

P1 port Certifier (P1C-003) Hands-on Training

2015-11-19



1

Agenda

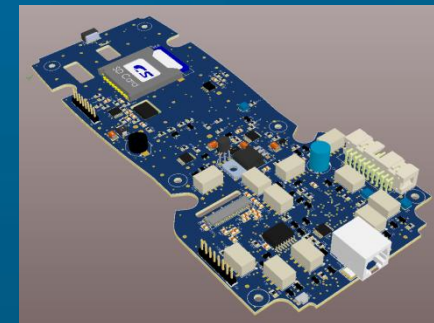
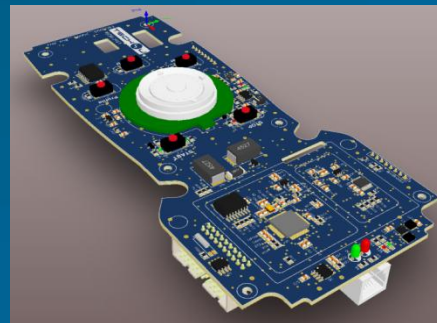
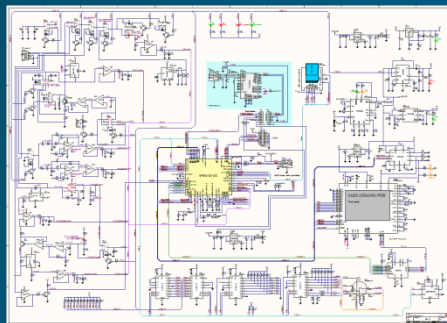


- General part
 1. Device overview
 2. Charging
 3. USB connection
 4. RJ-12 Cable
 5. USB stick with PC application
- PC application
 1. Installation
 2. File system
 3. SW update
 4. Firmware update
 5. Profile editor
 - A. HW parameters
 - B. Parser parameters
 6. Test suit editor
 7. Report generator
 - A. Headers / footers
 8. Documentation
- Main MENU
 1. Single test menu
 2. Test suite menu
 3. Profile menu
 4. Settings menu
 - A. Set time
 5. USB storage mode
- Single test menu
 1. Load tests
 2. Voltage tests
 3. Current tests
 4. Noise tests
 5. Data tests
 6. OVP tests
- Test cases
 1. Load tests
 2. Voltage tests
 3. Current tests
 4. Noise tests
 5. Data tests
- Bug reporting system

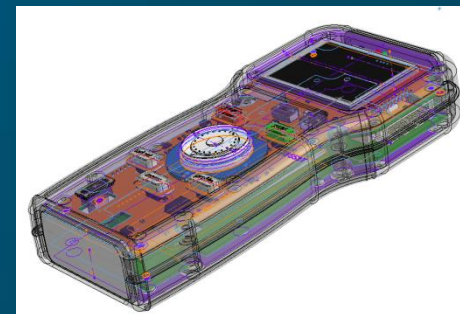
2

Device overview

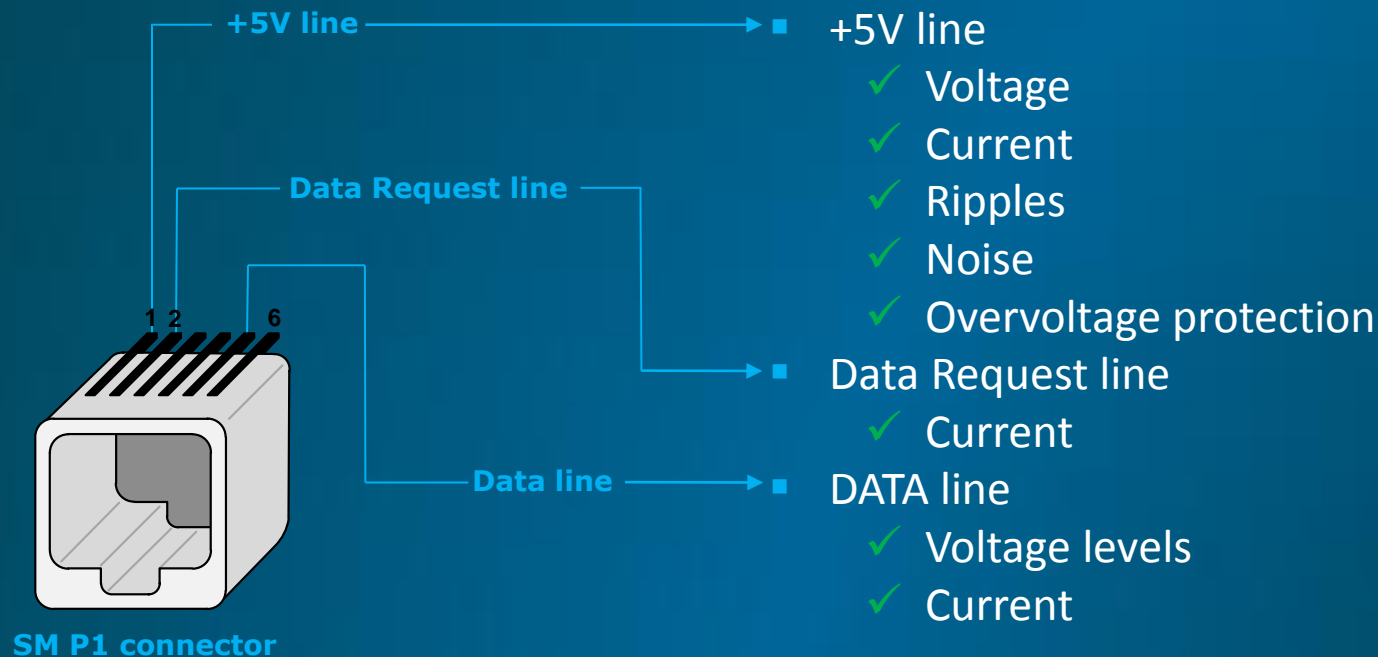


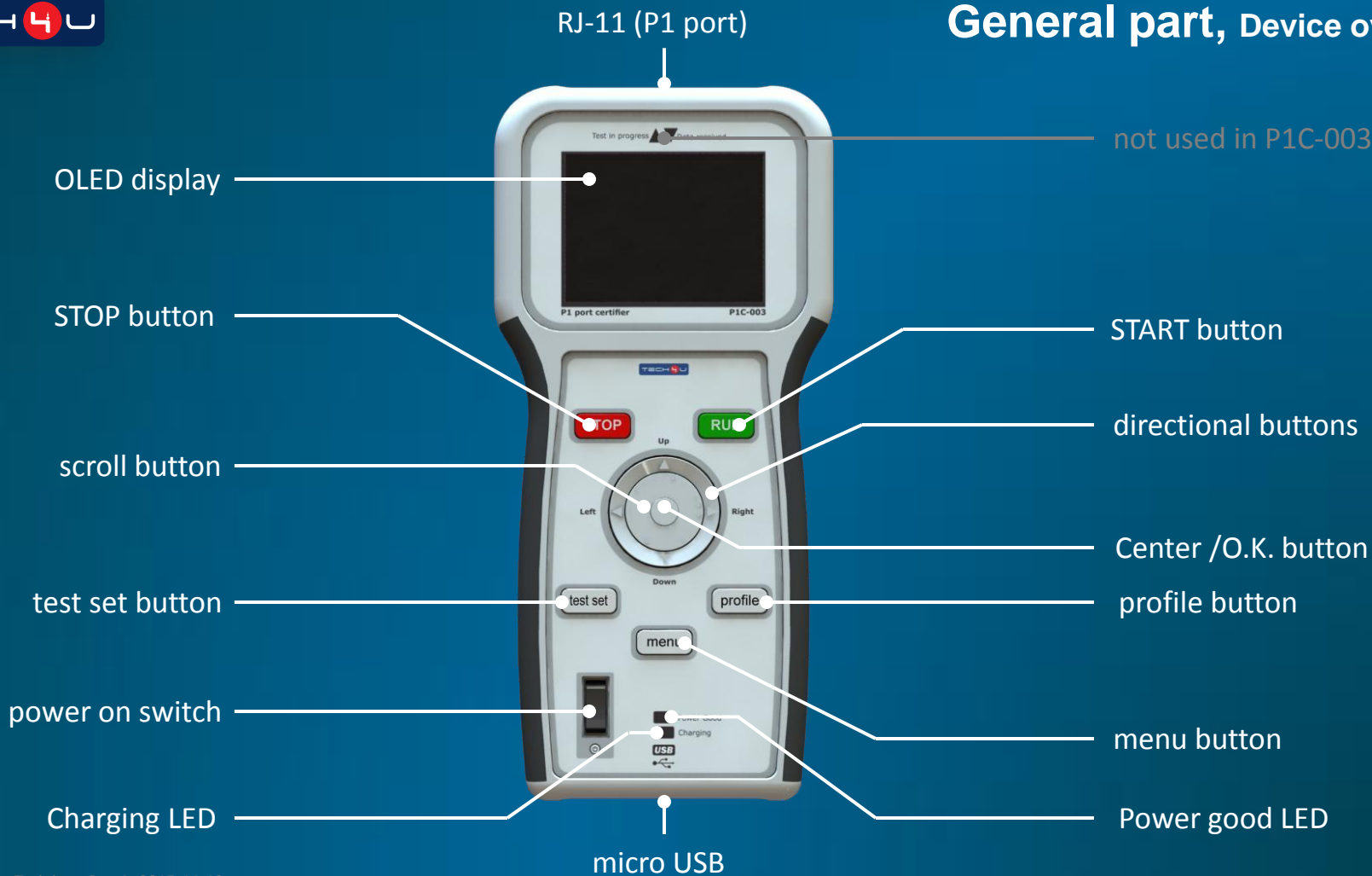


- More than 400 components (!)
- 9 different power sources (!)
- Super precise voltage source “on board” for voltage calibration $V=5.000\text{ V}$
- 14 Ultra low noise OpAmps
- 3 x Precise current sensor chips
- ARM microprocessor
- OLED display
- 11 micro relays (to increase measurement precision)
- 4GB SD card “on board”
- Large LiPo battery (2200 mAh)
- Low noise 4 layers PCB design



Measured physical parameters of P1 port lines:







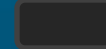
Power good



Charging



Charging almost ready



Battery fully charged



**IMPORTANT !**

It is very important to switch off the device after usage, to avoid deep discharge of the battery.

