter '**Appendix 2**' - section '**References technical assistances**'.

### Specific responsibilities.



### IMPORTANT

#### Environmental conditions.

Extreme environmental conditions should be avoided!  
 The necessary measures should be taken against dust, moisture and heat.  
 Particularly against the climatological fluctuations - variations of temperature, or humidity: moisture can condense on or in the device which may lead to short-circuits.

Do not use direct heat from heaters.  
 Let the device adapt to the ambient temperature before putting in operation.  
 A waiting period of about 12 hours is recommended.



### WARNING

#### The Control Panel should not be opened by the user.

For more information and technical assistance, please consult the chapter '**Appendix 2**' - section '**References technical assistances**'



**IMPORTANT**

**Switching ON and OFF Power Supply.**

The Control Panel does not have its own switch. Switching ON and OFF the control panel is carried out by the PLC. Do not disconnect any connection when powered, software data could be lost or damaged.



**IMPORTANT**

**Maintenance of the Control Panel.**

For the maintenance, please consult the chapter '**Maintenance**'.

**Operation.**

The Control Panel may only be operated by qualified and authorized operators; furthermore, each operator must be familiar with the Windows browser and the application software.



**IMPORTANT**

**The operating of the Touch Screen may only be done with the finger or a Touch Screen Pencil.**

The operator should wear gloves, but they must not contain any hard particles such as chips, metal shavings, debris or glass splinters.

**Function:**

Image management:

- Display of the images.
- Handling of the various operating processes with data recording of measurements.
- Service supervision.
- Report and communication.

**External measurement.**

Application for the BALTO Modular System.



**Remark:**

The external measurement is also used for the function '**Recalibrate Output**'.

Please refer to the paragraph '**Output configurations**' - section '**Boot up to the BALTO**' - chapter '**Operating**'.

## Communication - Buzzer.

### Buzzer. ⑧

Not in use by software release v4.12



### Ethernet Interface. ⑦

Communication and operating by PC or Laptop from the BALTO Win software

Printer with Ethernet connection - addressing TCP/IP (not available for printing)

- Interface Ethernet according to EIA/TIA568 TSB-36

- Twisted-Pair cable

- Max length: 100m

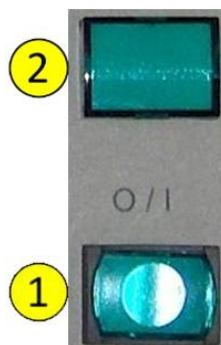
### USB Interface. ⑥

- It is possible to store measurement data on a USB Stick.

The data can be processed by BALTOWin

- Connection of keyboard.

## Push button O/I - PLC Signalling.



### Push button/Signalling button ①:

The BALTO System can only be activated when the indicators are lit up. After which, you can press the button to start the operation.

During the operation, this signal will be turned off and the button will become inactive during the process. These indicators will light back up when the operation has been stopped completely. Afterwards, the BALTO System can be restarted.

### Signalling - System ready ②:

The green lamp 'System ready' lights up after a successful start-up process. This means that the Control Unit including the PLC is operational and the BALTO System start-up was completed successfully.

## Emergency Stop.

In case of an emergency, the Emergency Stop Button has to be activated.



By activating the emergency stop button operation of the BALTO System is blocked.



For more information, please consult the chapter 'Operating' - section 'Emergency Stop'.

## Connectors.

On the Control Unit there are the following connectors:

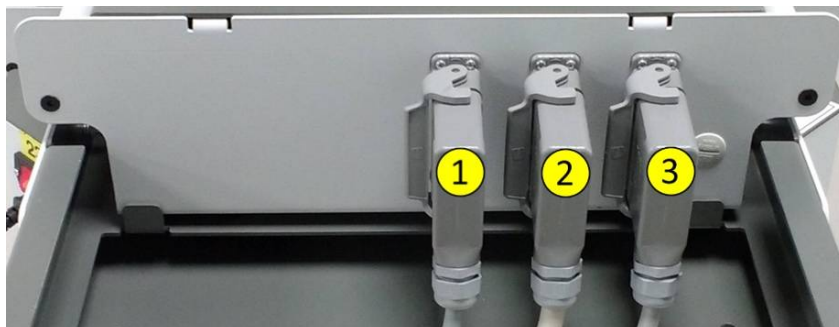


Figure 4: Control Unit: Connectors.

1. Connector. ①  
Power Supply Control Unit: 230VAC/50Hz or 120VAC/60Hz

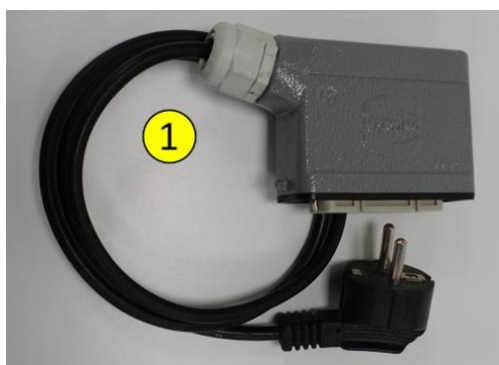


Figure 5: Control Unit: Power Supply cable.

2. Connector. ②
3. Connector. ③

### Remark:

Connectors ② and ③: Application for the Modular BALTO System.

## DC Protection Relay Interface.

### Protection Test SUBModul ADP

The Control Unit is equipped with an interface - Submodul ADP - with outputs for testing DC Protection Relays.

**Output:** Source of simulation errors input for DC Protection Relay.

- mA: - 20mA/+20mA or +4mA/+20mA ①
- mV: Selection between 60mV up to 10VDC ②

**Input - TRIP:** Signalling contact form the High-Speed DC Circuit Breaker or the DC Protection Relay.

- Trip ③ → Signalling trip contact.
- Trip ④ → Implementation in according the application.

**Remark:**

By BALTO Modular Systems used for testing High-Speed DC Circuit Breakers for rolling stock, the second Trip ④ can be implemented for measuring the interactions of the auxiliary contacts.



Figure 6: Control Unit: Connection DC Protection Relay.



## Power Supply.

Power Supply with primary switch mode SFB technology  
PULS Q-Series.

For more information and technical assistance, please consult the chapter '**Appendix 2**' - section '**References technical assistances**'.

## Integrated CX5130 PC and Interfaces.

### General information.

The module CX5130 has an Intel® Atom™ multi-core processor with a clock rate of 1.75 GHz. Depending on the installed TwinCAT runtime environment, the CX5130 can be used for implementing PLC functions with or without monitoring.

### Specific responsibilities.

#### Switching ON or OFF

Never disconnect any connection to the PLC or any peripheral device when powered, software data could be lost or damaged.

For more information regarding safely turning the device ON or OFF, refer to the chapter '**Operating**'.



**IMPORTANT**

#### Use of the CF (CompactFlash) modules.

Never abruptly remove the CF modules.

Software data could be destroyed, lost or damaged.

In this case **STEVO Electric** cannot be held responsible for the suffered damage, and that is not covered by any guarantee.

### Replacement of the Battery.



**IMPORTANT**

**The Battery must be replaced every five years.**

A badly inserted Battery, **or inserted with incorrect polarity**, can explode and can cause damage.

**Only use original Battery types: CR2032 from Sanyo or Panasonic - Battery Lithium.**

**The Battery is not rechargeable.**



**WARNING**



When removing or closing the controller unit cover, care should be taken to not displace any components or connections.



**WARNING**

Concerning the replacement and the precautionary measures and for more information, please consult the manual CX51x0 Beckhoff available on the website: [www.beckhoff.de](http://www.beckhoff.de)

For more information and technical assistance, please consult the chapter '**Appendix 2**' - section '**References technical assistances**'.

## PLC control management.

The PLC has a number of digital inputs and outputs, as well as analogy inputs and outputs to carry out the controls and monitoring for the BALTO Controller System.

These consist of:

- Input management:
  - Measurements of the various currents.
  - Emergency Stop.
- Output management:
  - Control Unit fan.
  - Command and control signals.
  - Generation of power curves.
- Monitoring.
- Processing of measurements and calculations.

---

# Installation.



## Safety.



**WARNING**

How to use the BALTO Controller System and make it operational in order to carry out tests on the DC Protection Relays .

During the assembly of the various units it's necessary to read the warnings concerning the equipment carefully.



**WARNING**

All primary tests have to be terminated before removing any equipment.

## Preparation.

How to prepare the BALTO Controller System?

### BALTO Modular System.

For starting the Secondary Injection function, several actions have to be taken in order to unblock the software program for performing Secondary Injections.



**WARNING**

All primary tests have to be finished and the test object has to be removed from the Power Units.

On the Control Unit, there are the following connectors:

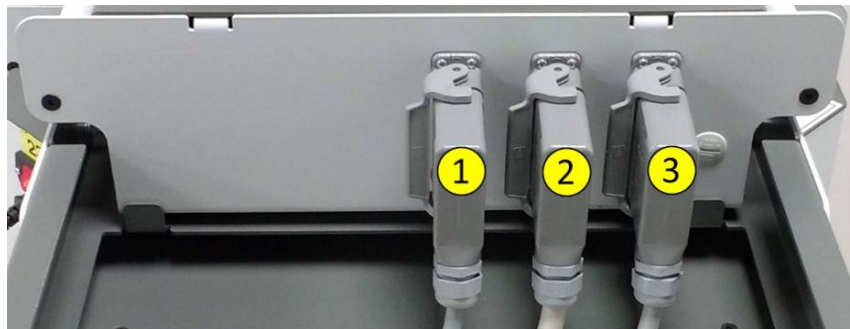


Figure 7: Control unit: Connectors.

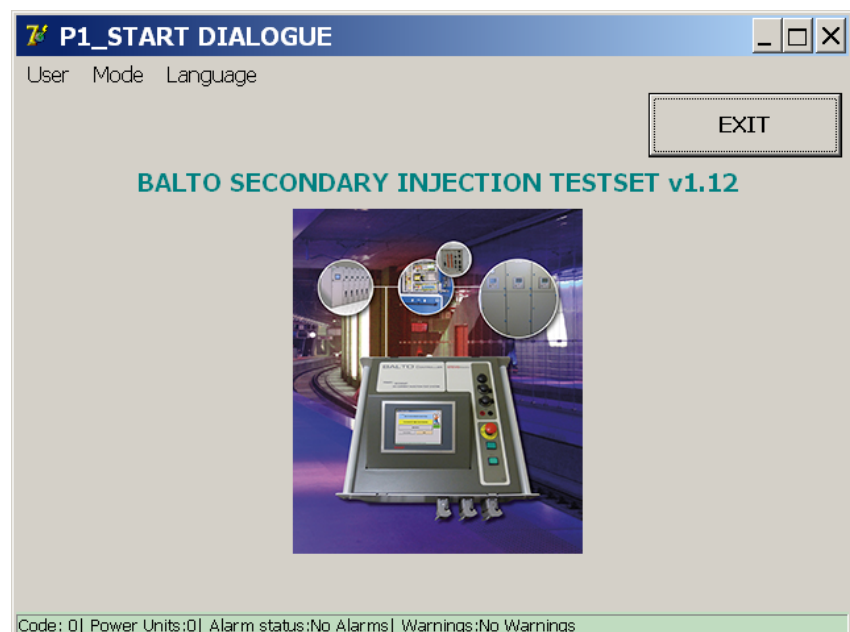
Disconnect the connectors ② and ③

The Control Unit is now ready to operate has a BALTO Controller.

**Remark:**

The Control Unit can also be removed from the Support Carriage and be used as autonomous system.

The start dialog will indicate that the Secondary Injection program is running.



Communication between the software for Primary and Secondary Injection takes place automatically and depends on the detection of the Power Unit.

### **Standalone BALTO Controller System.**

No preparation must be done.

**Remark:**

It's concerning the Control Unit.

## Connections.

This section describes the connections of the BALTO System.

**Remark:**

Concerning a standalone system.

### Connectors.

There are several connectors on the Control Unit:

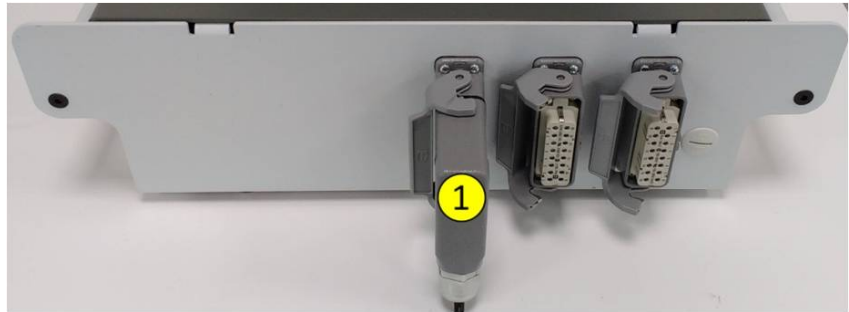


Figure 8: Control Unit: Connectors.

Only connector ① has to be connected

1. Connector. ①  
Power Supply Control Unit.

### Power Supply.

For a Modular BALTO System we can use the usual power supply, or the separate power supply cable as shown on the figure 5 sector 'Connectors'.

Connect the BALTO System on the mains 230AC/50Hz or 120V/60Hz - 10A.

### Connection DC Protection Relays.

#### Preparations.



**IMPORTANT**

It is important to follow the instructions and be aware of a procedure accompanied by a risk analysis before starting the work.

All safety measures which are applicable on the low- and high-voltages systems must be taken.

In any case, it must be prevented that the operating voltage (3.000VDC, 1.500VDC ... 680VDC) will be connected to the test equipment.

The procedure as well as the risk analysis established in accordance with the safety regulations in force in the company must be observed. The High-speed DC Circuit Breaker must be in OFF position.



**DANGER**



Connections on the shunt have to be removed before making injections with the BALTO Controller. Those connections are on the level of the operating DC high voltage and can cause damage to the BALTO Controller System.

## Connection BALTO Controller.

The following connections have to be realised:



Figure 9: Interface connections BALTO Controller.

The outputs are simulating source of errors which are provided by the measure elements.

**Outputs:** Source of simulation errors input for DC Protection Relay

- mA: - 20mA/+20mA or +4mA/+20mA ①
- mV: Selection between 60mV up to 10VDC ②

**Input - TRIP:** Signalling contact form the High-Speed DC Circuit Breaker or the DC Protection Relay.

- Trip ③ → Signalling Trip Contact – potential free NO or NC
- Trip ④ → Implementation in according the application.

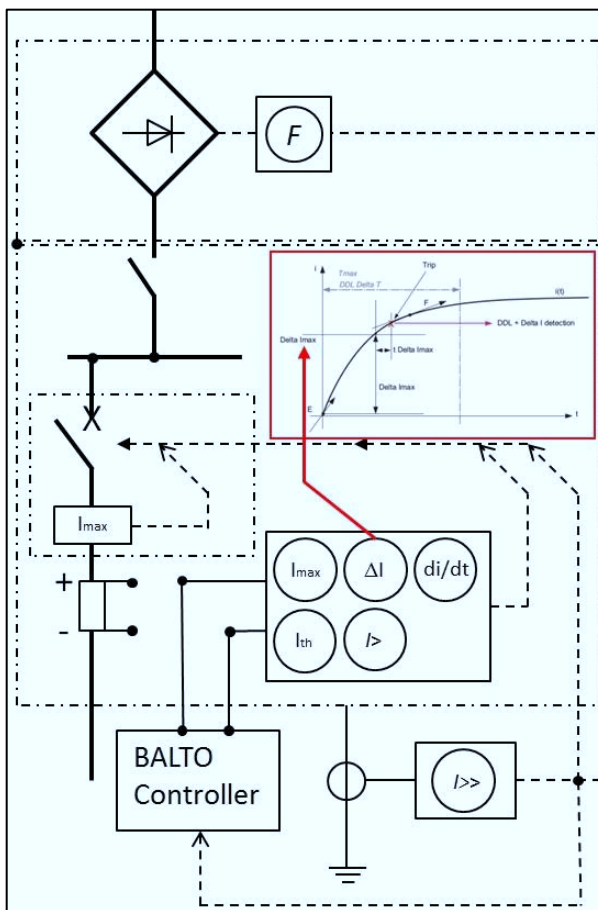


Figure 10: Connection BALTO Controller.

---

# Operating.



**WARNING**

How to use the BALTO Controller System?

The following points must be checked carefully before carrying out tests with the BALTO System.



**WARNING**

Control if the safety measures were followed as described in the company or prescribed by the status law.



**DANGER**

Control if the safety regulations were followed as described in this handbook in the chapter '**Introduction - Regulations of safety**'.



### **Caution!**

Before testing the DC Protection Relay please take into account the following considerations:

Do not connect the DC Protection Relay to the BALTO Controller System until the secondary injection program is running.

In case of open switchgears, the High-speed DC Circuit Breaker used for test purposes must be isolated and the busbar grounded.

In case of enclosed switchgears, the extendable part must be removed from the DC switchgear.

In both cases the High-speed DC Circuit Breaker should be placed in testmode or service mode.



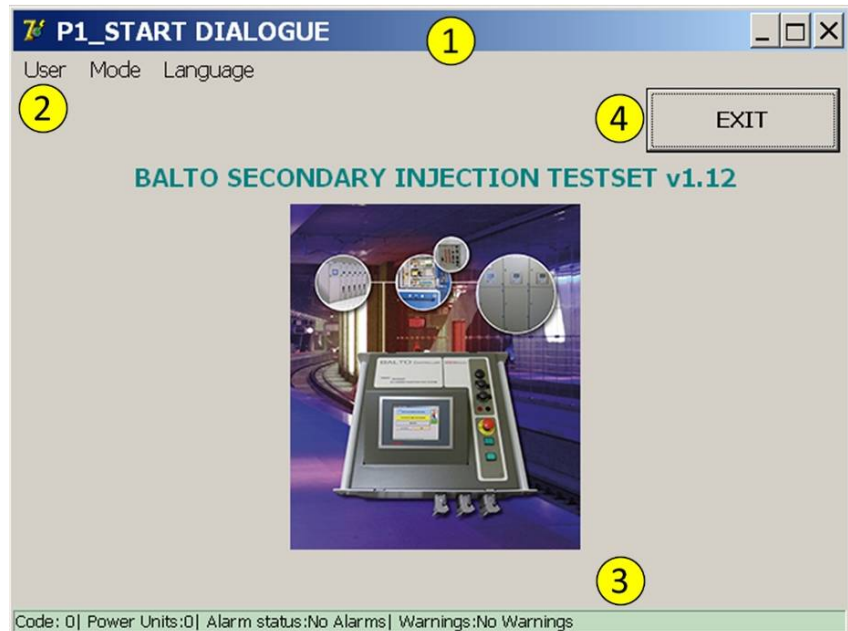
## Software structure.

This section describes the different applications and display modes in further detail.

### General information.

#### Dialog box.

General information regarding the structure of the BALTO dialog box.



1. Main header.  
Information about the dialog box displayed in the process.
2. Menu bar.  
Menu selection.
3. Status bar.
4. Exit program.

#### Exit.

For more information regarding exiting the program, please consult the section '**Exit BALTO System**'.

#### Remark:

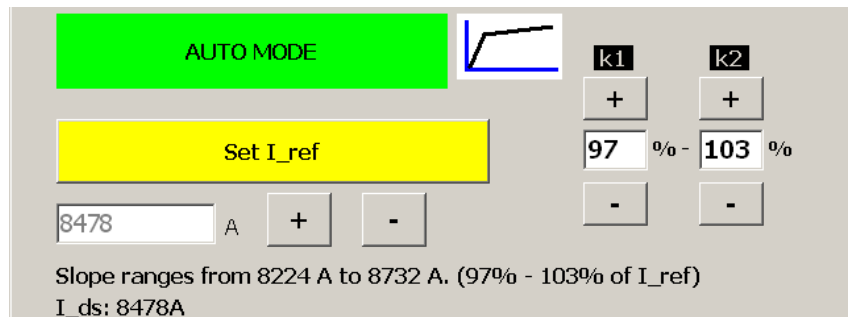
For more information regarding the colour of the background, please consult the section '**Background**' in this chapter.

## Setting I<sub>ref</sub>

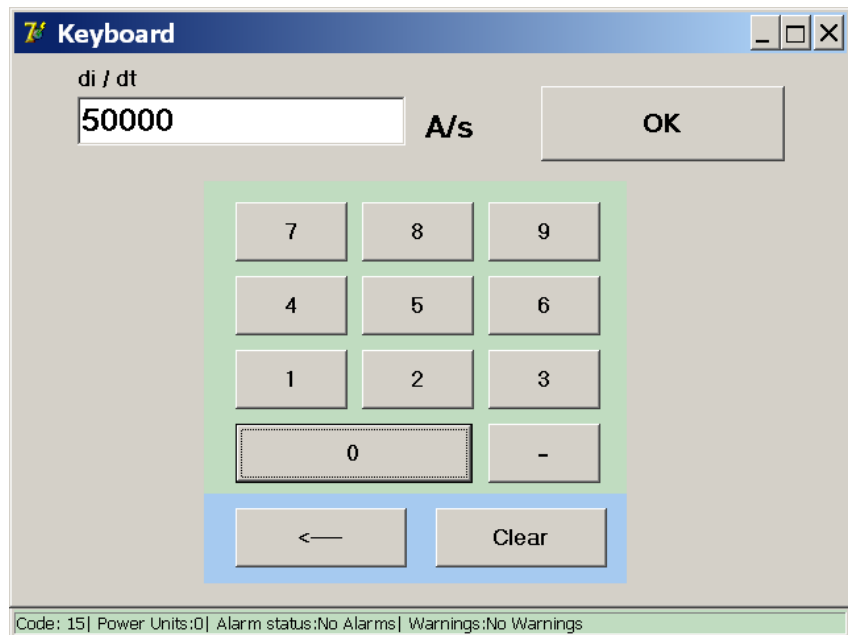
The I<sub>ref</sub> threshold can be modified in the dialog displayed by the function 'Set I<sub>ref</sub>'.

### Example:

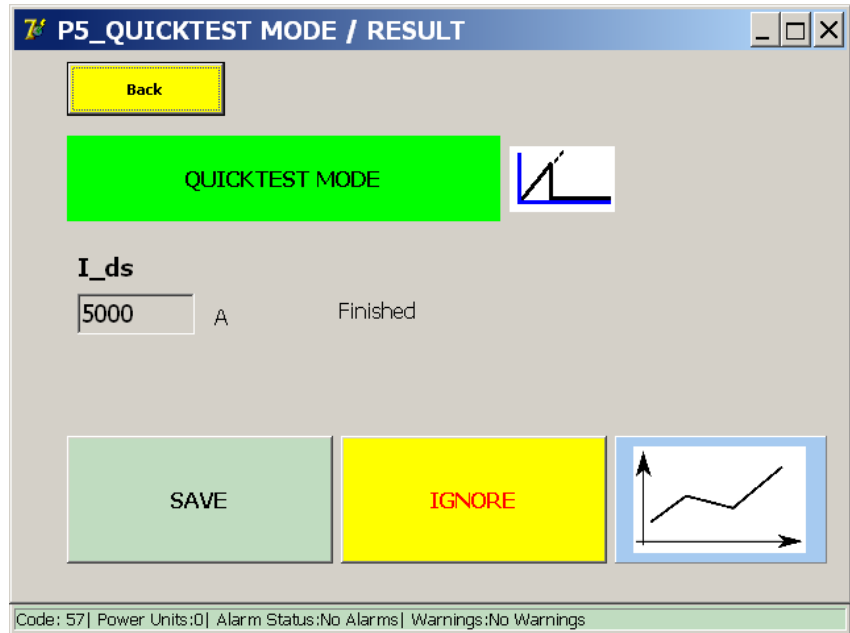
Example in this dialog:




Activate the button 'Set I<sub>ref</sub>' and the following dialog will be displayed.



Curves reproduction.



In this dialog the curve of the last measurement can be re-examined by activating the key .



**INDICATION**

This function appears after making the first measurement.

Displaying measured values.



The values which are displayed in the different dialogs are examples and not necessarily related to your project.

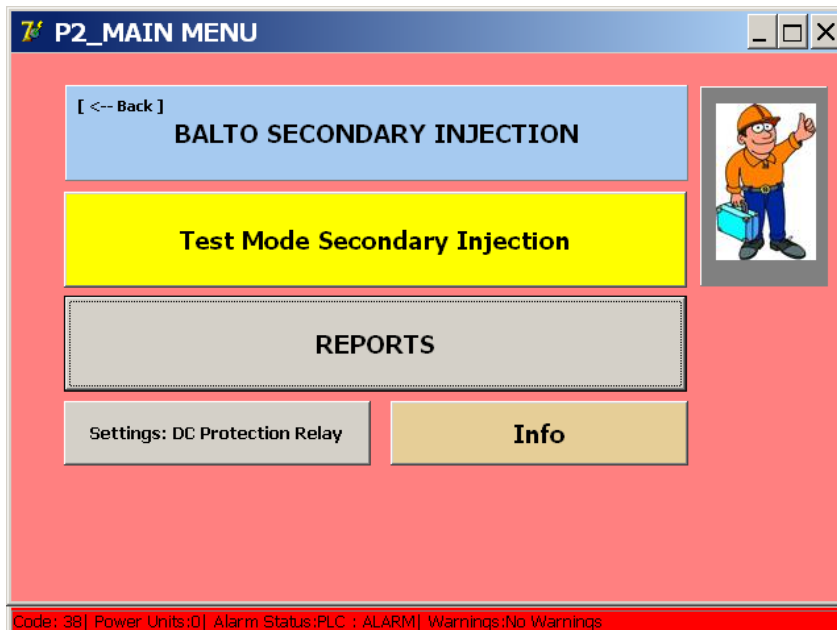
Background.

A background colour will be placed in the dialogs under the following conditions:

COLOR	SIGNIFICATION
Grey	Normal operation
Orange	Not applicable
Red	Defect
Yellow	Not applicable

**Defect.**

Please consult the chapter 'Troubleshooting' - section 'Status Info dialog'.



Once an error has been detected, the normal operation cannot continue, any further injections are restricted.

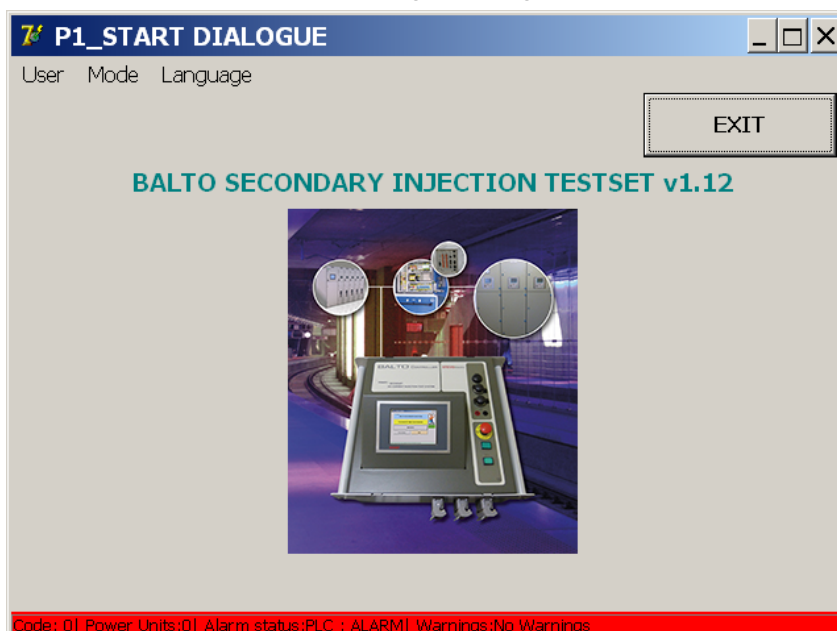
The reason for the defect is displayed in the status bar in a coded message.

The error and warning messages warning overwrite the normal operations.

**Remark:**

The varying background colours are not displayed on the start dialog. However, error and warning messages will still be visible on the status bar.

➡ Status bar: Error and warning messages.



## Management of messages.

This system includes a message management:

### Operation codes.

#### Code 1- 57

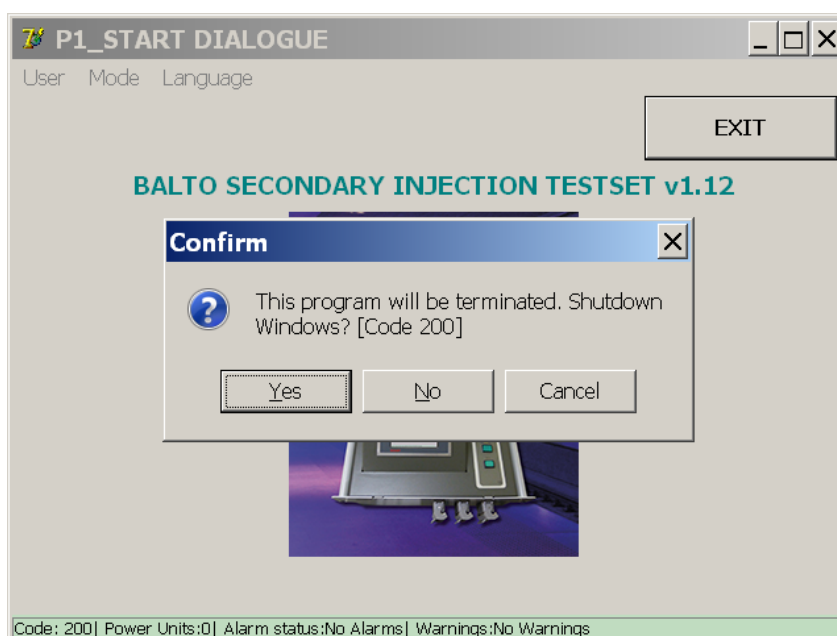
Can on the one hand be displayed in all dialogs - status bar and relate to status, warnings and error messages – and on the other hand at full screen with an **'OK'** button to confirm the message or with **'Cancel'**, or dialogs with pop-up windows as well.

