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Application for RTD-Box TR1200 (RS485)　　7XV5662-6AD10

**This document describes the measurement of 12 temperatures in a 7SJ62x
via the RTD-Box TR1200 at an RS485-Bus.**

The RTD-Box TR1200 has 12 sensor inputs and can in this way measure 12 temperatures via Pt 100-elements.

2 and 3 conductor Pt 100 are supported. In the case of 2 conductor operation, the measured line resistance can be compensated with an applicable setting.

All settings are done with 3 keys on the front cover. Input can be blocked with a code.

The measured value output to the protection device is done with the bus cable 7XV5103-7AAxx via a RS485-Bus.

Note: SIPROTEC 4 protection devices can process up to 12 measured values.
Up to now, 2 RTD-Boxes TR600 were required. The RTD-Box TR1200 can now replace up to 2 RTD-Boxes TR600 for temperature measurement.

Note: The TR1200 does not supply its own alarm messages or contacts.
The alarm levels must be set and displayed for each input in the protection device, and output via contacts or transferred to a central control system.

Note: This application guide is only meant as an additional user information, and assumes knowledge of the general information for operation of the products as well as their basic functions as described in the applicable manuals.

Measurement of up to 12 temperature measured values

From a RTD-Box TR1200 up to 12 temperature measured values can be input into and processed by a protection device via an "RS485-Bus". Larger distances should be covered with an FO converter and optical interface.
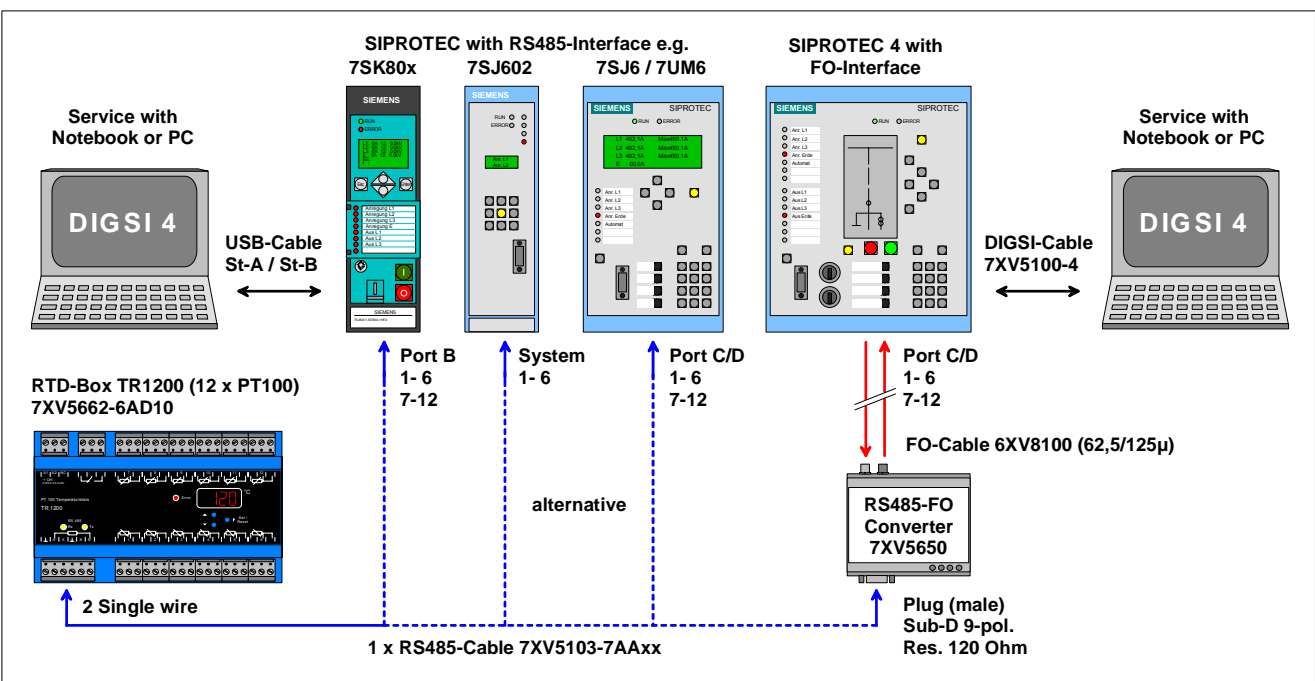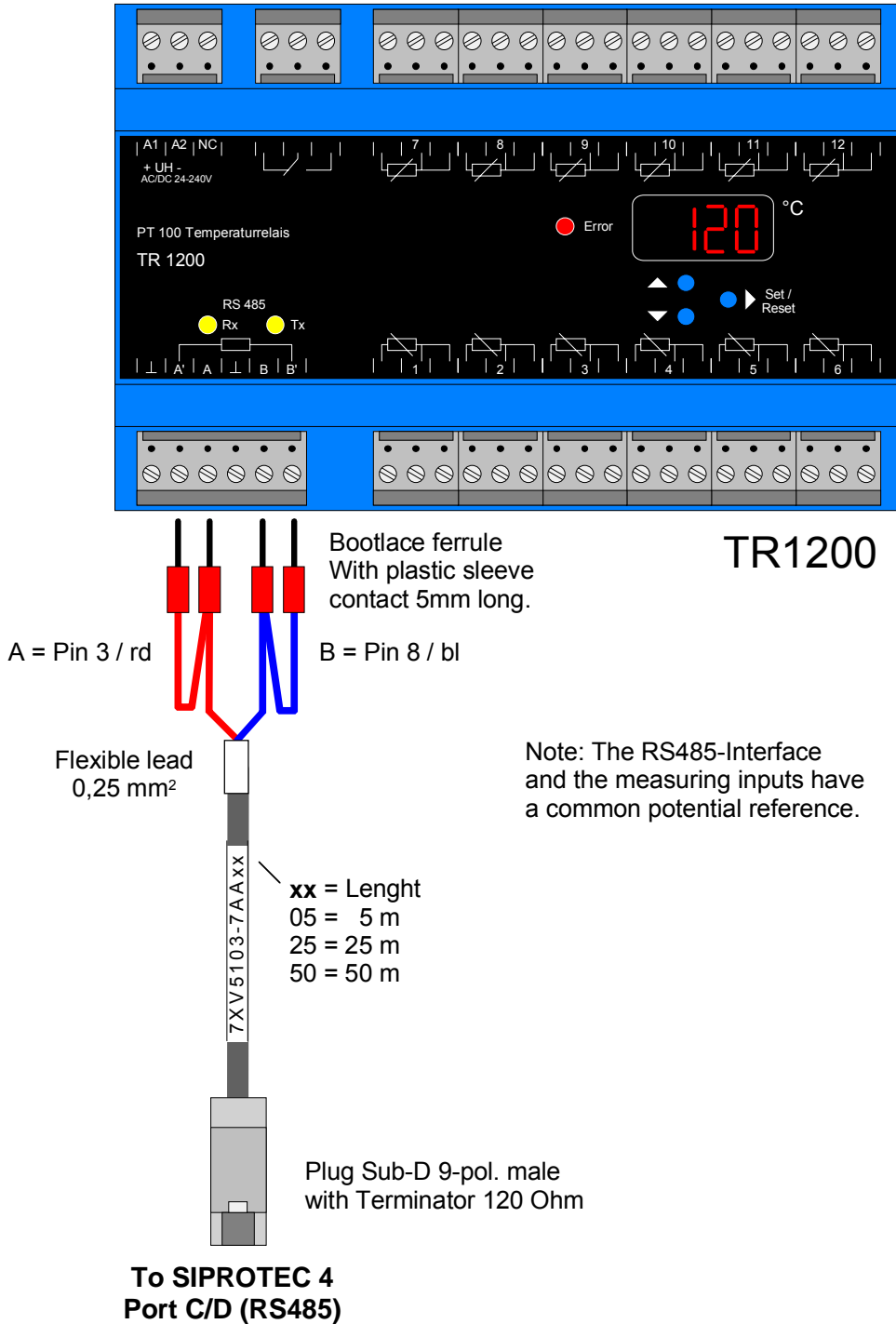

