

Applications for RTD box TR1200 IP (Ethernet)

7XV5662-8AD10

In this document the measurement of temperatures in a 7SK80x via the RTD-Box TR1200 IP in an Ethernet-network (LAN) is described.

The RTD box TR1200 IP has 12 sensor inputs and can by using these measure up to 12 temperatures with Pt 100 sensors.

Three conductor sensors are supported. For two conductor operation compensation of the measured conductor resistance is possible via a corresponding setting.

All settings on the TR1200 IP can be done through 3 keys on the front of the device or in a Web-browser (e.g. Internet Explorer).

If Ni100 or Ni120 sensors are applied the measured values have to be adapted in the protection device. The 7SK80 supports this with its integrated RTD functionality.

The measured value output to the protection device is done via Ethernet network with RJ45 connectors.

Note: The SIPROTEC 4 system interface with EN100 module does not support the temperature detection of the RTD box TR1200 IP.

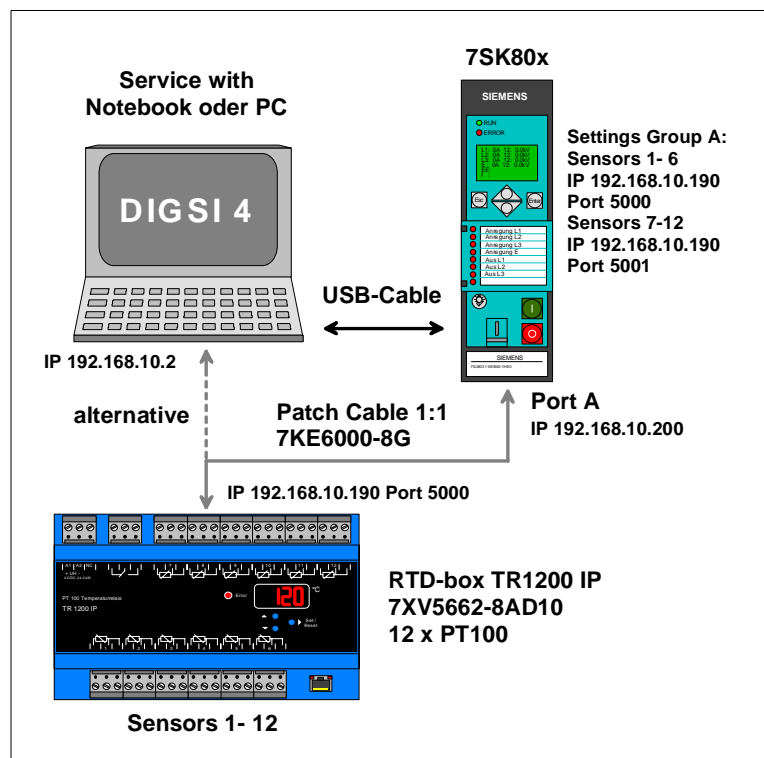
Note: This application guide is only intended as additional user information and it is a prerequisite that the user has knowledge of the general operation and usage of the device and its basic functions as described in the device manual.

Application: Get up to 12 measured values with a TR1200 IP

To get up to 12 measured values one RTD box TR1200 IP is connected via a double screened CAT5 patch cable (1:1 or crossed over) directly to the protection device (e.g. 7SK80x Port A). The protection device is set using DIGSI 4 running on a Notebook via the USB-front interface.