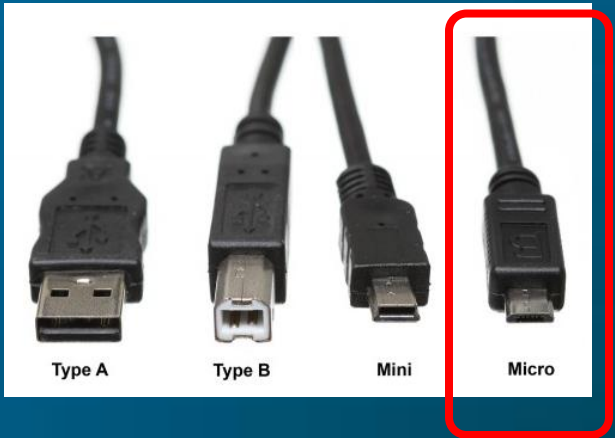
power on switch



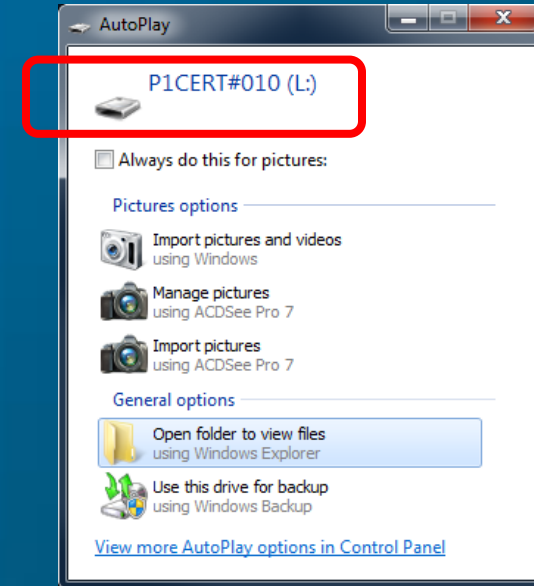
3

USB connection





Micro USB cable

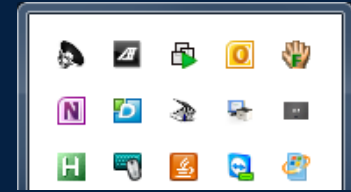


Micro USB cable

Connecting to PC



Micro USB cable



Disconnecting from PC

4

RJ-11 connection





RJ-11 cable

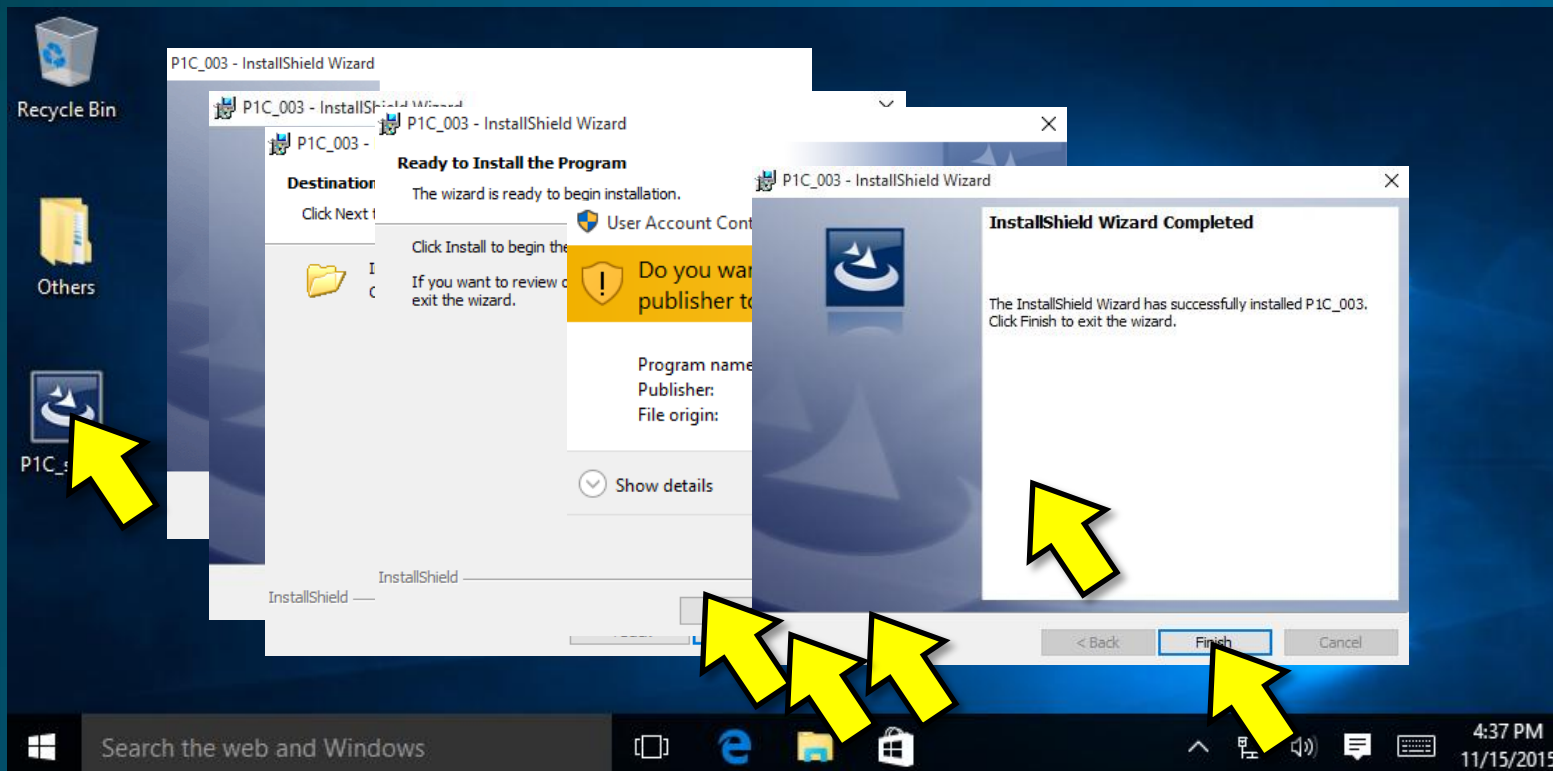
Connecting to SM

5

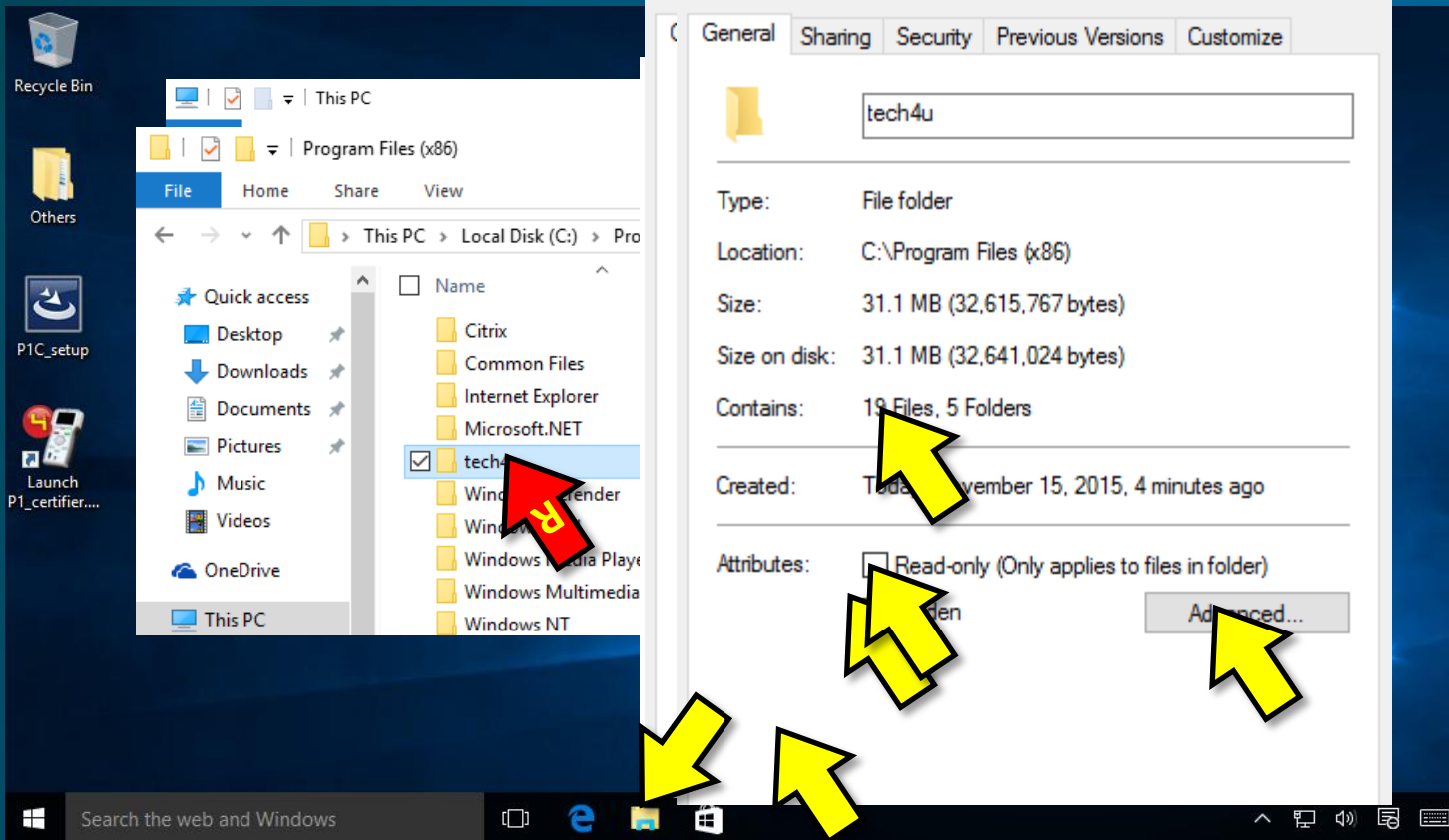
PC Application - installation



Installation on Windows 10



Installation on Windows 10



tech4u Properties

General Sharing Security Permissions

Object name: C:\Program Files

Group or user names:

- ALL APPLICATION PACKAGES
- CREATOR OWNER
- SYSTEM
- Administrators (DESKTOP-...)

To change permissions, click Edit Permissions for ALL APPLICATION PACKAGES

Full control
Modify
Read & execute
List folder contents
Read
Write

For special permissions or advanced permissions, click Advanced.

Permissions for tech4u

Security

Object name: C:\Program Files

Group or user names:

- ALL APPLICATION PACKAGES
- CREATOR OWNER
- SYSTEM
- Administrator
- Users (DESKTOP-...)
- TrustedInstaller

Permissions for ALL APPLICATION PACKAGES

Full control
Modify
Read & execute
List folder contents
Read

Permissions for tech4u

Security

Object name: C:\Program Files (x86)\tech4u

Group or user names:

- ALL APPLICATION PACKAGES
- CREATOR OWNER
- SYSTEM
- Administrator
- Users (DESKTOP-...)
- TrustedInstaller

Permissions for ALL APPLICATION PACKAGES

Full control
Modify
Read & execute
List folder contents
Read

OK Cancel Apply

Permissions for tech4u

Security

Object name: C:\Program Files (x86)\tech4u

Group or user names:

- ALL APPLICATION PACKAGES
- CREATOR OWNER
- SYSTEM
- Administrator
- Users (DESKTOP-...)
- TrustedInstaller

Permissions for ALL APPLICATION PACKAGES

Full control
Modify
Read & execute
List folder contents
Read

OK Cancel Apply

Confirm Attribute Changes

You have chosen to make the following attribute changes:

unset read-only

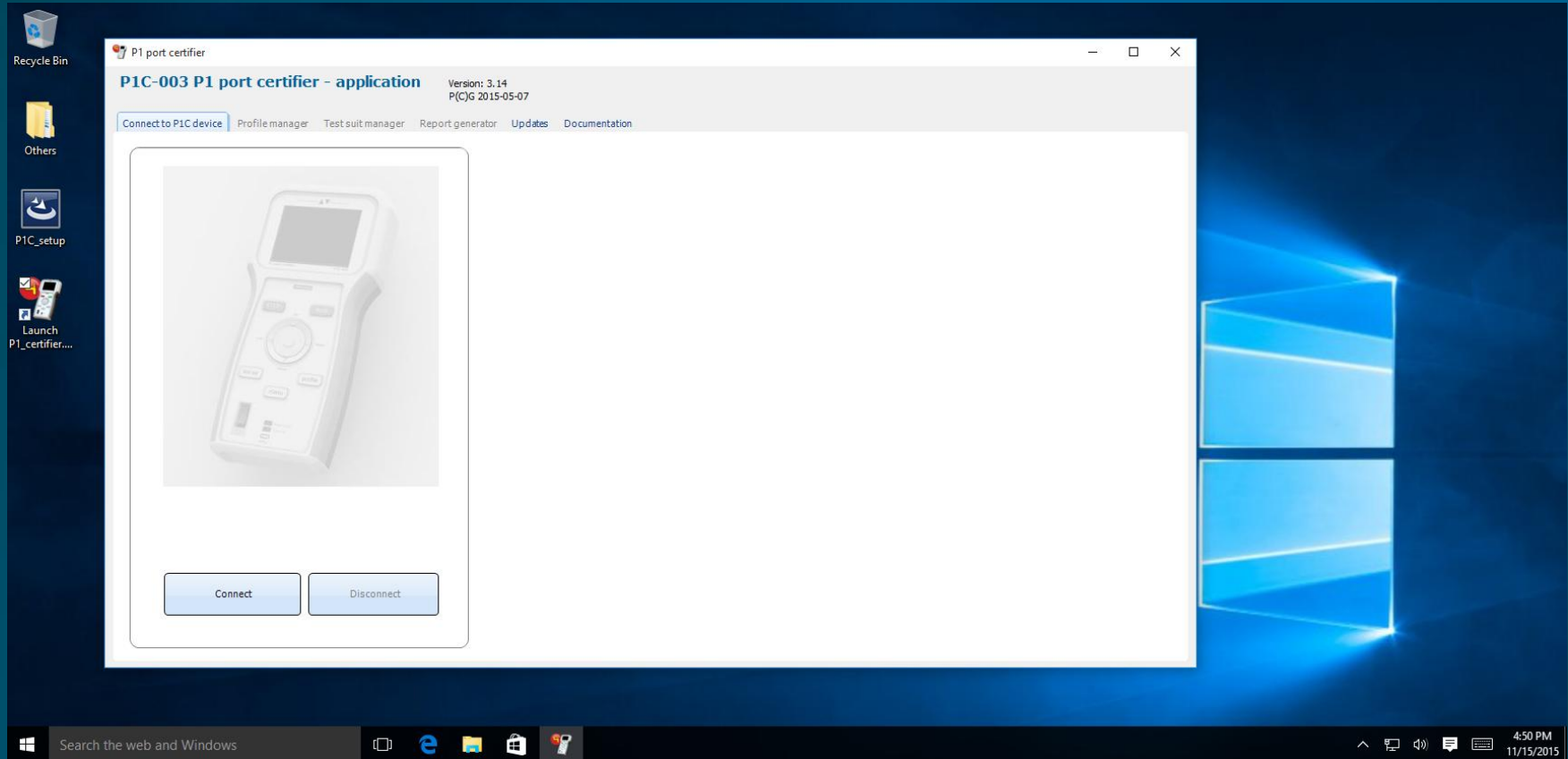
Do you want to apply this change to this folder only, or do you want to apply it to all subfolders and files as well?

Apply changes to this folder only

Apply changes to this folder, subfolders and files

OK Cancel





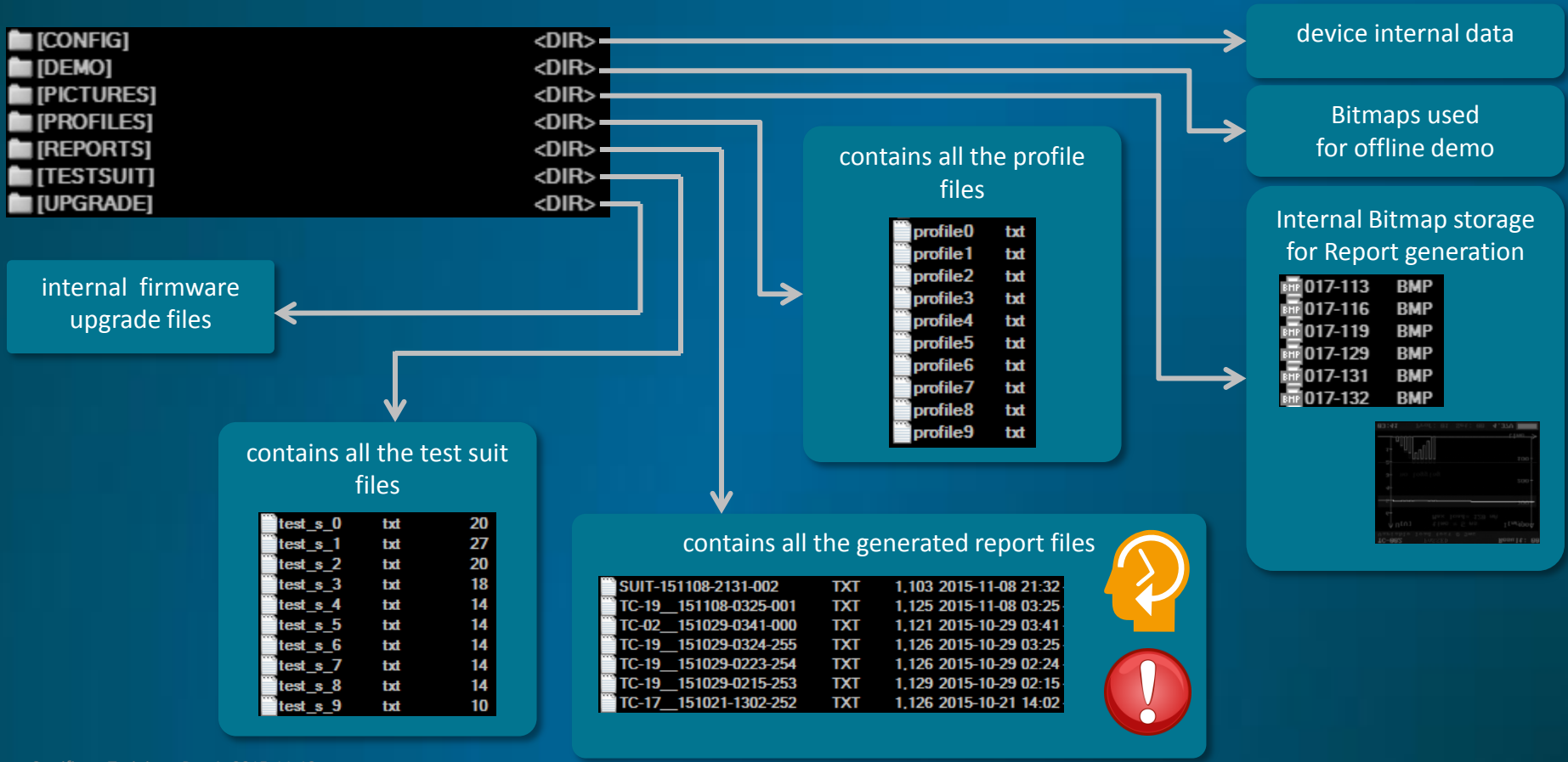
PC Application - installation exercise



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PC Application – File System





internal firmware upgrade files

contains all the test suite files

```

test_s_0  txt  20
test_s_1  txt  27
test_s_2  txt  20
test_s_3  txt  18
test_s_4  txt  14
test_s_5  txt  14
test_s_6  txt  14
test_s_7  txt  14
test_s_8  txt  14
test_s_9  txt  10
    
```

contains all the profile files



```

profile0  txt
profile1  txt
profile2  txt
profile3  txt
profile4  txt
profile5  txt
profile6  txt
profile7  txt
profile8  txt
profile9  txt
    
```

contains all the generated report files

```

SUITE-151108-2131-002  TXT  1,103  2015-11-08  21:32
TC-19_151108-0325-001  TXT  1,125  2015-11-08  03:25
TC-02_151029-0341-000  TXT  1,121  2015-10-29  03:41
TC-19_151029-0324-255  TXT  1,126  2015-10-29  03:25
TC-19_151029-0223-254  TXT  1,126  2015-10-29  02:24
TC-19_151029-0215-253  TXT  1,129  2015-10-29  02:15
TC-17_151021-1302-252  TXT  1,126  2015-10-21  14:02
    
```


device internal data

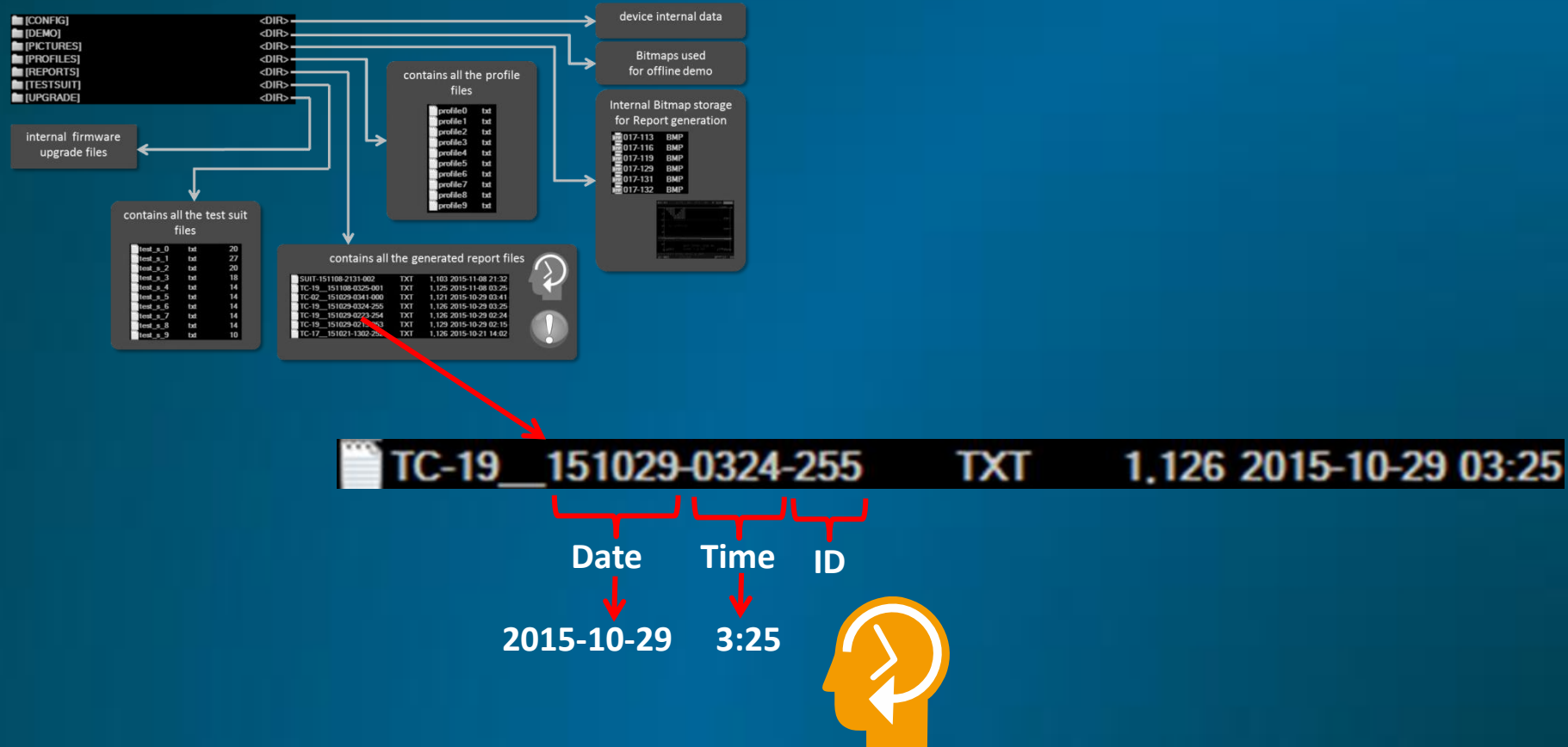
Bitmaps used for offline demo

Internal Bitmap storage for Report generation

```

BMP 017-113  BMP
BMP 017-116  BMP
BMP 017-119  BMP
BMP 017-129  BMP
BMP 017-131  BMP
BMP 017-132  BMP
    
```