Figure 1: TR1200 with various protection devices and operation PC with DIGSI 4

**Connection of the RTD-box 7XV5662-6AD10 with connection cable 7XV5103-7AAxx
to Protection devices SIPROTEC 4 (RS485)**

| A1 | A2 | NC |
| + UH − |
| AC/DC 24-240V |

PT 100 Temperaturrelais
TR 1200

● Error 120 °C

RS 485
● Rx   ● Tx

⊥ | A' | A | ⊥ | B | B'

▲ ● ▼ ● ● > Set / Reset

TR1200

Bootlace ferrule
With plastic sleeve
contact 5mm long.

A = Pin 3 / rd   B = Pin 8 / bl

Flexible lead
0,25 mm²

Note: The RS485-Interface
and the measuring inputs have
a common potential reference.

7XV5103-7AAxx

xx = Lenght
05 =   5 m
25 = 25 m
50 = 50 m

Plug Sub-D 9-pol. male
with Terminator 120 Ohm

**To SIPROTEC 4
Port C/D (RS485)**

The two short cable ends (rd + bl) are connected to A (rd) and B (bl) of the RTD-box.
By bridging of the terminals A - A' and B - B' the termination resistances are activated.

The two long cable ends (rd + bl) are connected to A' (rd) and B' (bl) to activated the bus termination.

Setting the devices

The protection device 7SK80 is set with DIGSI 4 on a Notebook via the USB front interface. A USB cable with plug type A to plug type B is used.

The SIPROTEC 4 protection devices (here e.g. 7SJ62) are set with the "DIGSI-cable" 7XV5100-4/BB via the serial front interface.

The RTD-Box TR1200 is set with 3 keys. The navigation is done via the setting tree and the relevant settings are displayed in the display.