#### Code 200 - 205

Messages concerning extra's.

#### Example:

Following dialog with a pop-up window:



### Error codes test results:

#### Code 100 - 106

Test related notifications in result dialogs.

For more information regarding these codes, please consult the chapter **'Troubleshooting'** - section **'Codes index'**.

#### Remark:

The some of those codes are related to a BALTO Modular System.

## Boot up the BALTO System.

Carry out the assembly and all connections as described in the chapter - '**Installation**'.

### Start procedure.

Switch the system ON.

The indicator of the O/I button lights up when the button is activated (please consult the chapter '**System Assembly**' - section '**Control Unit**' for more information)

The start-up procedure is now in progress and is completely automatic.

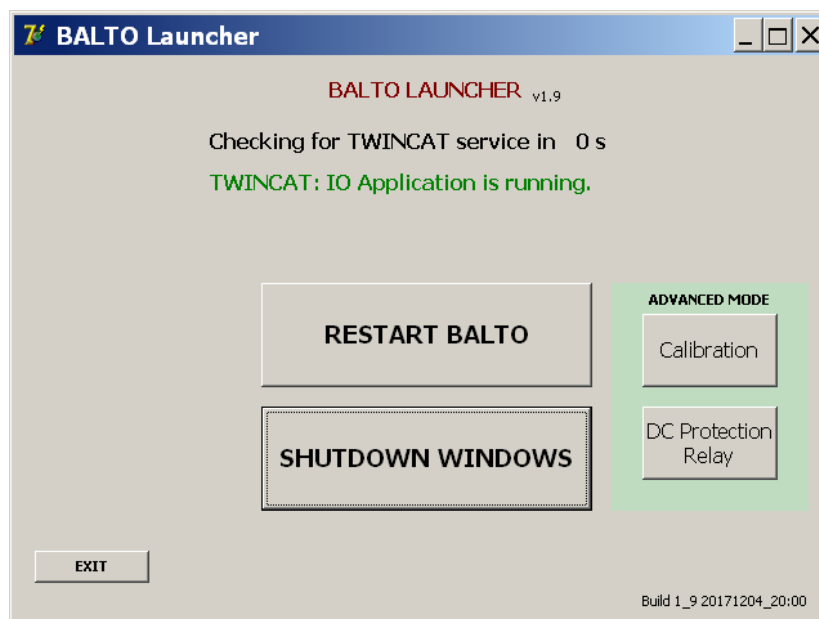
Several dialogs will be displayed briefly while the system is starting up.



After starting the software '**TwinCAT**', the BALTO program will be started with BALTO '**Launcher**'.



... 'TwinCAT' activated ...



Starting ... BALTO 'Launcher' ...

Wait for the starting dialog is displayed.



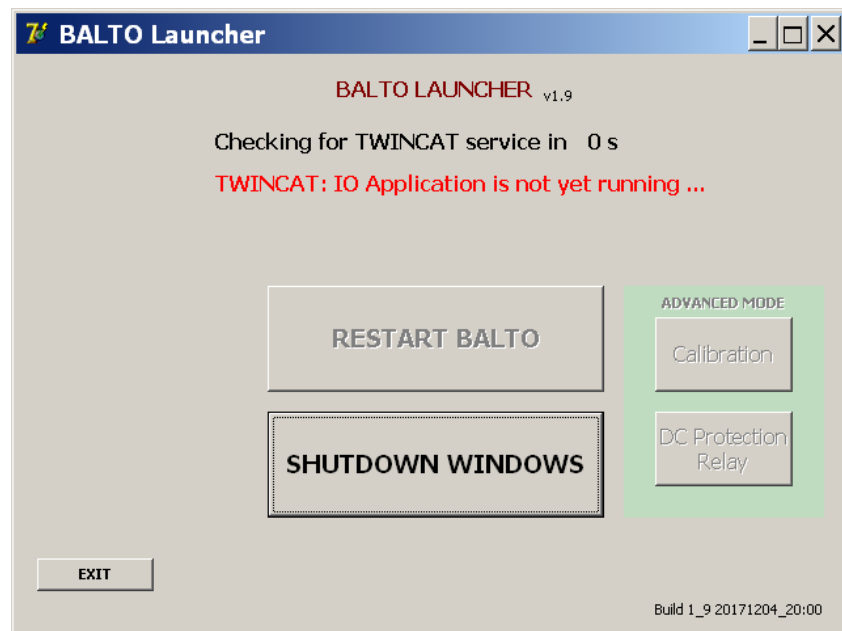
**INDICATION**

'TwinCAT' is a management software for PLC applications. For additional information, please consult [www.beckhoff.de](http://www.beckhoff.de).

In 'ADVANCED MODE' two functions are available in option:

- **Calibration** - Option for BALTO Modular System.
- **DC Protection Relay**.

... displaying messages of status during the launch ...



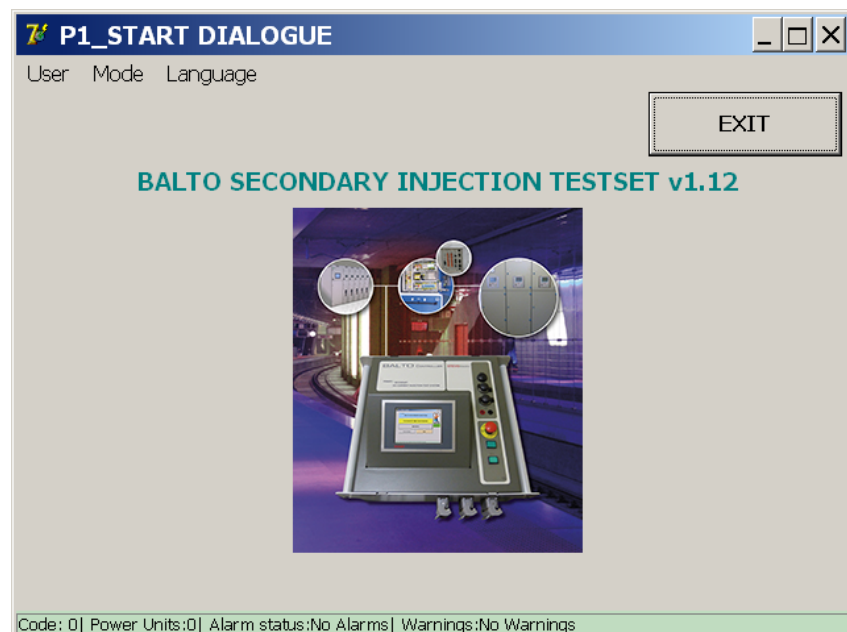
During the launching process, the text in red can appear briefly and can be shown repeatedly.



**IMPORTANT**

But if this text does not go away after a few minutes, there could be a problem with the device. Please contact STEVO Electric if this was to occur.

Please consult the chapter - '**Troubleshooting**' - section '**Start-up Procedure**' for more information.



**INDICATION**

The start-up dialog box should appear. The indicator '**System ready**' must be activated and the indicator '**O/I**' must be deactivated. Please consult the chapter '**System Assembly**' - section '**Control Unit**' for more information.



Remark:



**IMPORTANT**



In the condition where the start dialog is not reached, or that the progress of the boot procedure hangs - signalling '**System ready**' is missing - the system cut the launch after 2min. Wait 20sec before launching a second attempt - signalling '**O/I**'. In case of repetition, please contact STEVO Electric services

## Flow sheet secondary BALTO System.

Functional diagram and operation of the Secondary BALTO System.

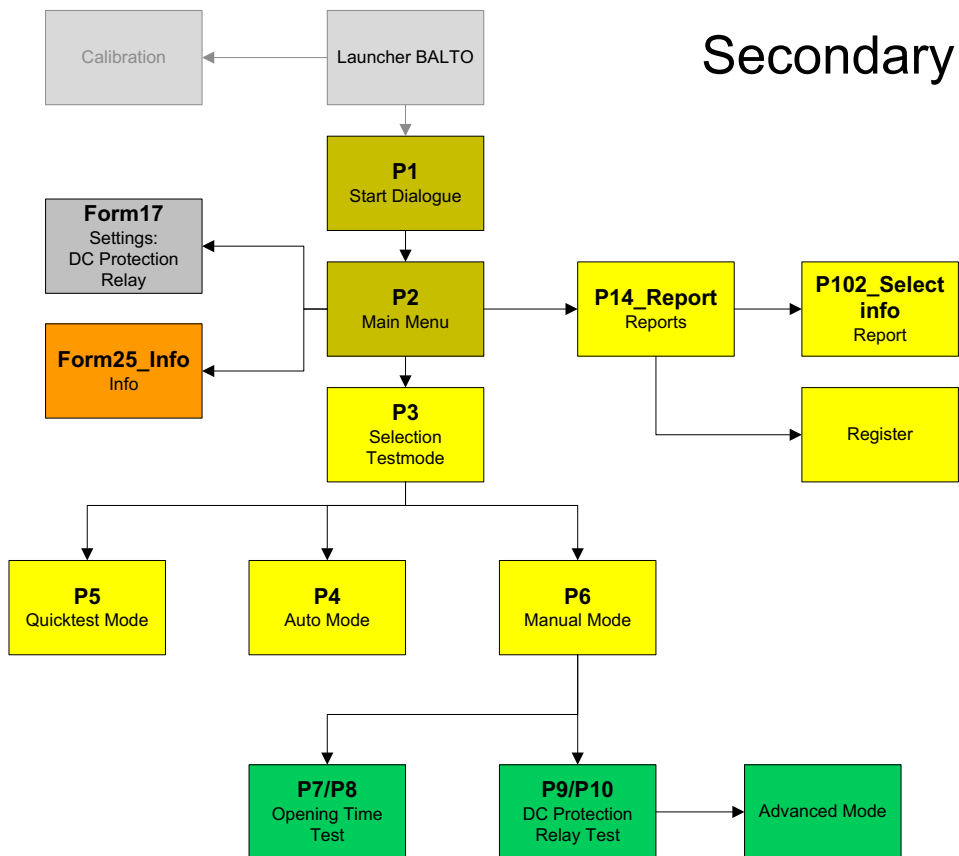
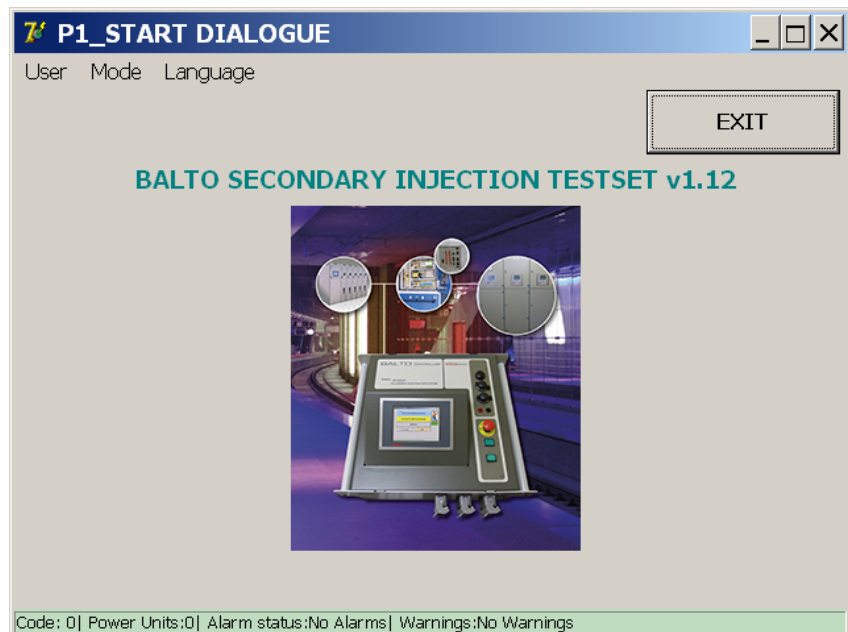


Figure 11: Flow sheet Secondary BALTO System.

## Start Dialog.

After the execution of the starting procedure, the following dialog is displayed:



## Main Bar.

Information regarding the current menu or sub-menu.

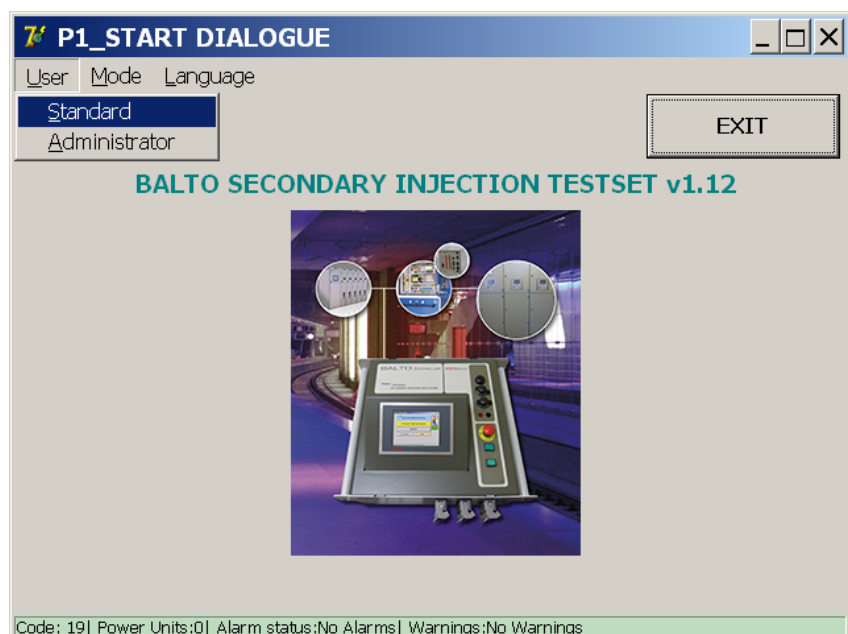
## Menu Bar.

**Menu option: User**

**Dropdown menu:**

Selection from the dropdown menu:

- Standard (by default): Normal user.
- Administrator: STEVO Electric staff, only accessible with a password.



**Menu option: Mode**

**Dropdown menu:**

Now application.

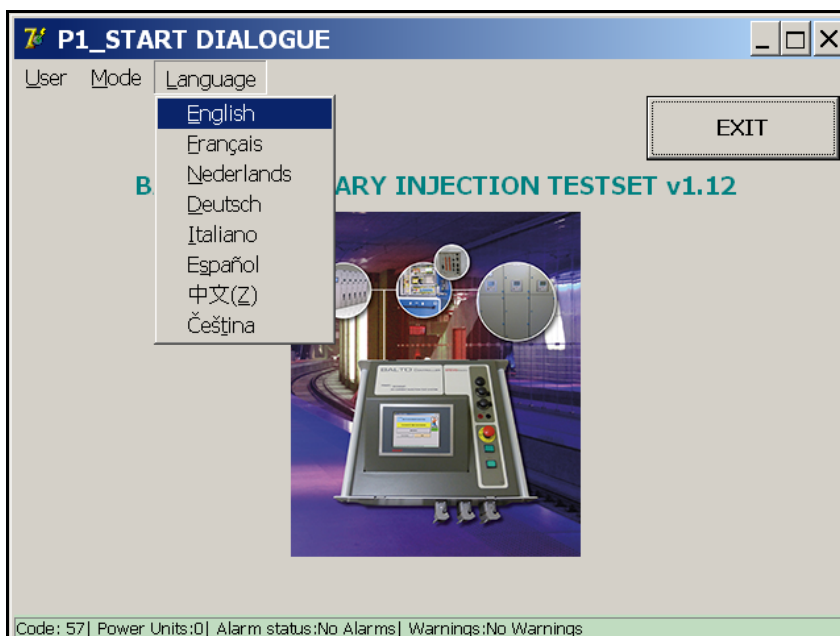


**Menu option: Language**

**Dropdown menu:**

Available languages:

English, French, Dutch, German, Italian, Spanish, Chinese and Czech.



**Explanation:**

By changing the language in this menu, both the BALTO Launcher and the calibration program will adapt to the selected language. The language exchange is prompt.

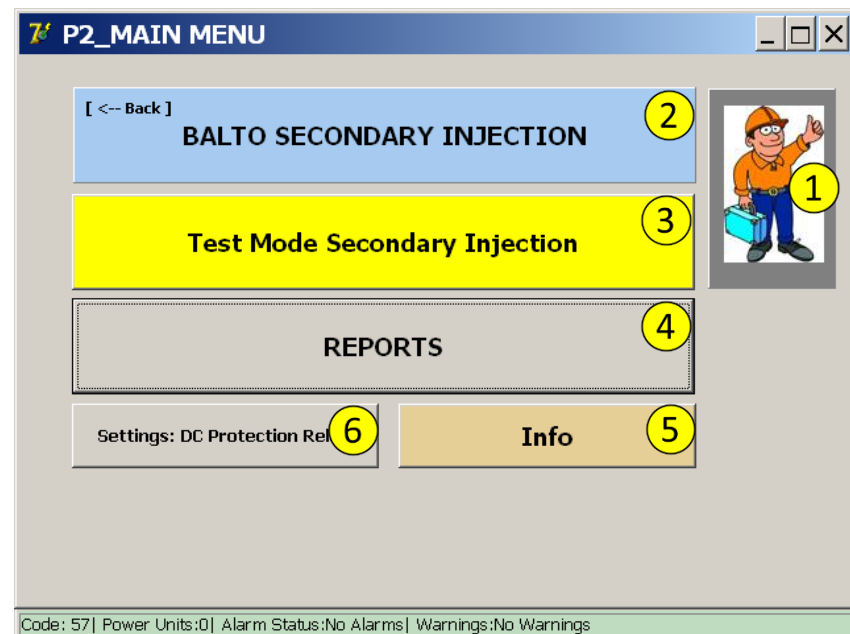
## Main Menu.

The Main Menu contains all the functionalities in order to test extensively a DC Protection Relay.

From the '**Start Dialog**', the application for the test modes will be activated by touching the image.



The '**Main Menu**' will be displayed ...



In this Main Menu, several sub-menus can be selected:

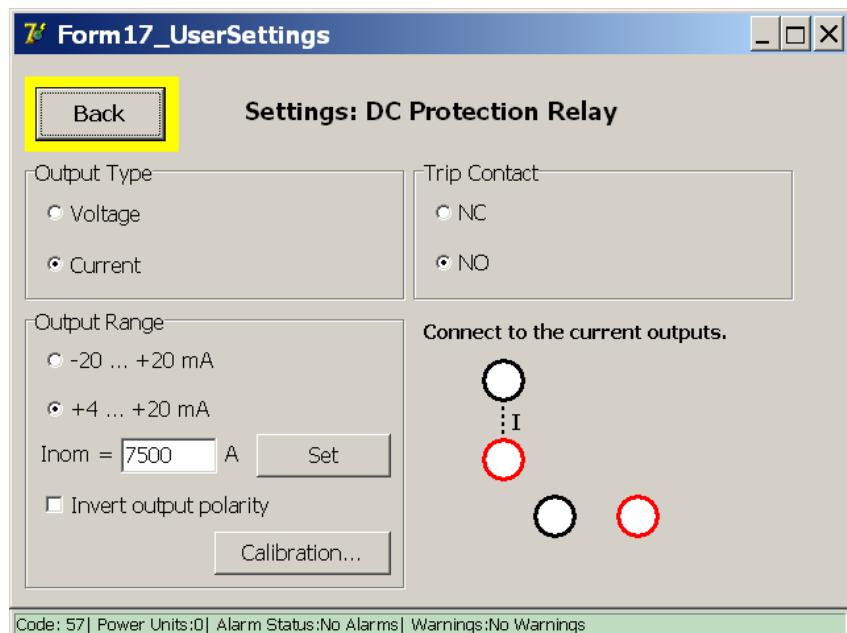
1. Activate Safety Mode.
2. Information about the BALTO, the operator will return to the '**Start Dialog**' when selecting this option.
3. Access to the various test modes:  
Quicktest Mode, Auto Mode and Manual Mode.

4. Measurement reports:
  - Displayed in grey: no measurements recorded.
  - Displayed in yellow: contains measurements.
5. 'Info' dialog regarding the operating conditions.
6. Settings for the adaptation of the DC Protection Relay.

## Output configurations.

Concerning the configuration off the outputs and feedback, please activate the button **Settings: DC Protection Relay**.

### Current output.



- Selection of output type.
- Selection of output range.  
Invert output polarity by check off.
- Define  $I_{nom}$ .
- Input the value  $I_{nom}$ .

The output current from the BALTO Controller should be in the same range as the measure transducer from the DC Protection Relay.

### Example:

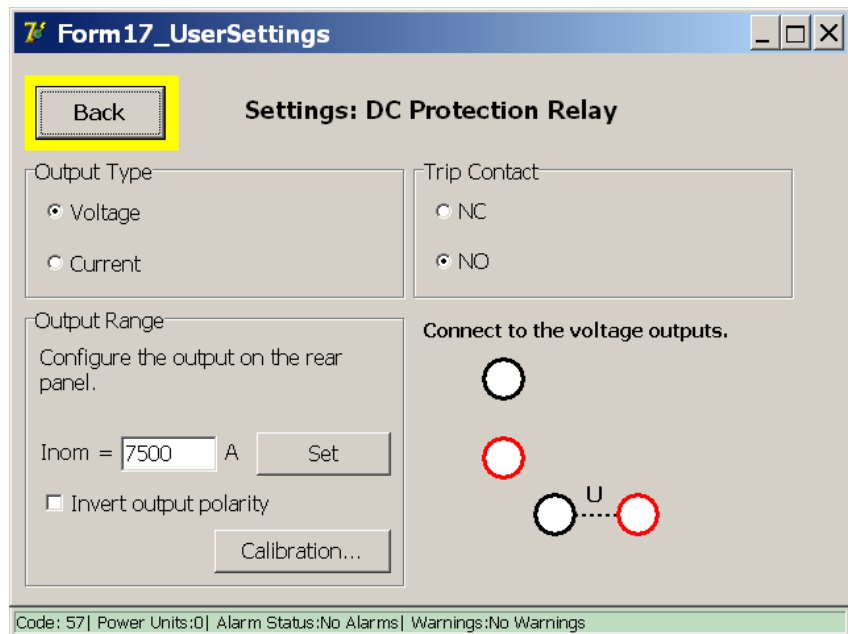
$$I_{nom} = 7.500A$$

Output Range			Output Range		
-20mA	0	+20mA	+4mA	+12mA	+20mA
-7.500A	0	+7.500A	-7.500A	0	+7.500A

- As feedback - trip contact - an auxiliary contact from the DC Protection Relay is utilized, select between:  
NC - Normal Closed, or  
NO - Normal Open.

The connection to the different current outputs is automatically done.

Voltage output.



- Selection of output type.
- Selection of output range.
- Invert output polarity by check off.
- Define  $I_{nom}$ .
- Input the value  $I_{nom}$ .

The output voltage from the BALTO Controller should be in the same range as the measure transducer from the DC Protection Relay.

Recalibrate Output.

Before executed some tests, it is appropriated to recalibrate the output. By activating the corresponding function, the next dialog will be displayed.

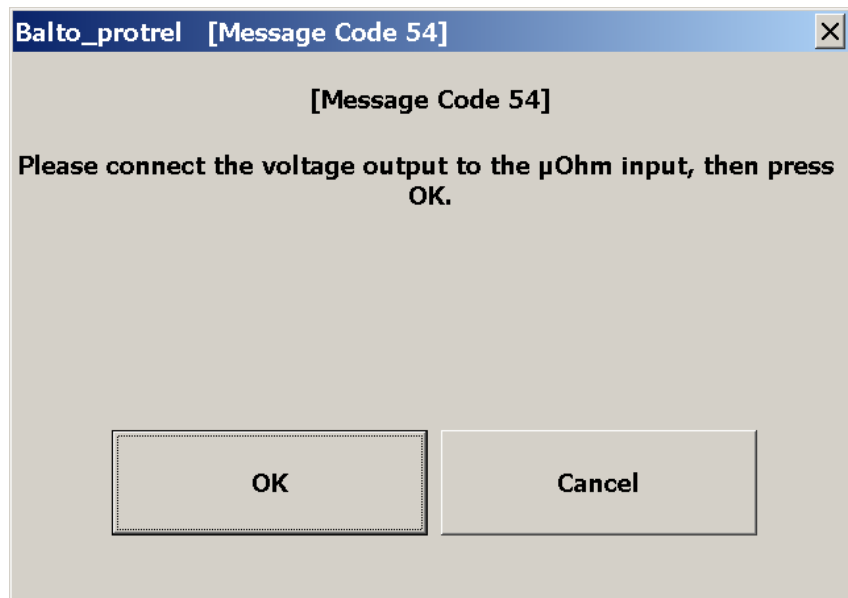




Figure 12: Connection for recalibrate output.

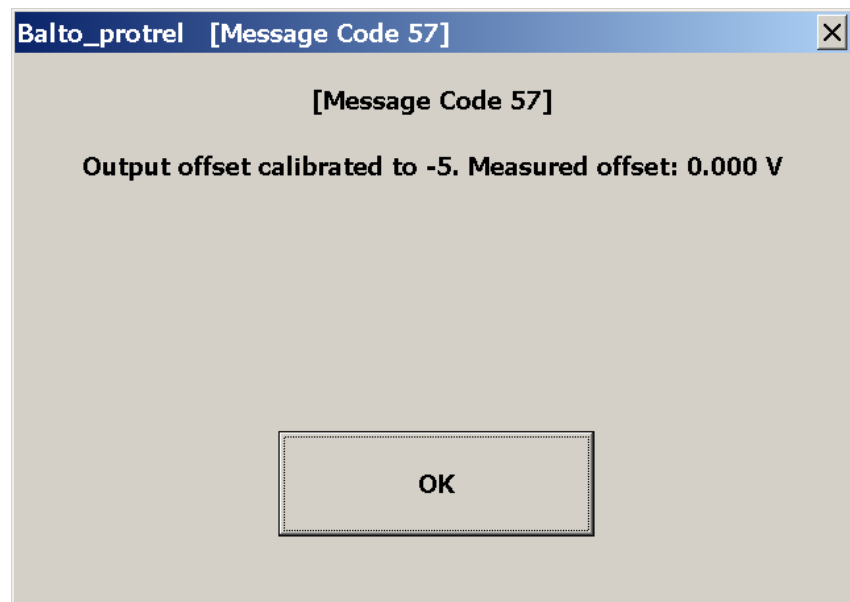
Output - mV ② connect to the External measurement ⑤ control with a Volt-meter.

**Fault message.**



Please, make a control of the connections and the polarity.



**Calibration result.**

The calibration can have influence concerning the current output

**Example:**

The value of shunt is 6.000A/90mv and the max value of the expected current is not higher than 7.500A - The linearity of this value is dependent on the saturation level of the shunt.

$I_{nom} = 7.500A$

- As feedback - trip contact - an auxiliary contact from the DC Protection Relay is utilized, select between:  
 NC - Normal Closed, or  
 NO - Normal Open.

The connection to the voltage output is automatically done.

- Adjust output range ⑤



Figure 13: Interface DC Protection Test: Adjust output range.