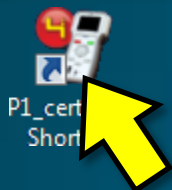
Test report – file name composition

7

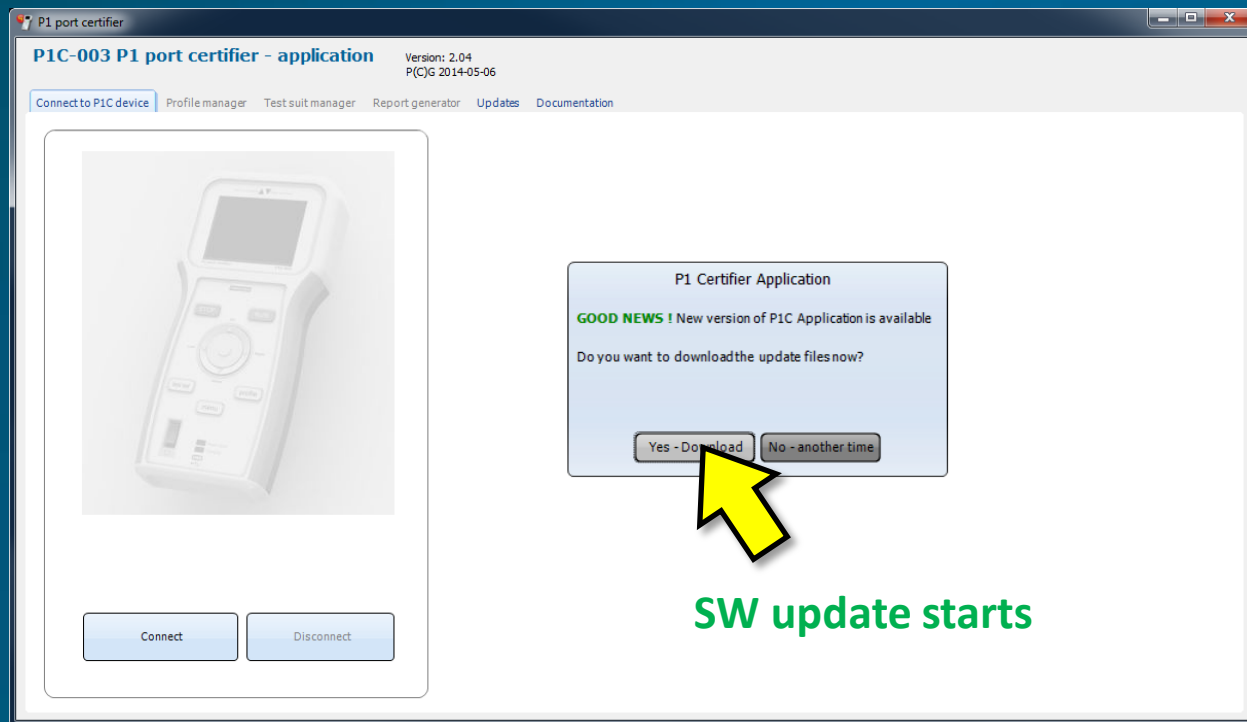
Software update



Method 1

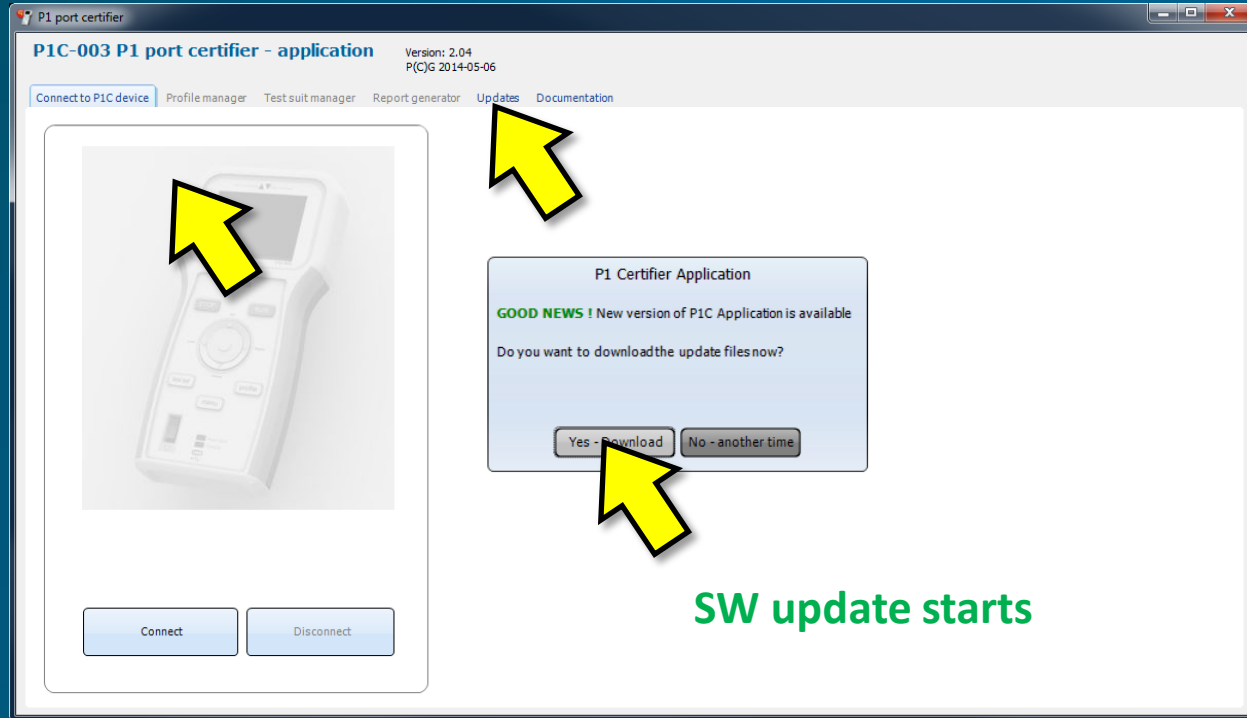
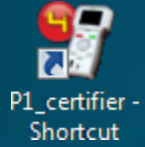
P1_cert
Short

Double click



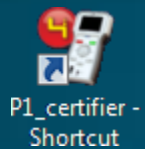
SW update starts

Method 2



The screenshot shows the 'P1 port certifier' application window. The title bar reads 'P1 port certifier'. The main window title is 'P1C-003 P1 port certifier - application'. The version is '2.04' and the path is 'P(C)G 2014-05-06'. The menu bar includes 'Connect to P1C device', 'Profile manager', 'Test suit manager', 'Report generator', 'Updates', and 'Documentation'. A yellow arrow points to the 'Updates' menu item. Below the menu bar is a large image of a handheld device. A yellow arrow points to the device image. At the bottom left are 'Connect' and 'Disconnect' buttons. A dialog box titled 'P1 Certifier Application' is open, displaying the message: 'GOOD NEWS ! New version of P1C Application is available. Do you want to download the update files now?'. The dialog has two buttons: 'Yes - Download' and 'No - another time'. A yellow arrow points to the 'Yes - Download' button. Below the dialog, the text 'SW update starts' is written in green.

SW update starts



The screenshot shows the 'P1 port certifier' application window. The title bar reads 'P1 port certifier'. The main window title is 'PIC-003 P1 port certifier - application'. The version is '2.04' and the path is 'P(C)G 2014-05-06'. The 'Updates' tab is selected in the top navigation bar. The 'Application update' section has a 'Check for updates' button. Below it, the 'What's new' section is highlighted with a red rounded rectangle. It contains the following text: '2014-12-02, 18:58', 'PC application version 1.12 released as a web update.', 'Fixed:', '1). Minor change to the lists of "profiles" and "test suit"', and '2). **New Firmware** version 2.14 included in this update'. The 'Firmware update' section on the right shows a list of firmware versions: 'Firmware v.310' (highlighted), 'Firmware v.214', 'Firmware v.210', and 'Firmware v.200'. Below this list is a 'Firmware upgrade' button. To the right of the firmware list, there is a date '2015-10-18, 12:19', 'Firmware version. v 3.10', and a 'Fixed bug reports:' section with one item: '1). P1 Datagram display - improved'.

P1 port certifier

PIC-003 P1 port certifier - application Version: 2.04
P(C)G 2014-05-06

Connect to PIC device Profile manager Test suit manager Report generator Updates Documentation

Application update:

Check for updates

What's new

2014-12-02, 18:58

PC application version 1.12 released as a web update.
Fixed:
1). Minor change to the lists of "profiles" and "test suit"
2). **New Firmware** version 2.14 included in this update

Firmware update:

Firmware v.310
Firmware v.214
Firmware v.210
Firmware v.200

2015-10-18, 12:19
Firmware version. v 3.10

Fixed bug reports:
1). P1 Datagram display - improved

Firmware upgrade

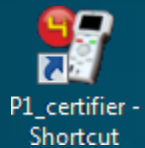
PC Application – SW update exercise



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Firmware update





The screenshot shows the 'P1 port certifier' application window. The title bar reads 'P1 port certifier'. The main window title is 'P1C-003 P1 port certifier - application'. The version is '2.04' and the path is 'P(C)\G 2014-05-06'. The 'Updates' tab is selected, showing a list of updates. A red box highlights the 'Firmware update' section, which includes a list of firmware versions: 'Firmware v.310', 'Firmware v.214', 'Firmware v.210', and 'Firmware v.200'. A yellow arrow points to 'Firmware v.310'. Another red box highlights the 'Fixed bug reports' section, which includes 'P1 Datagram display - improved'. A yellow arrow points to the 'Firmware upgrade' button. A modal dialog box is open in the center, titled 'P1 Certifier Firmware update', asking 'Do you want to upgrade to firmware v.310 now?'. The dialog has 'Yes' and 'No' buttons. A yellow arrow points to the 'Yes' button.

P1 port certifier

P1C-003 P1 port certifier - application Version: 2.04
P(C)\G 2014-05-06

Connect to P1C device Profile manager Test suit manager Report generator Updates Documentation

Application update:
Check for updates

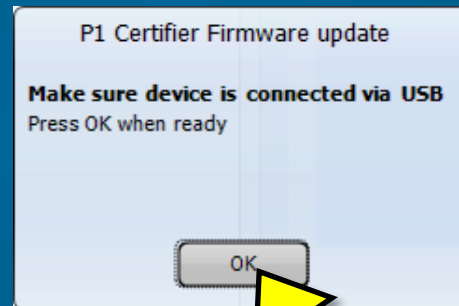
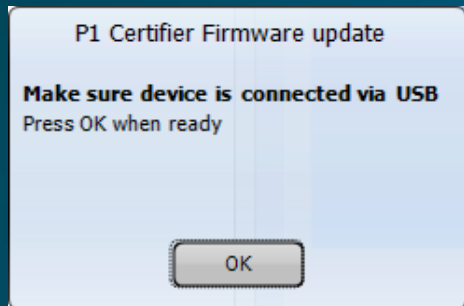
What's new
2014-12-02, 18:58
PC application version 1.12 released as a web update.
Fixed:
1). Minor change to the lists of "profiles" and "test suit"
2). **New Firmware** version 2.14 included in this update

Firmware update:
Firmware v.310
Firmware v.214
Firmware v.210
Firmware v.200

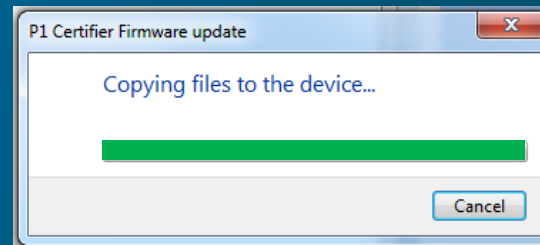
2015-10-18, 12:19
Firmware version. v 3.10
Fixed bug reports:
1). P1 Datagram display - improved

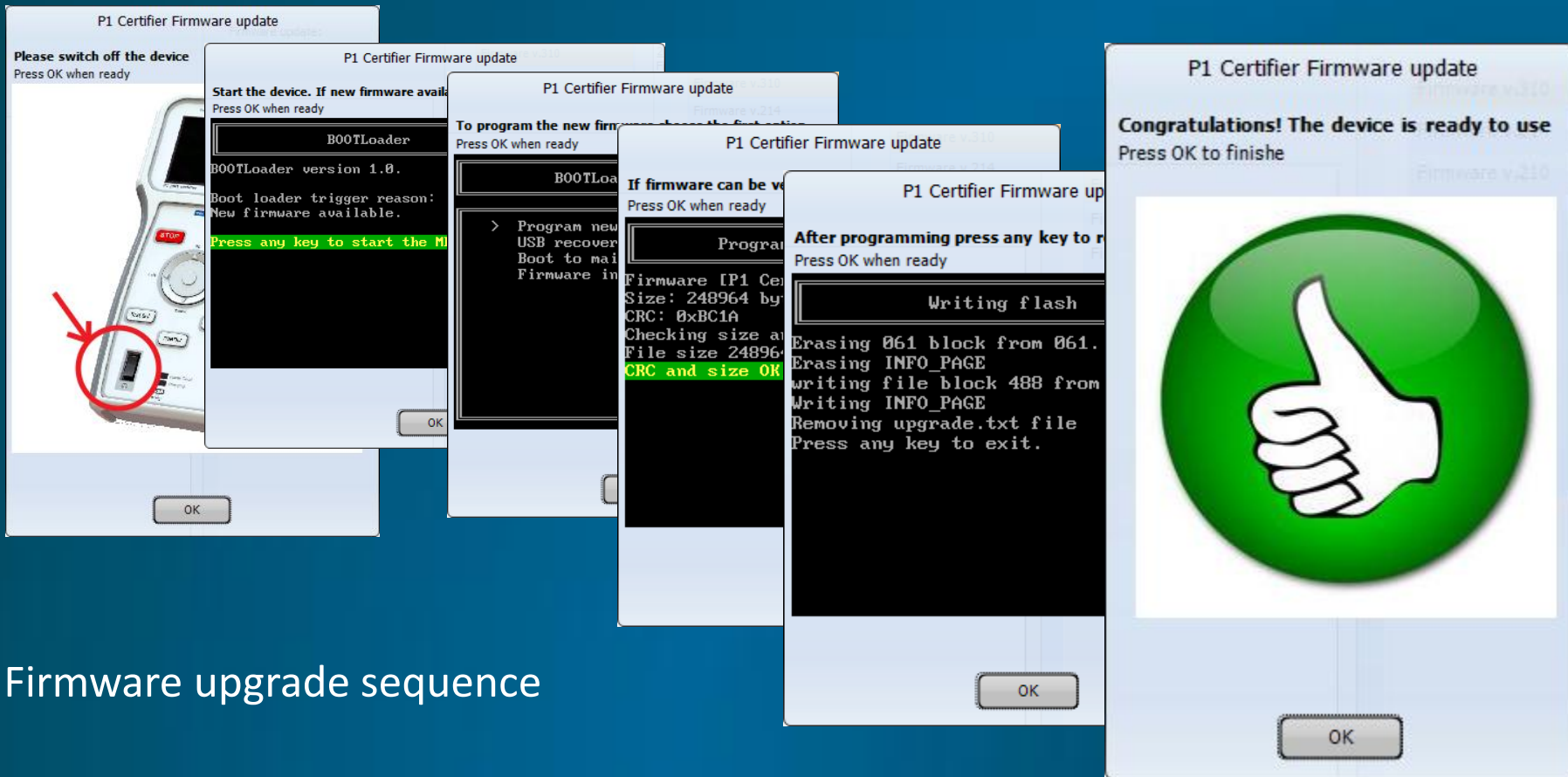
P1 Certifier Firmware update
Do you want to upgrade to firmware v.310 now?
Yes No

Firmware upgrade



USB cable





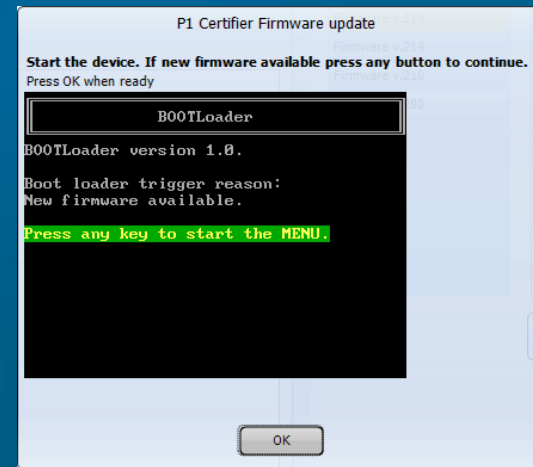
Firmware upgrade sequence



switch on the device



press and keep both buttons down



Firmware upgrade sequence – another method

PC Application – Firmware update exercise




9

Profile editor – HW parameters



P1 port certifier
Version: 3.14
P(C)G 2015-05-07

Connect to P1C device
Profile manager
Test suit manager
Report generator
Updates
Documentation



P1C_Rev=3.0
 Firmware_version=3.10
 SN=0011
 Owner=tech4u
 calibration_date=2014-10-04
 calibrated_by=tech4u

Connect
Disconnect

Profile definition - **Found (O.K.)**
 Test suit definition - **Found (O.K.)**

```

150209-2014-040.TXT
Single_151018-2353-209.TXT
Single_151019-0001-210.TXT
Single_151019-0008-211.TXT
Single_151019-0037-212.TXT
Single_151019-0056-213.TXT
Single_151019-1600-214.TXT
Single_151019-2346-218.TXT
P1data_151019-2308-216.TXT
P1data_151019-2332-217.TXT
Single_151019-2358-219.TXT
Single_TC-06__151020-0011-220.TXT
Single_TC-07__151020-0039-221.TXT
Single_TC-08__151020-0045-222.TXT
Single_TC-09__151020-0051-223.TXT
Single_TC-13__151020-0106-224.TXT
Single_TC-15__151020-0132-227.TXT
Single_TC-16__151020-0134-228.TXT
151020-0217-229.TXT
TC-11__151021-0215-239.TXT
Single_TC-14__151020-0110-225.TXT
Single_TC-15__151020-0123-226.TXT
TC-01__151021-0218-240.TXT
151021-0222-241.TXT
151021-0226-242.TXT
151021-0228-243.TXT
151021-0254-244.TXT
TC-15__151021-0336-245.TXT
TC-13__151021-0337-246.TXT
TC-16__151021-0337-247.TXT
TC-06__151021-0339-248.TXT
TC-06__151021-0340-249.TXT
TC-17__151021-0343-250.TXT
SUJT-151021-1120-251.TXT
TC-17__151021-1302-252.TXT
TC-19__151029-0215-253.TXT
TC-19__151029-0223-254.TXT
TC-19__151029-0324-255.TXT
TC-02__151029-0341-000.TXT
TC-19__151108-0325-001.TXT
SUJT-151108-2131-002.TXT
P1_TC-99__151021-0200-238.TXT
                    
```



DSMR requirements – Netbeheer Netherland

DSMR 4.0

4.2 Power supply

The power supply for the P1 port shall be able to withstand short circuits. Manipulation of the power supply lines shall never influence any other part of the meter.