## *Setting the protection device 7SJ62 with DIGSI 4*

A notebook is connected with the "DIGSI-cable" 7XV5100-4/BB via the RS232-interface with the front interface of the protection device. The protection device is configured in DIGSI 4 with a corresponding MLFB and (if not yet done) initialised.
The RTD-Box is connected to the RS485 Service-interface „Port C".
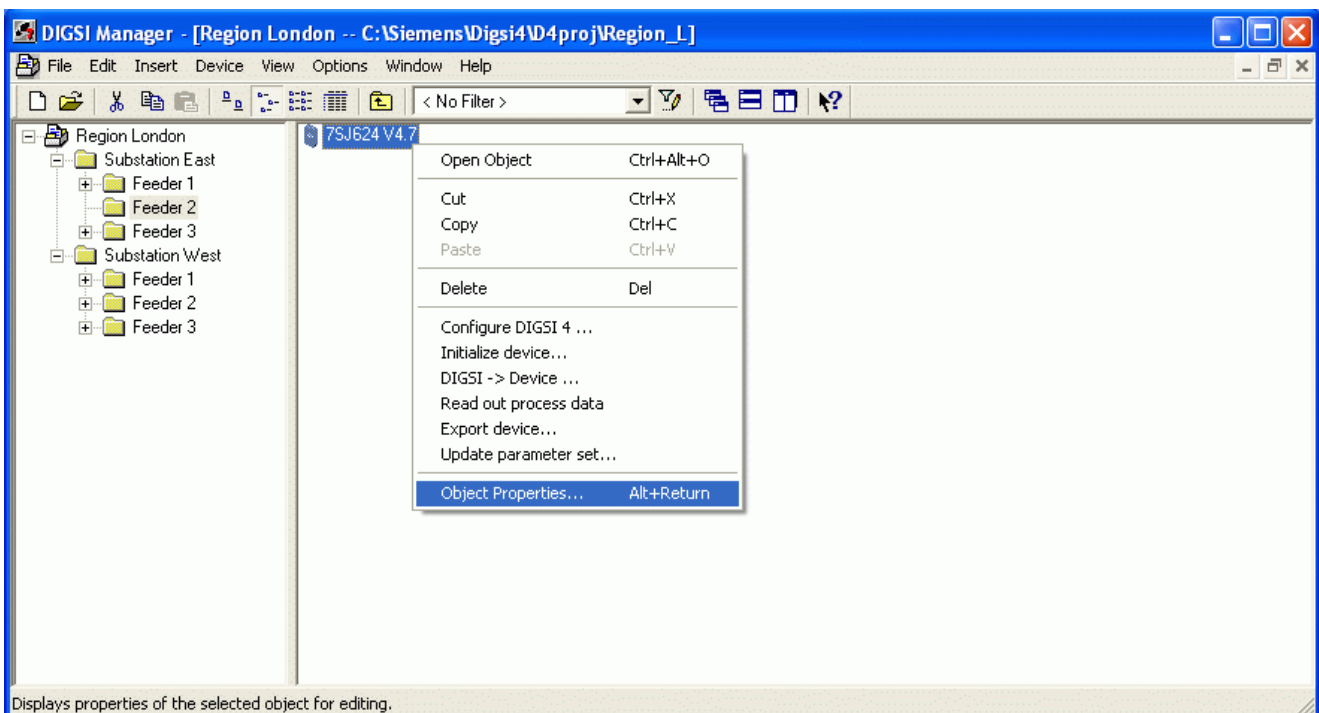
If the "**Service Port**" (Port C) has already been configured in the factory with **"MLFB"**, this can be checked under "**Properties**", **"MLFB"**
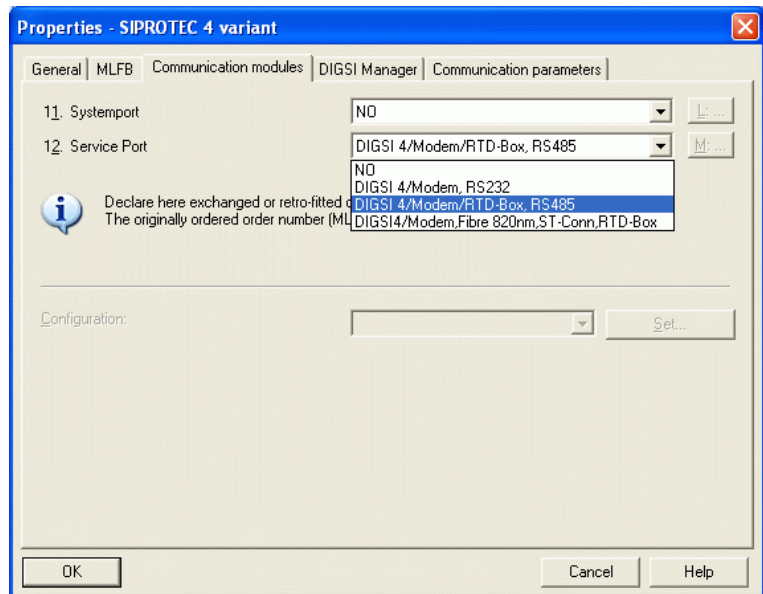
Save with "**OK**"