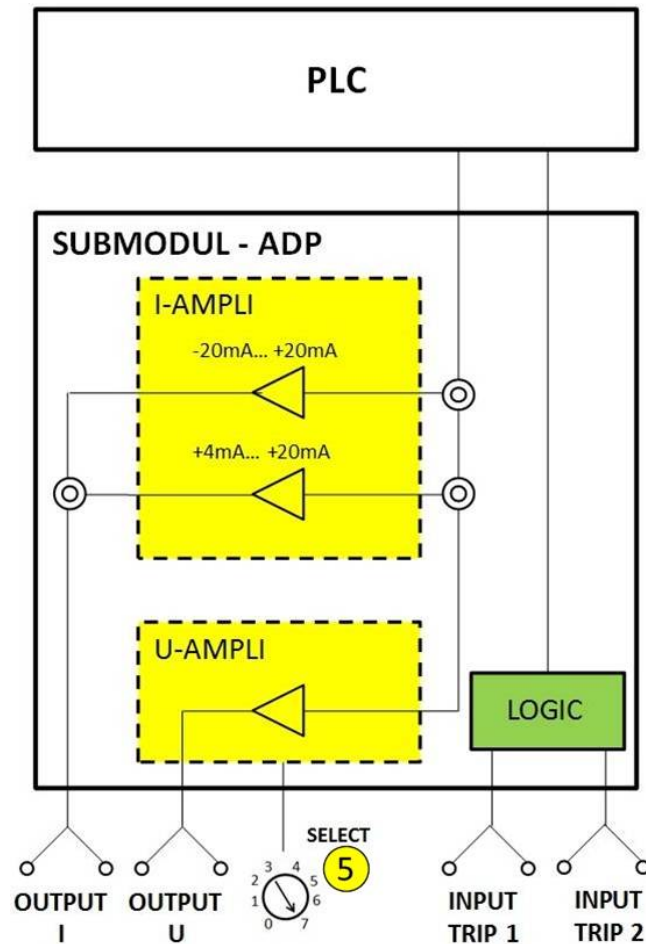


Figure 14: BALTO Controller - SUBModul - ADP

The selection ⑤ of the output level is done with the selector switch '**SELECT**'

The different settings are as follows:

Positions	Values
0	-60mV/60mv
1	-90mV/90mV
2	-150mV/150mV
3	-300mV/300mV
4	-500mV/500mV
5	-1V/1V
6	-5V/5V
7	-10V/10V

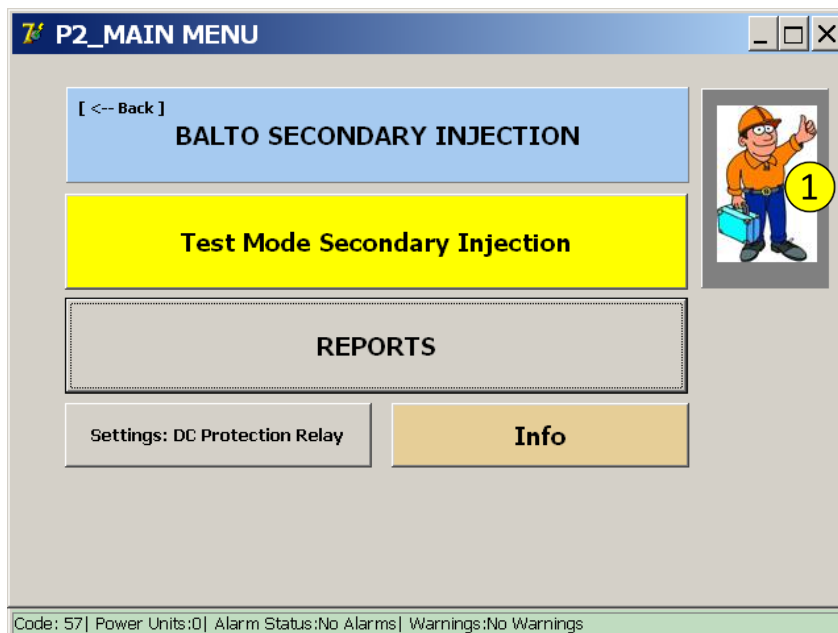
In our example, the selector switch has position 1(90mV).

## Safety Mode.

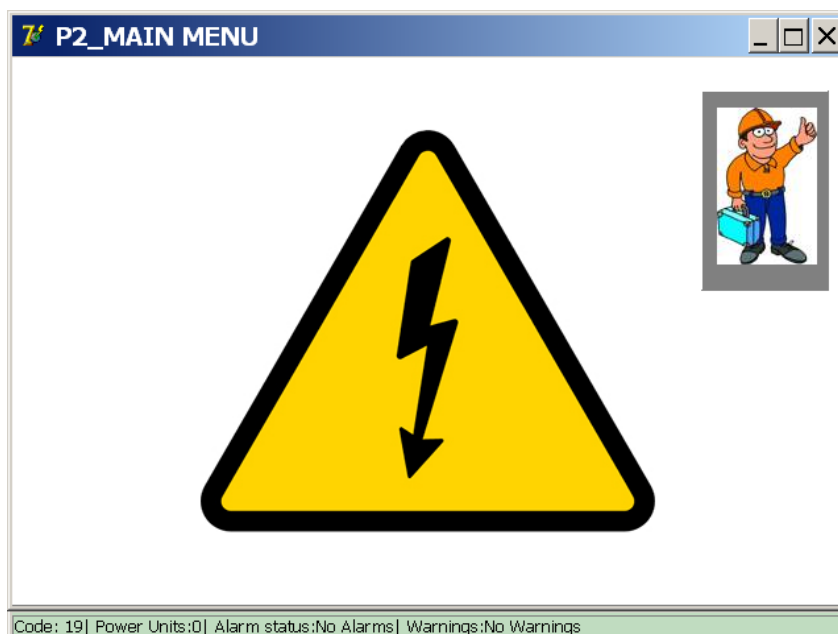


**ATTENTION**

This mode must be activated when interventions on connections must be made on the device under test.  
Select from the Main Menu:



Activate the symbol marked by ①  
The following dialog will be displayed:



No injection can be made. After implementation of the necessary interventions, return to the application by clicking on the danger symbol.



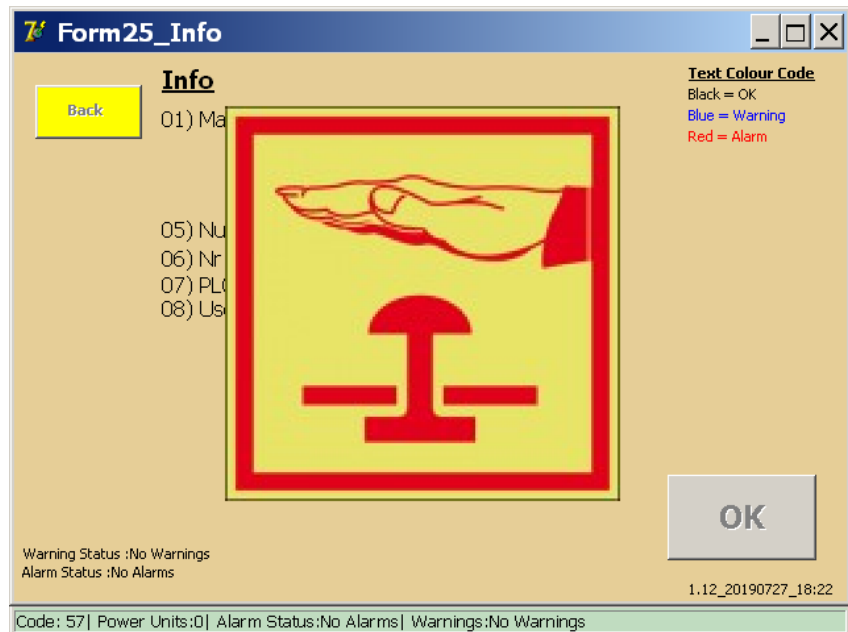
**IMPORTANT**



It is recommended to activate this function whenever the system must be left unattended and during pauses between the tests.

## Emergency Stop.

When the Emergency Stop Button is activated the following symbol is displayed in the 'Info' dialog.



**IMPORTANT**

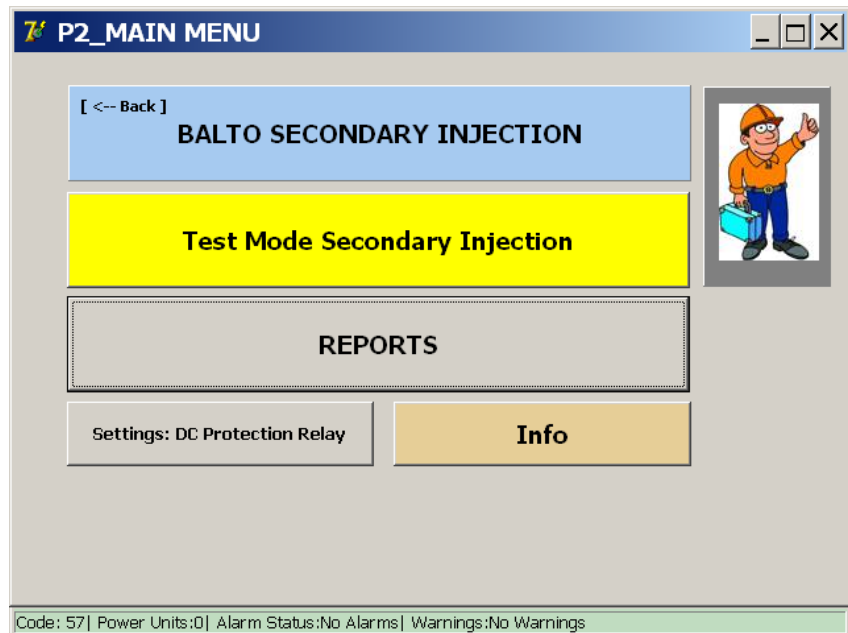
All handlings regarding injections are blocked.

To continue, release the Emergency Stop Button.

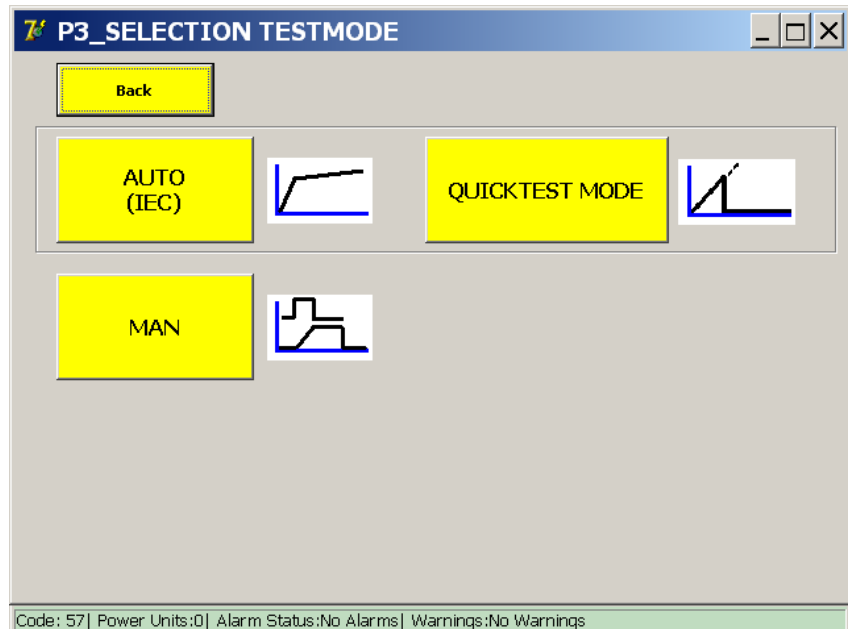
Reset with the bottom '**OK**'.

## Testmode.

After activating the key 'Test Mode Secondary Injection'



The dialog box 'P3\_Selection Testmode' will be displayed:



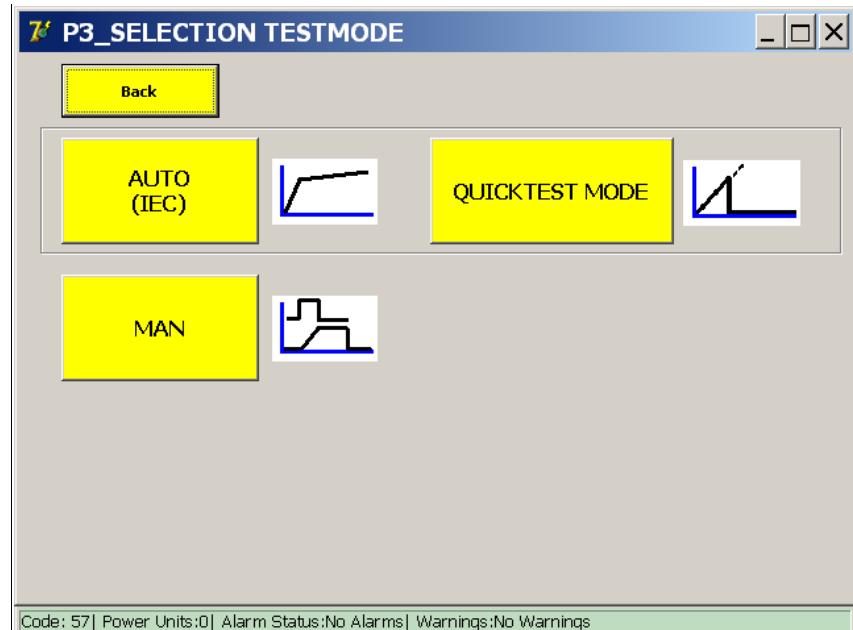
This dialogue contains the following tests:

- Quicktest Mode.
- Auto Mode - AUTO(IEC)
- Manual mode - MAN
  - Opening Time Test.
  - DC Protection Relay Test.

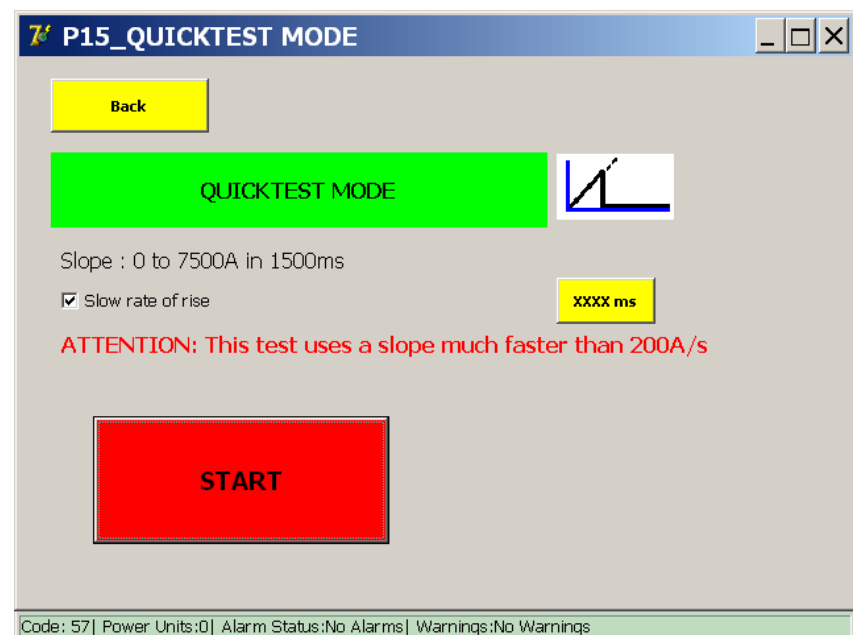
## Quicktest Mode.

In the dialog box 'Main Menu' select the sub-menu 'Test Mode Secondary Injection'. For testing your DC Protection Relay system with manual settings, please select 'MAN' and 'DC Protection Relay Test'. Otherwise, continue as follows:

In the dialog box 'P3\_Selection Testmode':



... and select 'P15\_Quicktest Mode'. The following dialog will be displayed:



### Slow current rate of rise.

Not active: Current rate of rise standard 600ms

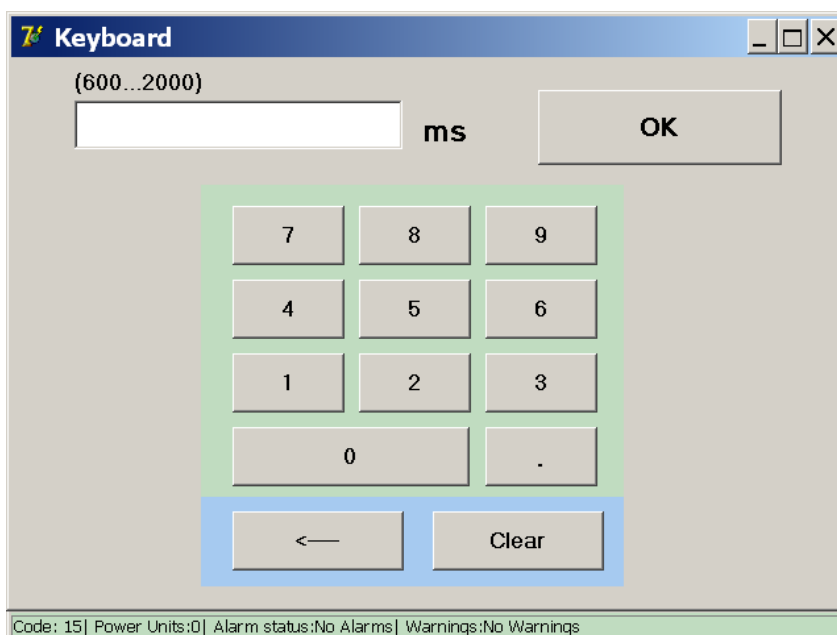
### Slow current rate of rise.

Active: Current rate of rise, with button 'xxxms'



It is recommended to activate the slow current rate of rise, with this function there is a better measurement result.

The following dialog will be displayed:



The range is can only be set between 600 and 2000ms (the fixed minimum is 600ms, whereas the fixed maximum is 2000ms, any value between these limits is permitted).



**INDICATION**

The obtained result - from the last test - is automatically transferred to the introduction field of the Ids-value in Auto Mode.

To start the test, activate the '**Start**' button.

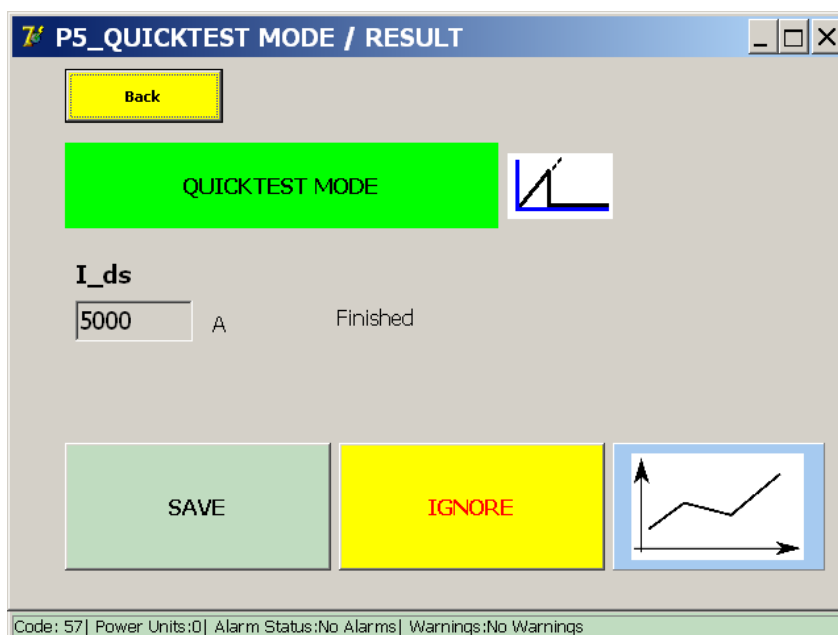



## Principle of measurement.

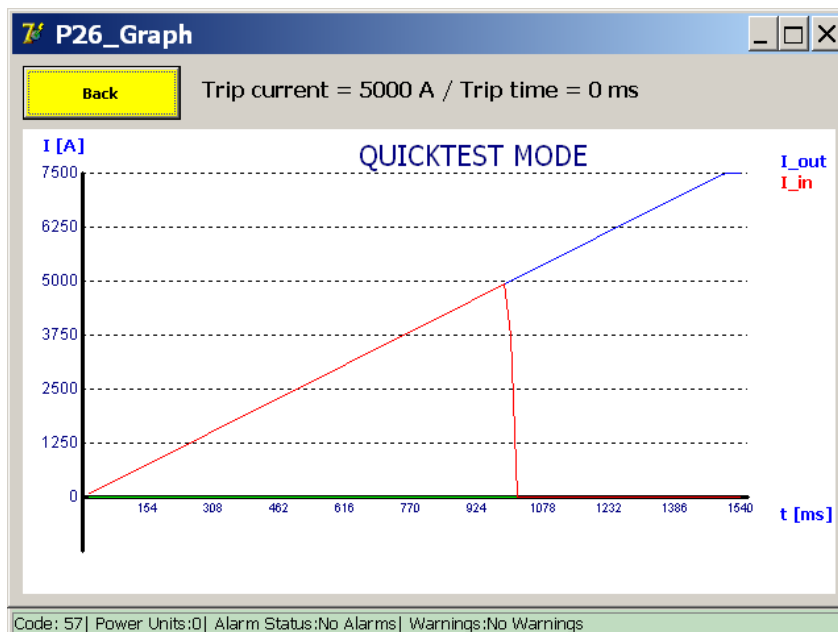
The function is identical as Primary Injections used by the BALTO Modular Systems.

## Measure results.

The test results will be displayed in the following dialog:

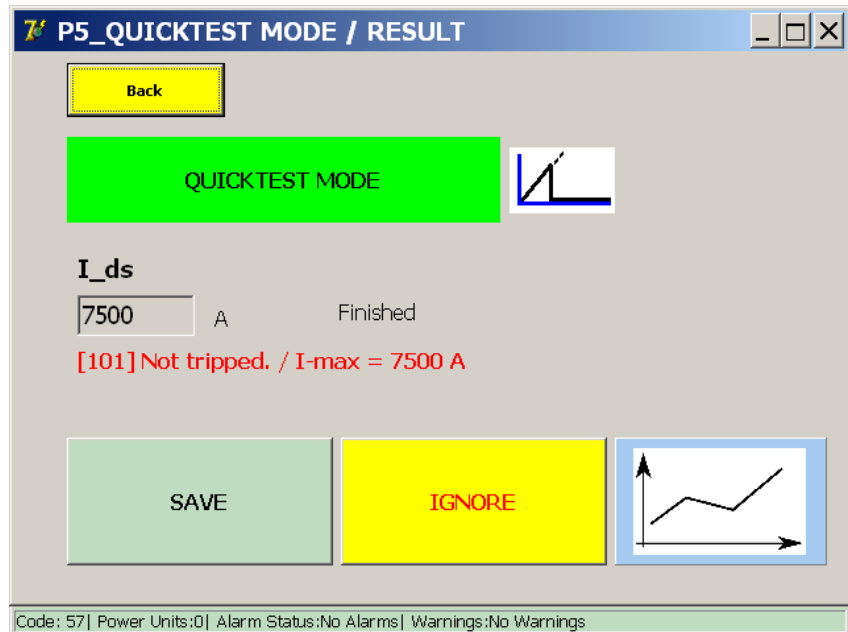


With the button '**Save**' the test result will be stored in a report file and this value will be used as reference value in Auto Mode. The key  displays the dialog '**P26\_Graph**' with the result of the performed measurement.



**Remark:**

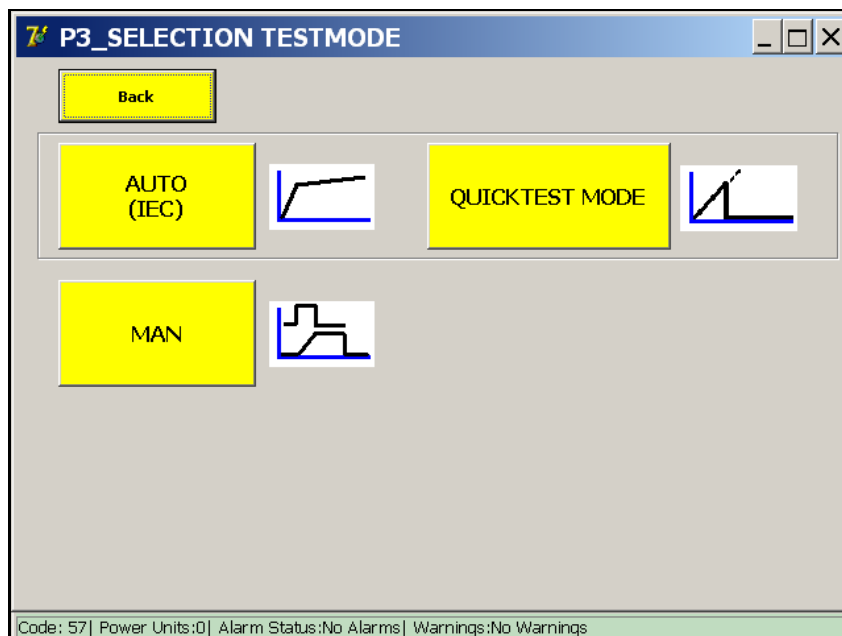
When the set value of the DC Protection Relay is not reached the following dialog will be displayed:



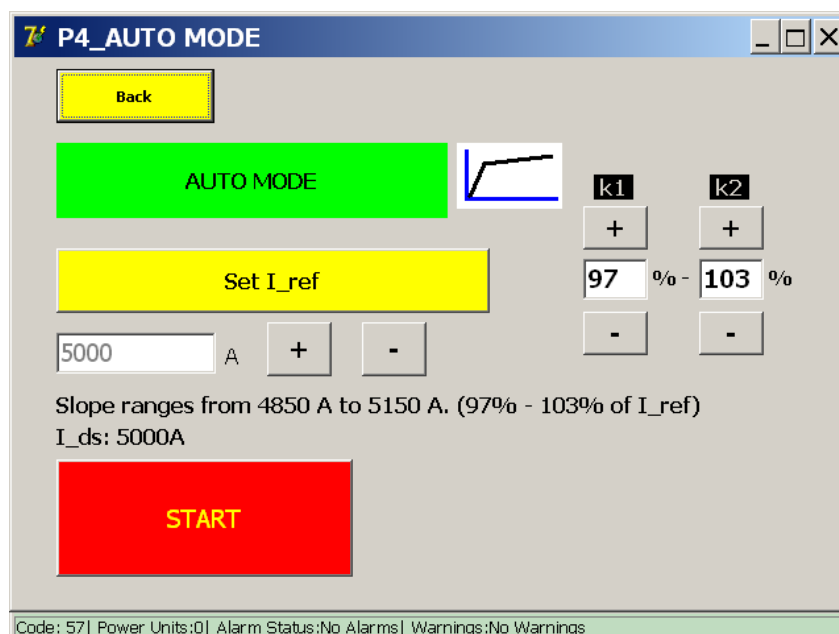
Please, control the set values or parameters from the DC Protection Relay.

## Auto Mode.

Activate this mode by pressing the 'Auto' button in the dialog box 'P3\_Selection Testmode'.



The key  opens a 'P26\_Graph' dialog with the result of the performed measurement illustrated in a graph. The following dialog will be displayed:



The value displayed as  $I_{ref}$  comes from the test in the Quicktest Mode. To adapt this value - if necessary - use the function 'Set  $I_{ref}$ ' or use the keys + and -.

### Remark:

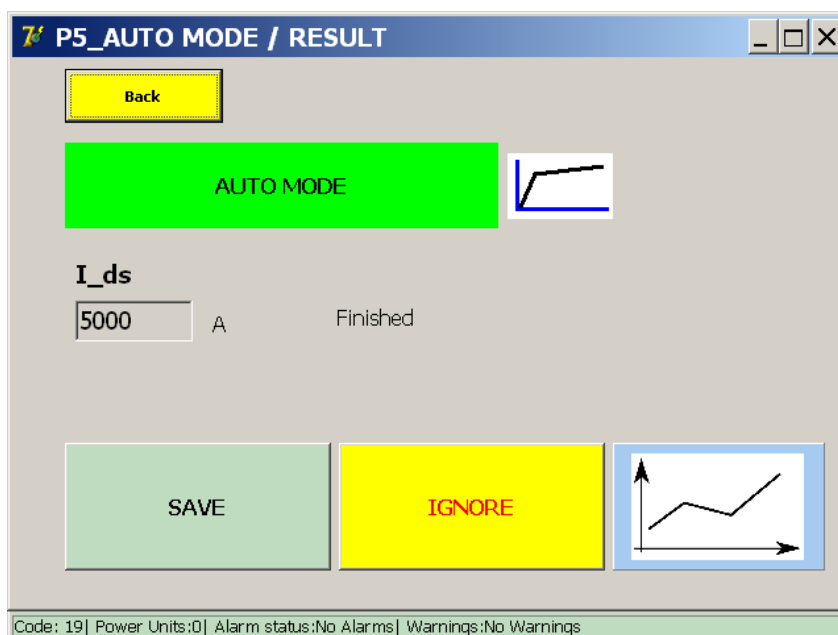
When using Secondary Injections, the function 200A/sec is always active.

## Principle of measurement.

The function is identical as Primary Injections used by the BALTO Modular Systems.

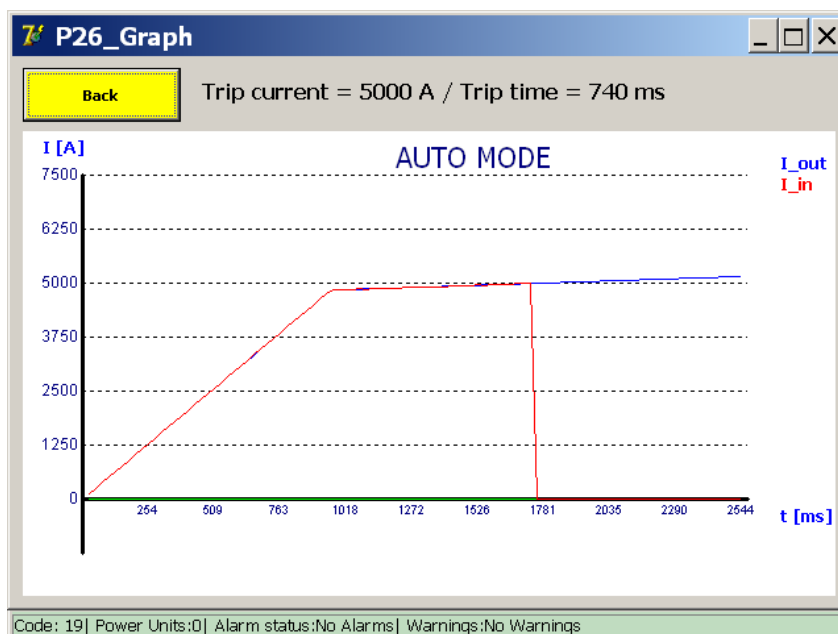
## Measure results.