When no device is connected through the P1 port, the power consumption of the P1 circuitry shall not be included in the register values. When a device is connected to the P1 port, the power consumption of the P1 circuitry shall be included in the register values. The P1 port will function and supply power independent of the state of the breaker.

The power supply will supply a maximum current of 100 mA at 5 Vdc. Overload protection shall be implemented as a current limiting mechanism.

DSMR 2.2

4.4 Measuring device response time

The measuring device must complete a data transfer within eight seconds.

4.5 Signals

All signals are compliant with CMC levels.

Max current $I_H(\max) = 30\text{mA}$

4.6 Physical connector

The connector is RJ11. The Metering System holds a female connector, the customer can plug in a standard RJ11 plug. Note that the connector in the metering system is physically accessible at all times and should not be sealed or protected by a sealed cover.

Pin #	Signal name	Description
1		
2	Request	Input
3	GND	Ground
4	N.C.	Not Connected
5	Data	Output
6		

devices will need a hub. The hub is outside the scope of the P1 document, but a basic schematic is shown in Appendix I.

4.5 Measuring device transfer time

The measuring device must complete a data transfer to the P1 device within eight seconds, because the data has to be sent by the P1 port to the P1 device every ten seconds. This means at a minimum there is a pause of two seconds between messages.

4.6 Signals

All signals are compliant with following levels (different from the NTA8130!) Operating range per (P1) device as seen from the meter:

Symbol	Parameter	Meter			OSM			Units
		Min	Typ	Max	Min	Typ	Max	
V_i request	Request voltage				4	5	5.5	V
I_i request	Current supplied to the request pin				4	5	10	mA
V_o data	Low level output voltage of the Data pin		1					V
I_i data	Input current sinked, supplied by the Data pin per OSM		5	6				mA

Table 4-1: Signal Levels

Limit values:
 Max Voltage: opto coupler: 15V, driver 6V
 Max current sink (data output) : max = 30mA
 Logical levels are specified as follows:
 SPACE "0" as > 4V
 MARK "1" as < 1 V

ESMR 5.0

5.8 P1 signal levels

Symbol	Description	Requirement for the Meter			Requirement for OSM			Units
		Min	Typical	Max	Min	Typical	Max	
U_{DR_1}	"Data request" line - HIGH level	-	-	5,5	4,0	5,0	5,5	V
I_{DR_1}	"Data request" line current	-	5	10	4	5	10	mA
U_{D_0}	"Data" line - LOW level	0	0,2	1	0	0,2	1	V
U_{D_1}	"Data" line - HIGH level	-	5,0	-	-	5,0	-	V
I_{D_MAX}	"Data" line max current	-	-	30	-	-	5	mA
U_L	"+5V" power supply - voltage	4,9	5	5,3	4,9	5	5,3	V
U_{RIPPLE_MAX}	"+5V" line maximum ripple voltage	-	-	100	-	-	100	mV
U_{NOISE_MAX}	"+5V" line- maximum noise	-	-	50	-	-	100	mV
U_{OVP}	OVP level ("+5V" and "Data request" lines)	5,8	5,9	6	-	-	-	V
I_{L_CONT}	"+5V" maximum continuous current	-	250	260	-	-	250	mA
I_{L_MAX}	"+5V" line overload protection trigger	260	-	3000	-	-	-	mA
I_{SC}	"+5V" line Short Circuit current	-	-	50	-	-	-	mA

Logical levels are specified as follows:
 SPACE "0" usually > 4V
 MARK "1" as < 1 V

P1 port certifier

PIC-003 P1 port certifier - application Version: 3.14
P[CG] 2015-05-07

Connect to PIC device Profile manager Test suit manager Report generator Updates Documentation

Profile_0 - ESMR50 Profile name: ESMR50 SM type: DSMR5.0 Save profile

Profile_1 - DSMR40
Profile_2 - DSMR22
Profile_3 - Elster
Profile_4 - Sagemcom
Profile_5 - Kaifa
Profile_6 - LG
Profile_7 - new1
Profile_8 - new2
Profile_9 - new5

Profile parameters Parser configuration RAW data

"+5V Line" voltage levels

Noise level
Ripple level
Max continuous load
Overload trigger
RJ-11 cableresistance
Datagram period
Short circuit max current
DATA line max zero level
REQUEST line max current

+5V Allowed voltage window

Save profile

Profile has changed

Save profile

Profile has been saved

10

Profile editor – Parser configuration



P1 port certifier

P1C-003 P1 port certifier - application Version: 2.04
P(C)G 2014-05-06

Connect to P1C device | Profile manager | Test suit manager | Report generator | Updates | Documentation

Profile name: DSMR40 SM type: DSMR4.0

Save profile

Profile parameters | Parser configuration | RAW data

M00	M01	M02	M03	M04	M05	M06	M07	M08	M09
O00	O01	O02	O03	O04	O05	O06	O07	O08	O09
E00	E01	E02	E03	E04	E05	E06	E07	E08	E09
G00	G01	G02	G03	G04	G05	G06	G07	G08	G09

OBIS to find: 0-0:96.1.1

Info: Equipment ID

What is required?

- Empty field allowed
- Value
- Units
- Time stamp
- ASCII

Format of the value field

Type of number

- Not applicable
- Integer
- Float

Decimal fraction: na

Delete object

The screenshot displays the 'P1 port certifier' application window. The title bar reads 'P1 port certifier'. The main window title is 'PIC-003 P1 port certifier - application', with 'Version: 2.04' and 'P(C)G 2014-05-06' displayed to the right. A 'TECH 4 U' logo is in the top right corner. Below the title bar is a navigation menu with tabs: 'Connect to P1C device', 'Profile manager' (selected), 'Test suite manager', 'Report generator', 'Updates', and 'Documentation'. On the left, a list of profiles is shown, with 'Profile_1 - DSMR40' selected. The main area has two sub-tabs: 'Profile parameters' and 'RAW data' (selected). The 'Profile name' field contains 'DSMR40' and the 'SM type' dropdown is set to 'DSMR4.0'. A 'Save profile' button is in the top right. The 'RAW data' tab shows a text area with the following configuration parameters:

```
Profile_name=DSMR40
SM_type=DSMR4.0
Max_voltage_on_5V_line=5.50
Min_voltage_on_5V_line=4.60
Ripple_level=100
Noise_level=100
Max_continuous_load=120
Overload_trigger=280
Max_DATA_request_current=10
RJ_11_cable_resistance=0.18
DATA_line_zero_level=1.0
Datagram_period=10
Short_circuit_max_current=100
M00_OBIS_to_find=1-3:0.2,8
M00_Info=Protocol version 1
M00_What_is_required=1
M00_Value_format=IXX
M01_OBIS_to_find=0-0:1.0.0
M01_Info=Main time stamp
M01_What_is_required=4
M01_Value_format=XXX
M02_OBIS_to_find=0-0:96.14.0
M02_Info=Tariff indicator
M02_What_is_required=1
M02_Value_format=IXX
M03_OBIS_to_find=0-0:96.1.1
M03_Info=Equipment ID
M03_What_is_required=8
M03_Value_format=XXX
O00_OBIS_to_find=1-0:31.7.0
```

A 'Save to disk' button is located at the bottom right of the text area.

PC Application – Configuring parameters **exercise**



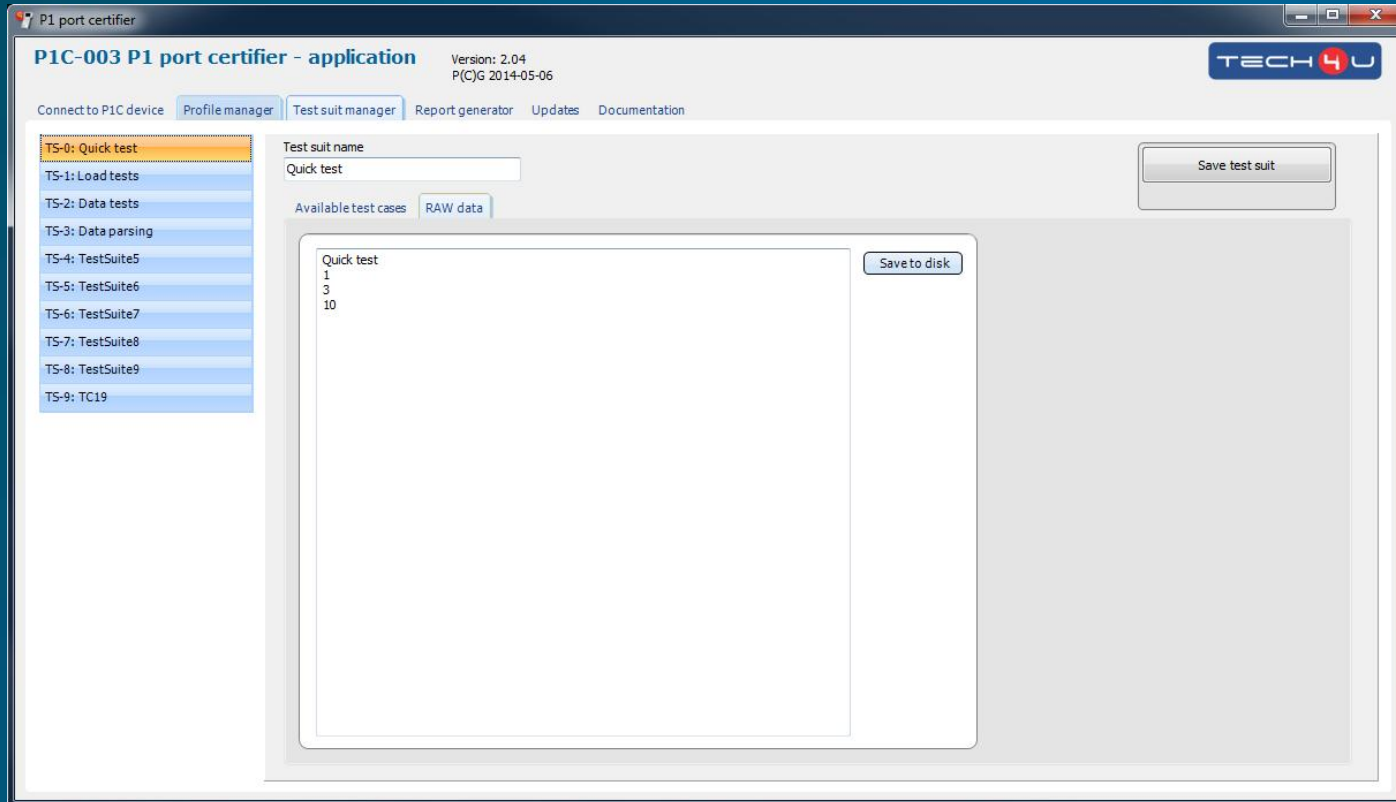
11

Test suite editor



The screenshot displays the 'P1 port certifier' application window. The title bar reads 'P1 port certifier'. The main window title is 'P1C-003 P1 port certifier - application', with 'Version: 2.04' and 'P(C)G 2014-05-06' displayed to the right. A 'TECH 4 U' logo is in the top right corner. The interface includes a navigation menu with 'Connect to PIC device', 'Profile manager', 'Test suite manager' (selected), 'Report generator', 'Updates', and 'Documentation'. On the left, a list of test suites is shown, with 'TS-0: Quick test' selected. The main area is titled 'Test suite name' and contains a text field with 'Quick test' and a 'Save test suit' button. Below this, there are tabs for 'Available test cases' (selected) and 'RAW data'. A list of test cases is displayed, each with a checkbox:

- TC-001 Voltage under load test
- TC-002 Variable load @ 5ms
- TC-003 Variable load @ 10ms
- TC-004 Variable load @ 100ms
- TC-005 Variable load @ 1s
- TC-006 Noise level at idle load
- TC-007 Ripple level at idle load
- TC-008 Ripple level at maximal load
- TC-009 Noise level at maximal load
- TC-010 Data packet reception
- TC-011 Timing P1 packets
- TC-012 Receive 100 packets
- TC-013 Inrush current
- TC-014 DATA line - zero level
- TC-015 Request line current
- TC-016 Short circuit test
- TC-017 OVP on +5V line
- TC-018 OVP on DATA line
- TC-019 Data parser



PC Application – Test suite creation exercise



12

Report generator



P1 port certifier Version: 2.04
P(C)G 2014-05-06

TECH4U

Connect to PIC device Profile manager Test suit manager **Report generator** Updates Documentation

150209-2014-040.TXT
Single_151018-2353-209.TXT
 Single_151019-0001-210.TXT
 Single_151019-0008-211.TXT
 Single_151019-0037-212.TXT
 Single_151019-0056-213.TXT
 Single_151019-1600-214.TXT
 Single_151019-2346-218.TXT
 P1data_151019-2308-216.TXT
 P1data_151019-2332-217.TXT
 Single_151019-2358-219.TXT
 Single_TC-06__151020-0011-220.TXT
 Single_TC-07__151020-0039-221.TXT
 Single_TC-08__151020-0045-222.TXT
 Single_TC-09__151020-0051-223.TXT
 Single_TC-13__151020-0106-224.TXT
 Single_TC-15__151020-0132-227.TXT
 Single_TC-16__151020-0134-228.TXT
 151020-0217-229.TXT
 TC-11__151021-0215-239.TXT
 Single_TC-14__151020-0110-225.TXT
 Single_TC-15__151020-0123-226.TXT
 TC-01__151021-0218-240.TXT
 151021-0222-241.TXT
 151021-0226-242.TXT
 151021-0228-243.TXT
 151021-0294-244.TXT
 TC-15__151021-0336-245.TXT
 TC-13__151021-0337-246.TXT
 TC-16__151021-0337-247.TXT
 TC-06__151021-0339-248.TXT
 TC-06__151021-0340-249.TXT
 TC-17__151021-0343-250.TXT

Report header

This document presents the test results executed by "P1 Certifier device".
The document is divided in number of sections.

Table of contents:

- 1). Test Report Oneliner
- 2). SM test profile used during the test

Save to disk

Report footer

Test executed by:
Test report prepared by:

Signatures: _____

Save to disk

Report data

```

##### device info #####
<device_section>
Firmware 3.10
PIC_Rev=3.0
Firmware_version=3.10
SN=0011
Owner=tech4u
calibration_date=2014-10-04
calibrated_by=tech4u
<device_section_end>
##### profile #####
<profile_section>
  
```

Generate report(pdf)

```

[.]
report_address
TC_reasons
TC_description
TC_names
report_header
report_footer
    
```

```

TC_description - Notepad
File Edit Format View Help
1=The intention of TC-001 is to check correctness of overload protection mechanism. During the test, voltage on the "+5V line" is measured at continuously increasing load.
2=This testcase simulates variable load on +5V line at period of 5 millisecond.
3=This testcase simulates variable load on +5V line at period of 10 millisecond.
4=This testcase simulates variable load on +5V line at period of 100 millisecond.
5=This testcase simulates variable load on +5V line at period of 1 second.
6=Test case measures the noise level when there is no load on +5V line.
7=Test case measures the ripple level when there is no load on +5V line.
8=Test case measures the ripple level when +5V line is loaded at level of maximal continous load.
9=Test case measures the noise level when +5V line is loaded at level of maximal continous load.
10=This testcase analyzes the P1 datagram and checks its CRC code when needed.
11=This testcase measures the time period between two consecutive datagrams.
12=This test case checks the error rate of P1 datagrams. 100 consecutive packets are analyzed.
13=This test case verifies the behaviour of the SM under "inrush current" circumstances.
14=This TC measures the logical "zero" level on the DATA line, under variable load.
15=This TC measures power consumption by the REQUEST line, under variable voltage.
16=This testcase measures the Short circuit current of the +5V line.
17=This testcase check the behaviour of the +5V line under overvoltage situation. The 20V overvoltage is applied for a period of 200ms.
18=This testcase check the behaviour of the DATA line under overvoltage situation. The 20V overvoltage is applied for a period of 200ms.
19=DATA parser test
    
```

```

Lister - [c:\P1Certifier_3-13\Report_files\TC_reasons.txt]
File Edit Options Encoding Help 100 %
0=Testcase executed correctly. No errors found.
1=Maximal allowed voltage exceeded
2=Minimal allowed voltage exceeded
3=Min and Max allowed voltage exceeded
4=Maximal allowed current exceeded
5=Maximal allowed current and voltage exceeded
6=Maximal allowed current and minimal voltage exceeded
7=All allowed parameters exceeded!
8=CRC of the datagram incorrect
16=Maximal allowed noise level exceeded
32=Maximal ripple level exceeded
64=Maximal short circuit current exceeded
128=Wrong voltage after short circuit
129=wrong voltage after inrush current
130=Zero level on DATA line is too high
132=No datagrams received on time
144=REQUEST line current too high
145=No datagrams received
    
```

```

Lister - [e:\PCB\000_SW_Delphi\302_P1C_003_certifier\Report_files\report_header.txt]
File Edit Options Encoding Help 100 %
This document presents the test results executed by "P1 Certifier device".
The document is divided in number of sections.

Table of contents:

1). Test Report Oneliner
2). SM test profile used during the test
3). Test case set used during the test
4). TC details
5). Recorded datagram
6). Conclusion
    
```

```

Lister - [e:\PCB\000_SW_Delphi\302_P1C_003_...
File Edit Options Encoding Help 100 %
Test executed by:
Test report prepared by:

Signatures: _____
    
```



```

report_address - Notepad
File Edit Format View Help
Tech4u
Nispensstraat 3
5045MR, Tilburg
The Netherlands
    
```



1) Document description

This document presents the test results executed by "P1 Certifier device".
The document is divided in number of sections.