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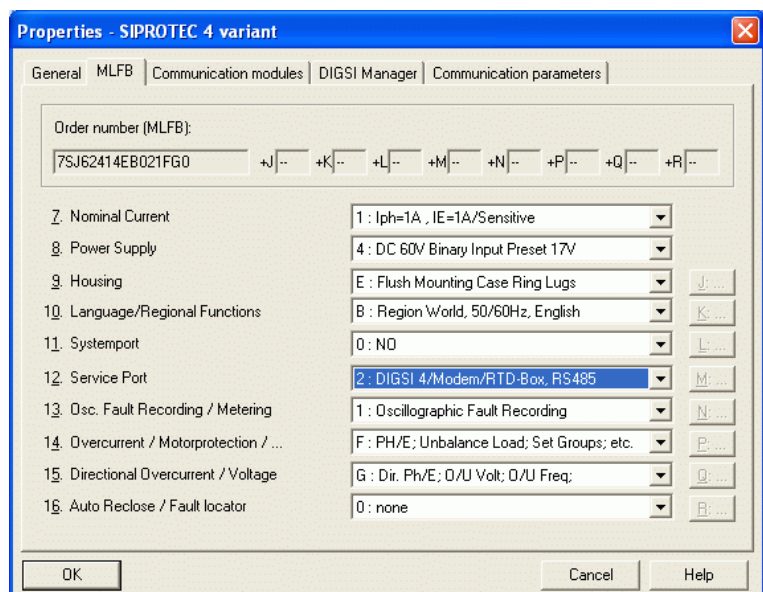
If the interface module was retro-fitted it must first be configured under "**Properties**", "**Communication modules**."
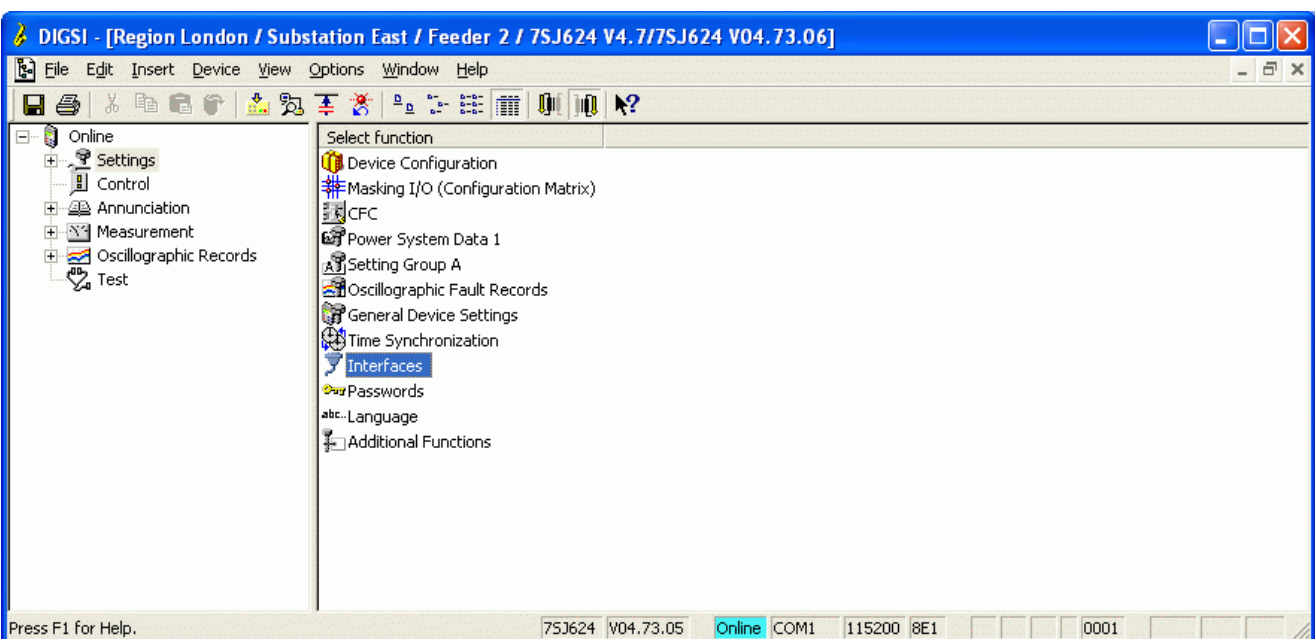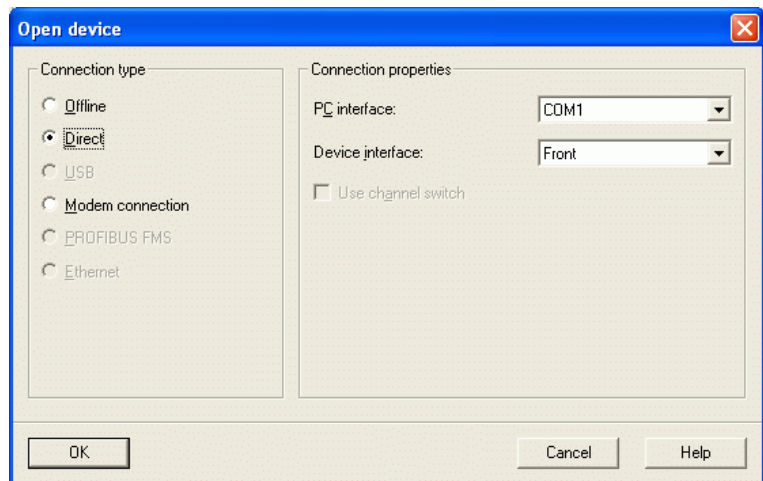
Thereafter again "**Initialize device…**".

Save with "**OK**"