Test result will be displayed in the following dialog:



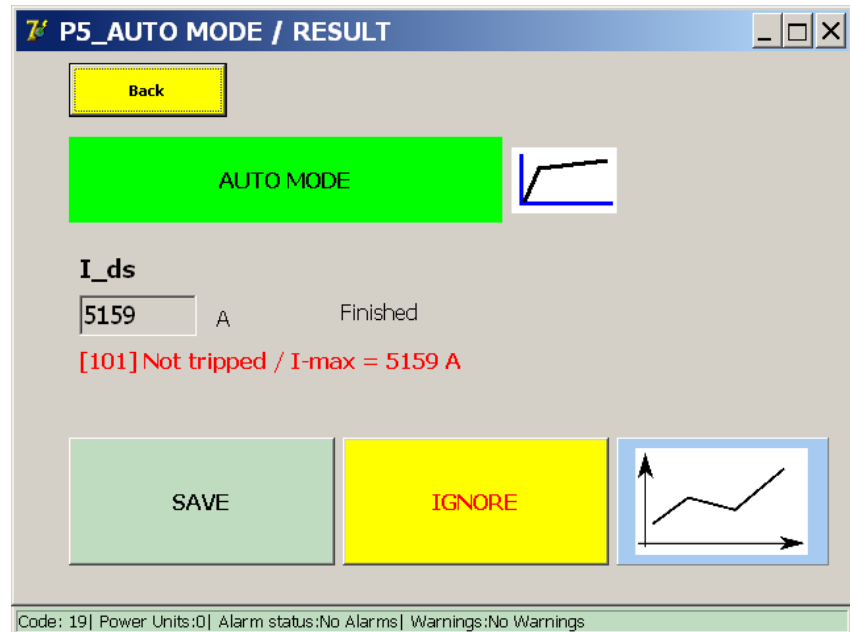
With the button '**Save**', the test result will be stored in a report file. Furthermore, this value will be used as reference for correction - in respect to the test in Quicktest Mode - for the second and following tests.

The key displays the dialog '**P26\_Graph**' with the result of the performed measurement.



**Remark:**

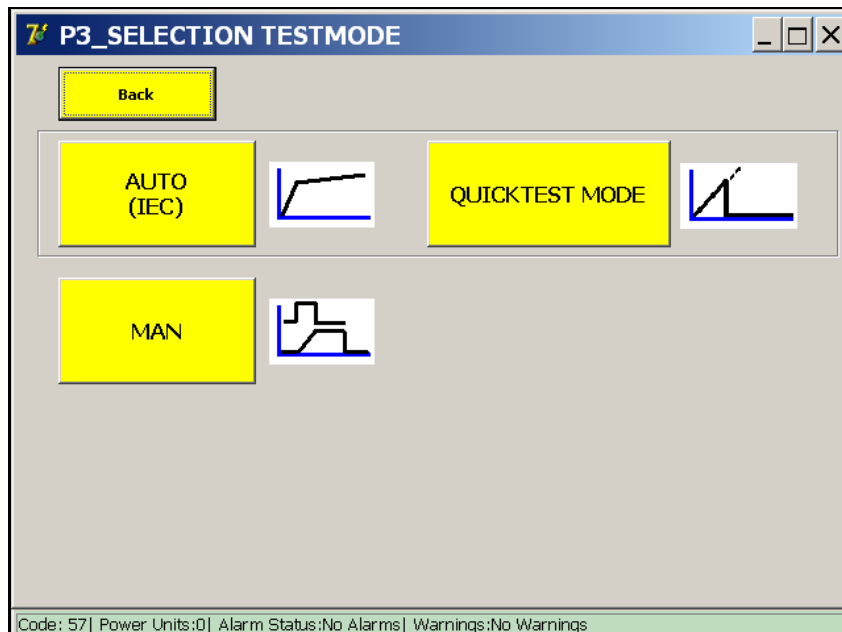
When the set value of the DC Protection Relay is not reached the following dialog will be displayed:




Please, control the set values or parameters from the DC Protection Relay.

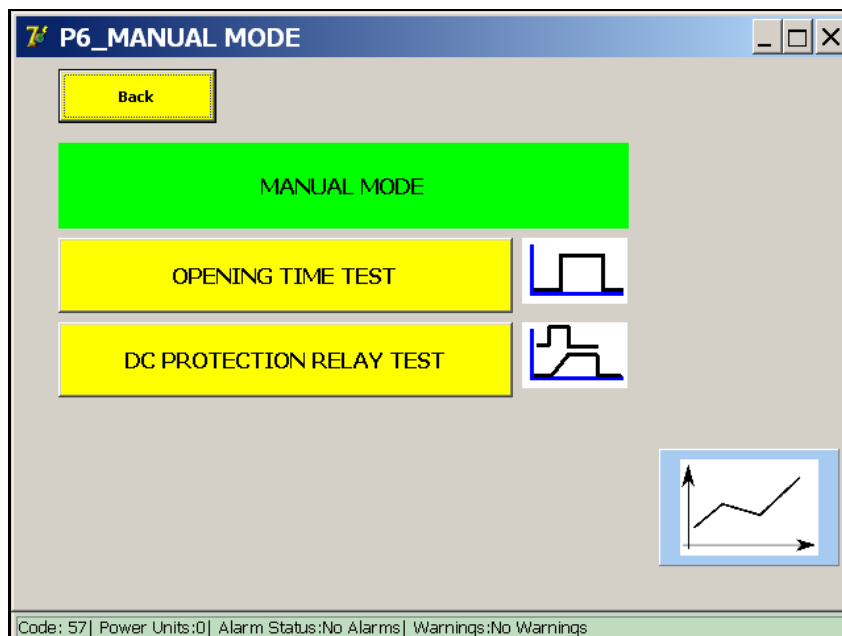
## Manual Mode.



From sub menu 'P3\_Selection Testmode', activate 'MAN'.



The key  displays the dialog 'P26\_Graph' with the results of the performed measurement.

The following dialog '**MANUAL MODE**' will be displayed. In this dialog two functions are available:



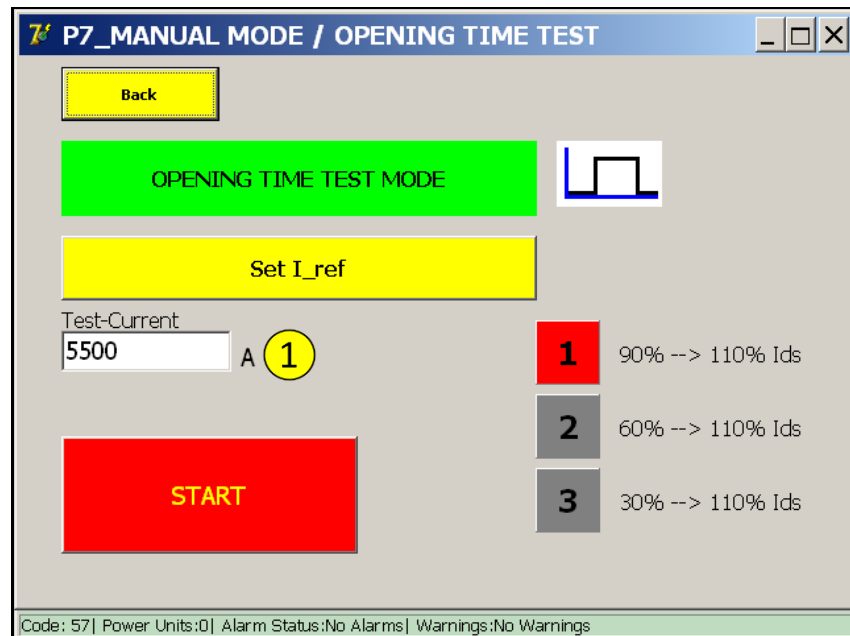
-  Opening Time Test.
-  DC Protection Relay Test.

## Opening Time Test.

This function is used to determine the reaction time of the DC Protection Relay.

Select in the dialog box 'Manual Mode' the function 'Opening Time Test'. The following dialog will be displayed:

### Dialog information.



The used test-current ① - causing the release of the test object - will be introduced automatically as a real value.

The value is calculated by the Ids value measured in the Auto Mode.

Selection concerning the increase of the (test) current:

1. 90% to 110% - active selection in red
2. 60% to 110%
3. 30% to 110%

### Remark:



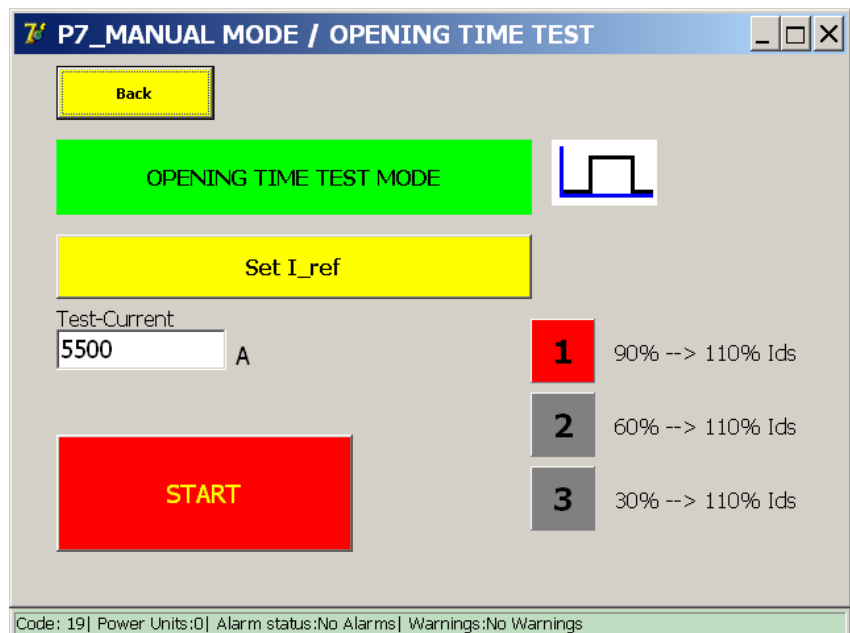
### INDICATION

These data are not default values.

The I\_ref threshold can be adapted by the function 'Set I\_ref'. Please consult the section 'General Information – Set I\_ref' in this chapter.

**Principle of measurement 1**

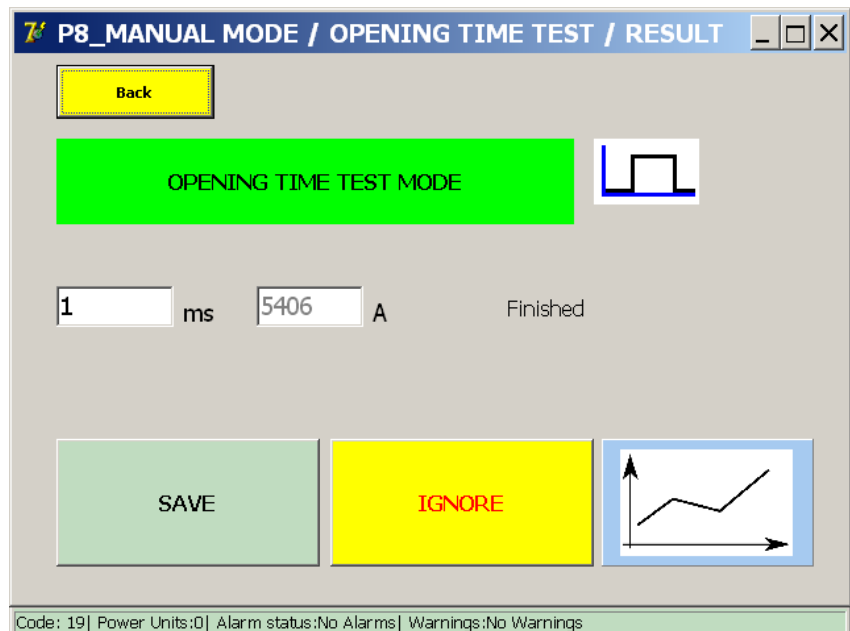
Selection 1: 90% to 110%



To start the test, activate the 'Start' button.


**Measure results.**

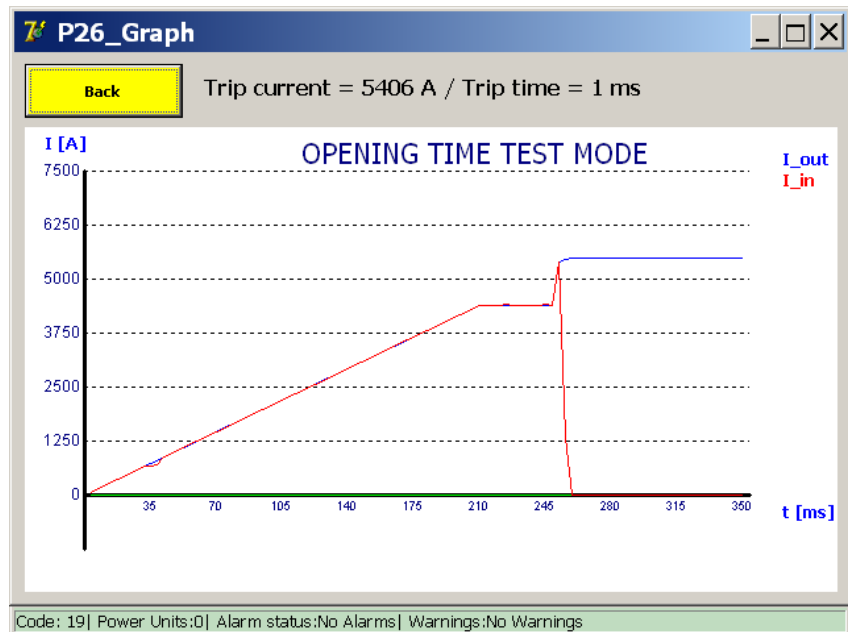
The test result will be displayed in the following dialog:



The button 'Save' stores the test result in a report file.



The key  from the result dialog displays the dialog 'P26\_Graph' with the results of the measurement.



## Principle of measurement 2

Selection 2: 60% to 110%

**P7\_MANUAL MODE / OPENING TIME TEST**

Back

OPENING TIME TEST MODE

Set I\_ref

Test-Current: 5500 A


START

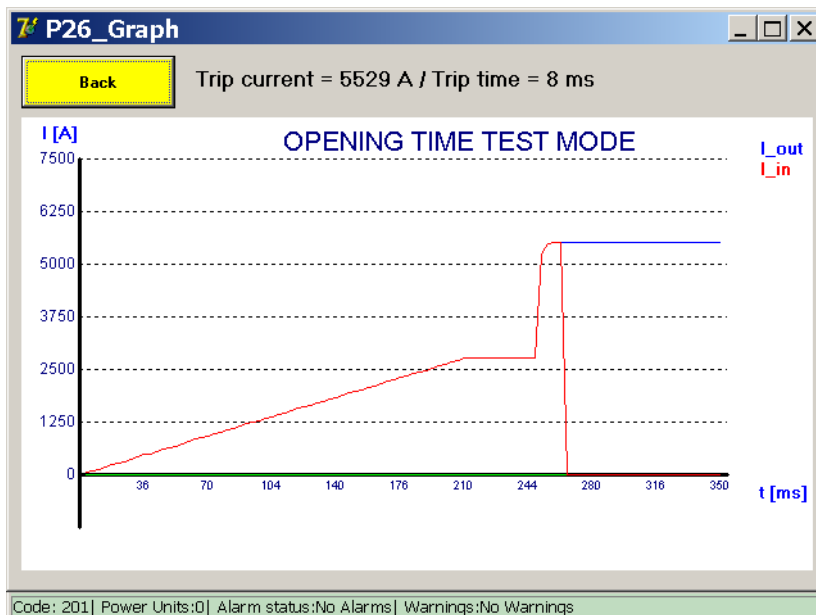
- 1 90% --> 110% Ids
- 2 60% --> 110% Ids
- 3 30% --> 110% Ids

Code: 19 | Power Units:0 | Alarm status:No Alarms | Warnings:No Warnings

To start the test, activate the 'Start' button.

Measure results.


The key  from the result dialog displays the dialog 'P26\_Graph' with the results of the measurement.

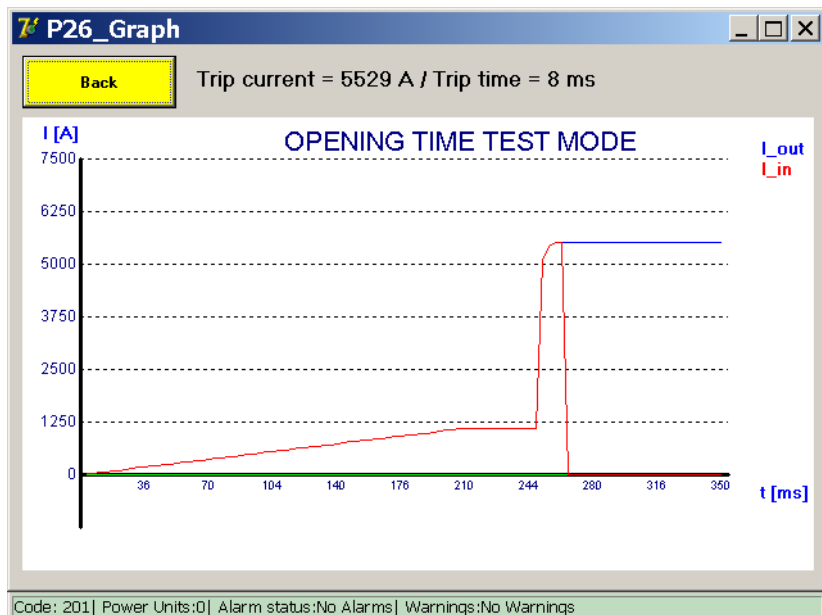


Principle of measurement 3  
Selection 2: 30% to 110%

To start the test, activate the 'Start' button.

Measure results.

The key  from the result dialog displays the dialog 'P26\_Graph' with the results of the measurement.



Remark:

Decisive is the  $I_{nom}$  value introduced ad the '**Output configurations**' - (Max. value =  $I_{nom}$ )



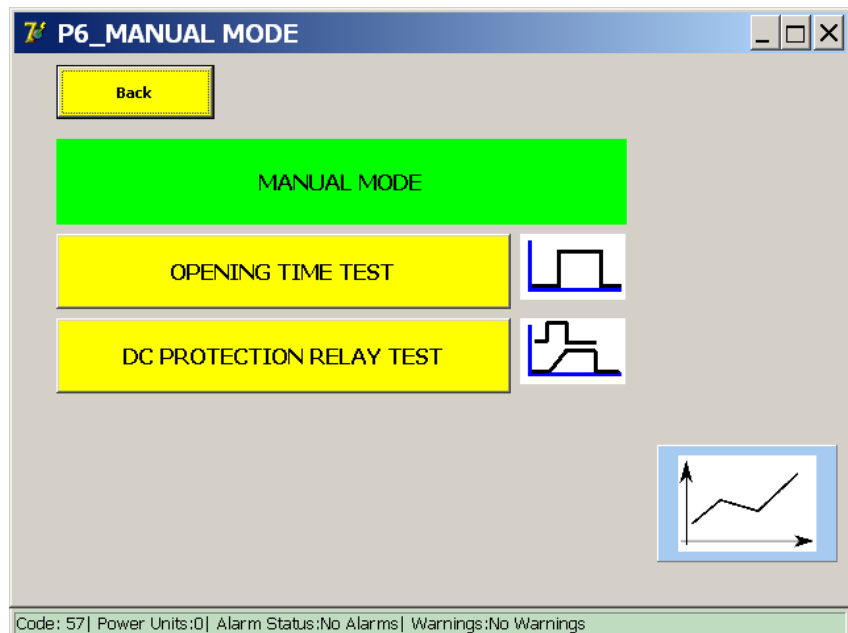
Please, reduce the test current.

Remark:

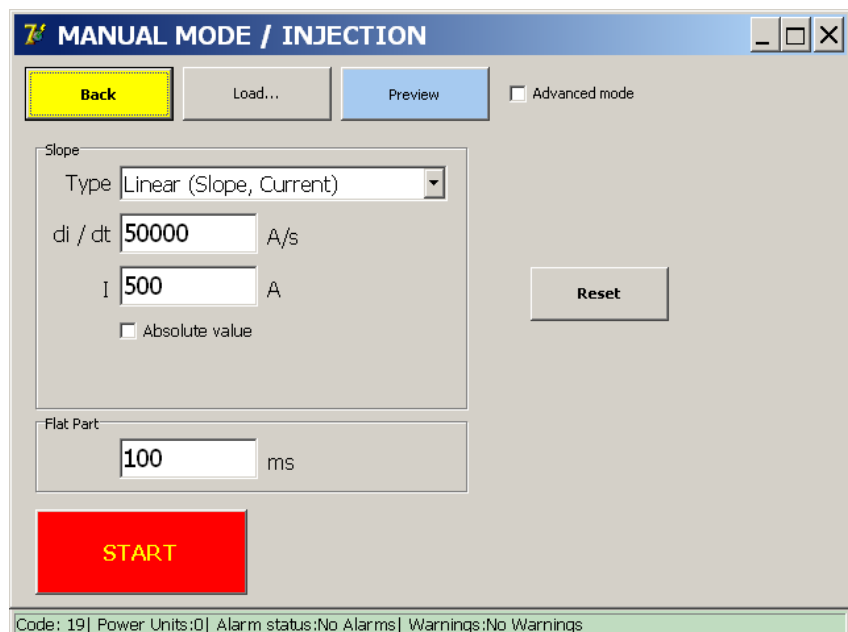
Note that de result in the '**P14\_Report**' is labelled as '**Pulse Mode**'.

## DC Protection Relay Test.

This test is designed for quickly testing di/dt and delta-I trips settings of the DC Protection Relay. It also provides a framework for user-defined custom tests, suitable for testing other DC Protection Relay settings not covered by the standard tests.



Select in the dialog box 'Manual Mode' the function 'DC Protection Relay Test'. The following dialog will be displayed:



To perform tests by using this function, the operator must introduce specific data and corresponding to the profile of the operating network in exploitation.

## Slope types.

Those tests can be configured for a linear or exponential injection.

Several types can be selected :

- Linear (Slope, Duration).
  - Values to input: Parameters →  $di/dt$  -  $dt$
- Linear (Slope, Current).
  - Values to input: Parameters →  $di/dt$  -  $I$
- Linear (Duration, Current).
  - Values to input: Parameters →  $dt$  -  $I$
- Exponential (Duration, Current).

The different types provide different methods of entering the parameters for a linear injection.

## Parameters.

The available parameters depend on which slope type is selected.

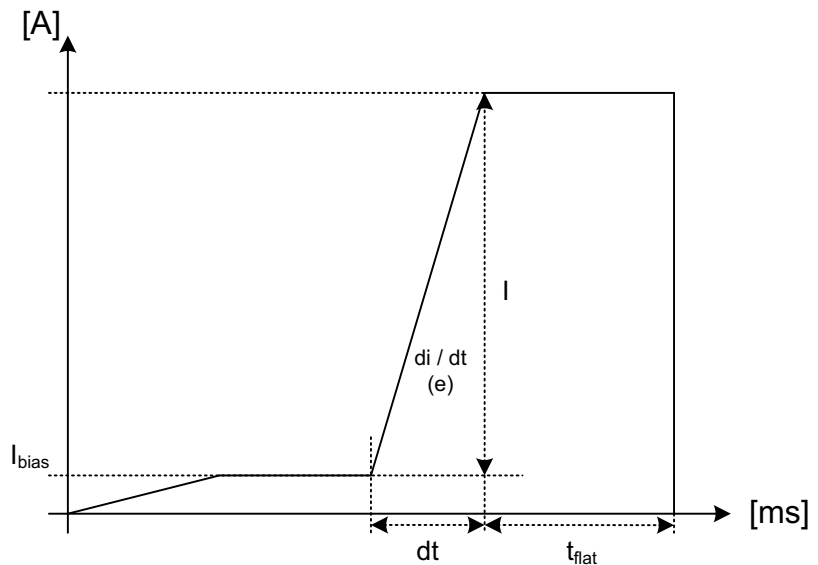
Parameter:	Description:	Unit:
$di/dt$	The slope used for a linear injection.	A/s
$dt$	The duration used for a linear injection.	ms
$\Delta I$	The size of the injection.	A
Absolute value	If this is checked, then the current will rise to exactly 'I'. Like the example :5.000A - Otherwise, 'I' + the bias current.	
Bias current	The injection started with a run-up current of 100A	
$\tau$	The rate of increase used for an exponential injection. 'tau' is the time it takes to reach 63,2% of 'I'.	ms
Flat Part	The time to hold the final current after the injection.	ms

**Remark:**

The '**Flat part**' function can be used for introducing intervals when configuring injections in '**Advanced Mode**'.

**Principle of measurement.**

**Linear injections:**



**di/dt, I, dt** and **t<sub>flat</sub>** (flat part) are set by the operator.

**I** = **di** → value to input.

**di/dt** = e (U/L - t=0) → value to input.

**dt** = Value to input.

Increase time to reach the value **I**

This value is calculated based on the entered data.

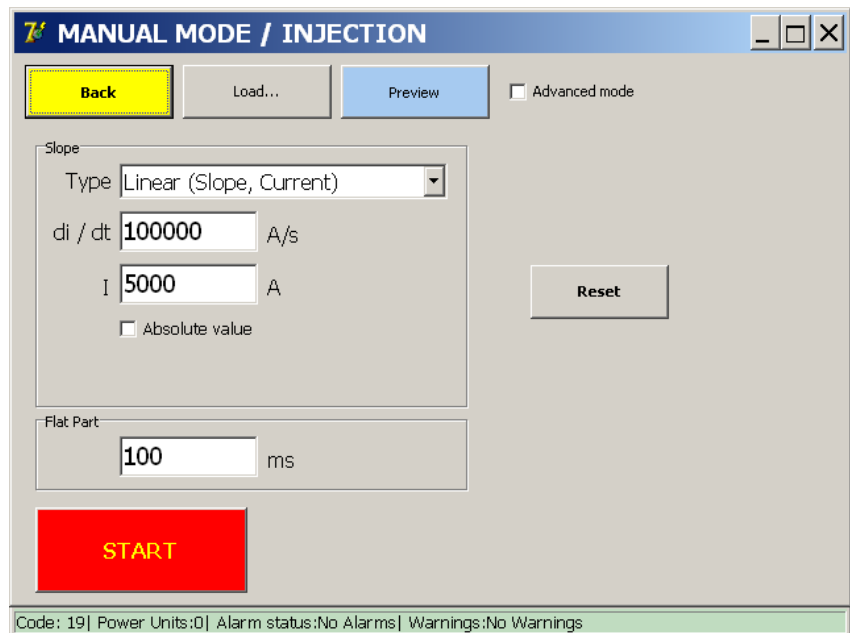
**I<sub>bias</sub>** = Run-up current is fixed on 100A

This value can be adjusted in Advance Mode.

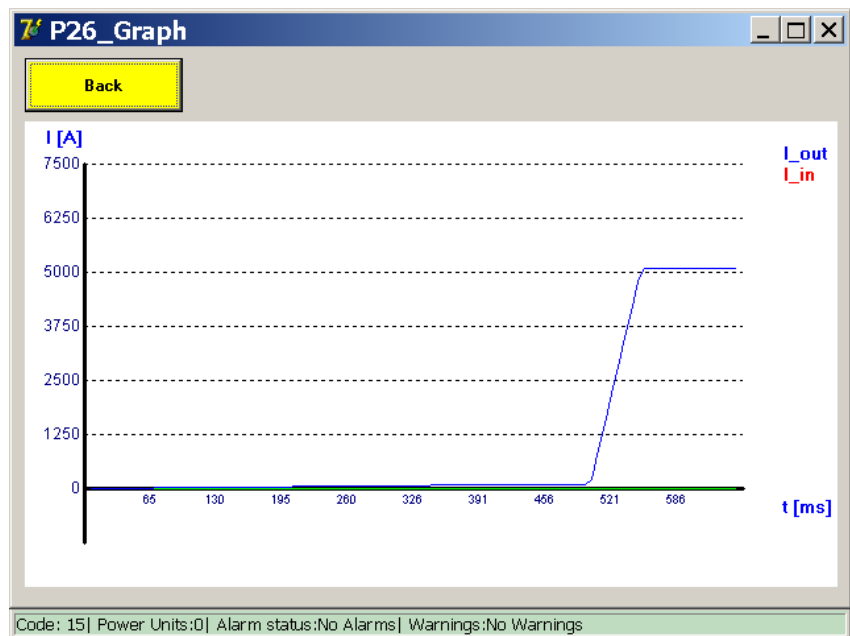
The configured injection can be previewed at any time using the '**Preview**' button.

To start the test, press the button '**Start**'.

Example:



The key '**Preview**' from the dialog displays the dialog '**P26\_Graph**' with a view on the injection graphic.