Table of contents:

- 1) Test Report Overview
- 2) SM test profile used during the test
- 3) Test case set used during the test
- 4) TC details
- 5) Recorded datagram
- 6) Conclusion

2) P1 Certifier device information

Firmware 3.11
P1C Rev=3.0
Firmware version=3.10
SN=0011
Owner=tech4u
calibration date=2014-10-04
calibrated by=tech4u

3) Profile parameters used during the test

profile number=1
OSMR40
Max voltage on 5V line=5.500
Min voltage on 5V line=4.600
Ripple level=100
Noise level=150
Max continuous load=120
Overload trigger=280
RJ_11_cable_resistance=0.180
Datagram_period=10
Short_circuit_max_current=100.000
Max_DATA_request_current=10.000
DATA_line_zero_level=1.000

4) Test set used during the test

test suit: number=0
test_suit_name=Quick test
1 Voltage under load test
3 Variable load @ 10ms
10 Data packet reception

5) One page report

1	PASSED	Voltage under load test	Testcase executed correctly. No errors found.
3	PASSED	Variable load @ 10ms	Testcase executed correctly. No errors found.
10	PASSED	Data packet reception	Testcase executed correctly. No errors found.

6) TC details and graphs

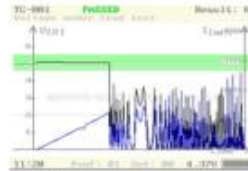
Below all the executed tests are detailed.
Reduced graphs are displayed where applicable.

TC-001 Voltage under load test

The intention of TC-001 is to check correctness of overload protection mechanism. During the test, voltage on the "+5V line" is measured at continuously increasing load.

Result = PASSED

Reason = Testcase executed correctly. No errors found.



Reason: "OK"

TC-003 Variable load @ 10ms

This testcase simulates variable load on +5V line at period of 10 millisecond.

Result = PASSED

Reason = Testcase executed correctly. No errors found.



Reason: "OK"

TC-010 Data packet reception

This testcase analyzes the P1 datagram and checks its CRC code when needed.

Result = PASSED

Reason = Testcase executed correctly. No errors found.

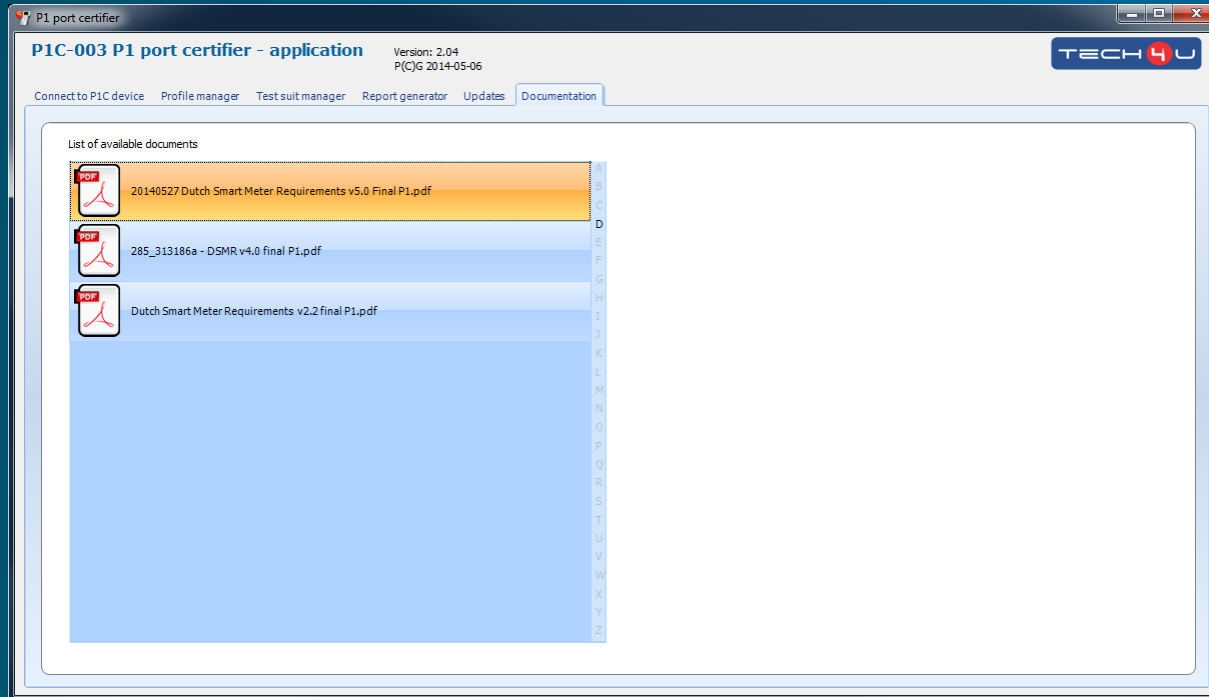
PC Application – Report generation exercise



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PC Application - Documentation





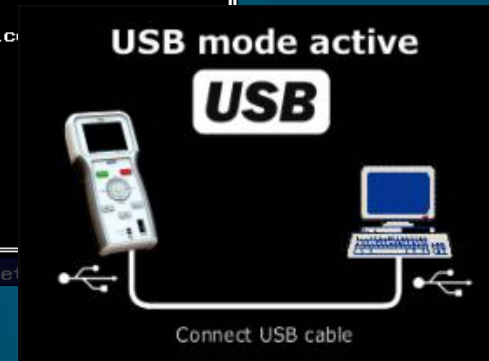
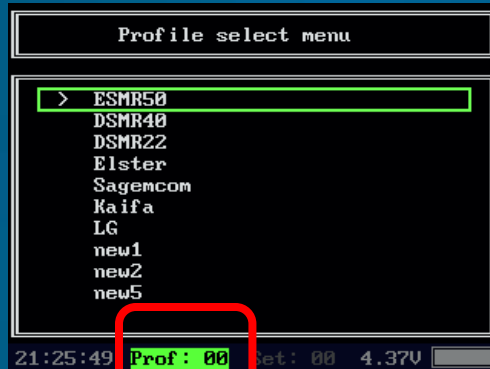
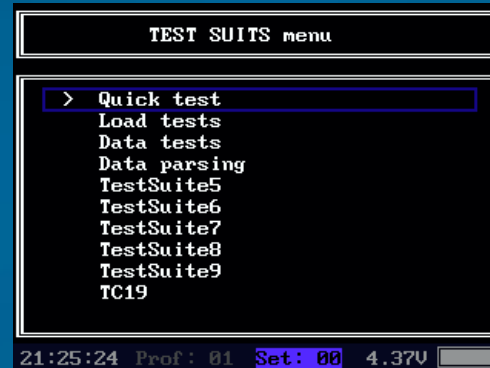
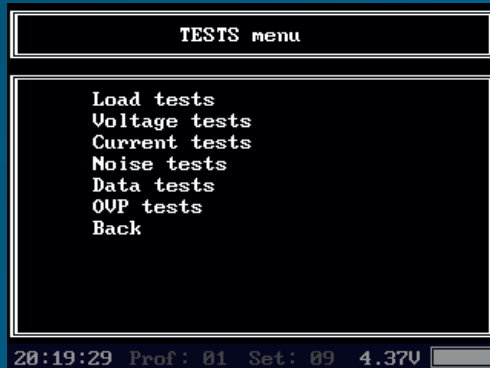


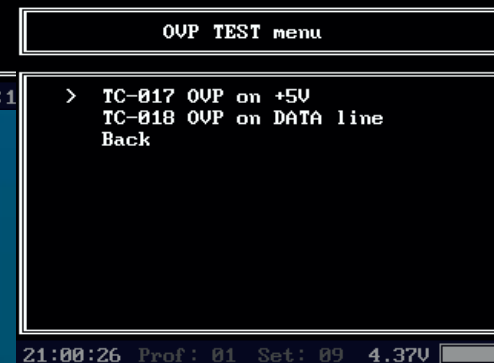
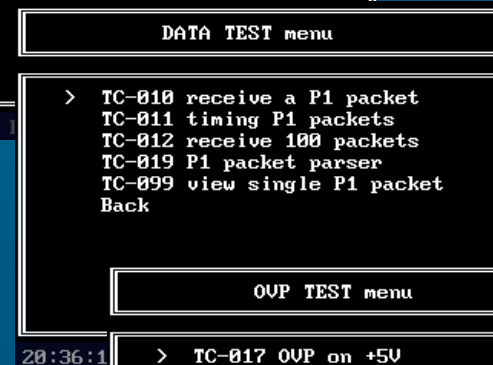
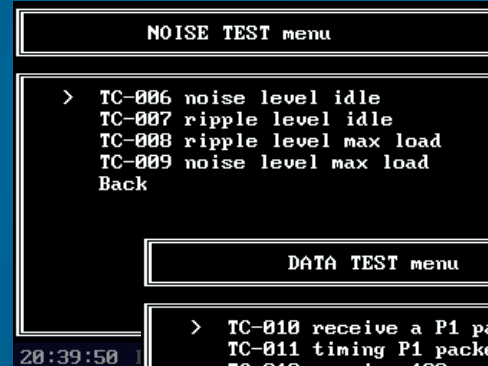
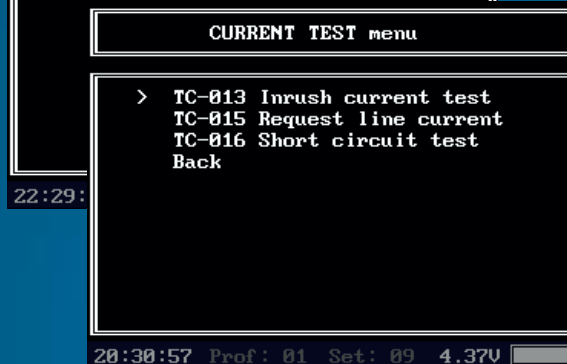
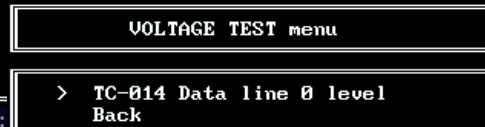
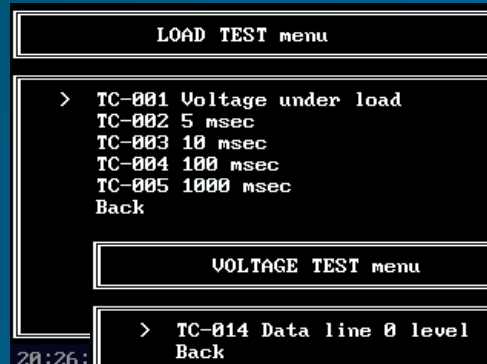
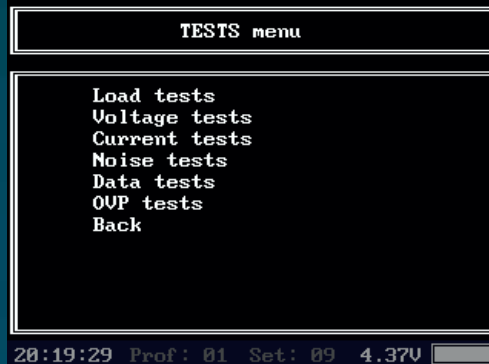
<http://www.tech4u.info/product-info/p1-certifier-003/>

14

MENU System











Coffee break...

15

TEST cases

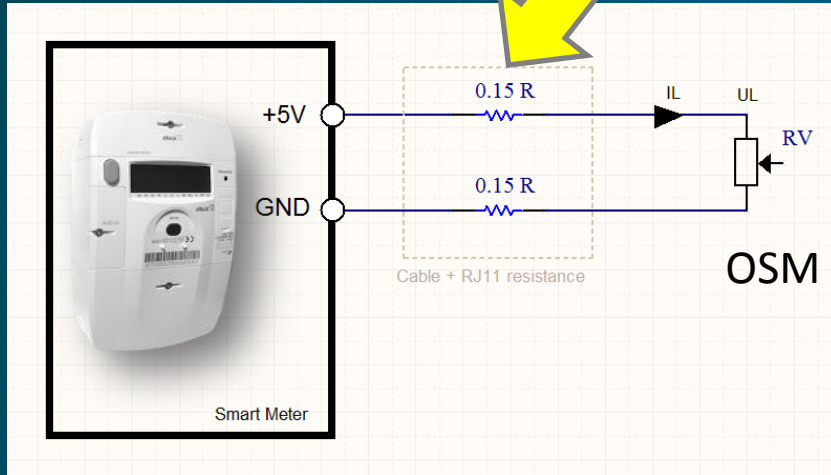


16

TC-001 Voltage under load



Load test cases, TC-001 – Voltage under load



Real circuit



100 mA

DSMR 4.0

ESMR 5.0

4.2 Power supply
 The power supply for the P1 port shall be able to withstand short circuits. Manipulation of the power supply lines shall never influence any other part of the meter.
 When no device is connected through the P1 port, the power consumption of the P1 circuitry shall not be included in the register values. When a device is connected to the P1 port, the power consumption of the P1 circuitry shall be included in the register values. The P1 port will function and supply power independent of the status of the meter.
 The power supply will supply a maximum current of 100 mA at 5 V. Overload protection shall be implemented as a current limiting mechanism.

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 Page 7 of 23

devices will need a hub. The hub is outside the scope of the P1 document, but a basic schematic is shown in Appendix I.

4.5 Measuring device transfer time
 The measuring device must complete a data transfer to the P1 device within eight seconds, because the data has to be sent by the P1 port to the P1 device every ten seconds. This means at a minimum there is a pause of two seconds between messages.

4.6 Signals
 All signals are compliant with following levels (different from the NTA6130) Operating range per (P1) device as seen from the meter:

Symbol	Parameter	Meter			OSM			Units
		Min	Typ	Max	Min	Typ	Max	
V _{request}	Request voltage				4	5	5.5	V
I _{request}	Current supplied to the request pin				4	5	10	mA
V _{low data}	Low level output voltage of the Data pin			1				V
I _{data}	Input current sink, supplied by the Data pin per OSM	5	6					mA

Table 4-1: Signal Levels

Limit values:
 Max Voltage: opto coupler: 15V, driver 6V
 Max current sink (data output) : max = 30mA
 Logical levels are specified as follows:
 SPACE '0' as +4V
 MARK '1' as < 1 V

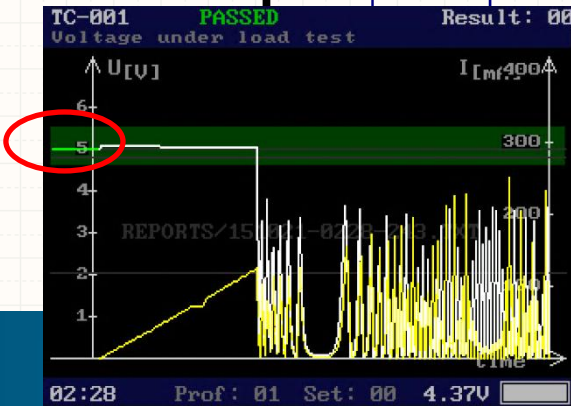
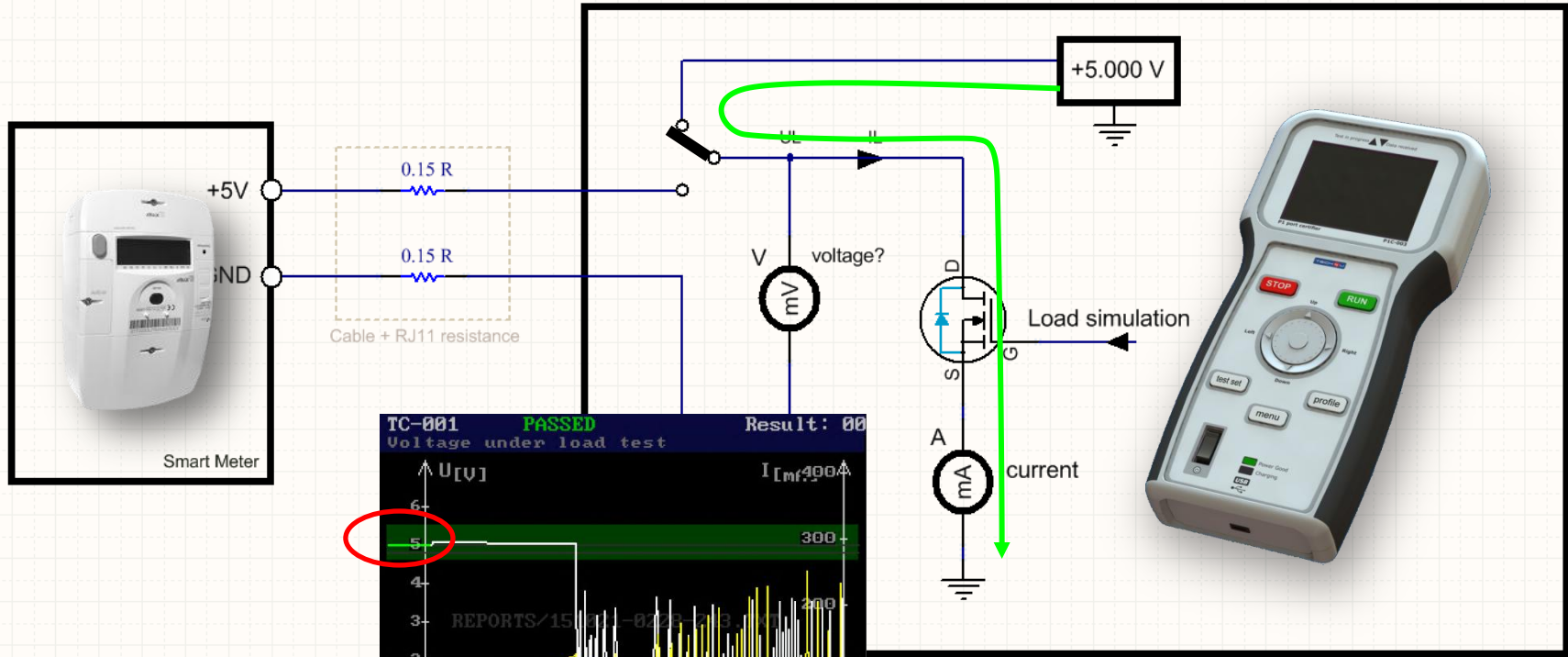
netbeheer nederland