Open dialog with the protection device in DIGSI 4 using the connection type "**Direct**" via the "**PC-interface**" "**COM1**" and the "**Device interface**" "**Front**".
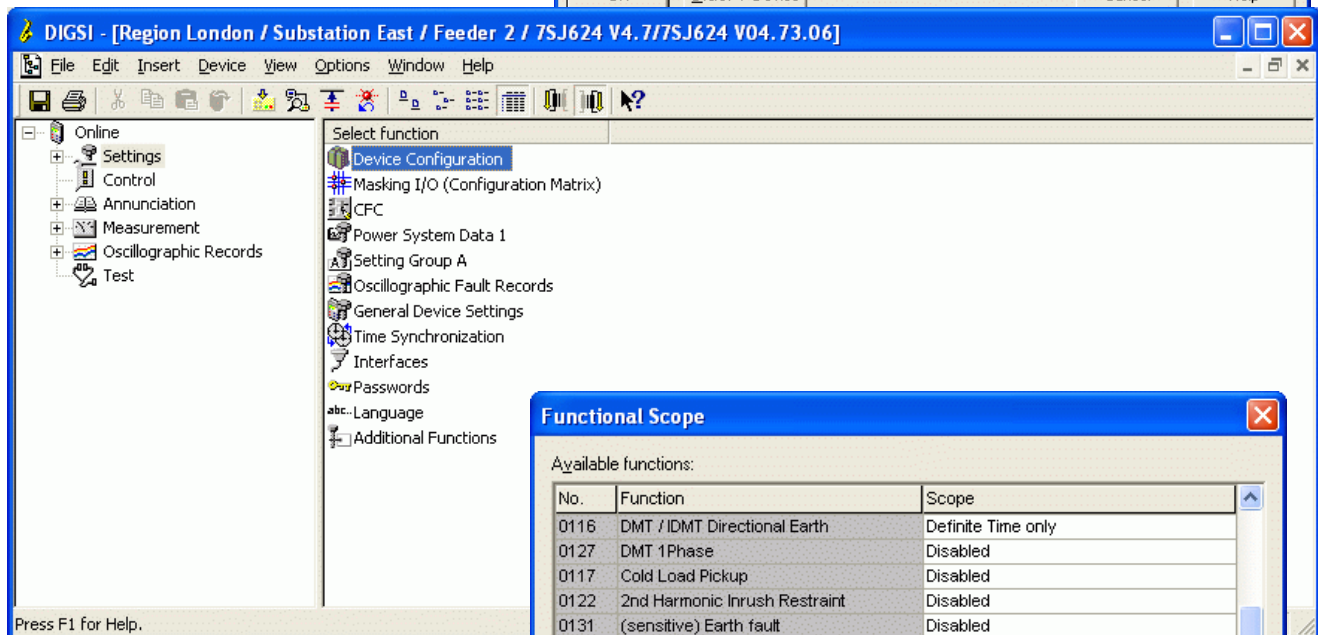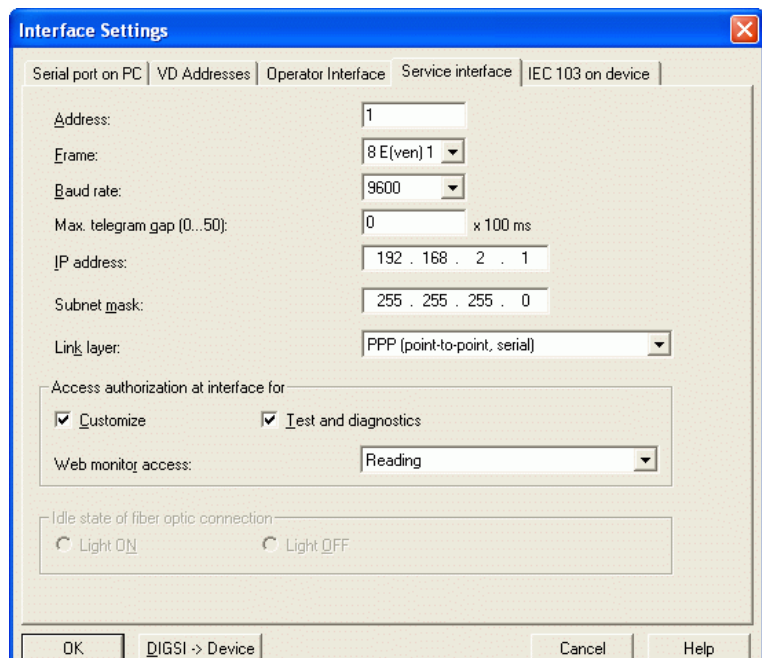
Continue with "**OK**"

Under "**Settings**" select the function "**Interfaces**".

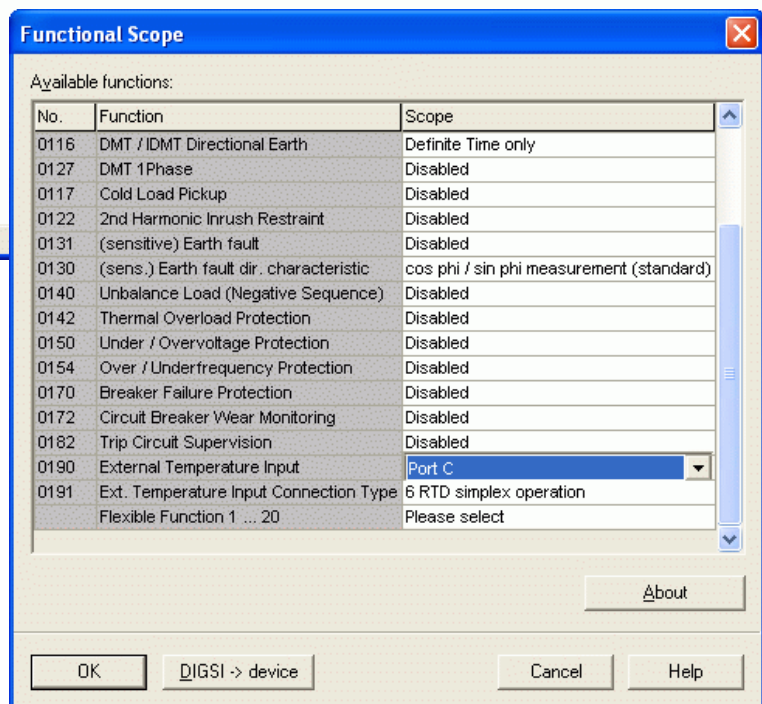Under **"Interface Settings"** the setting of the **"Service interface"** is done.