## Principle of measurement.

### Exponential injections:

For an exponential injection, use the following type:

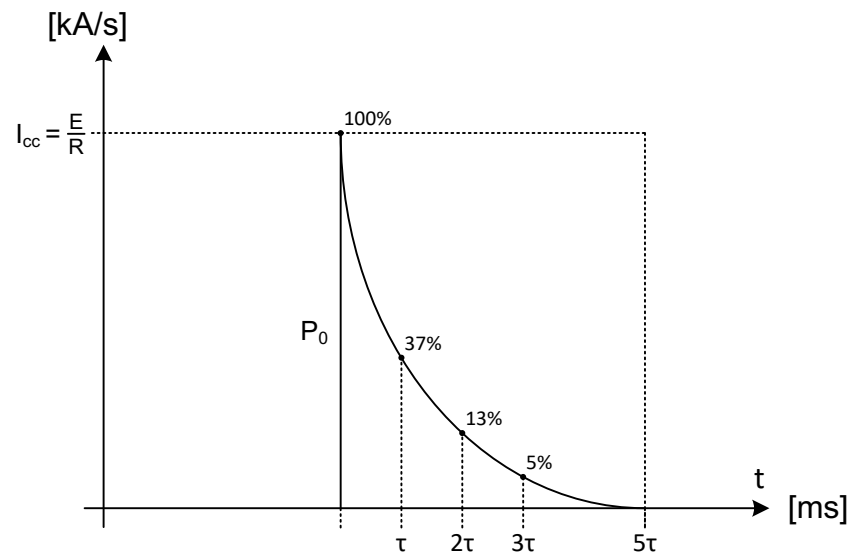
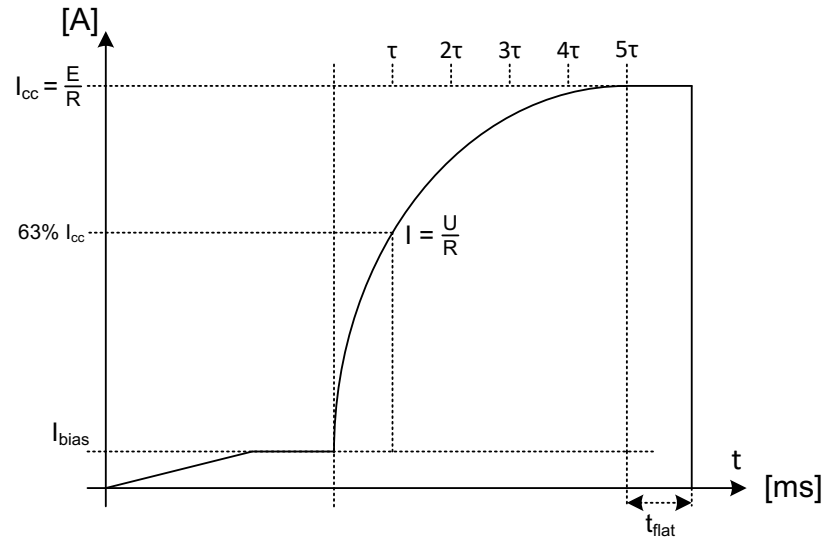
- 🌐 Exponential (Duration, Current)

Exponential injections are configured using **Tau** and **I**.

These values can either be entered directly, or their theoretical values can be computed from line characteristics inside the BALTO program by activating '**Calculate Tau**'.

Enter data in this dialogue and active with the button '**Calculate**', then '**Apply**'.





$\tau$  (tau), I (I<sub>cc</sub>) and t<sub>flat</sub> (flat part) are set by the operator.

I = **dl** → Value to input → I<sub>cc</sub>

$\tau$  = **tc** → Value to input

I = 63,2% value  $R=U/I$

I<sub>bias</sub> = Run-up current is fixed on 100A

This value can be adjusted in 'Advanced Mode'.

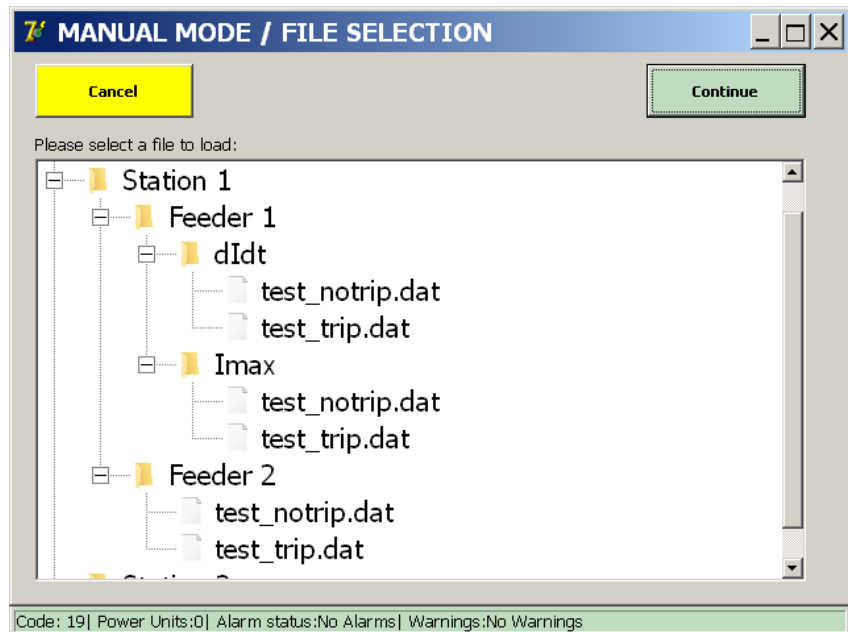
P<sub>0</sub> =  $di/dt_0 \rightarrow I_{cc}/\tau \rightarrow U/L$

The configured injection can be previewed at any time using the 'Preview' button.

To start the test, press the button 'Start'.

## Pre-configured tests.

Previously designed test configurations can be loaded by pressing the 'Load...' button. This presents the following dialog:



By selecting a test and pressing '**Load Selected**', the configuration will be loaded into the test parameters form. In this example, tests have been pre-configured by an equipment specialist for several feeders and protection functions.

This allows a user to simply select a test and run it, rather than entering the parameters manually each time.

Pre-configured tests can be made using '**Advanced Mode**', as described in the next section.

## Advanced Mode.

For 'Advanced Mode', select the checkbox.  
This presents the following extended form:

## Adjust I bias

The run-up current can be adjusted as follow:

- 1. Select the checkbox 'Advanced Mode'.
- 2. Move the scrollbar to the top ①
- 3. Enter the current I ②

By the 'Advanced Mode', the operator has the possibility to configured one or more injections with multiples functions.

Advanced Mode adds the following functionality:

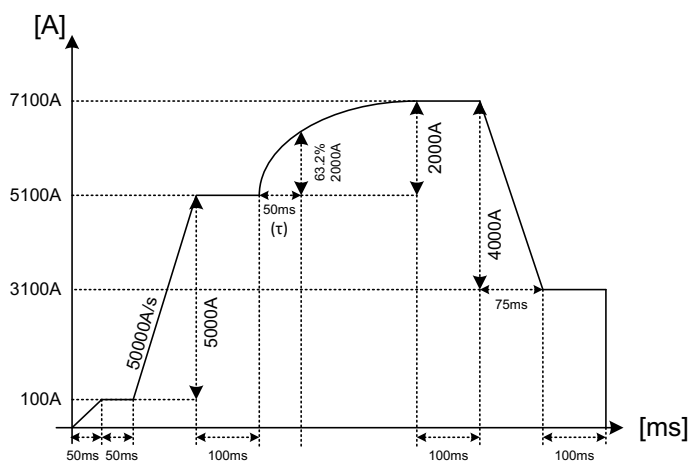
- The ability to design an injection with multiple sequenced steps.
- The ability to modify the bias current (step 1)
- The ability to save a designed injection

Multiple step injections are configured by pressing the '**Add Step**' button until the desired number of steps is reached. The scrollbar is used to switch between steps.

To remove a step, press the '**Remove Step**' button. To revert to the initial configuration, which contains the default bias step and an empty step, press '**Reset**'.

An example of a multiple step injection can be seen below, using the following input parameters:

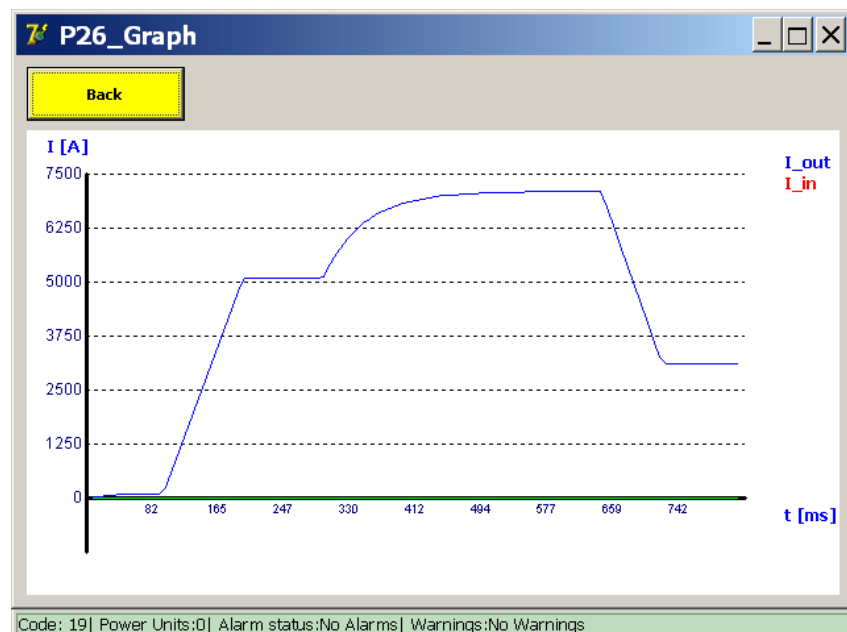
### Example:



- Step 1: Linear (default bias)
  - dt = 50ms
  - I = 100A
  - flat part = 50ms
- Step 2: Linear
  - di / dt = 50000A/s
  - I = 5000A
  - flat part = 100ms
- Step 3: Exponential
  - tau = 50ms
  - I = 2000A
  - flat part = 100ms
- Step 4: Linear
  - dt = 75ms
  - I = -4000A
  - flat part = 100ms

### Results of advance configuration.

The key '**Preview**' from the dialog displays the dialog '**P26\_Graph**' with a view on the injection graphic.



This example contains a negative 'I' value which reduces the output. Negative 'I' values are valid for both linear and exponential steps. Configured injections can be saved as a new pre-configured test by pressing the '**Save As**' button. Once a test is named, the '**Save**' button can be used to save any changes to the pre-configured test.

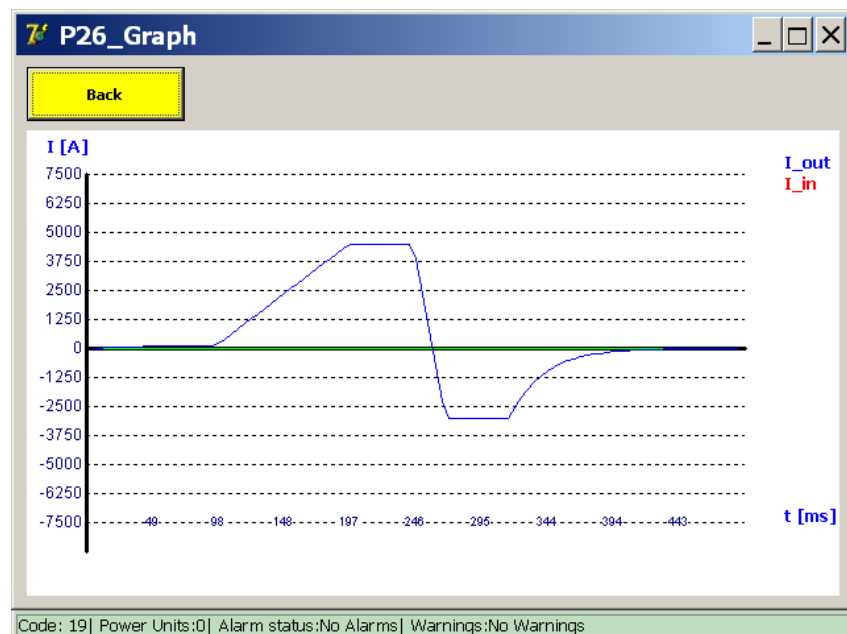
Pre-configured tests are saved on the file system and remain present even after a shutdown and reboot of the BALTO Controller System.

**Remark:**

In '**Advanced Mode**', the invert function is always active.

**Example:**

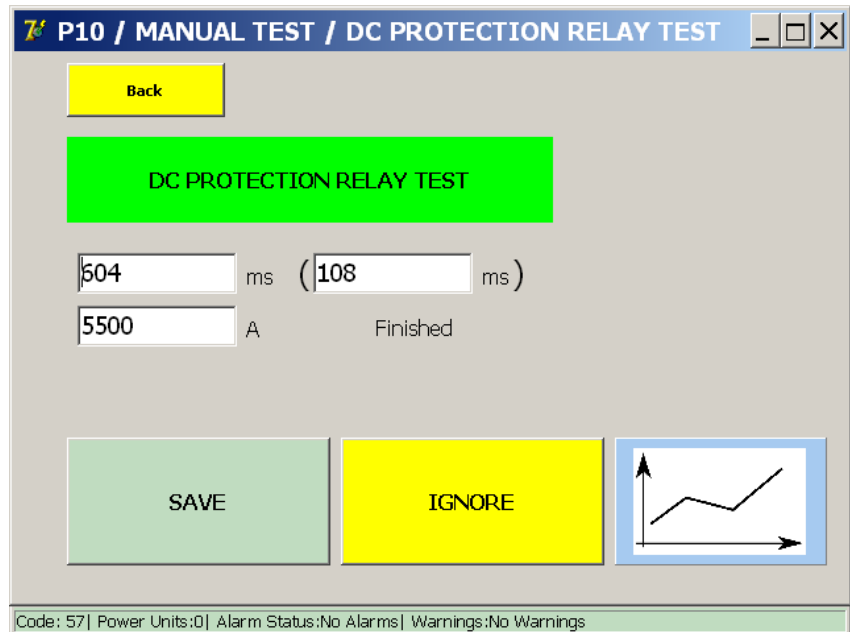
Example of an injection with an invert function




Advanced tests are saved in the System and remain present after exit and rebooting von the BALTO Controller System.

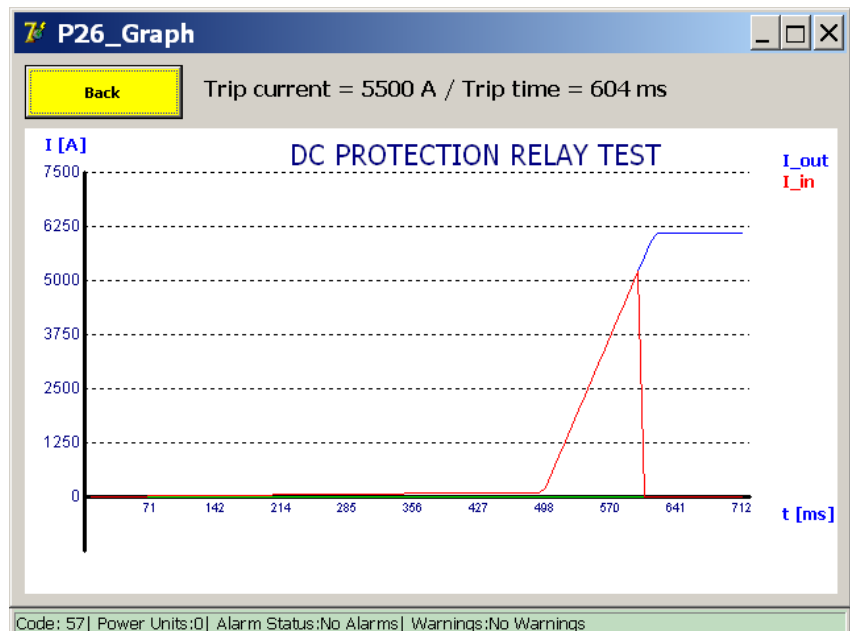
Test result.

Test results are displayed in the following dialog:



This dialog displays whether the test resulted in a trip. If so, it displays at what time and current level the trip occurred

The key  displays the dialog 'P26\_Graph' with the results of the performed measurements.



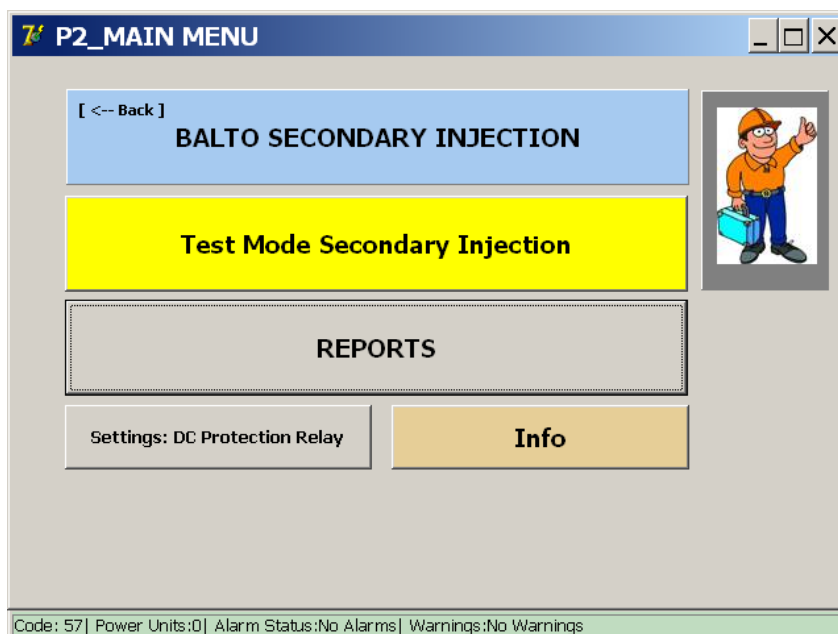
## Reports.



### INDICATION

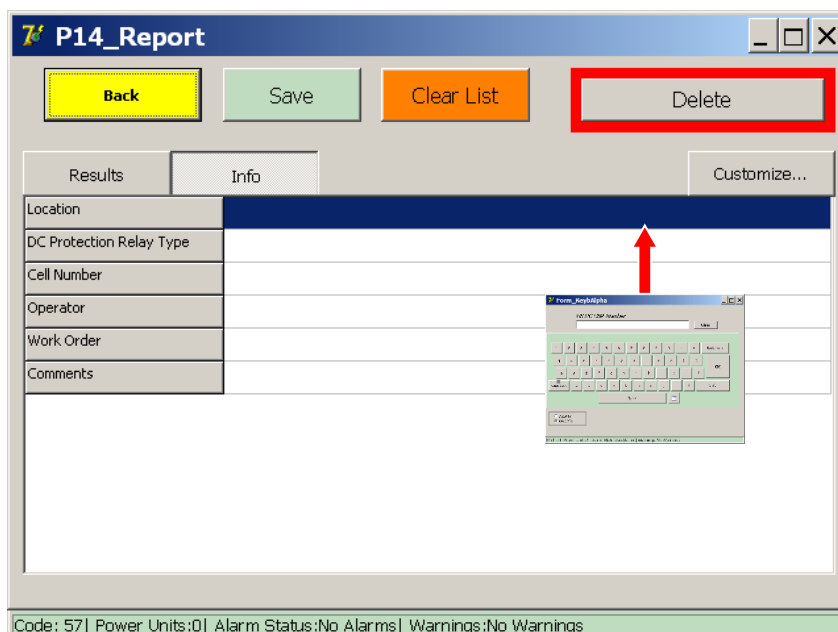
From the main menu, activate the sub menu **'Reports'**.

When the button **'Reports'** lights up grey - as shown in the dialogue below -, no measurement was recorded.



## Identification.

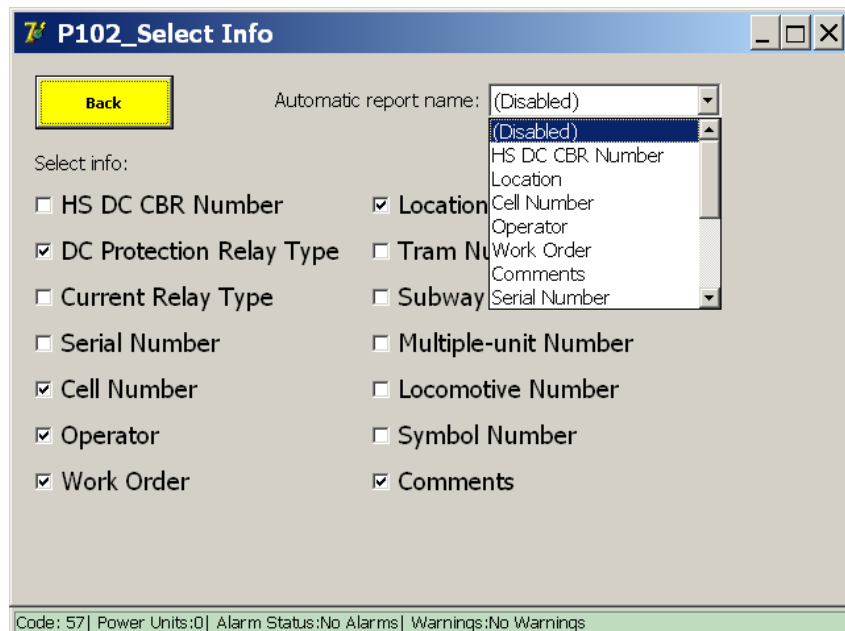
Regarding records identification: For according data of the DC Protection Relay the button **'Reports'** has to be activated and in the next dialog the button **'Info'**.



By click on an empty field, a dialog opens to enter text on the customize selections.

### Customize identification.

By activating the button 'Customize', the next dialog will be displayed:



The identification records can be activated or deactivated. The report name is regarding the selection made in the dropdown list.

**Remark:**

Comments can be added to every moment.

In this example, the DC protection relay type as selected for report name.

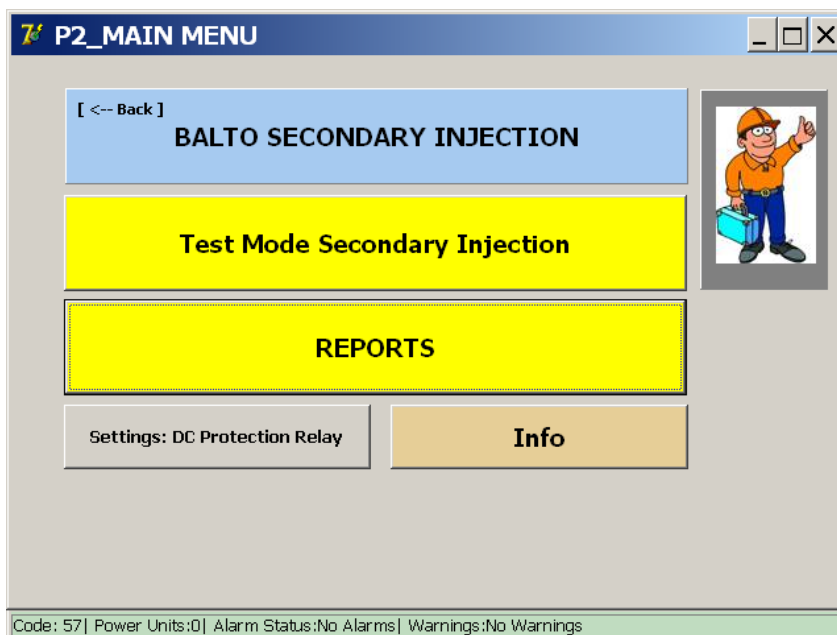
Please, introduce a reference; otherwise the next dialog will be displayed:





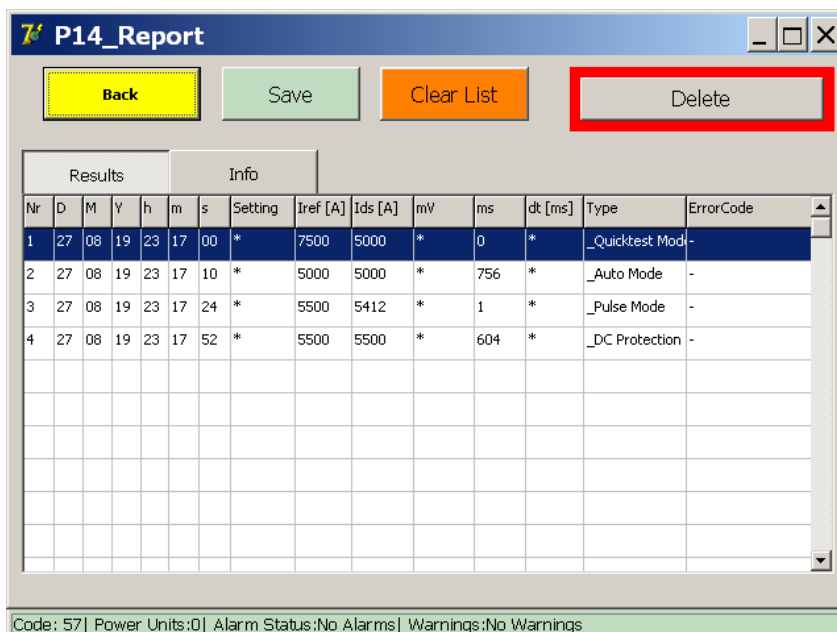
## Reading reports.

When the button **'Reports'** is coloured in yellow - as shown in the dialog box below - there has been at least one recorded measurement and the function is available.



Please consult the chapter **'BaltoWin'** - section **'Operating - USB Interface'**.

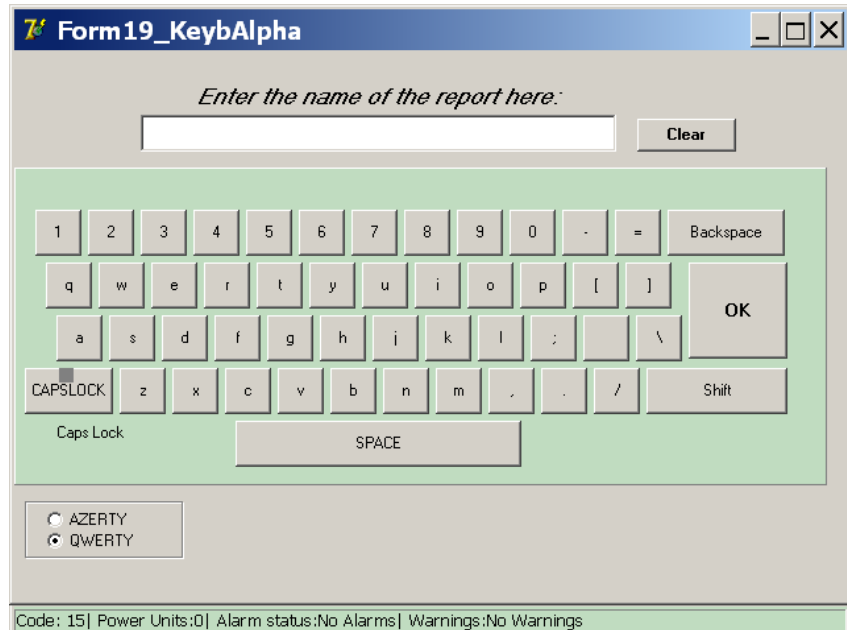
The following dialog will be displayed:



The measured values that were saved - using the **'Save'** function after a test in the various current injection modes - will be visible in this dialog.

This register is used to store values and can store up to 20 measurements.

These values can be recorded always by activating the button 'Save'. The following dialog will be displayed to allow the operator to enter a name for the report file.

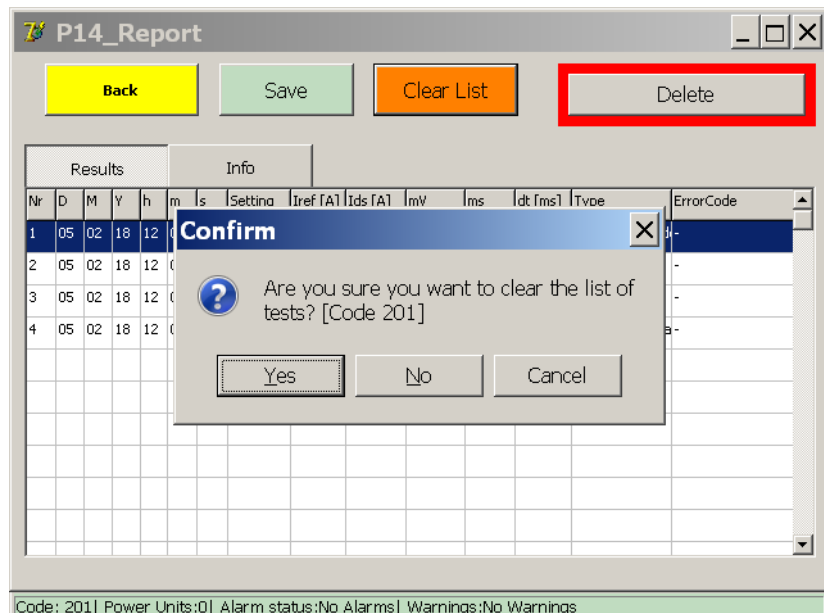


Enter the desired name and press the button 'OK'. If previous measurements are not deleted and if the limit of 20 measurements has been reached, any further measurements will request a report file name after the measurement has been completed. The abovementioned dialog will appear, allowing the operator to enter a name for the report file.