5.8 P1 signal levels

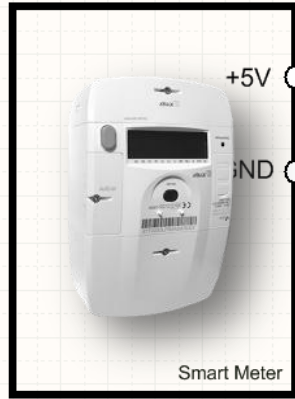
Symbol	Description	Requirement for the Meter			Requirement for OSM			Units
		Min	Typical	Max	Min	Typical	Max	
U _{DR_L}	"Data request" line - HIGH level	-	-	5.5	4.0	5.0	5.5	V
I _{DR_1}	"Data request" line current	-	5	10	4	5	10	mA
U _{DR_0}	"Data" line - LOW level	0	0.2	1	0	0.2	1	V
U _{DR_1}	"Data" line - HIGH level	-	5.0	-	-	5.0	-	V
I _{DR_MAX}	"Data" line max current	-	-	30	-	-	5	mA
U _L	"5V" power supply - voltage	4.9	5	5.3	4.9	5	5.3	V
U _{RIPPLE_MAX}	"5V" line maximum ripple voltage	-	-	100	-	-	100	mV
U _{NOISE_MAX}	"5V" line maximum noise	-	-	50	-	-	100	mV
U _{OVIP}	OVP level ("5V" and "Data request" lines)	5.8	5.9	6	-	-	-	V
I _{CONT}	"5V" maximum continuous current	-	-	250	-	-	250	mA
I _{MAX}	"5V" line overload protection trigger	26	-	3000	-	-	-	mA
I _{SC}	"5V" line Short Circuit current	-	-	50	-	-	-	mA

Logical levels are specified as follows:
 SPACE '0' usually > 4V
 MARK '1' as < 1 V

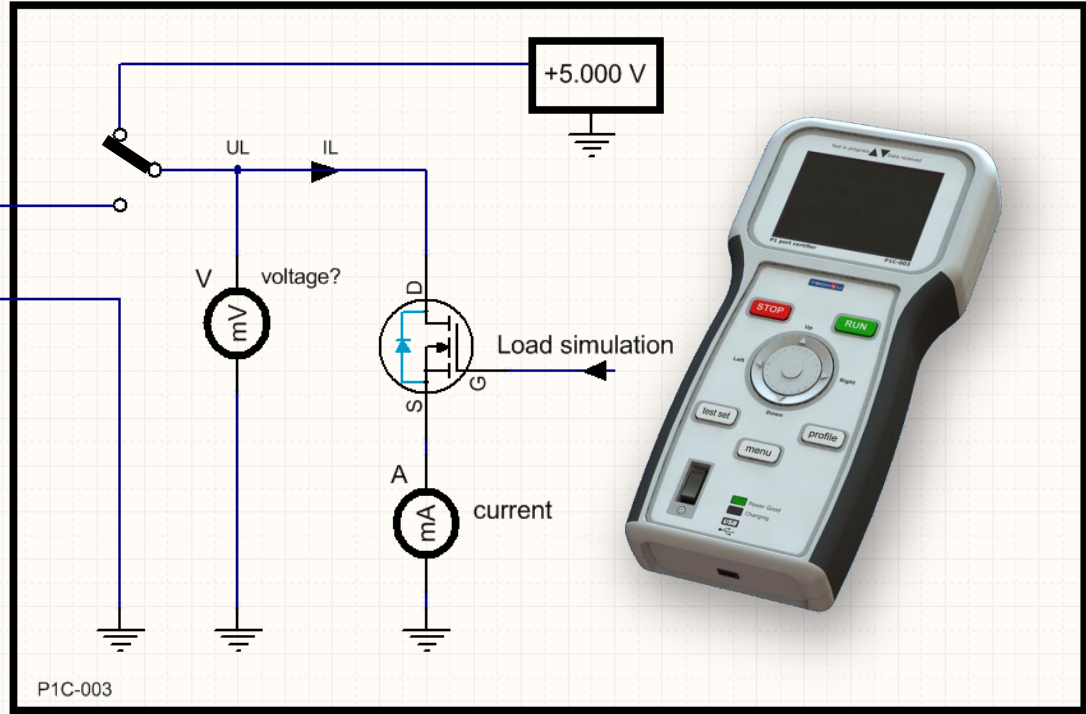
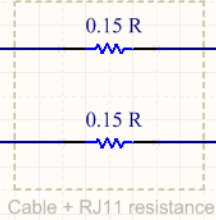
250 mA