Address: **1**
Frame: 8 E(ven) 1
Baudrate: 9600

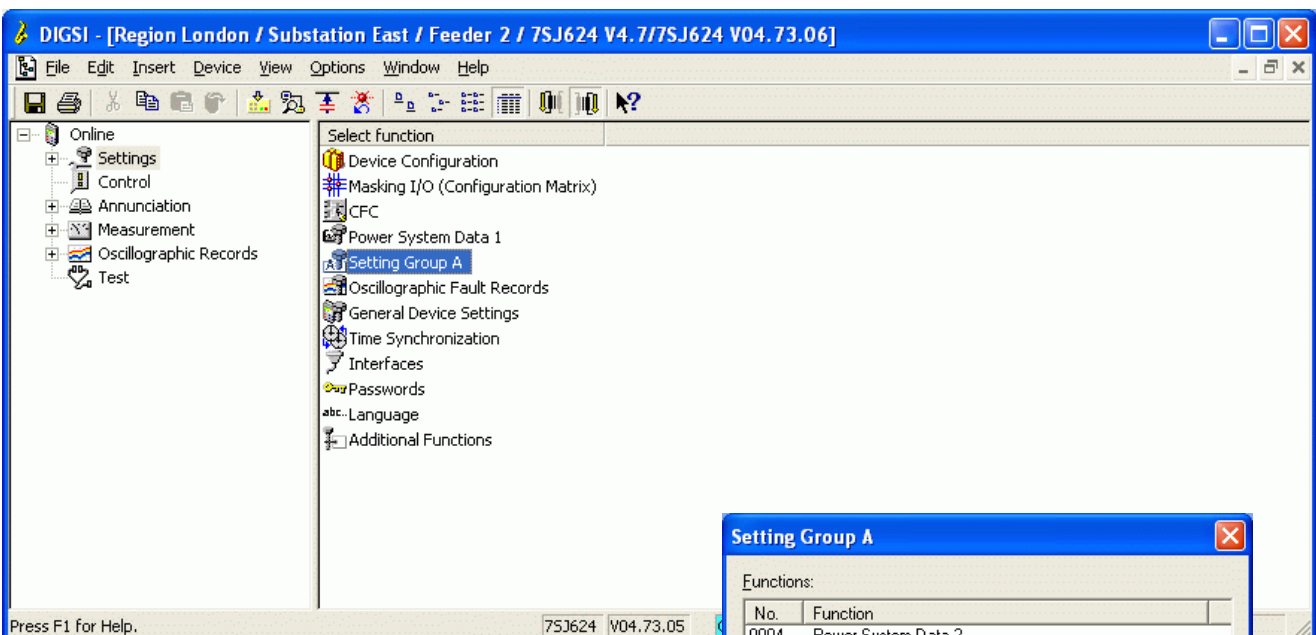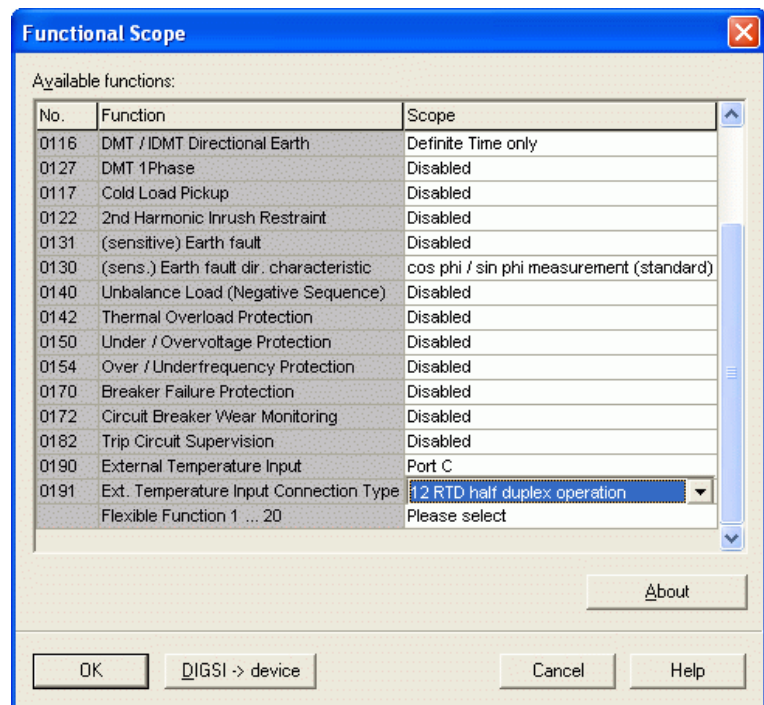All other settings are not relevant and can remain in their pre-set state.

Data transfer at the service interface is always done automatically if a RTD-Box is used, at 9600 Baud and 8E1.
These settings must also be selected in the RTD-Box.