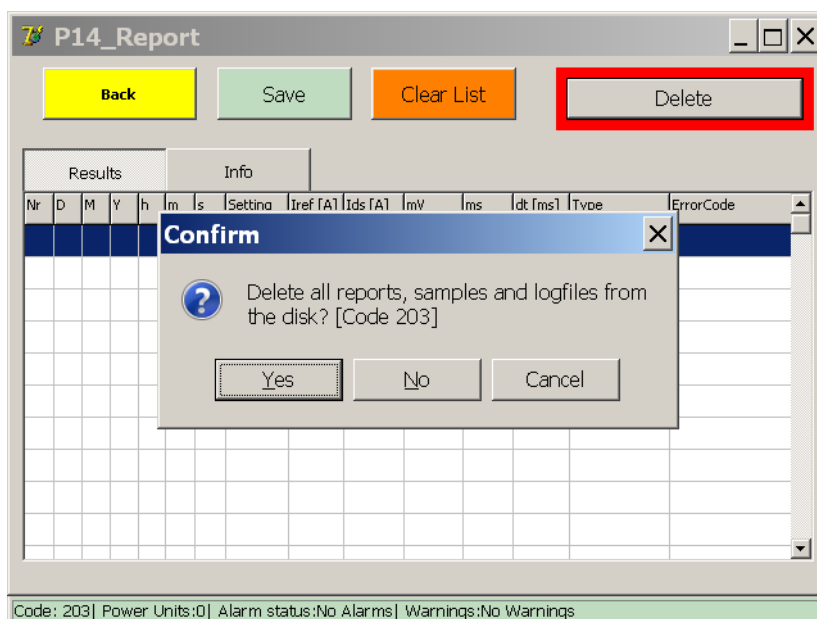


**INDICATION**

If the operator chooses to cancel the saving of this excess measurement report, the measurements will be lost. By pressing the key 'Clear List' in the report files dialog, the content of the register will be erased. Confirm clearing the list by pressing 'Yes' in the displayed a pop-up window.



Stored files can be downloaded with the BaltoWin program for further processing. When a USB Stick is connected to the USB Interface - Control Unit/Control Panel position 6, the files will be transferred automatically and can be processed in the BaltoWin program.



**IMPORTANT**

By pressing the button '**DELETE**' all reports, samples and log files as well as previous recordings will be removed from the hard drive.

Confirm clearing the hard drive by pressing the button '**Yes**' in the displayed a pop-up window.

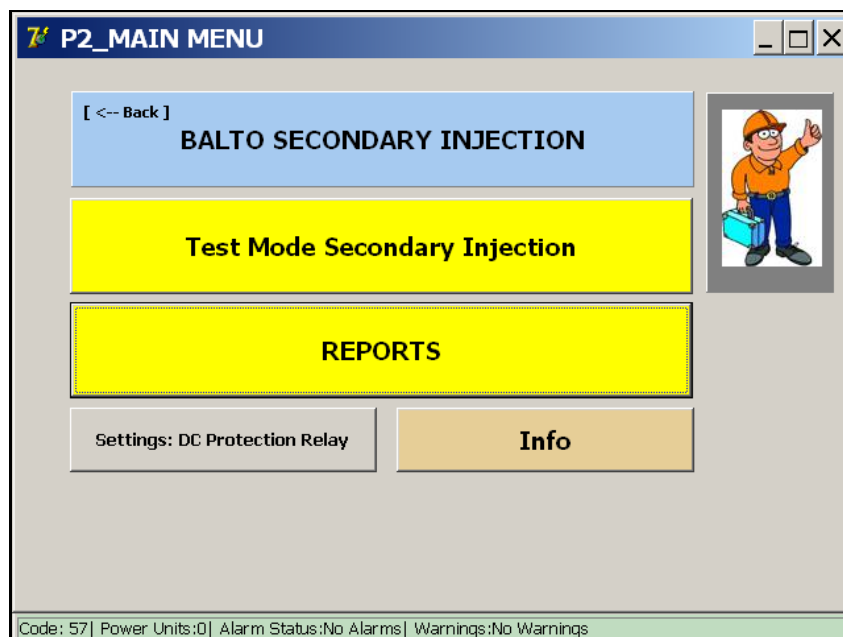
**Remark:**



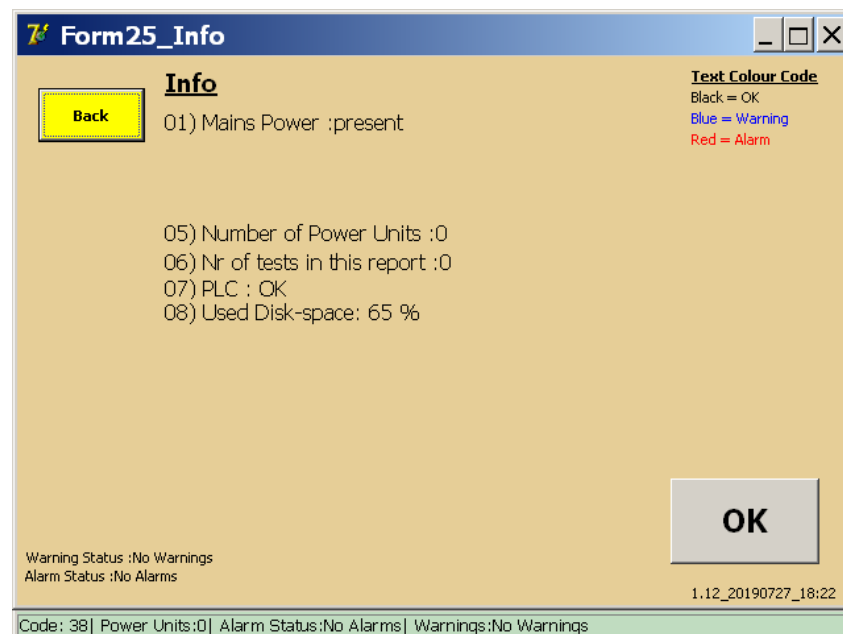
During the BaltoWin data transfer, a Pdf. report with the measurements and graphs is also edited. This function must be specified when ordering the BALTO System.

## Info Dialog.

From the Main Menu, press the button 'Info' to go to the information sub-menu.



The following dialog will be displayed.



For more information, please consult the chapter 'Troubleshooting' - section 'Status Info dialog'.

**Remark:**

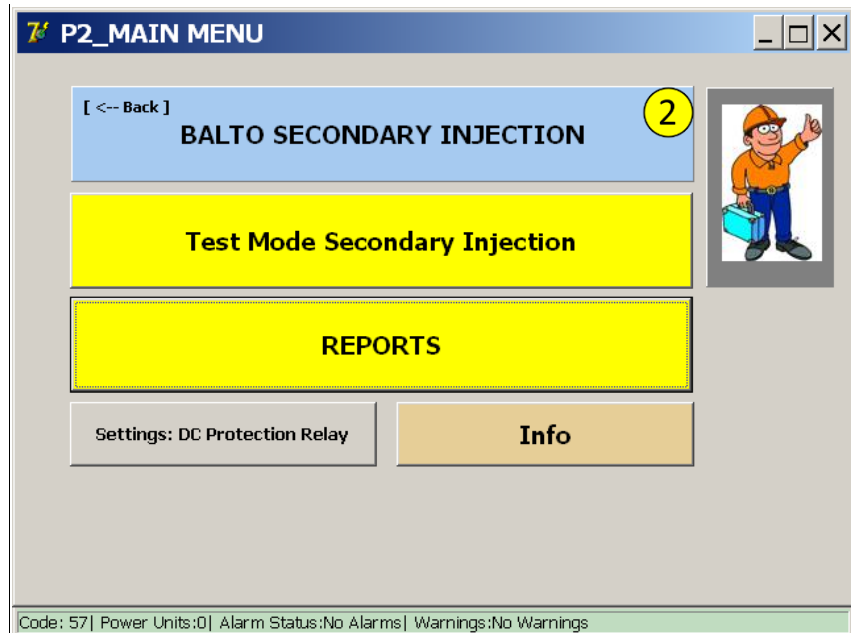
**'OK'**

With this button confirm warnings and alarms.

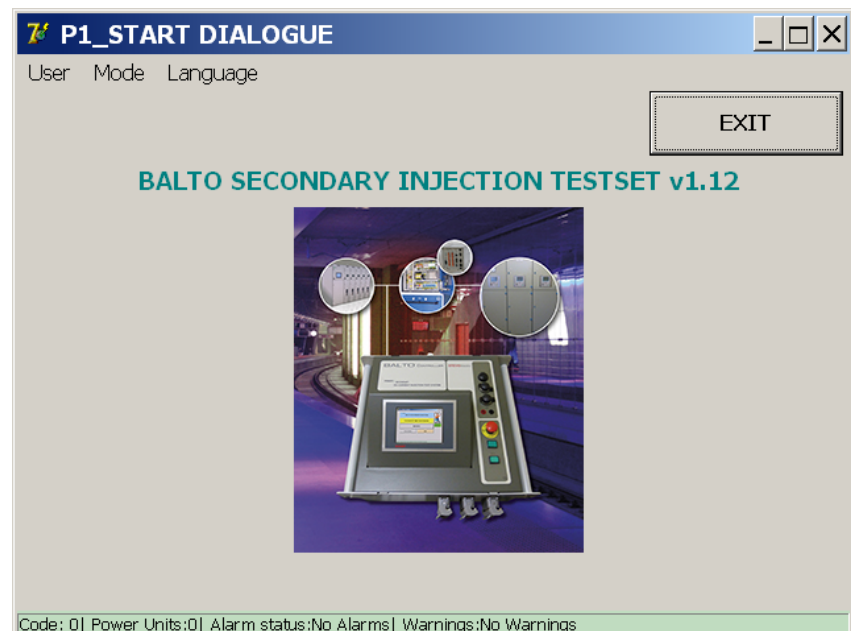
## Exit BALTO application.

After finishing all current injections:

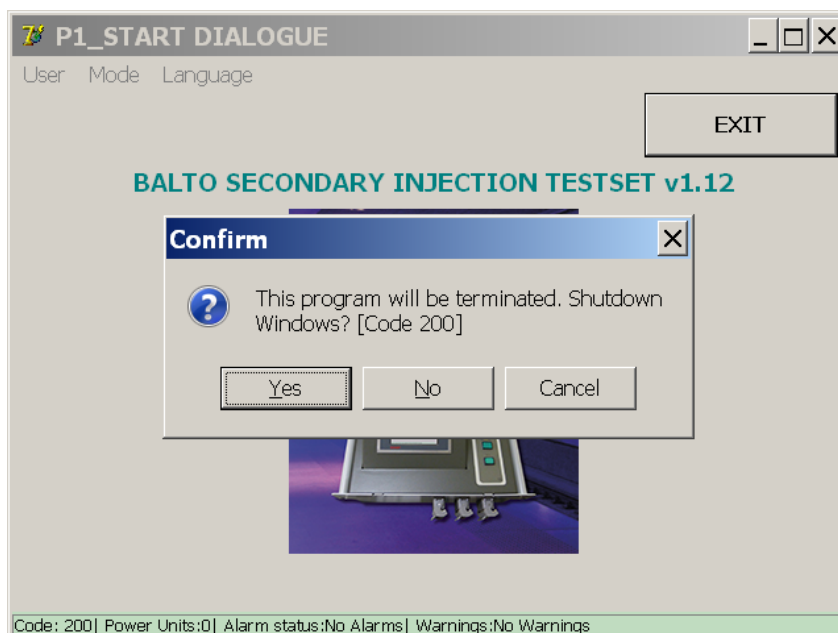
1. The device under test must be in open position.
2. Activate function ② to return to the dialog 'Start Dialog'.



3. Press the button 'EXIT' on the homepage of the BALTO System.



4. Confirm in the following pop-up window:



5. Press the button 'Yes' in the displayed dialog to close the program, this procedure can take up to 45 seconds.

**Important information.**

During the shutdown of the Windows operating system, the next message is displayed:



**IMPORTANT**

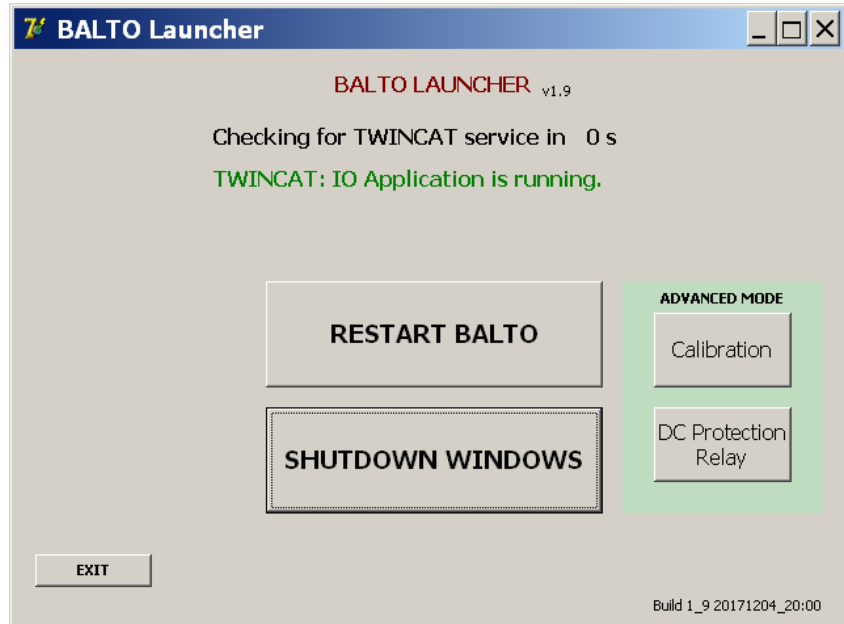


Power Supply Control Unit: 230VAC/50Hz or 120VAC/60Hz is displayed, because the shutdown off the PLC is still in progress – disconnecting I/O  
Please wait until signal lamp of the button O/I is lighted.

The indicator '**System ready**' must be deactivated and the indicator '**O/I**' activated. Please consult the chapter '**System Assembly**' - section '**Control Unit**'.

The Power Supply can be removed, or the procedure can be restarted.

If the operator presses the button '**No**' in the pop-up window from the abovementioned dialog, the following dialog will be displayed:



Press '**SHUTDOWN WINDOWS**' and wait for shutting down Windows.

---

# BaltoWin

Using the management software BaltoWin, test files can easily be downloaded and displayed.

The BaltoWin program is modelled after the standard Windows menu structure, for more convenient operation of the program. BaltoWin is available separately on a CD-ROM or a USB Stick. The installation of the program is quick and simple.

## System requirements.

**Operating System:** Microsoft Windows 10

**Hardware:** Ethernet and USB

**CPU:** Pentium 166 MHz or more

**Memory:** 64 MB (128 MB or more)

**Screen:** SVGA (min. 800 x 600) 16 bits or more

**Hard Disk Drive:** 10 MB or more

**CD-ROM drive:** for software installation

**Additional software:** Microsoft Excel



### **INDICATION**

Alternatively, use a USB Stick as a carrier for downloading the program.

This avoids changes to the IP address of the PC or laptop.



## Information regarding the BaltoWin files.

Software version v1.9

**BaltoWin\_Setup.exe:** BaltoWin installation file

**BaltoWin License.txt:** If delivered on a USB Stick, this file contains the license code. If delivered on a CD-ROM, the license code will be written on there.



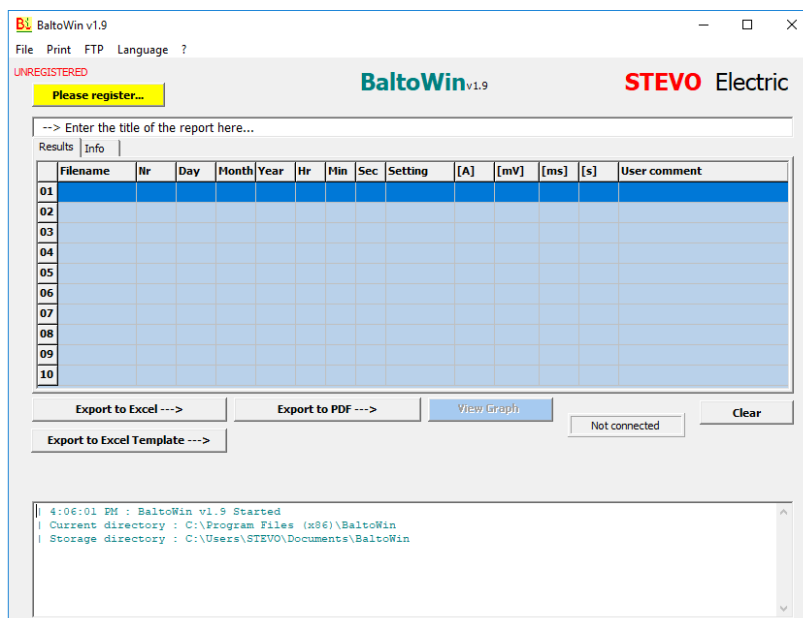
Figure 15: Control Unit: Laptop with BaltoWin.

## Installation.

Run the BaltoWin setup file - '**BaltoWin\_Setup.exe**' - to start the installation.  
 This file may be executed from both the CD-ROM and the USB Stick.

After the installation, a shortcut will be made both on the desktop and in the start menu (see '**STEVO Electric**').

The BaltoWin program will start automatically.  
 The following window will be displayed:



### INDICATION

The operator must first register to use the program, click on the option '**Please register**' in the top-left corner of the window.

Without registration, the program is active for 30 days.

The following dialog will be displayed:

In this dialog, the following information needs to be entered:

- **License ID**                    Enter licence code
- **Organisation**                Enter the name of the company  
(This is not mandatory)
- **Registration Code**        Enter Registration code

This information is located on the cover of the CD-ROM or in the file '**BaltoWin License.txt**' on the USB Stick.



**INDICATION**

A new BaltoWin version can be installed without deleting older versions.

**Shortcuts**

Shortcuts will be available on the desktop as well as from the start menu (check '**STEVO Electric**').



## Communication.

Communication with the BALTO System takes place through the Ethernet interface.



### INDICATION

The USB Interface is used for storing the measurement data in the USB Stick.

## PC Configuration.

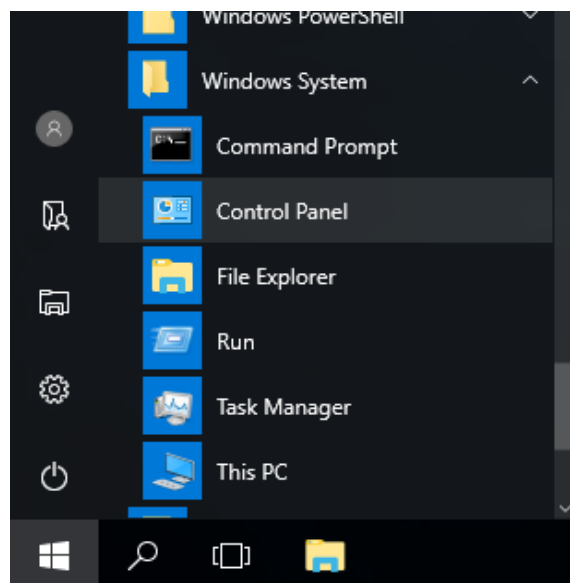
The configuration of the PC/Laptop is parameterized for connection on a local area network or other such connections.



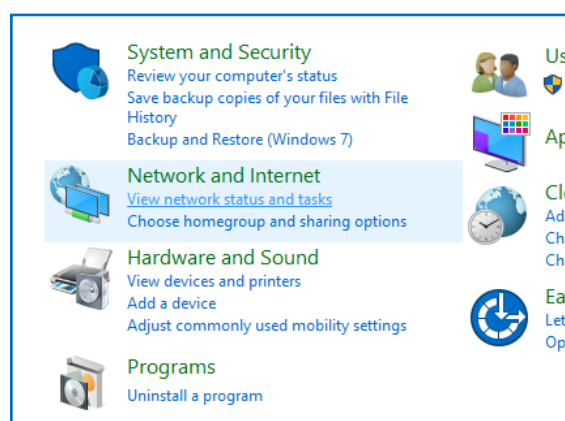
Please find a suitable connection in the **'Network Connections'** menu as shown in the figure below. To adapt the parameters or for any problems that may occur, please request the assistance of the company administrator or network manager.



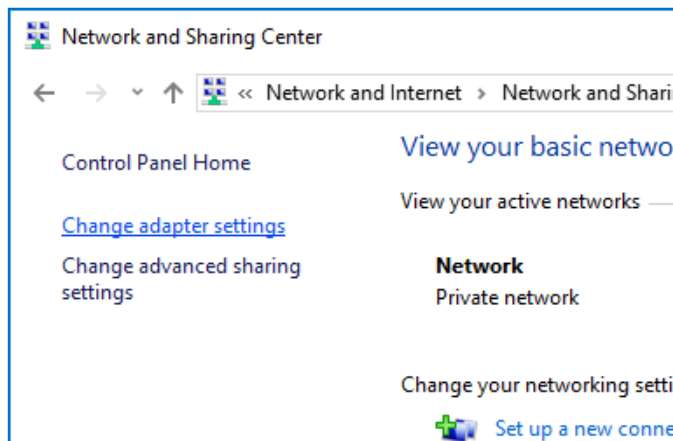
Procedure Windows 10



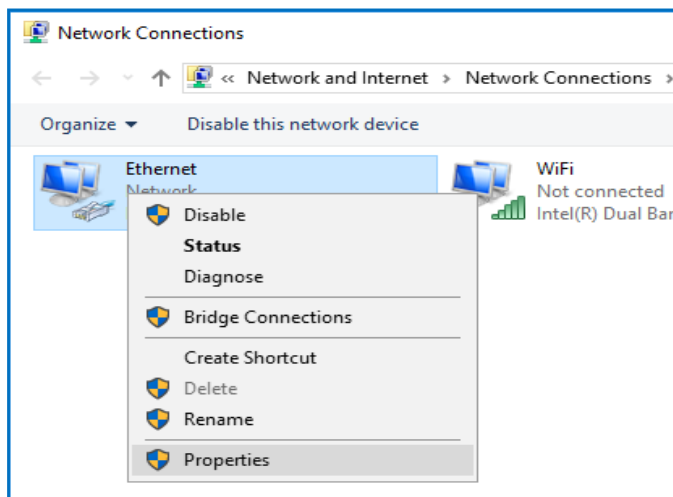
In the **'Start Menu'** open the file **'Windows System'** and select **'Control Panel'**.



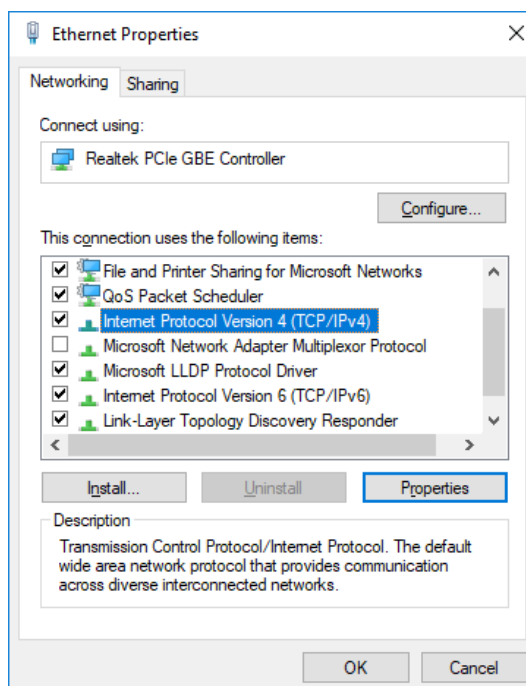
Select **'View network status and tasks'**.



Click on '**Change adapter settings**'.



Click on '**Ethernet**' and select '**Properties**'.



Select '**Internet Protocol Version 4 (TCP/IPv4)**' and '**Properties**'.

In the following dialog input data:

Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

Obtain an IP address automatically

Use the following IP address:

IP address: 192 . 168 . 1 . 10

Subnet mask: 255 . 255 . 255 . 0

Default gateway: . . .

Obtain DNS server address automatically

Use the following DNS server addresses:

Preferred DNS server: . . .

Alternate DNS server: . . .

Validate settings upon exit

Advanced...

OK Cancel

Check off '**Use the following IP address**'.

Input the data as indicated in the fields of the dialog: '**IP address**' and '**Subnet mask**'.

'**Default gateway**' can be empty.

Confirm with '**OK**'.

## Connection.

Establish connection between the laptop/pc and the RJ45 connector on the Control panel from the Control Unit - position 7

## Preparations.

Start the laptop/pc and start the BaltoWin program.  
If necessary, adjust the network configuration.

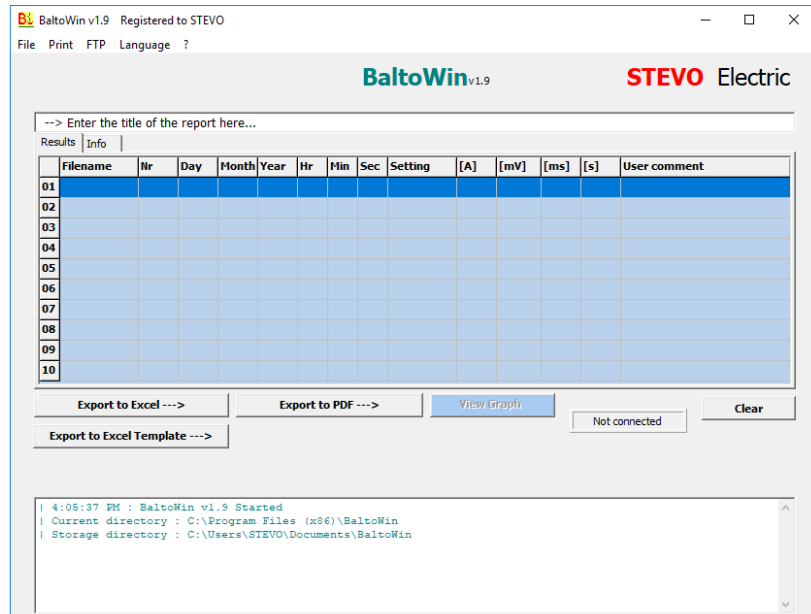
## Operating.

### Starting up and exiting BaltoWin.

Start the BaltoWin program by executing the shortcut 'BaltoWin'.



The following dialog will be displayed.

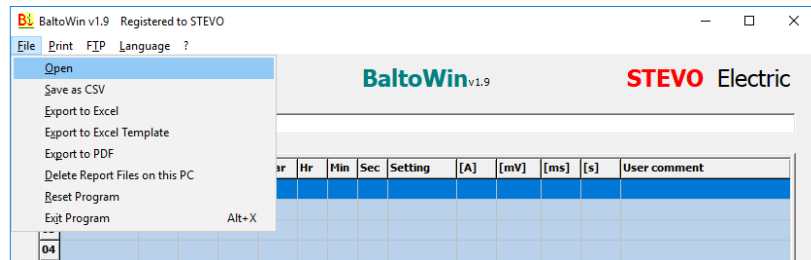




## Notes on the dialog.

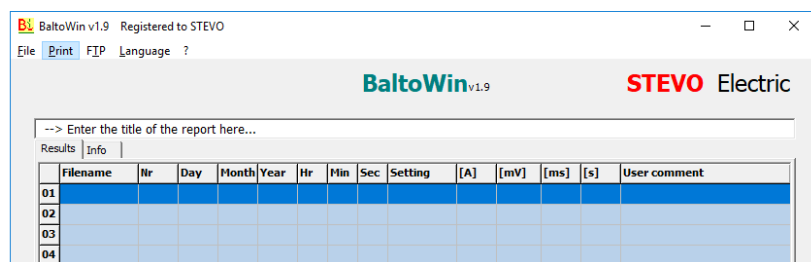
### Menu option - File

Dropdown menu:



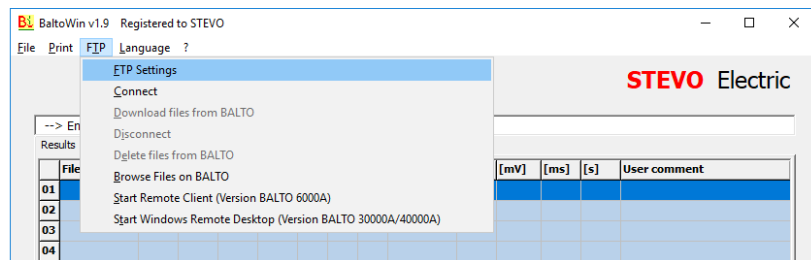
- Option '**Open**'  
Use this to open stored measurement results that are stored on the BALTO System.
- Option '**Save as CSV**'  
Use this to store the results in a text file.
- Option '**Export to Excel**' and '**Export to Excel Template**'  
The results are exported into an Excel file.
- Option '**Export to PDF**'
- Option '**Delete report files on this PC**'  
Use this to delete the local measurement result files stored on the PC/laptop.
- Option '**Reset Program**'
- Option '**Exit Program**'

### Menu option - Print

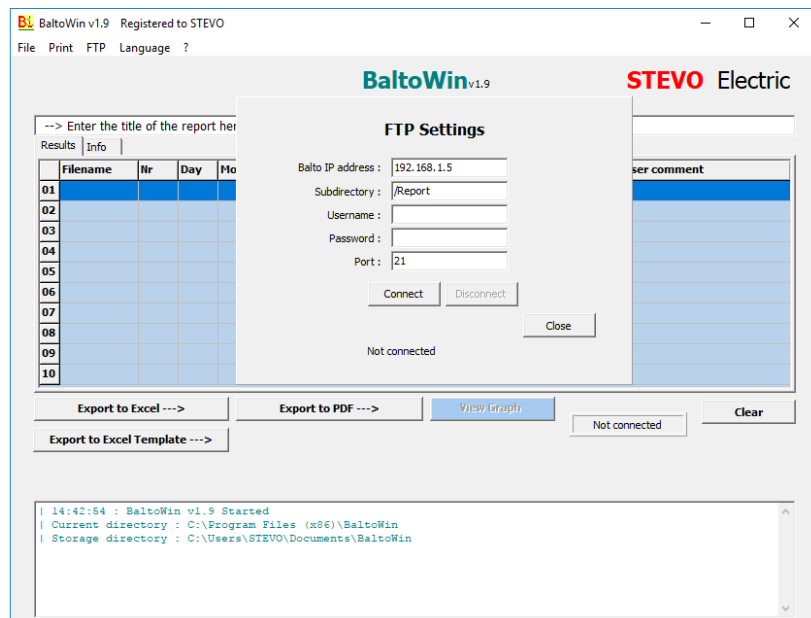


Print the results.