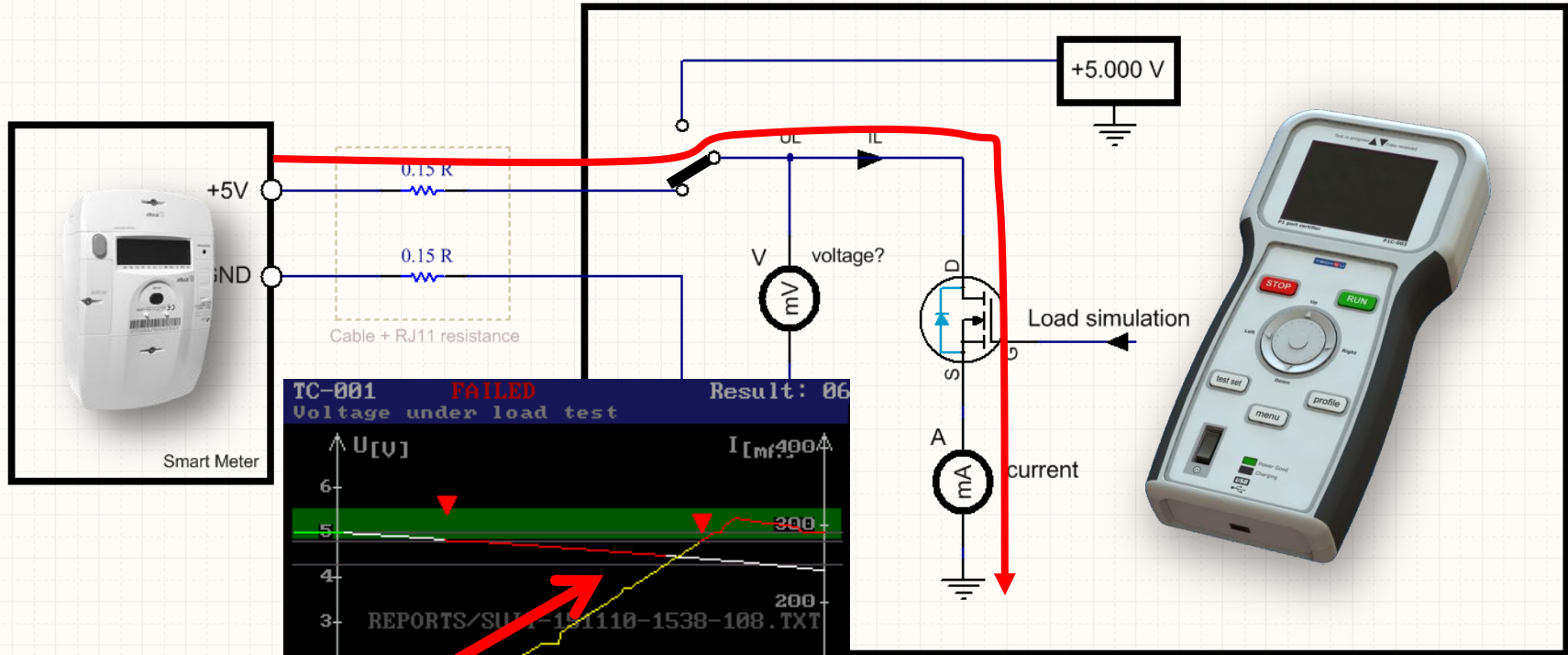
Test circuit



+5V
GND



Test circuit



Test circuit

Number of the Test Case

Test result

Test result's reason/reasons

Name of the Test Case

Name of the Report file

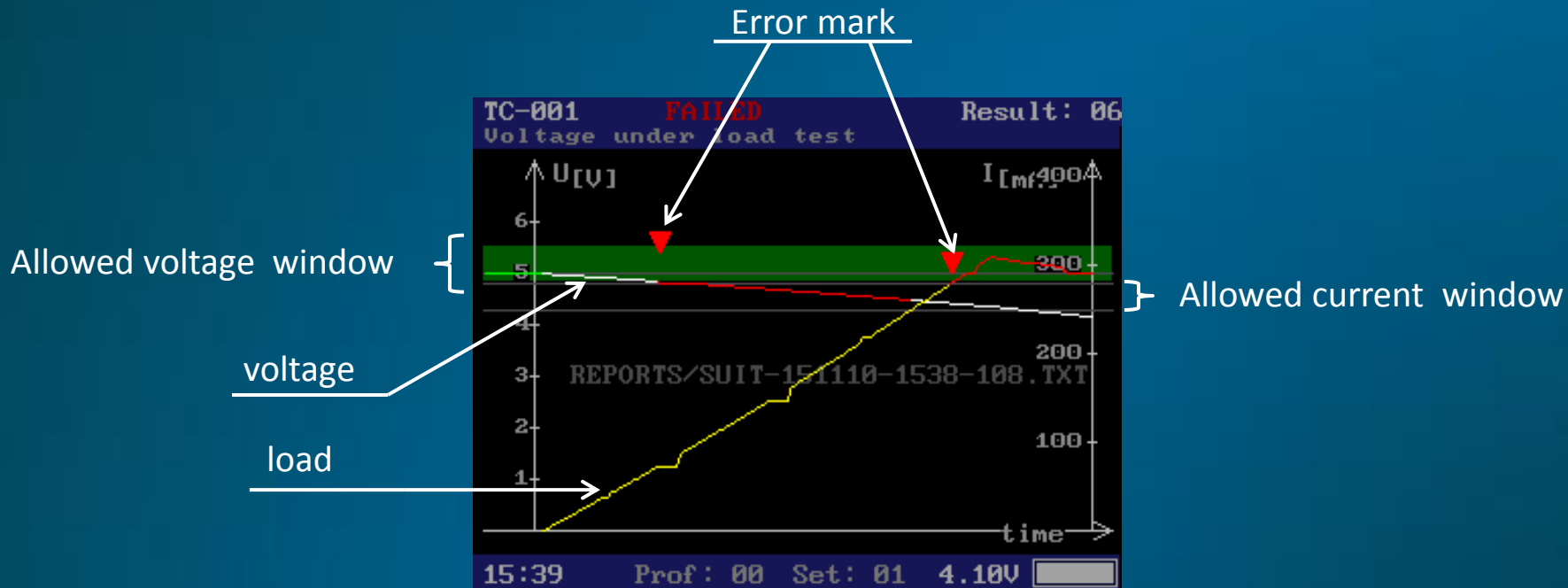
Current time

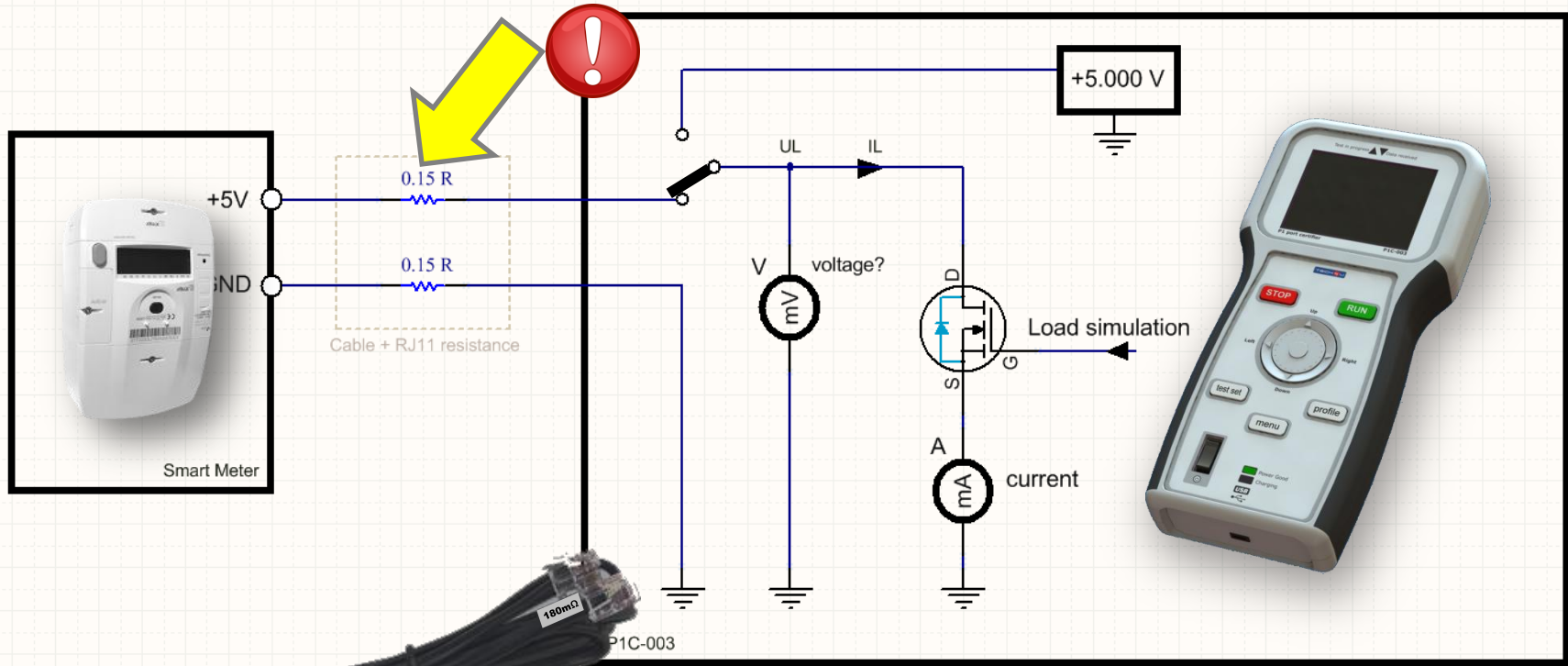
Chosen profile

Chosen test suite

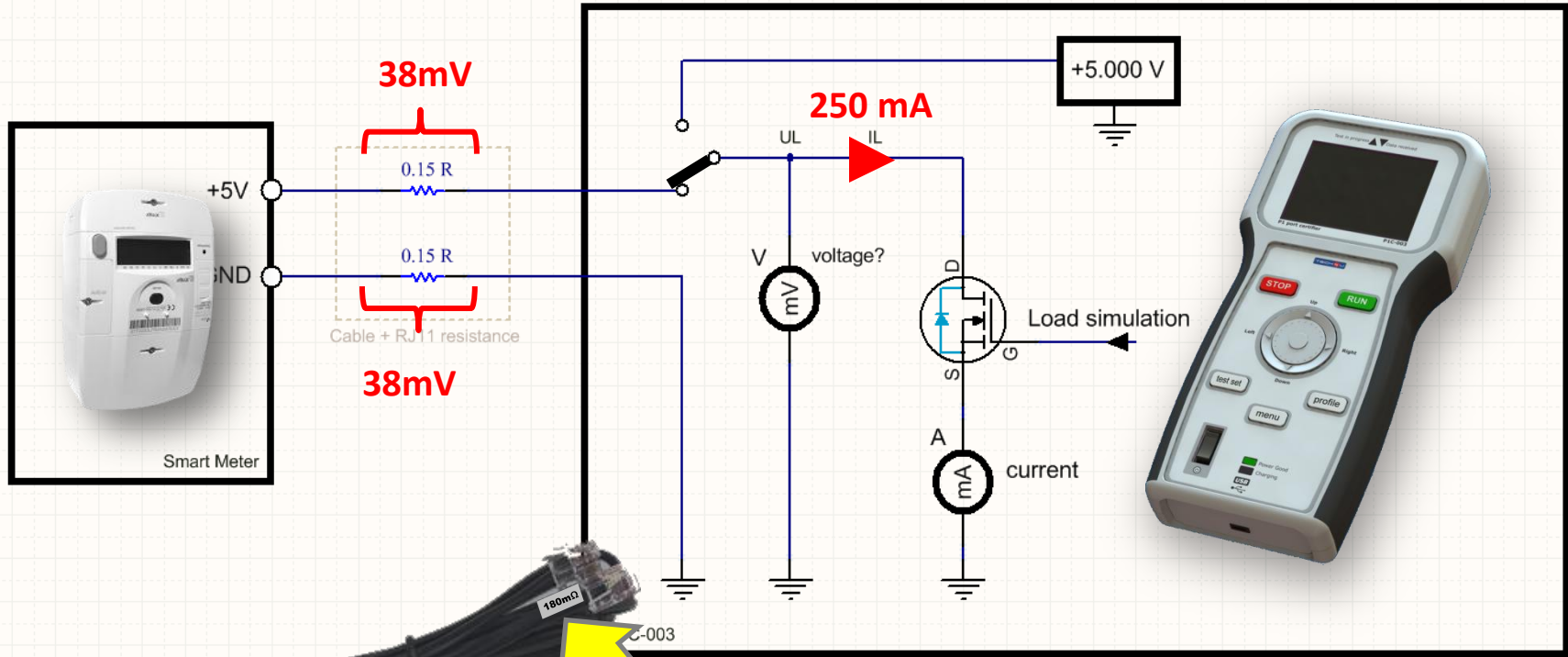
Battery indicator





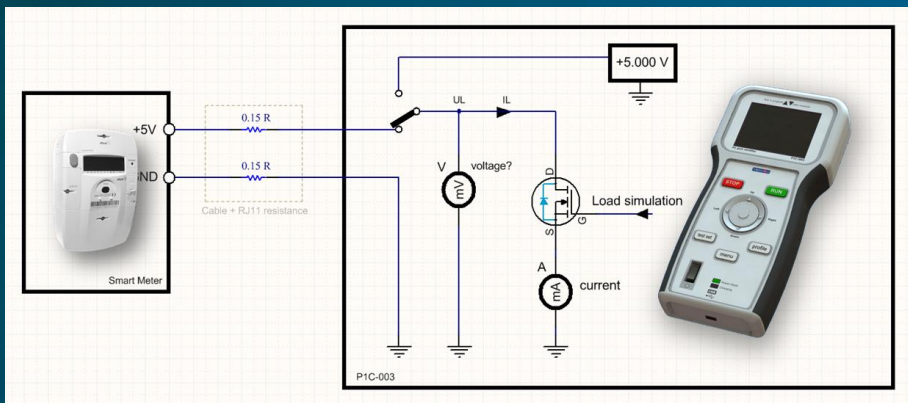


Test circuit

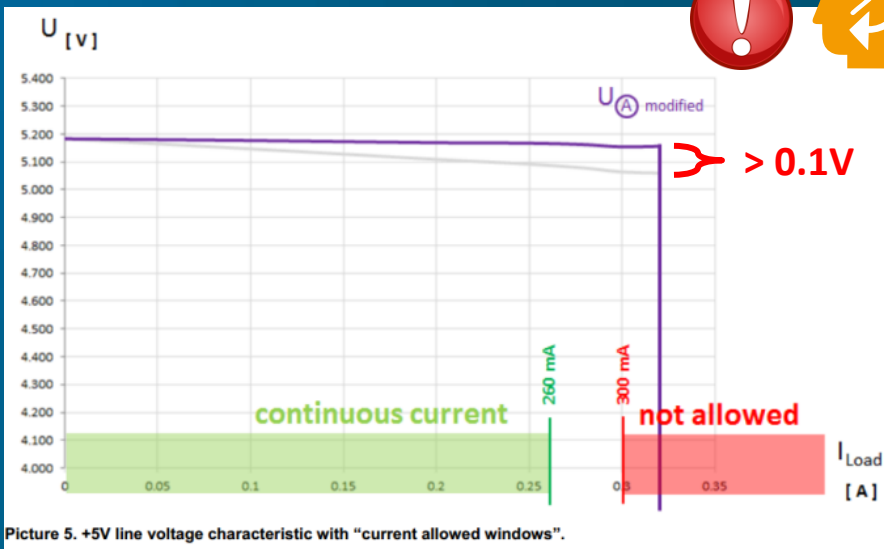


Test circuit





RJ-11 cable resistance - impact



Picture 5. +5V line voltage characteristic with "current allowed windows".

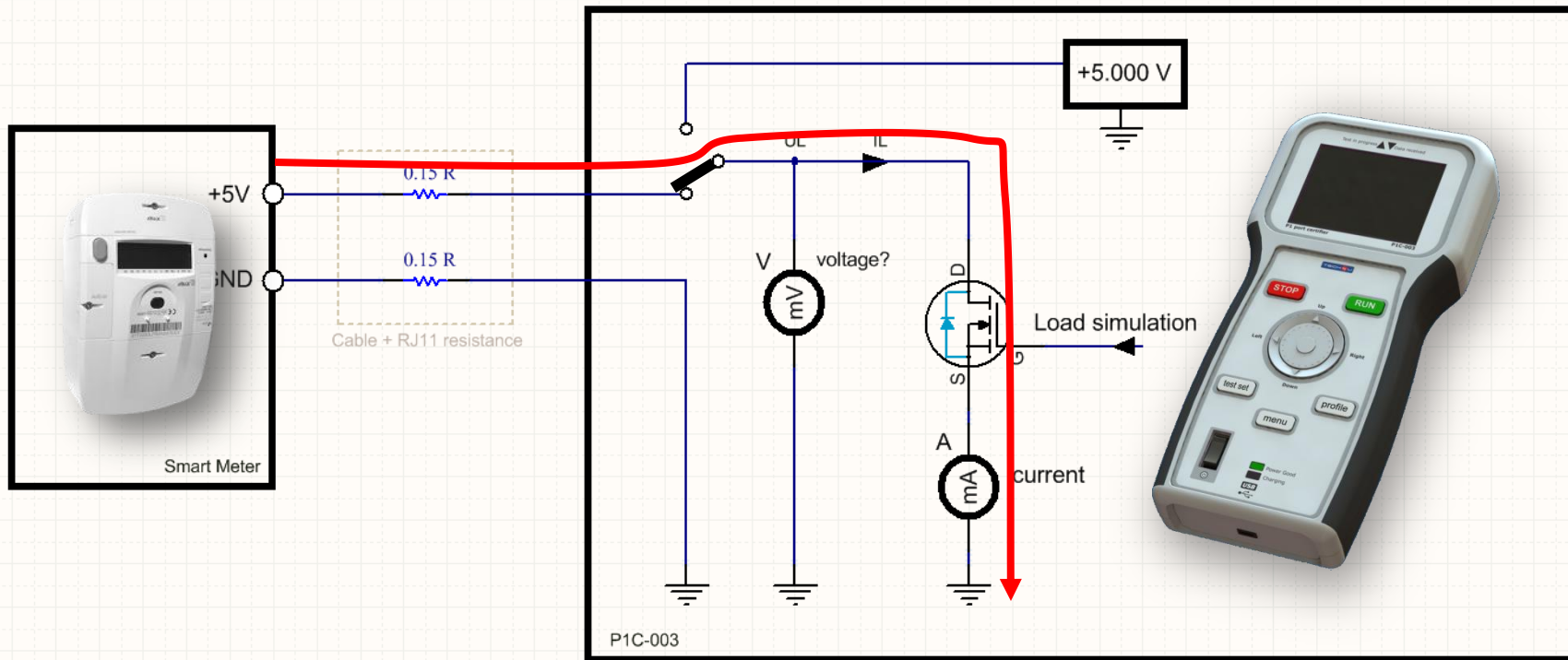
TC-001 Voltage under load exercise



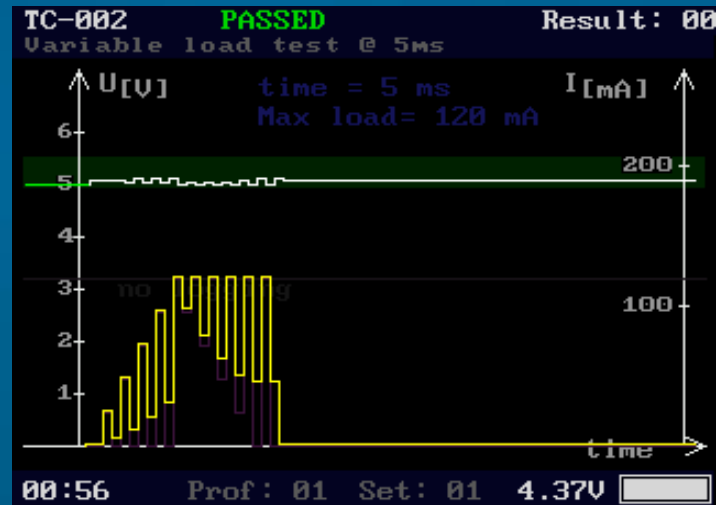
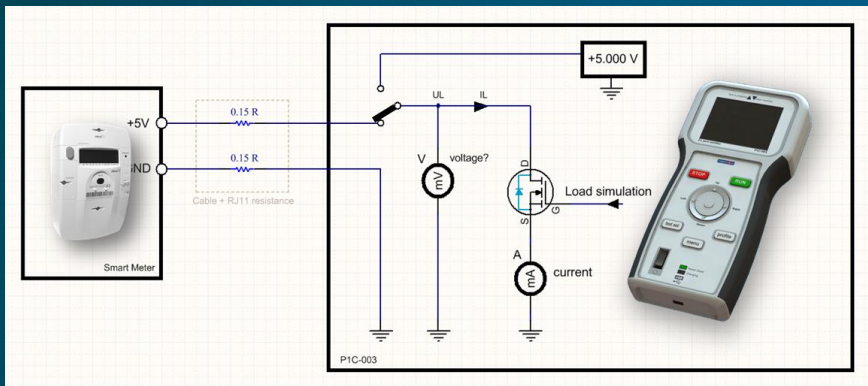
17

TC-002..5 Variable load tests





Test circuit



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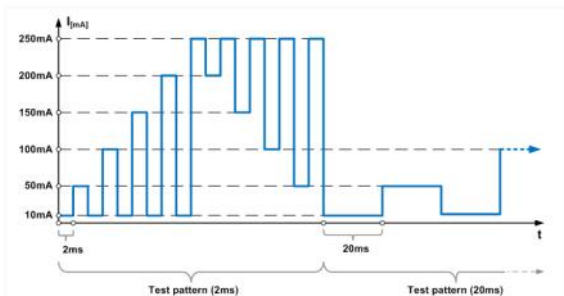
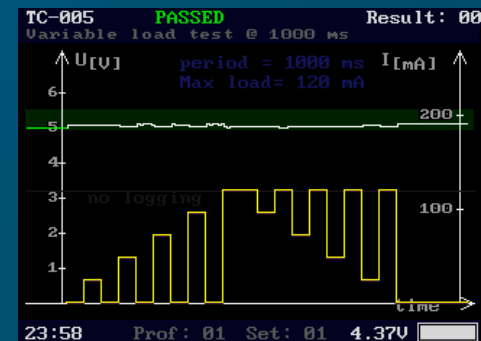
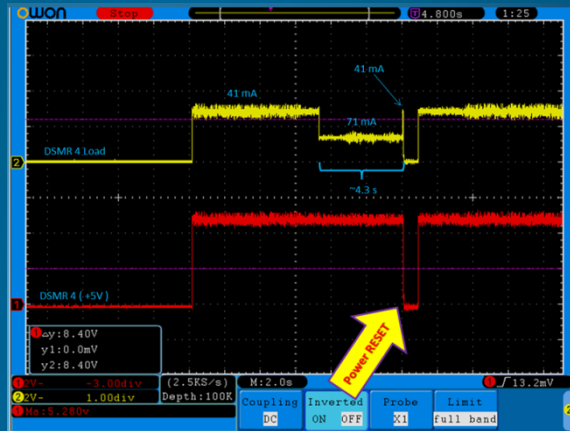


Figure 5-7: Variable load – test pattern example



TC-002..5 Variable load tests

exercise

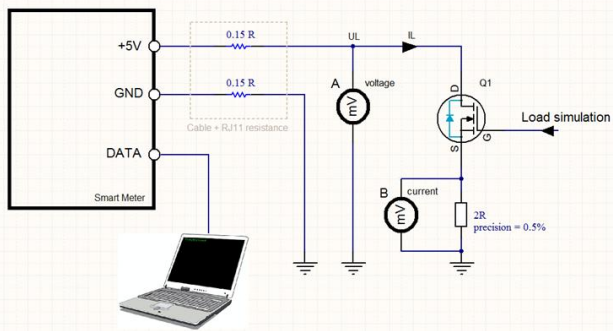


18

TC-006..9 Noise and ripple tests



The following test circuit has been used to measure "+5V line" voltage characteristics under load:



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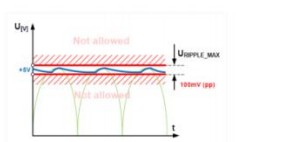


Figure 5-4: Ripple voltage window.

The "Noise Level" U_{noise_max} must not exceed $\leq 50\text{mV}$ peak to peak, for frequencies higher than 50 kHz. Defined at pure resistive load.

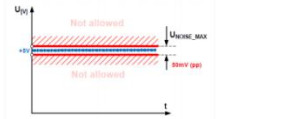
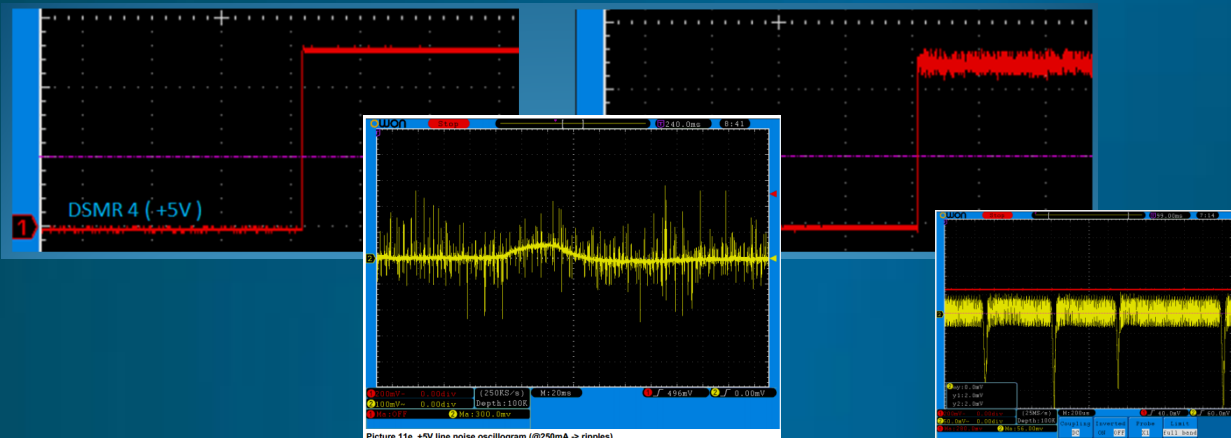
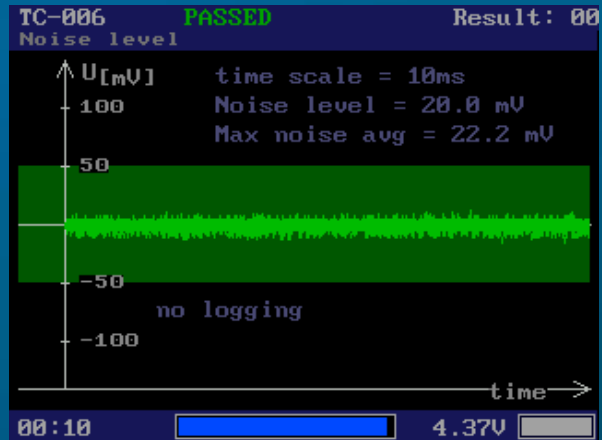
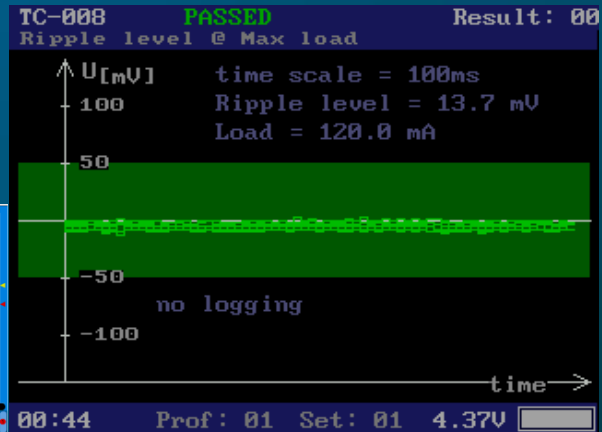


Figure 5-5: Noise level window.



Picture 11e. +5V line noise oscillogram (@250mA -> ripples).



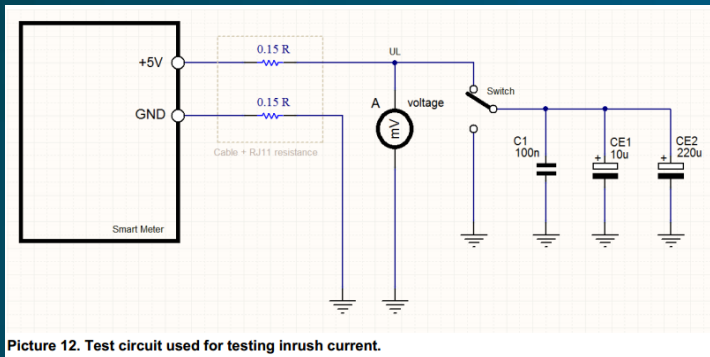
TC-006...9 Noise and ripple tests exercise



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TC-013 Inrush current test





Picture 12. Test circuit used for testing inrush current.