Interface Settings

| Serial port on PC | VD Addresses | Operator Interface | Service interface | IEC 103 on device |

Address: 1
Frame: 8 E(ven) 1
Baud rate: 9600
Max. telegram gap (0...50): 0 x 100 ms
IP address: 192 . 168 . 2 . 1
Subnet mask: 255 . 255 . 255 . 0
Link layer: PPP (point-to-point, serial)

Access authorization at interface for
☑ Customize   ☑ Test and diagnostics
Web monitor access: Reading

Idle state of fiber optic connection
○ Light ON   ○ Light OFF

OK   DIGSI -> Device   Cancel   Help

DIGSI - [Region London / Substation East / Feeder 2 / 7SJ624 V4.7/7SJ624 V04.73.06]

File Edit Insert Device View Options Window Help

Online
  Settings
  Control
  Annunciation
  Measurement
  Oscillographic Records
  Test

Select function
  Device Configuration
  Masking I/O (Configuration Matrix)
  CFC
  Power System Data 1
  Setting Group A
  Oscillographic Fault Records
  General Device Settings
  Time Synchronization
  Interfaces
  Passwords
  Language
  Additional Functions

Press F1 for Help.

In **"Functional Scope"** in the **"Function"**
„**External Temperature Input**"
select **"Port C"** service interface.

Functional Scope

Available functions:

No.	Function	Scope
0116	DMT / IDMT Directional Earth	Definite Time only
0127	DMT 1Phase	Disabled
0117	Cold Load Pickup	Disabled
0122	2nd Harmonic Inrush Restraint	Disabled
0131	(sensitive) Earth fault	Disabled
0130	(sens.) Earth fault dir. characteristic	cos phi / sin phi measurement (standard)
0140	Unbalance Load (Negative Sequence)	Disabled
0142	Thermal Overload Protection	Disabled
0150	Under / Overvoltage Protection	Disabled
0154	Over / Underfrequency Protection	Disabled
0170	Breaker Failure Protection	Disabled
0172	Circuit Breaker Wear Monitoring	Disabled
0182	Trip Circuit Supervision	Disabled
0190	External Temperature Input	Port C
0191	Ext. Temperature Input Connection Type	6 RTD simplex operation
	Flexible Function 1 ... 20	Please select

About

OK   DIGSI -> device   Cancel   Help

In **"Functional Scope"** „12 RTD half duplex operation" is selected under the function
"Ext. Temperature Input Connection Type".

Under **"Setting Group A"** **customisation** of the "**RTD-Box"** is done with **"Customize…"**.

The next step is to configure all
required measurement inputs. 4
setting pages with 3 measurement
inputs each are offered for
configuration.

In the following example only the
first measuring input is configured.
The same procedure must be
used for the others.
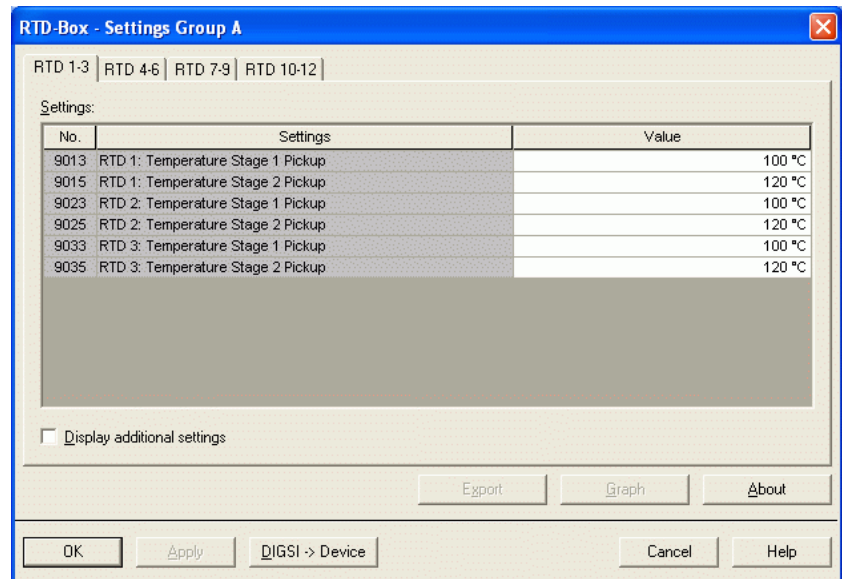
In the initial menu only the pick-up
values of the temperature stages
are displayed.

Put a check in
„**Display additional settings**" to
make all settings visible.
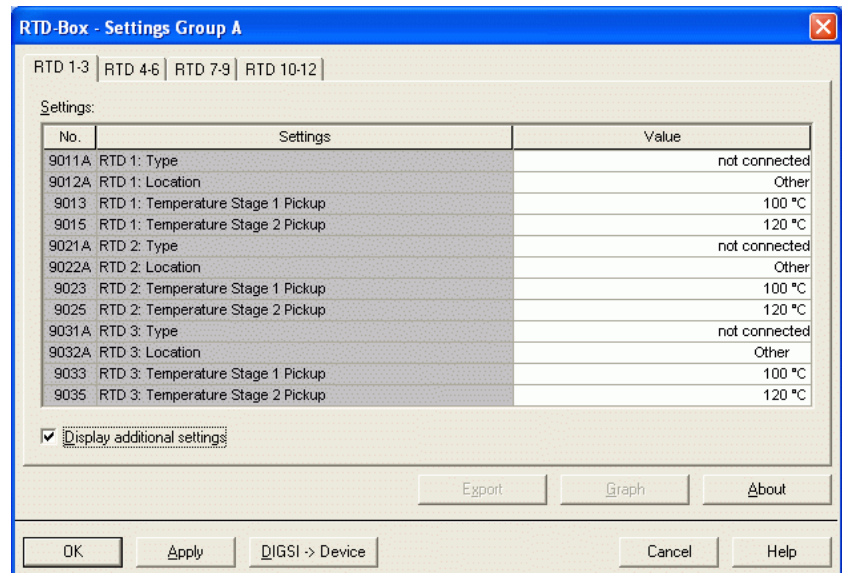
In the window „**RTD 1-3**" the
settings for the first three
measuring inputs can now be
done.