**Menu option - FTP**  
**Dropdown menu:**

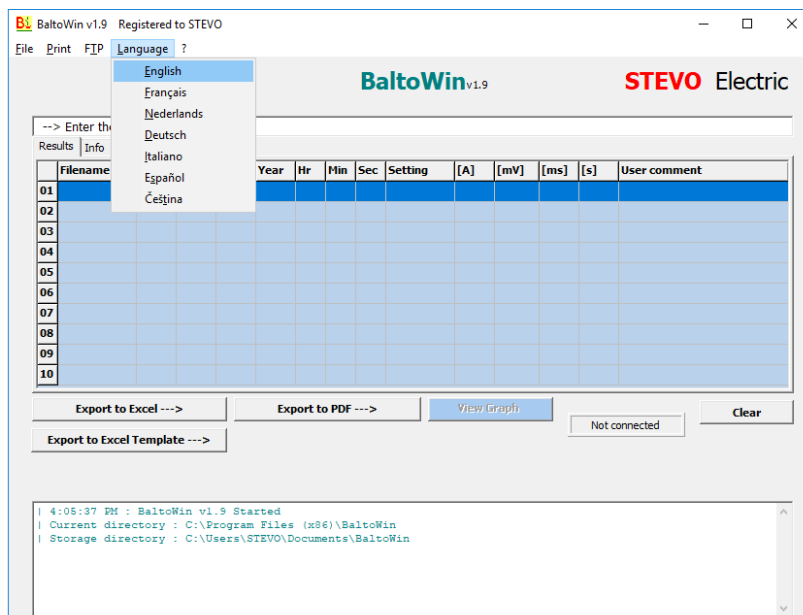


- Option '**FTP Settings**'.  
This menu contains the network settings.

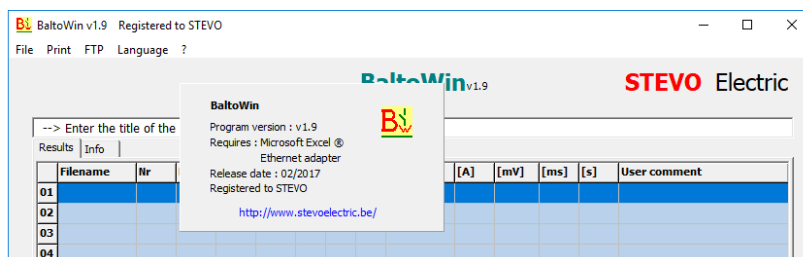


- Option '**Connect**'  
Make a connection with the BALTO System.
- Option '**Download files from BALTO**'  
Used for downloading files from the BALTO System.
- Option '**Disconnect**'  
Disconnect from the BALTO System.
- Option '**Delete files on BALTO**'  
Delete files of the BALTO System.
- Option '**Browse files on BALTO**'  
Opens Windows explorer to check files on the BALTO
- Option '**Start Remote Client**' (Previous versions **BALTO 6,000A**) Not applicable to new BALTO systems.
- Option '**Start Windows Remote Desktop**'.  
Start the remote control, only applicable for new BALTO Systems.

### Menu option - Language

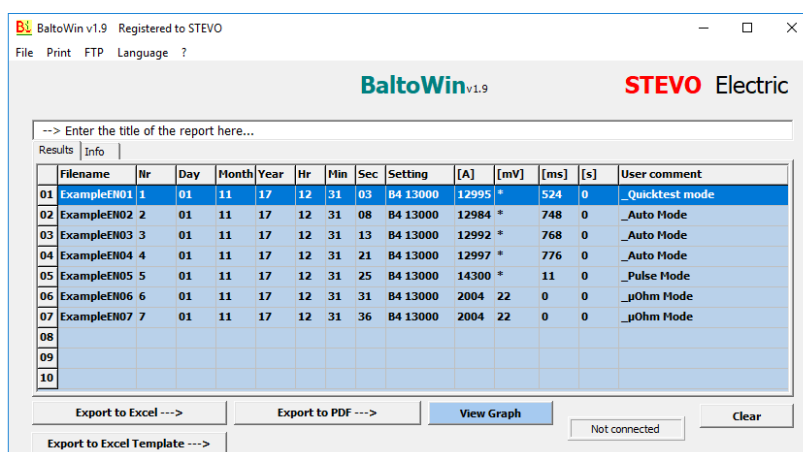


### Menu option - ?

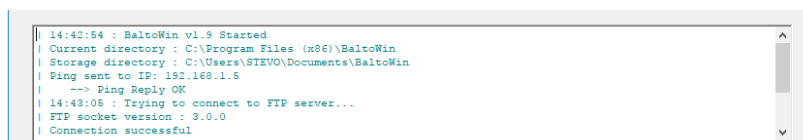


Information regarding the version of the BaltoWin program.

### Table with test results.



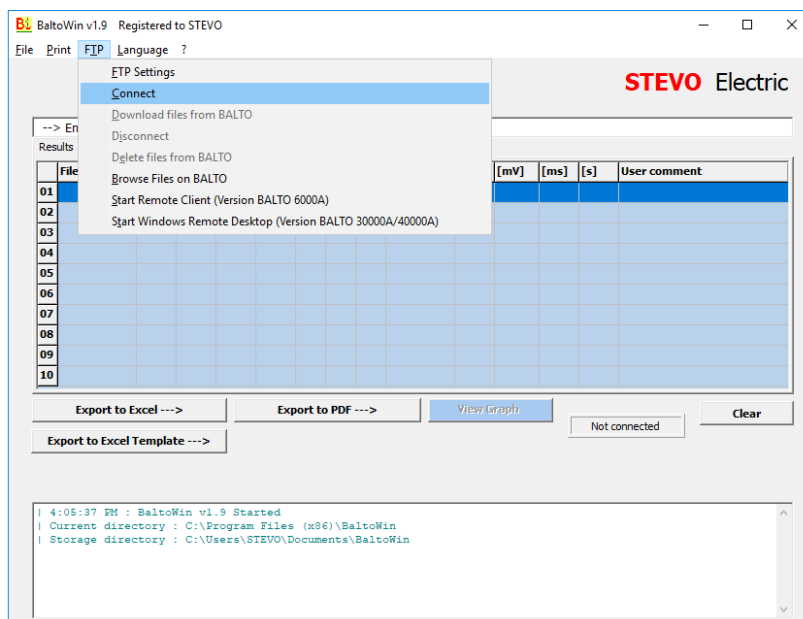
### Event log.



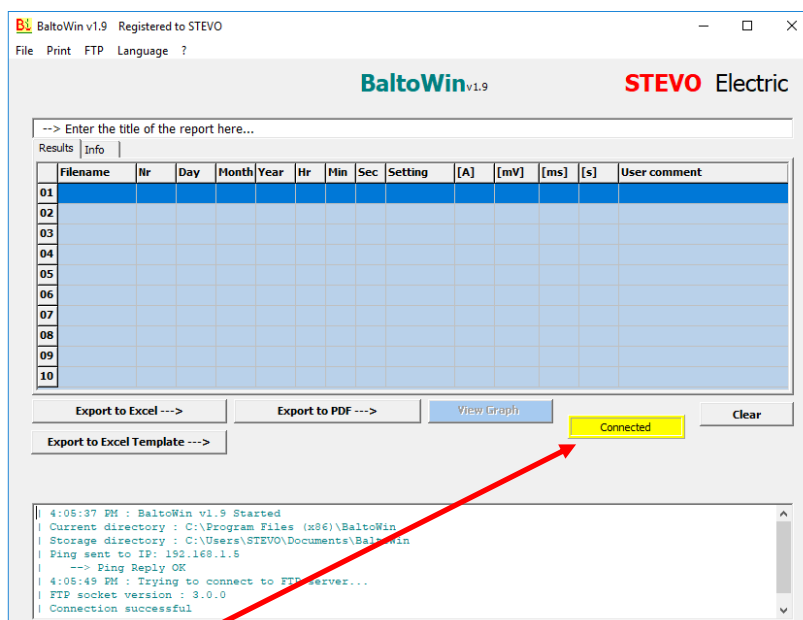
A copy of all events is logged in the '**BaltoWin.log**' log file.

Download.  
Menu option - FTP  
Dropdown menu:

Select **Connect** from the **FTP** menu.



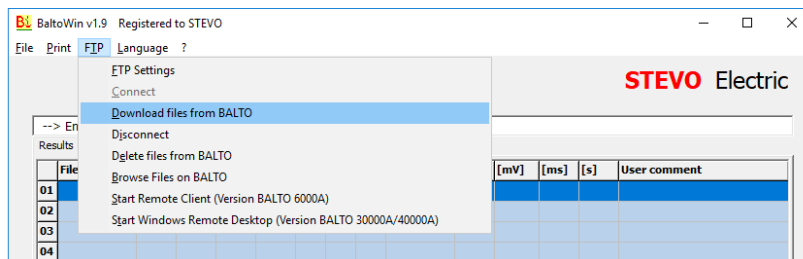
When the connection has been established, the following dialog will appear.



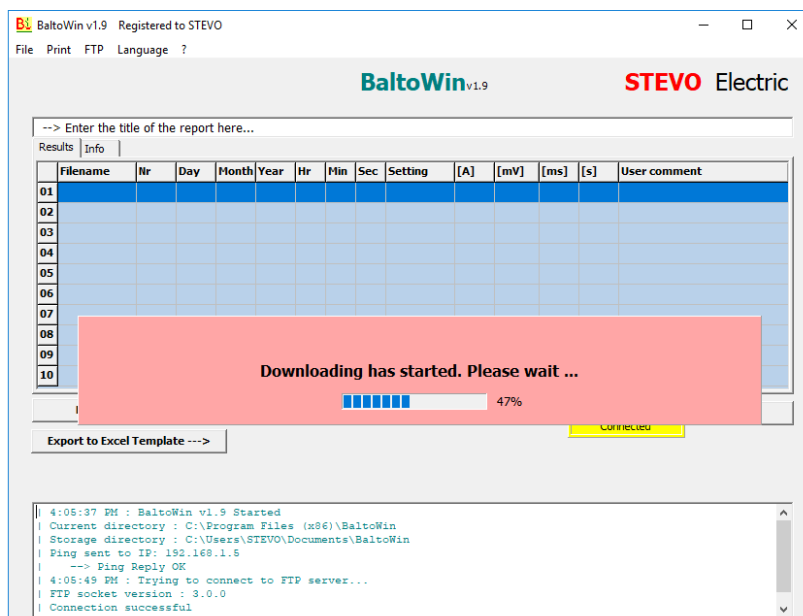
Connection has been made successfully.

**Menu option - FTP**  
**Dropdown menu:**

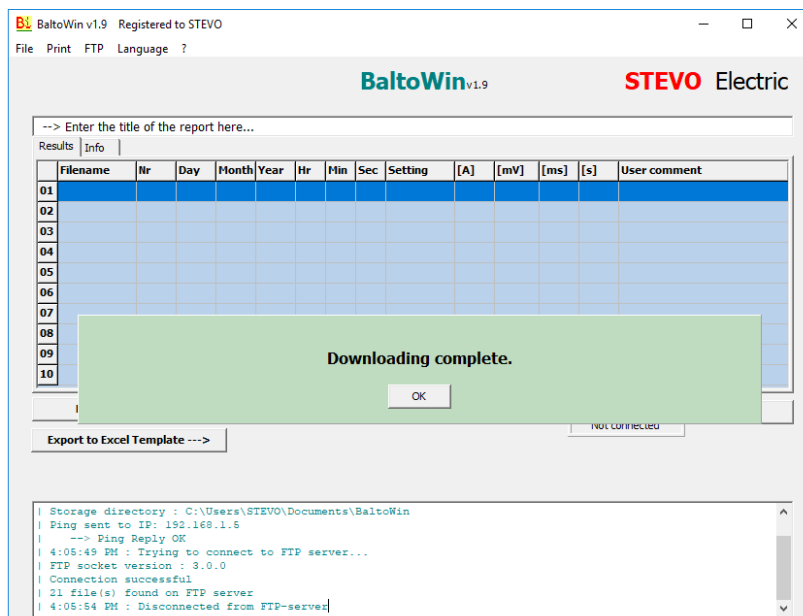
Select option 'Download files from BALTO'.



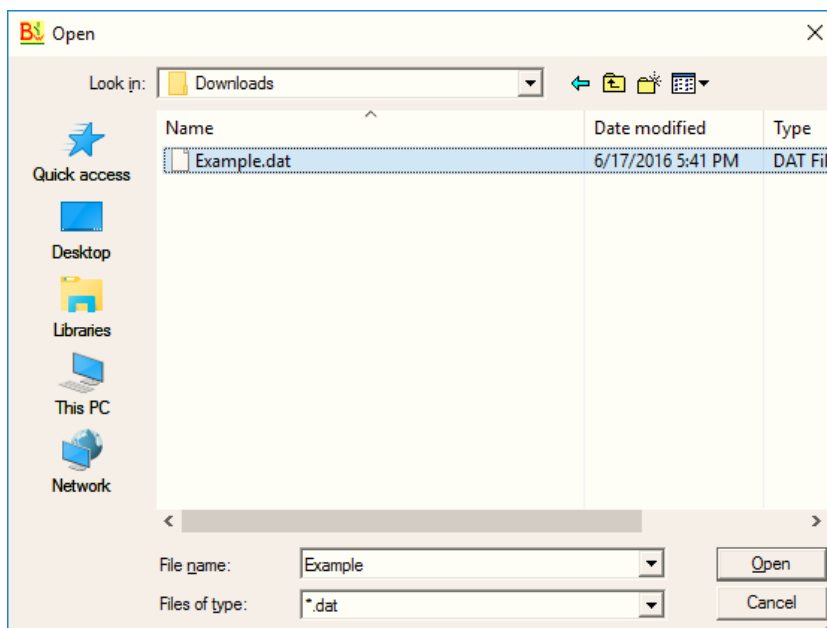
The following message will appear. Downloading may take longer depending on the amount of stored reports.



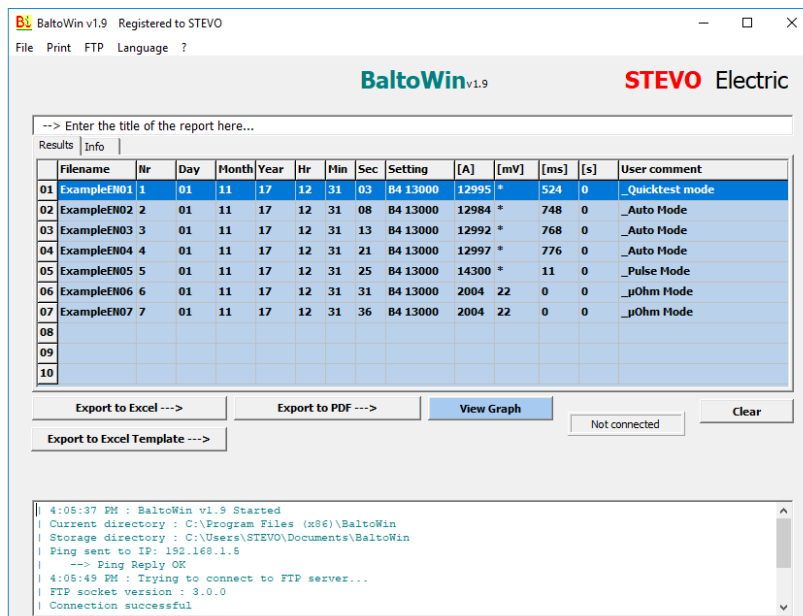
The duration of the download depends on the number of reports.



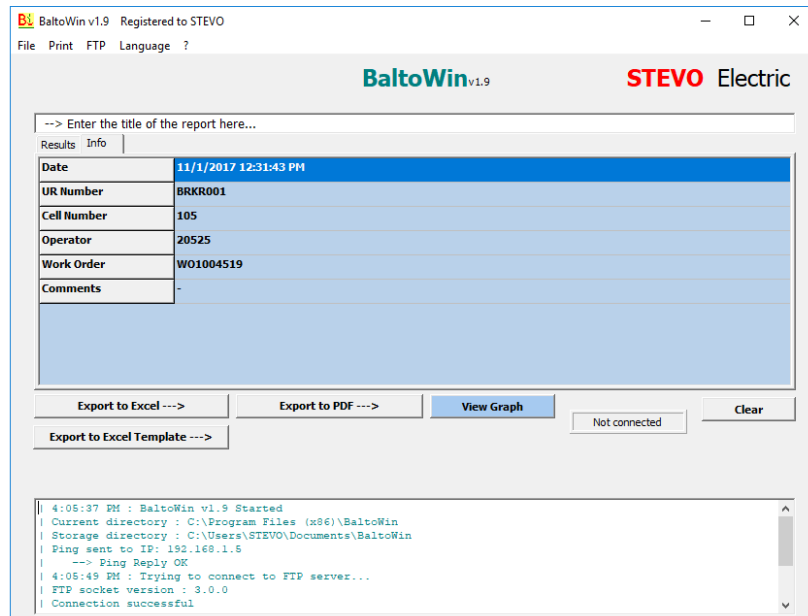
Confirm by clicking the button 'OK' and ...  
 ... select the appropriate files in the next window.



Open the selected file.  
 The measured values will be shown in the following table:



The related information to the report is located under the option **'Info'**:



**Menu option - File**  
**Dropdown menu:**

A suitable title for the report can be introduced in **'Enter the title of the report here ...'**

The measured values can be exported and stored by choosing the option **'Export to Excel'** or **'Export to Excel Template'**. The operator can modify and adapt the Excel files accordingly.

The option **Export to PDF-file** include the customize information's and graphs as well.

## Example:

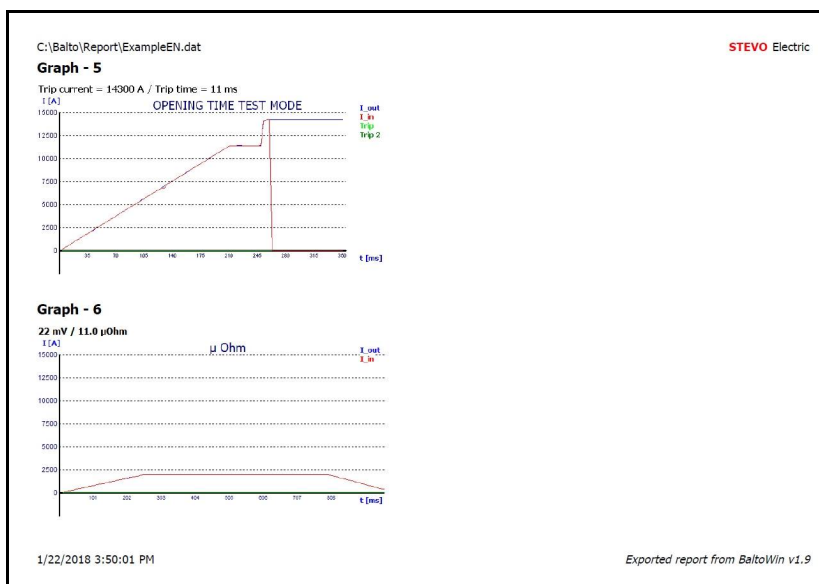
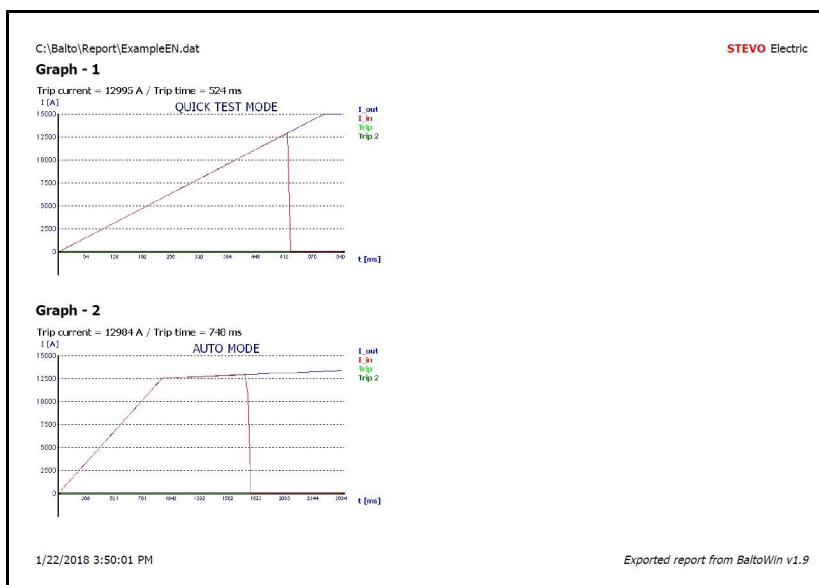
C:\Balto\Report\ExampleEN.dat STEVO Electric

**Example**

Date: 11/1/2017 12:31:43 PM  
 UR Number: BRKR001  
 Cell Number: 105  
 Operator: 20525  
 Work Order: WO1004519  
 Comments: -

Nr	Day	Month	Year	Hr	Min	Sec	Setting	[A]	[mV]	[ms]	[s]	User comment
1	01	11	17	12	31	03	B4 13000	12995	*	524	0	Quicktest mode
2	01	11	17	12	31	08	B4 13000	12984	*	748	0	Auto Mode
3	01	11	17	12	31	13	B4 13000	12992	*	768	0	Auto Mode
4	01	11	17	12	31	21	B4 13000	12997	*	776	0	Auto Mode
5	01	11	17	12	31	25	B4 13000	14300	*	11	0	Pulse Mode
6	01	11	17	12	31	31	B4 13000	2004	22	0	0	µOhm Mode
7	01	11	17	12	31	36	B4 13000	2004	22	0	0	µOhm Mode

1/22/2018 3:50:01 PM Exported report from BaltoWin v1.9





## Downloading graphs.

Text files made in version 1.6 or higher contain graphs.

In the versions including the graph function, the '**View Graph**' option will be available when selecting a row in the table.

By clicking on '**View Graph**', the graph for the selected row will open in a new window.

BaltoWin v1.9 Registered to STEVO  
File Print FTP Language ?

BaltoWin v1.9 STEVO Electric

--> Enter the title of the report here...

Results info

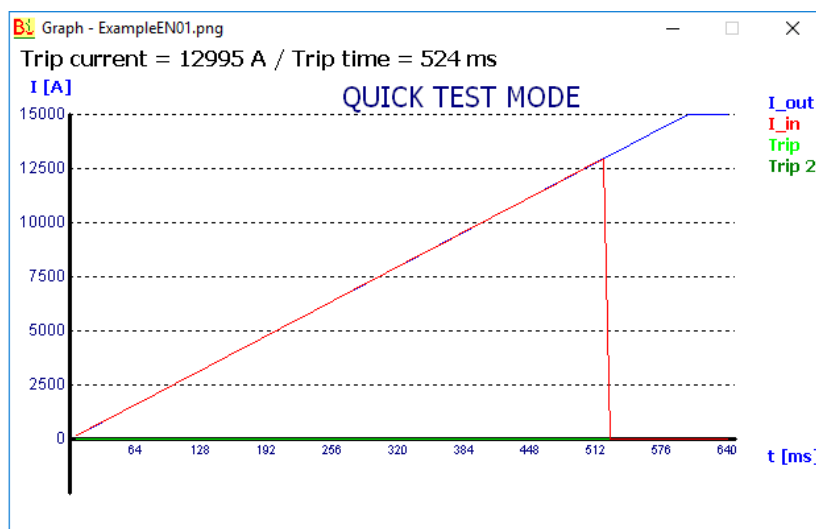
Filename	h	Day	Month	Year	h	Min	Sec	Setting	[A]	[mV]	[ms]	[s]	User comment
01 ExampleEN01	1	01	11	17	12	31	03	B4 13000	12995 *	524	0		Quicktest mode
02 ExampleEN02	2	01	11	17	12	31	08	B4 13000	12984 *	748	0		_Auto Mode
03 ExampleEN03	3	01	11	17	12	31	13	B4 13000	12992 *	768	0		_Auto Mode
04 ExampleEN04	4	01	11	17	12	31	21	B4 13000	12997 *	776	0		_Auto Mode
05 ExampleEN05	5	01	11	17	12	31	25	B4 13000	14300 *	11	0		_Pulse Mode
06 ExampleEN06	6	01	11	17	12	31	31	B4 13000	2004	22	0	0	_µOhm Mode
07 ExampleEN07	7	01	11	17	12	31	36	B4 13000	2004	22	0	0	_µOhm Mode
08													
09													
10													

Export to Excel ---> Export to PDF ---> **View Graph** Not connected Clear

Export to Excel Template --->

```

4:05:37 PM : BaltoWin v1.9 Started
| Current directory : C:\Program Files (x86)\BaltoWin
| Storage directory : C:\Users\STEVO\Documents\BaltoWin
| Ping sent to IP: 192.168.1.5
| --> Ping Reply OK
| 4:05:49 PM : Trying to connect to FTP server...
| FTP socket version : 3.0.0
| Connection successful
    
```



## USB Interface.

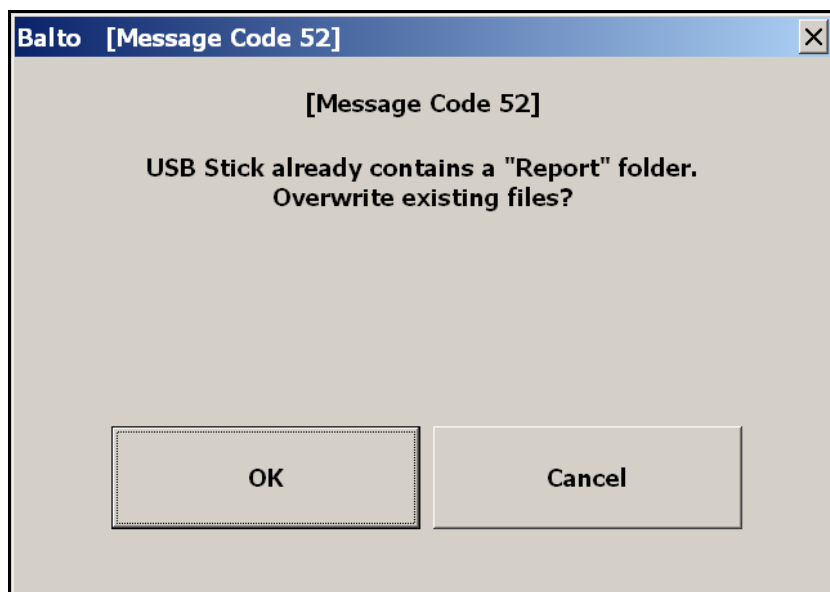
### Control Unit.

After you have performed all the necessary tests, and that all measures have been correctly saved, a USB Stick can be plugged in the USB Interface position 6 - '**Control Panel**' - chapter '**System Assembly**', paragraph '**Control Unit**'.

The following information can be loaded on the USB Stick:

- Graphics as a simple file.
- Reports BaltoWin.
- Complete PDF report.

### Status messages:

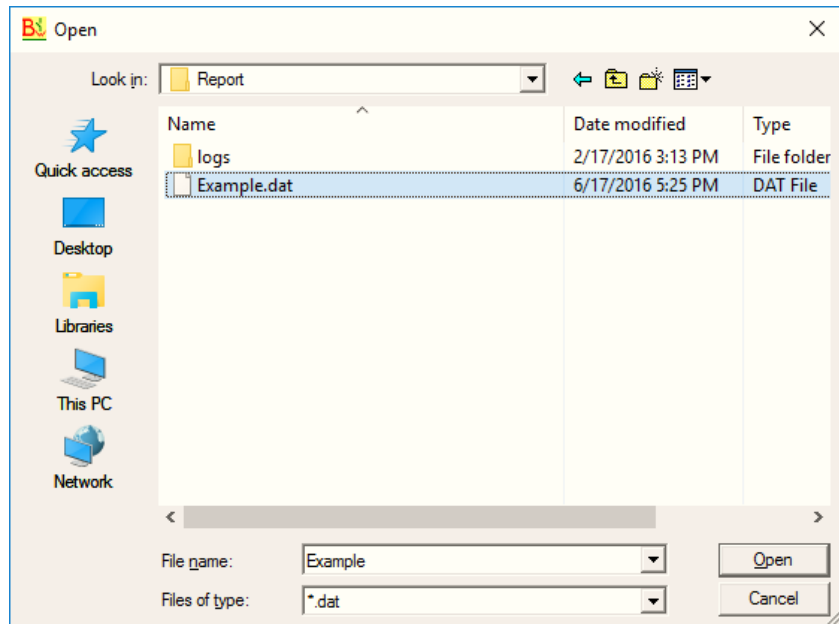


Do not insert a USB Stick before performing tests, only after you have finished all testing or a test sequence.

## PC/Laptop

Plug the USB Stick in the USB Interface of the PC/laptop.

- Select '**File**', then '**Open**'.
- Select the USB Stick.
- Select the folder '**Report**'.



Select the proper file - file type: .dat - and open it.