5.3.2.1 Inrush Current

Once the OSM device is connected to the P1 port (depends on OSM internal design), its power supply unit may require to use an excessive current for a very short period of time (usually for less than 1 ms). Such current is often called: an "inrush current".

The power supply must be able to cope with an inrush current, caused by the OSM.

The E-meter must be able to withstand a typical "inrush current" from a circuit as presented in the picture below.

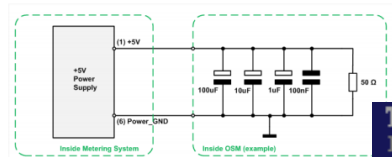
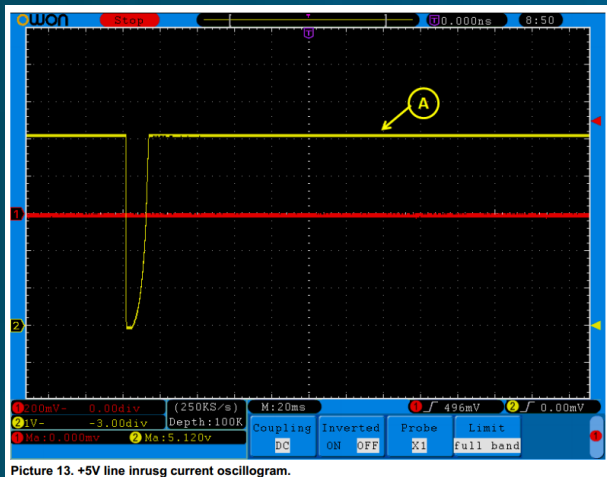
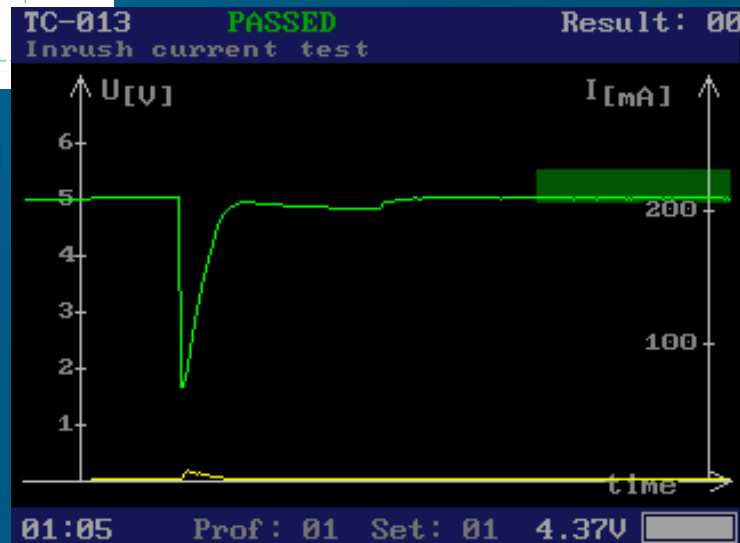


Figure 5-6: Inrush current circuit example.



Picture 13. +5V line inrush current oscillogram.



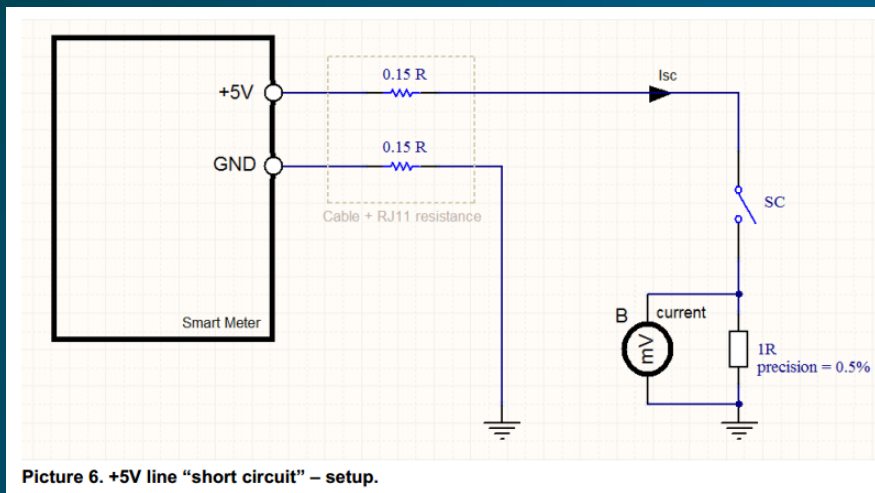
TC-013 Inrush current test exercise



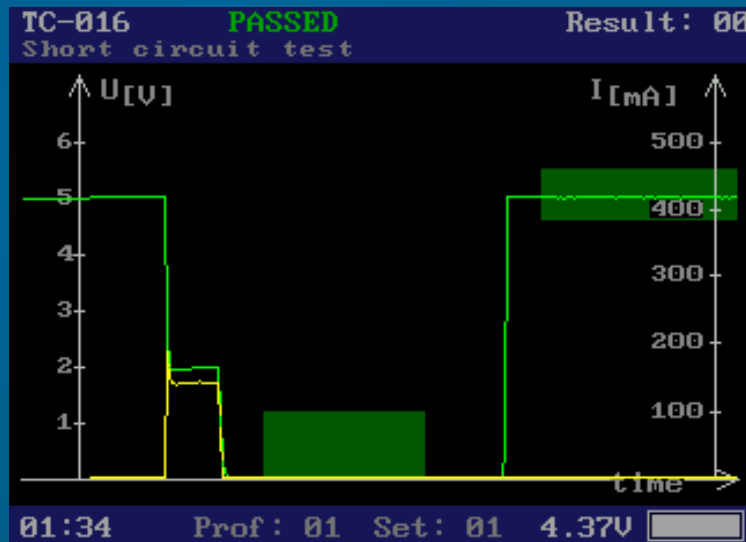
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TC-016 Short circuit test





Picture 6. +5V line “short circuit” – setup.



5.5.2 Short circuits

The “+5V” power supply line of the P1 port shall be able to withstand long lasting short circuits.

The maximum “short circuit current” has to be limited to 50 mA. $I_{sc} \leq 50 \text{ mA}$.

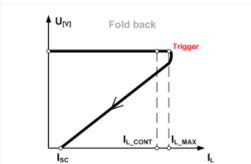
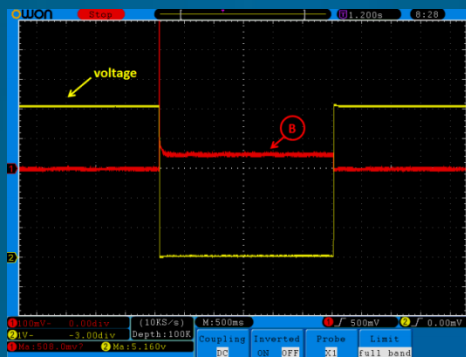


Figure 5-8: Over current / short circuit graph example.



Picture 7. +5V line “short circuit” – oscillogram.

Symbol	Description	Requirement for the Meter			Requirement for OSM			Units
		Min	Typical	Max	Min	Typical	Max	
I _{sc}	“+5V” line Short Circuit current	-	-	50	-	-	-	mA

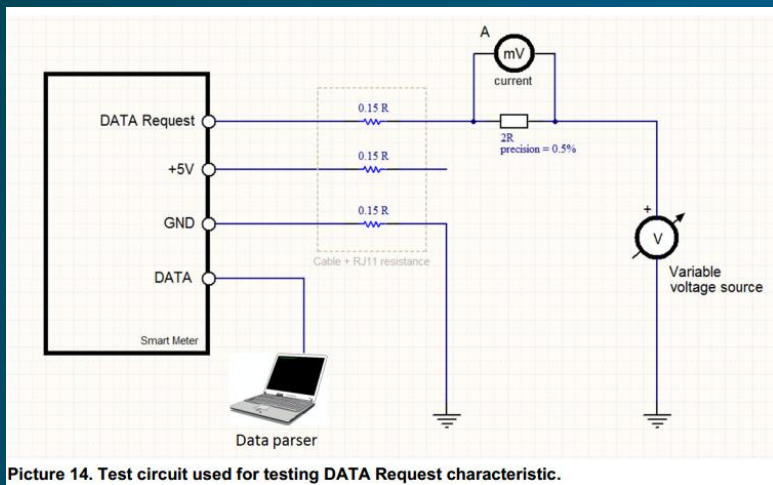
TC-016 Short circuit test exercise



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TC-015 Request line current test



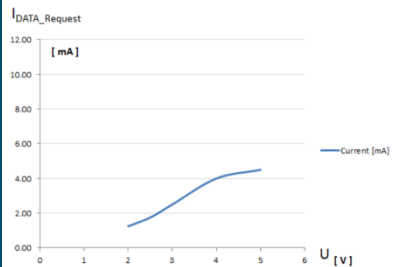


Picture 14. Test circuit used for testing DATA Request characteristic.



Voltage [V]	5	4	3	2.5	2
Current [mA]	4.30	4.00	3.90	3.75	3.70
Received data	OK	OK	OK	OK	OK
RESULT	OK	OK	OK	OK	OK

Table 5. DATA Request – measurements.



Picture 16. DATA Request – the current usage - graph.

5.8 P1 signal levels

Symbol	Description	Requirement for the Meter			Requirement for OSM			Units
		Min	Typical	Max	Min	Typical	Max	
U_{DR_1}	"Data request" line - HIGH level	-	-	5,5	4,0	5,0	5,5	V
I_{DR_1}	"Data request" line current	-	5	10	4	5	10	mA

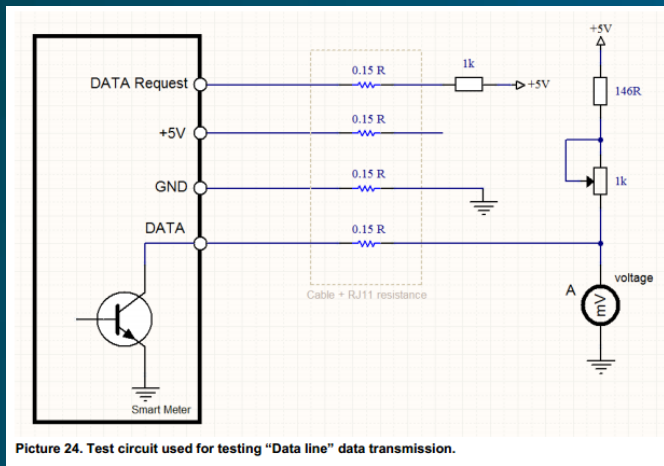
TC-015 Request line current test exercise



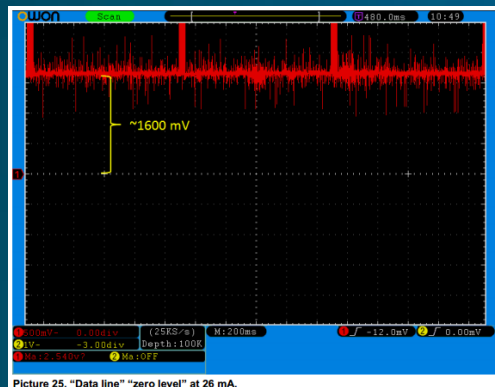
22

TC-014 DATA line “zero-level” test

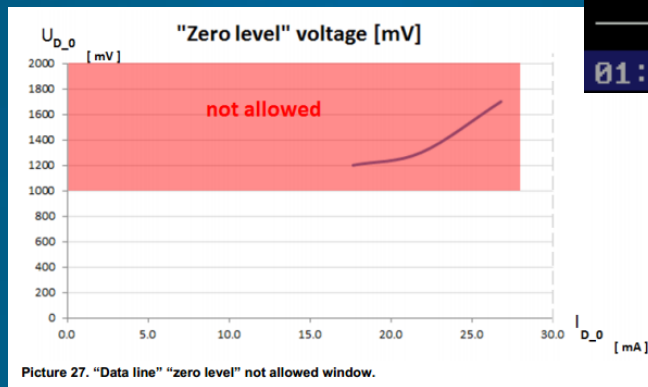




Picture 24. Test circuit used for testing "Data line" data transmission.



Picture 25. "Data line" "zero level" at 26 mA.



Picture 27. "Data line" "zero level" not allowed window.

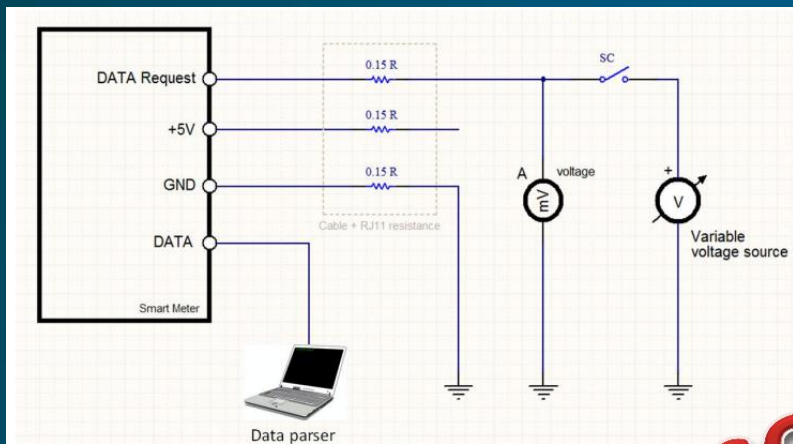
TC-014 - DATA line “zero level” test exercise



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TC-017..18 Overvoltage tests





Picture 18. Test circuit used for testing Data request OVP.



Not recommended!



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DATA tests



```

TC-019      EXECUTED      Result: 00
Pi message analysis

Mandatory:  [ ] [ ] [ ] [ ]
Optional:   [ ]
Electricity: [ ] [ ] [ ] [ ] [ ] [ ]
Gas:        [ ] [ ] [ ]

Legend:
[ ] OK
[ ] Partly OK
[ ] Empty
[ ] Missing
[ ] Error

L= 30
21:32 Prof: 01 Set: 09 4.37V [ ]
    
```

```

TC-019      EXECUTED      Result: 00
Pi message analysis

Mandatory:  [ ] [ ] [ ] [ ] [ ]
Optional:   [ ]
Electricity: [ ] [ ] [ ] [ ] [ ] [ ]
Gas:        [ ] [ ] [ ]

OBIS= 0-0:96.1.1
Info= Equipment ID
ASCI= E0009000010507814
L= 0-0:96.1.1(45303030393030303031303530

03:25:16 Prof: 01 Set: 00 4.37V [ ]
    
```

```

TC-019      FAILED      Result: 14
PI message analysis

Mandatory:  [ ] [ ] [ ] [ ]
Optional:   [ ]
Electricity: [ ] [ ] [ ] [ ] [ ]
Gas:        [ ] [ ] [ ]

CRC received= 3249
CRC calculated= 84fa

L= 24

19:56:27 Prof: 01 Set: 00 4.17V

```

■ OK
■ Partly OK
■ Empty
■ Missing
■ Error

<http://www.scadacore.com/field-applications/programming-calculators/online-checksum-calculator>

CRC-16-IBM

(Bisync, Modbus, USB, ANSI X3.28, many others; also known as CRC-16 and CRC-16-ANSI)

Generator Type	Big Endian (ABCD)	Little Endian (DCBA)
Normal 0x8005	AD AF	AF AD
Reversed 0xA001	3D BB	BB 3D
Reversed Reciprocal 0xC002	9E 77	77 9E

TC-019 – P1 parser

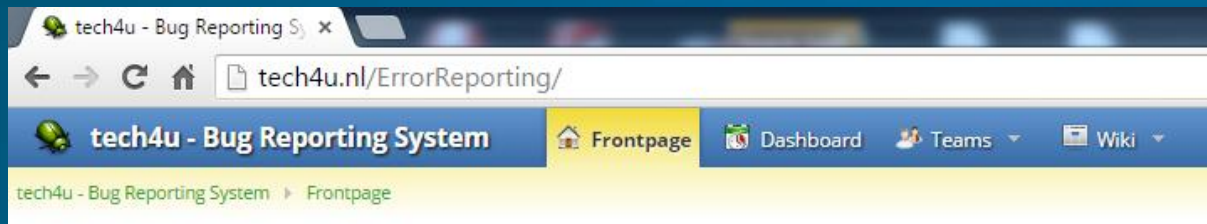
exercise



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Bug reporting system





tech4u - Bug Reporting System

Summary Report an issue Issues Project wiki

Piotr Grabarczyk

tech4u - Bug Reporting System > Enxis > P1 Certifier - device > Issues

Search for anything here Find

Open issues for P1 Certifier - device 3 issue(s) More actions

With selected issue(s): Do nothing Apply

Bug report

<input type="checkbox"/>	Issue type	Issue	Assigned to	Status	Category	Severity	% completed	Reproducibility	Priority	Estimate	Last updated	
<input type="checkbox"/>	Bug report	#5 - Failure during test	Piotr	Investigating	-	-	-	-	-	-	Jan 12, 2015	1
<input type="checkbox"/>	Bug report	#6 - P1 telegram for DSMR 2.2	Allard	Being worked on	-	-	-	-	-	-	Feb 05, 2015	1

Total number of issues in this group: 2

Enhancement

<input type="checkbox"/>	Issue type	Issue	Assigned to	Status	Category	Severity	% completed	Reproducibility	Priority	Estimate	Last updated	
<input type="checkbox"/>	Enhancement	#7 - Single test result	Piotr	Investigating	-	-	-	-	-	-	Jan 12, 2015	0

Total number of issues in this group: 1

With selected issue(s): Do nothing Apply

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Bug reporting exercise



Questions ?

Thank you for your attention



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