Initially for „**RTD 1**"the
„**Type**"of the Thermo element is
selected to
„**Pt 100 Ohm**"
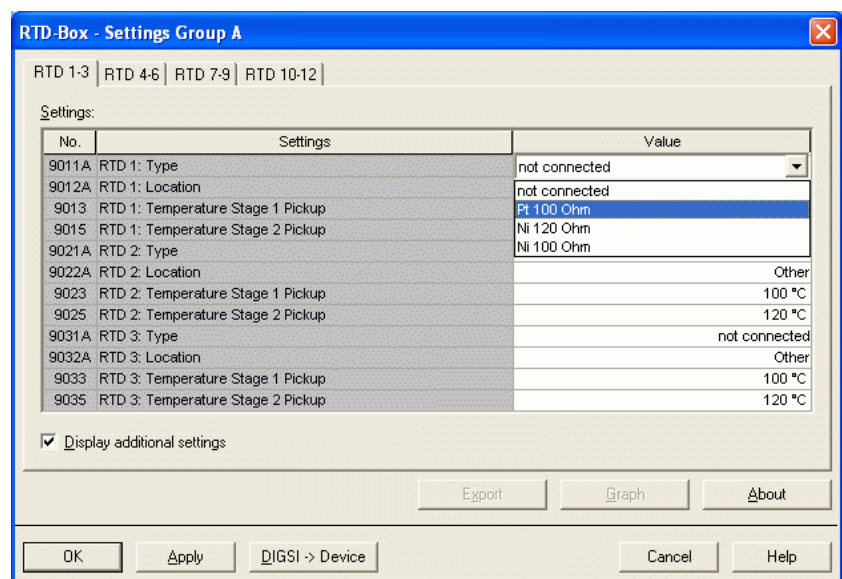
In this menu a **"Location"** can be
selected for the measured value
„RTD 1"

Under **"Temperature Stage 1 / 2
Pickup"** two pick up thresholds
for alarm or trip can be set for the
measured value **"RTD 1"**

When all measuring inputs have
been configured, the settings are sent to the protection device with the key
„DIGSI -> Device".

The procedure is concluded by entry of the password and
"OK".

Note: Also save the settings to **"File"**.

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The measured values can be output in DIGSI under **"Measurement" – „Others" – "RTD-Box Measurement Values"**.

In the display of the protection device, the measured values are output under "**Measurement"– "RTD-Box"**.

Processing of the measured values by protection functions

Alarms and measured values of the Thermo function can be transferred to a superordinate control system or may also be transferred between devices via "IEC 61850 GOOSE"

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Configuration of the RTD-Box TR1200

In the following, the connection of the sensors and the configuration of the TR 1200 for processing in SIPROTEC devices is described. The difference here is the mode of connection of the RTD-Box.

6 RTD Simplex (1x TR 1200 works like 1x TR 600) = Factory setting

The TR 1200 transmits the data from Sensors 1…6 cyclically every 3 s under device address 0.

- Connect Sensors 1…6.
- Configure Sensors 1...6 in menu item **SEn** depending on the connection. (configure Sensors that are not connected as „nc").
- Configure Sensors 7...12 in menu item **SEn** as „nc" (Factory setting).
- Set device address in menu item **bUS** → **Adr** to „0" (Factory setting).
- Set Baudrate in menu item **bUS** → **bdr** to „96" (Factory setting).
- Set Data in menu item **bUS** → **PAr** to „EuE" (Factory setting).

6 RTD half duplex (1x TR 1200 works like 1x TR 600)

The TR 1200 transmits the data from Sensors 1…6 on request with device address 1 or 2.

- Connect Sensors 1…6.
- Configure Sensors 1...6 in menu item **SEn** depending on the connection. (configure Sensors that are not connected as „nc").
- Configure Sensors 7...12 in menu item **SEn** as „nc" (Factory setting).
- Set device address in menu item **bUS** → **Adr** to „1".
- Set Baudrate in menu item **bUS** → **bdr** to „96" (Factory setting).
- Set Data in menu item **bUS** → **PAr** to „EuE" (Factory setting).

12 RTD halb duplex (1x TR 1200 works like 2x TR 600)

The TR 1200 transmits the data from Sensors 1…6 on request with device address 1 and the data from Sensors 7…12 on request with device address 2.

- Connect Sensors 1…12.
- Configure Sensors 1...12 in menu item **SEn** depending on the connection. (configure Sensors that are not connected as „nc").
- Set device address in menu item **bUS** → **Adr** to „1".
- Set Baudrate in menu item **bUS** → **bdr** to „96" (Factory setting).
- Set Data in menu item **bUS** → **PAr** to „EuE" (Factory setting).

Note for SIPROTEC-protection devices:

The data transfer at the service interface always takes place automatically at 9600 Baud with the data format 8E1 when a RTD-Box is used.

Installation as well as safety instructions and detailed setting notes for the devices may be found in the corresponding manuals for each device.

Good luck!