---

# Maintenance.

## Control Unit.

### Control Panel.



**WARNING**

The Control Panel should **NOT** be opened by the operator of the device.

For more information and technical assistance, please consult the chapter '**Appendix 2**' - section '**References technical assistances**'



**INDICATION**

#### Screen maintenance

The front as well as the screen of the Control Panel should be cleaned with a damp cloth.

Do **NOT** use corrosive cleaning products, no dilution of these products, no abrasive agent and no hard objects that may cause scratches.

### Control Electronics.



**INDICATION**

#### PLC CX5130 BECKHOFF

It is advisable to check - replace - the Battery every five years. For the replacement instructions, please consult the chapter '**System Assembly**' - section '**Integrated CX5130 PC and Interfaces**'.

### Ventilation.

Ensure that the vent terminal is kept clean.

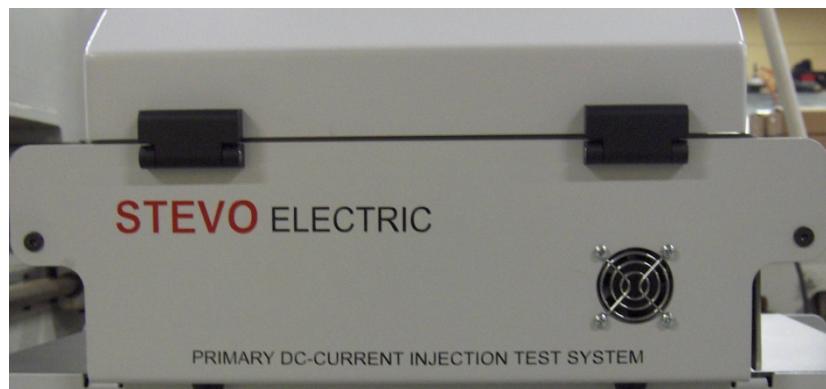


Figure 16: Control Unit: Vent terminal.

---

# Troubleshooting.

This chapter contains a number of errors and warnings as well as problems that may arise while using the BALTO System. Furthermore, a description of the coded messages that can be displayed in the dialogs and dialogs boxes during the operation of the BALTO System is also provided, including error and warning messages.

## Boot-up the BALTO System.



### **INDICATION**

Perform the setup and all connections as described in the chapter - '**Installation**'.  
The test device must be in off position.

Coded messages are displayed in all dialogs.

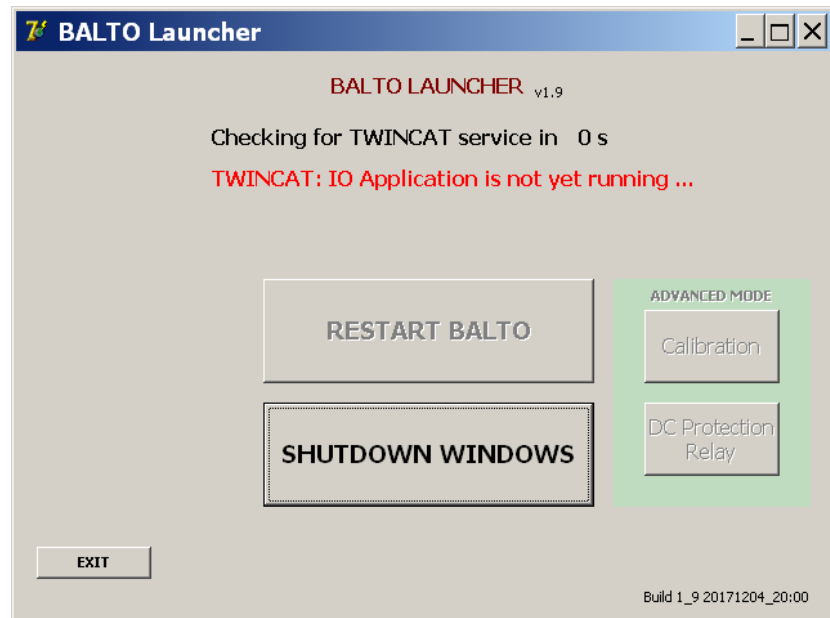
## Start-up procedure.

If the starting procedure has been carried out without failure, the starting dialog will be displayed (and should remain on screen).

If the starting procedure was not successful, different dialogs could be displayed, showing information regarding the failed starting attempt.

For more information, please consult the chapter - '**Operating**' - section '**Boot-up the BALTO System**'.

After starting the 'TwinCAT' program, the 'Start Dialog' from the BALTO System should be displayed.



**INDICATION**

If this message is permanently displayed in a red colour, it means that the starting procedure of the 'TwinCAT' software failed.

In this case, exit and restart the procedure.

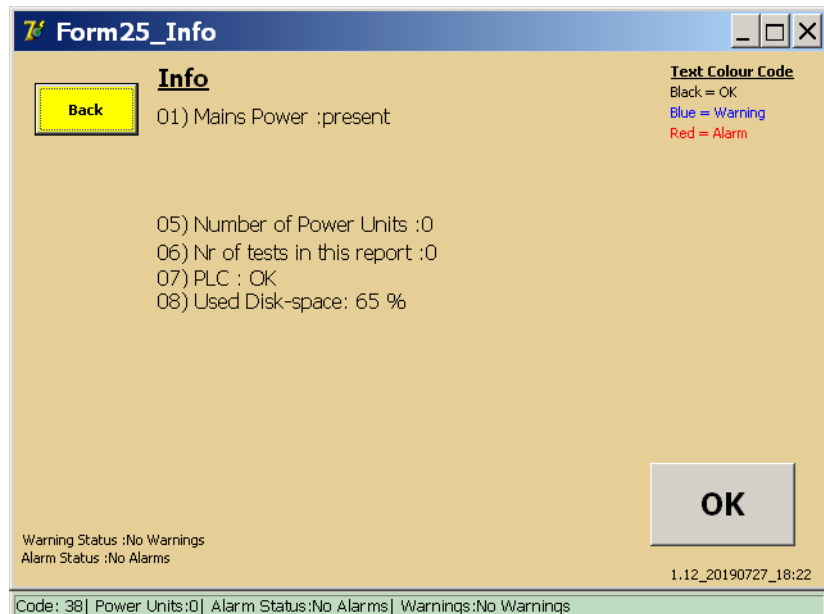


**IMPORTANT**

If this message or other messages/codes persists, please contact STEVO Electric  
 For more information and technical assistance, please consult the chapter '**Appendix 2**' - section '**References technical assistances**'.

## Status Info dialog.

Important information regarding the operating status is displayed in the 'Info dialog'.



### Info.

**Voltage:** Status  
 Normal Status: Present  
 Warning: Missing

**Number of Power Units:** 0

**Warning status:** Displays the warnings.

**Alarm status:** Displays the alarms.

**Number of tests in this report:** Information on the number of tests performed in this report.

**PLC:** Displays the PLC status  
 Out of order: Blocking alarm

**Free Memory-space:** Displays the free memory space on the flash memory.

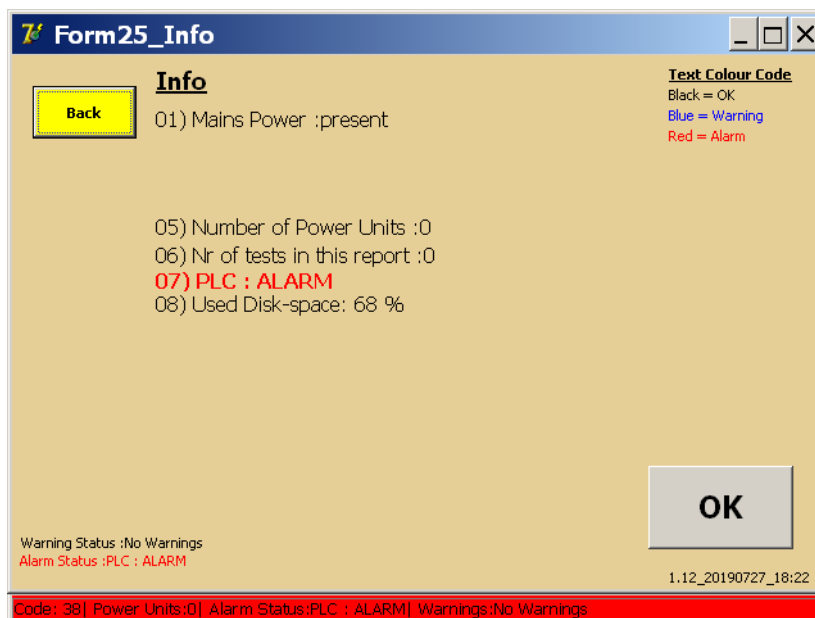
## Status.

### Warning status:

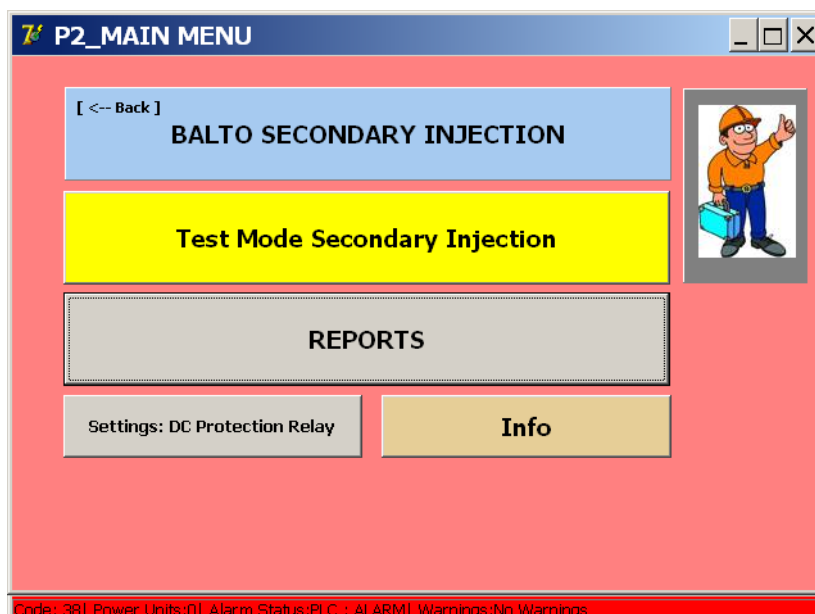
Displays the persistent warnings.

### Alarm status:

Displays any persistent alarms  
A red message means that there is an active alarm that is blocking any further use of the BALTO Controller System.



By pressing the 'Back' or 'OK' button, the following dialog will be displayed. No operation is allowed whilst the screen is coloured in red.





## Codes index.



The BALTO System is equipped with a list of coded messages to display alarms, errors and warnings.

The some of those codes are related to a BALTO Modular System.

### Operation codes.

These messages are displayed in all dialogs - status bar and in full dialogs, with an 'OK' button to confirm the message.

Messages in **black**: Modular and secondary versions.

Messages in **red**: Modular versions.

Message in **blue**: Secondary versions.

#### Code n°1

##### Message:

A severe alarm has occurred. No tests will be possible anymore. The 'Info' dialog will be shown.

##### **Alarm that blocks any further use of the device.**

No Current Injection is allowed to be performed.

This message is displayed if the operator tries to start an injection when a blocking alarm is still active.

The 'Info' dialog is displayed automatically, with a description of the problem.

##### Probable causes:

- Battery Voltage too low.
- No Power Units connected.
- PLC problem.
- Not enough free space on the flash memory.
- Temperature of the Ultracaps too high.

##### Action:

To solve the situation, wait for the Batteries to be fully charged, connect at least one Power Unit, delete any unused files, and cool the Ultracaps.

In case of a PLC problem, try to restart the BALTO System properly.

##### Otherwise:

Contact STEVO Electric before returning the device for repair.

#### Code n°2

##### Message:

**No Power Units available. Please connect a Power Unit.  
Test aborted**

##### **Alarm:**

No Power Unit is connected.

This message is displayed when the system detects the absence of Power Units.

##### Action:

Please connect the Power Unit(s) correctly.

##### Otherwise:

Contact STEVO Electric before returning the device for repair.

**Code n°3**

ADMIN-Mode - Internal use.

**Code n°4**

ADMIN-Mode – Internal use.

**Code n°5**

Reserve (no application).

**Code n°6**

Reserve (no application).

**Code n°7**

**Message:**

Initialization file not found. Program will be terminated for safety-reasons.

**Probable causes:**

Improper installation of the program.

**Otherwise:**

Contact STEVO Electric before returning the device for repair.

**Code n°8**

**Message:**

This program is not registered. The program will be terminated.

**Alarm that blocks any further use of the device.**

Software version not registered.

This message can only appear when starting the software.

**Probable causes:**

Incorrect installation of the program.

**Otherwise:**

Contact STEVO Electric before returning the device for repair.

**Code n°9**

**Message**

This program version is too old. This version = / version of ini-file = the program will be terminated for security reasons

**Alarm that blocks any further use of the device.**

Software version outdated compared to the initialization file.

This message can only appear when starting the software.

**Probable causes:**

Software update error.

**Otherwise:**

Contact STEVO Electric before returning the device for repair.

**Code n°10****Message:**

This program version is higher than the version on the ini-file.  
New parameters will be set to their default values.

**Warning:**

Initialization file version is older than the software version.  
The initialization file will be automatically converted to  
correspond to the software version.  
This message is followed by the message of code 11

**Probable causes:**

This message appears for each software update.

**Action:**

No action required.

**Code n°11****Message:**

Ini-file has been updated. The versions are now matching.

**Initialization file update.**

The update of the initialization file has been completed  
successfully. No action required. This message disappears  
automatically.

**Code n°12****Message:**

Calibration values are missing.

**Alarm that blocks any further use of the device.**

Calibration data is missing.

**Probable causes:**

Incorrect installation of the program.

**Otherwise:**

Contact STEVO Electric before returning the device for repair.

**Code n°13****Message:**

Free disk space has reached the warning level. Please delete  
old log-files.

**Warning:**

Lack of free space on the flash memory.  
(Warning threshold has been reached.)

**Probable causes:**

Too many reports stored in the BALTO System.

**Action:**

Delete log files by pressing '**Delete**' in the '**P14\_Report**' dialog.  
This action does not require immediate intervention.

**Otherwise:**

Contact STEVO Electric before returning the device for repair.

**Code n°14****Message:**

\*\* Free disk space has reached the CRITICAL LEVEL \*\*  
Please delete old log files as soon as possible.

**Critical status:**

Lack of free space on the flash memory.

**Blocking alarm:**

(Critical threshold has been reached.)

**Probable causes:**

Too many reports were stored in the BALTO System.

**Action:**

Remove Log files by pressing '**Delete**' in the '**P14\_Report**' dialog.  
This action must be performed immediately.

**Otherwise:**

Contact STEVO Electric before returning the device for repair.

**Code n°15**

Only applicable in Administrator Mode.

**Code n°16**

Only applicable in Administrator Mode.

**Code n°17**

Only applicable in Administrator Mode.

**Code n°18****Message:**

Files copied.

**Notice:**

Files have been copied to a USB Stick.

**Probable causes:**

This message is automatically displayed when the operator inserts a USB Stick into the USB Interface. All '**log**' files will be automatically transferred to the USB Stick.

**Action:**

Confirm by pressing the button '**OK**'.

**Code n°19****Message:**

USB Stick removed.

**Notice:**

The USB Stick has been removed.

**Action:**

Confirm by pressing the button '**OK**'.

**Code n°20****Message:**

This Control Unit is configured for 5 Power Units, but you are using 4 Power Unit(s). Please check the connections to the HS DC CBR and disconnect the Power Cables from unused Power Units!

**Warning:**

The number of Power Units does not match with the factory configuration.

Check the number of Power Units arranged in the Support Carriage and the connections to the High-speed DC Circuit Breaker.

**Action:**

Check the connections to the High-speed DC Circuit Breaker.

**Code n°21****Message:**

You have DISCONNECTED some Power Units. Please do not forget to DISCONNECT the corresponding Power Cables at the HS DC CBR side.

A Power Unit has been removed from the Support Carriage.

**Probable causes:**

This message is displayed when the operator removes a Power Unit.

**Action:**

Remove the connections between this Power Unit and the High-speed DC Circuit Breaker.

**Code n°22****Message:**

You have CONNECTED some additional Power Units. Please do not forget to CONNECT the corresponding Power Cables at the HS DC CBR.

One additional Power Unit has been added to the Support Carriage.

**Probable causes:**

This message is displayed when the operator adds a Power Unit.

**Action:**

Make sure to connect the additional Power Unit to the High-speed DC Circuit Breaker.

**Code n°23****Message:**

The UR is still closed. For safety reasons, this program will not be terminated. Please open the HS DC CBR first before terminating this program.

**Warning:**

The High-speed DC Circuit Breaker is still in the closed position. For safety purposes, it is necessary to open the High-speed DC Circuit Breaker and leave the software.

**Probable causes:**

This message is displayed when the operator tries to leave the BALTO software and the High-speed DC Circuit Breaker is still in closed position.

**Action:**

Switch off the High-speed DC Circuit Breaker and close the software.

**Code n°24**

Only applicable in Administrator Mode.

**Code n°25****Message:**

The max nr of tests for 1 report have been reached: Please insert a report name.

The maximal numbers of ten tests has been reached.

**Probable causes:**

This message is displayed when the operator already has 20 measurements recorded without a backup in a report.

**Action:**

The '**P14\_Report**' dialog is displayed, and the operator can either enter a name for the report or erase the test report list.

**Code n°26****Message:**

Value of I\_ref too high or value of k2 (%) too high. Please reduce either I\_ref or k2. Max I\_ref Value =

**Warning:**

In Auto Mode.

Regarding the I\_ref value, the curve reaches the limit I\_max.

**Action:**

- Reduce the threshold for the I\_Ref, or
- Reduce the threshold for K2

**Code n°27****Message:**

I-ref Value too high Max value.

**Warning:**

In Manual Mode - Function: Opening test time: I\_Ref too high.

**Action:**

Decrease the threshold I\_Ref.

**Code n°28****Message:**

Slope speed too slow, please increase the speed to at least %sA/s or reduce the current.

**Warning:**

In Manual Mode - Function: DC Protection Relay Test:  
Slope too low.

**Action:**

Decrease the threshold for the I\_Ref.  
Increase the threshold of the slope.

**Code n°29****Message:**

The value for di/dt should be > 0 ms. Please insert a higher value.

**Warning:**

In Manual Mode - Function: DC Protection Relay Test:  
I\_Ref value too low.

**Action:**

Increase the threshold for the I\_Ref.

**Code n°30****Message:**

I-ref Value too high Max value

**Warning**

In Manual Mode - Function: DC Protection Relay Test:  
I\_Ref value too high.

**Action:**

Decrease the threshold for the I\_Ref.

**Code n°31****Message:**

**Value of measuring current too small. The current must be at least 100A per Power Unit.**

**Warning:**

Measurement '**mV**': Measurement of the voltage across the main circuit of the High-speed DC Circuit Breaker: Current Injection is too low.

**Acton:**

Increase the threshold for the I\_Ref

**Code n°32****Message:**

I-ref Value too high. Max value.

**Warning:**

Measurement '**mV**': Measurement of the voltage across the main circuit of the High-speed DC Circuit Breaker: Current Injection is too high.

**Acton:**

Decrease the threshold for the I\_Ref.

**Code n°33****Message:**

The max. nr of tests for 1 report has been reached: Please insert a report name.

**Remark:**

Identical to code n° 25

**Code n°34****Message:**

Report "" saved.

The report was registered under the name entered by the operator.

**Acton:**

Confirm.

**Code n°35**

Reserve (no application).

**Code n°36**

Reserve (no application).

**Code n°37****Message:**

All report-files, logfiles and sample files deleted.

All reports were erased.

This message is displayed when the operator has pressed the '**Delete**' button in the '**P14\_Report**' dialog and if this action has been confirmed in the pop-up window.

**Acton:**

Confirm.



## Code n°38

### Message:

Nothing deleted.

No report has been deleted.

This message is displayed when the operator has pressed the 'Delete' button in the 'P14\_Report' dialog, but if this action was refused afterwards in the pop-up window.

### Acton:

Confirm.

## Code n°39

Reserve (no application).

## Code n°40

### Message:

I-ref Value too high. Max value.

Shunt Mode Current too high.

### Acton:

Decrease the I\_Test value.

## Code n°41

### Message:

The Shunt Mode Current should be at least %dA per Power Unit. Please set a higher value.

Shunt Mode Current too low.

### Acton:

Increase the I\_Test value.

## Code n°42

Reserve (no application).

## Code n°43

### Message:

The time for this test is set too high. The time has been automatically reduced to its maximum value.

Test time in Shunt Mode too long.

### Acton:

Decrease the time.

## Code n°44

Reserve (no application).

## Code n°45

Reserve (no application).

## Code n°46

Reserve (no application).

## Code n°47

Reserve (no application).

## Code n°48

Reserve (no application).

## Code n°49

### Message:

**nr of Power Units should be exactly 1.**

This message is displayed when the operator starts the test '**Auto-Verification**' while several Power Units are connected or when no Power Unit is connected.

### Action:

Connect only one Power Unit.  
Ensure that the unused Power Units are no longer connected to the High-speed DC Circuit Breaker.

### Remark:

Concerning the disposal of the Power Units on the Support Carriage, please consult the paragraph '**Distribution Power Units**' in the chapter '**Installation**' of the user Manual BALTO Modular System 3.000A/30.000A or 4.000A/40.000A

## Code n°50

### Message:

Current value too low. Please raise the value of I-ref (min=)

### Warning:

In Manual Mode - Function:  
Opening time trial: I\_Ref value too low.

### Action:

Increase the I\_Ref value.  
The messages in red text in the dialogs of the measurement results give the necessary information to solve the problem.

## Code n°51

### Message:

**No Power Units are allowed in this mode. Please open the HS DC CBR and withdraw all Power Units.**

### Alarm:

At least one Power Unit is connected.  
This message is displayed when the system detects the presence of at least one Power Unit.

### Action:

Please open the High-speed DC Circuit Breaker and disconnect all Power Units.

### Otherwise:

Contact STEVO Electric before returning the device for repair.

**Code n°52****Message:**

USB Stick already contains a "Report" folder.\n Overwrite existing files?

**Warning:**

USB Stick already contains a reports folder.

This message is displayed when the USB Stick already contains a reports folder. Reports on the USB Stick will be overwritten by reports from the BALTO System.

**Action:**

Continue to overwrite existing files.

**Otherwise:**

Cancel to abort the export procedure.

**Code n°53****Message:**

There are unsaved report entries. Are you sure you wish to exit without saving?

**Warning:**

There are unsaved report entries.

This message is displayed when the operator chooses to exit the BALTO program while there are still entries in the reporting table.

**Action:**

Continue to discard any unsaved report entries.

**Otherwise:**

Cancel to abort the shutdown procedure.

**Code n°54****Message:**

Please connect the voltage output to the  $\mu$ Ohm input, then press OK.

**Information:**

Please ensure the voltage output is connected to the  $\mu$ Ohm input.

This message is shown before the calibration process is started.

**Action:**

Once the connection is made, press OK to begin the calibration process.

**Code n°55****Message:**

No voltage feedback, please ensure the connection is made.  
Calibration aborted.

**Alarm:**

No voltage feedback.

This message is shown when no voltage is detected on the  $\mu$ Ohm input. The calibration process cannot continue.

**Action:**

Please ensure the proper connections are made, and then try again.

**Otherwise:**

Contact STEVO Electric before returning the device for repair.

**Code n°56****Message:**

Calibration in progress ... (%d)

**Information:**

Calibration in progress.

This message is shown during the calibration process.

**Action:**

No action required.

**Code n°57****Message:**

Output offset calibrated to %d. Measured offset: %.3n V

**Information:**

Output offset calibration result.

This message is shown after the calibration process has completed.

**Action:**

Press OK to return to the '**Settings: DC Protection Relay Settings**' dialog.

**Code n°200****Message:**

This program will be terminated. Shutdown Windows?

**Action:**

Confirm or cancel.

**Code n°201****Message:**

Are you sure you want to clear the list of tests?

**Action:**

Confirm or cancel.

**Code n°203****Message:**

Delete all reports, samples and logfiles from the disk?

**Action:**

Confirm or cancel.

**Code n°204****Message:**

Invalid password.

**Action:**

Enter correct password.

**Code n°205****Message:**

Please fill in the "%s" field.

**Warning:**

Please fill in the "..." field.

This message is displayed when an information field is required to save the report, but it has not yet been filled in.

**Action:**

Fill in the required information field, then save the report.

**Otherwise:**

Change the automatic report name setting to customize the required fields.

## Error codes test results.

These error codes are test-related and are displayed in the test result dialog.

### Code n°100

#### Message:

HS DC CBR is not closed. Test Aborted.

#### Probable causes:

The circuit is not closed. The measured backflow current is much too low.

#### Action:

Check the circuit, switch on the High-speed DC Circuit Breaker.

### Code n°101

#### Message:

Not tripped/Imax = ... A

#### Probable causes:

The High-speed DC Circuit Breaker is still switch on at the end of the test, and the switch off input doesn't have received a signal input.

#### Action:

Please try again with a higher test current or check the setting of the High-speed DC Circuit Breaker.  
The maximum used current is displayed as Imax.

### Code n°102

#### Message:

Battery Overload detected. Test aborted.

#### Probable causes:

A Battery Overload is detected.  
This happens when the Battery Voltage has 10VDC or even a lower level, or if the measured backflow current deviates more than 90A per Power Unit during 100 measuring points.  
The Current Injection is immediately stopped.

#### Action:

Please, wait until the Battery charge indication turns green.  
Try to establish a shorter Current Injection or reduce the impedance of the testing circuit.

#### Otherwise:

Repeatedly, please contact STEVO Electric services.

**Code n°103****Message:**

Tripped too soon / I<sub>max</sub>= ... A

**Probable causes:**

A trip is measured during a fast-increased current in Auto Mode or in opening time test in Manual Mode.

**Action:**

Please try again with a lower test current or a wider test range  
The maximum used current is displayed as I<sub>max</sub>.

**Code n°104****Message:**

Trip Contact is already activated.

**Probable causes:**

The Trip Contact is already active at the start of the test.  
Faulty selection off the Trip Contact NC/NO in the '**Settings: DC Protection Relay**' dialog and/or faulty the connections.

**Action:**

Check the selection off the Trip Contact - NC/NO - made in the '**Settings: DC Protection Relay**' dialog and/or check the made connections.  
Try again.

**Code n°105****Message:**

0 (!) μOhm.

**Probable causes:**

Measurement was not possible.

**Action:**

Please check the connection of the measuring leads, or wrong measured place on the High-speed DC Circuit Breaker.  
Try again.

**Code n°106****Message:**

HS DC CBR is not open. Test Aborted.

**Probable causes:**

The circuit is closed. The measured backflow current is running.

**Action:**

Check the circuit, switch off the High-speed DC Circuit Breaker.  
Try again.

---

# Appendix 1

## Concise technical specifications.

**Environment:****Application field:**

Used for testing of DC Protection Relays used in Traction DC Power Substations.

**Temperature:****Operating:**

0°C to +55°C (+32°F to +131°F)

**Storage & transportation:**

-20°C to +65°C (-13°F to 149°F)

**Humidity:**

5% - 95% RH, non-condensing

**Altitude:**

2.000m

**Protection rating:**

IP20

**CE Marking:****LVD**

IEC 61010-1

**EMC**

IEC 61326-1

**Railway Standards:****Railway applications:****Fixed installations - DC switchgear:**

IEC 61992-1 Ed.2 - Part 1

IEC 61992-2 Ed.2 - Part 2



**System:****Mains input:**

120VAC 60Hz  
230VAC 50Hz

**Power consumption:**

120VAC 60Hz - 3,00A  
230VAC 50Hz - 1,50A

**Power cord:**

CEE 7/7 Plug to HARTING Han 16A-BU-S, 2m, 10A, 250VAC

**Dimensions:**

500 x 480 x 160mm (19.6" x 18.8" x 6.2")

**Weight:**

16,4Kg (36lbs)

**Output modes - Current:**

-20 ... +20mA, 4 ... 20mA

**Output modes - Voltage:**

-60 ... +60mV, -10 ... +10V

**Duration of injection:**

0-20 sec

**Accuracy of results:**

0,2% ... 0,5%

**Control Unit****Functionality:**

HMI (Human machine Interface) and CPU

**Screen:****Type:**

TFT touchscreen

**Diagonal:**

14,5cm (5.7")

**Resolution:**

640 x 480 pixels.

**Software:**

Secondary injection testing.

**On-screen keyboard:**

QWERTY, AZERTY

**Reporting:**

PDF (standard), CVS (standard), XLS (optional).

**Communication:**

Ethernet 100 base-Tx and USB 2.0

**Emergency stop:**

Stops all injections immediately.

**Interfaces languages:**

English, French, Dutch, German, Spanish, Italian, Chinese, Czech.

**Dimensions:**

500 x 480 x 160mm (19.6" x 18.8" x 6.2")

**Weight:**

16,4Kg (36lbs)

---

# Appendix 2

## References technical assistances.

### STEVO Electric:

**STEVO Electric bvba**  
Support/Service  
Hamsesteenweg 22/6  
3971 Leopoldsburg-Heppen  
Belgium  
Phone: +32 11 341 001  
[Stefaan.volkaert@stevoelectric.be](mailto:Stefaan.volkaert@stevoelectric.be)

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