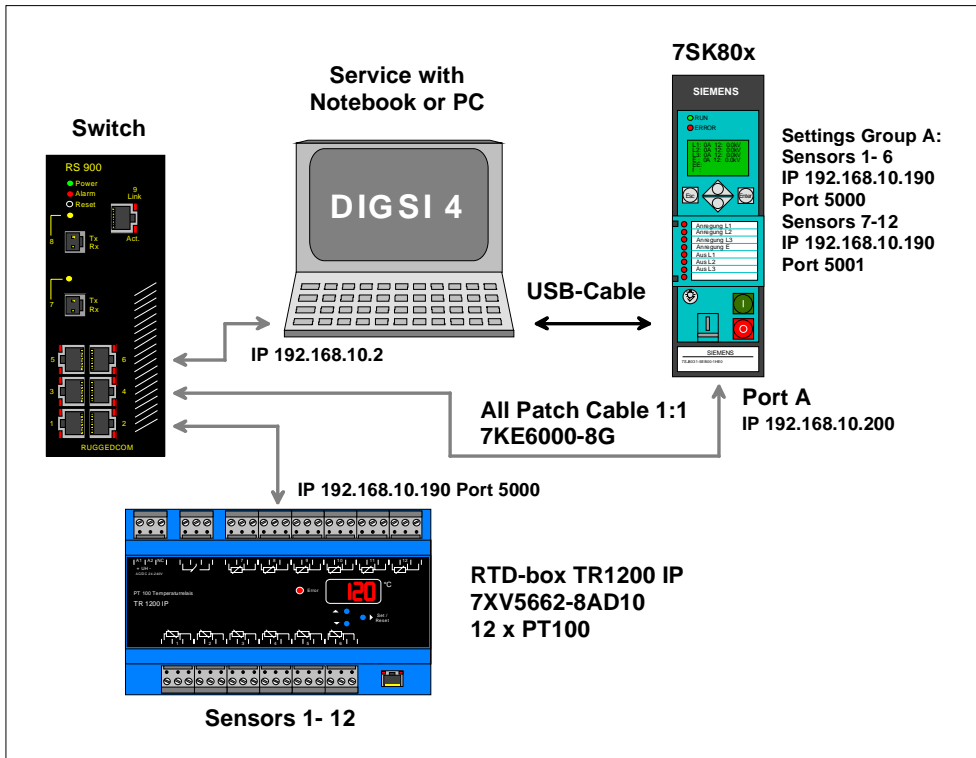
The RTD box TR1200 IP is set either through the front keys or by using a Web Browser running on the Notebook via the Ethernet interface. For this purpose the patch cable must be unplugged from the protection device and then re-plugged to the Notebook (for Notebooks with "Auto Cross" function). If the Notebook does not provide "Auto Cross" a "cross-over" patch cable has to be applied.

Tip: If during commissioning a common switch is temporarily inserted using three patch cables, the protection device can be set from a PC using DIGSI 4 in parallel with the TR1200 IP.



Application in an Ethernet network

If a TR1200 IP together with a 7SK80 are applied in an existing Ethernet network, a switch that is suitable for the substation environment (e.g. Scalance X307-2EEC or RUGGEDCOM RS900) must be used. The switch, the TR1200 IP, the protection device and the operating PC make up a sub-net that is connected via patch cables. DIGSI 4 and a Web browser can run in parallel on the PC. It is therefore possible to set the TR1200 IP and the protection device in parallel.



Note: The network must be restricted to those devices that are directly communicating with the RTD box TR1200 IP or communicate with the protection devices through DIGSI 4.

When setting the parameters of the Ethernet interfaces of all the devices in the network segment, different **“IP addresses”** within the same address range (e.g. 192.168.10.1 - 254) must be applied.

Example: See table

Subnet-Mask	255.	255.	255.	0
IP address (Switch/Router)	192.	168.	10.	1
IP address (PC)	192.	168.	10.	2
IP address (TR1200 IP)	192.	168.	10.	190
IP address (7SK80)	192.	168.	10.	200
IP address (max.)	192.	168.	10.	254

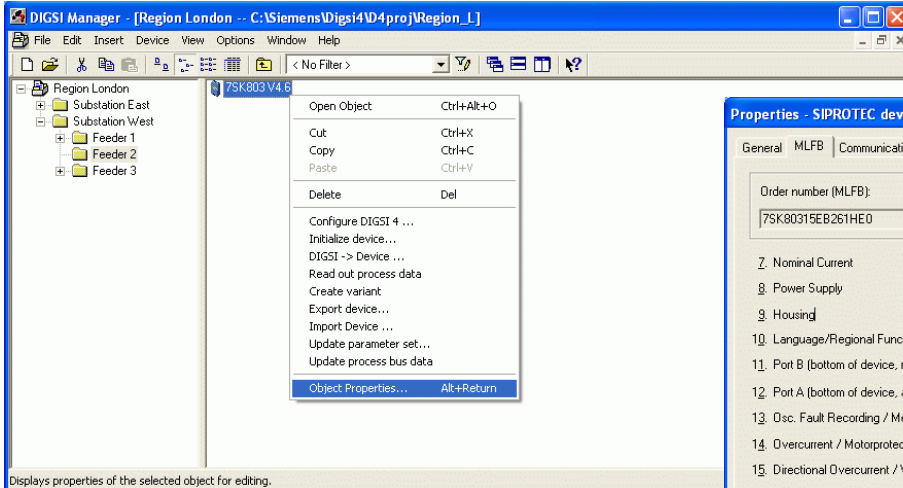
Setting of the Protection Device using DIGSI 4

The Notebook is connected with the front interface of the protection device, e.g. 7SK80x, using an available USB interface (1.1 / 2.0). A USB-cable with Plug-A to Plug-B is required for this purpose (e.g. from the accessories with DIGSI 4.82).

The protection device is inserted as new device in DIGSI 4 with corresponding MLFB and then initialized.

Subsequently the object properties of the device, the Ethernet interface and the measured values acquisition are set and saved.

The protection device must have an Ethernet-Interface „Port A“, (not EN100 / Port B).

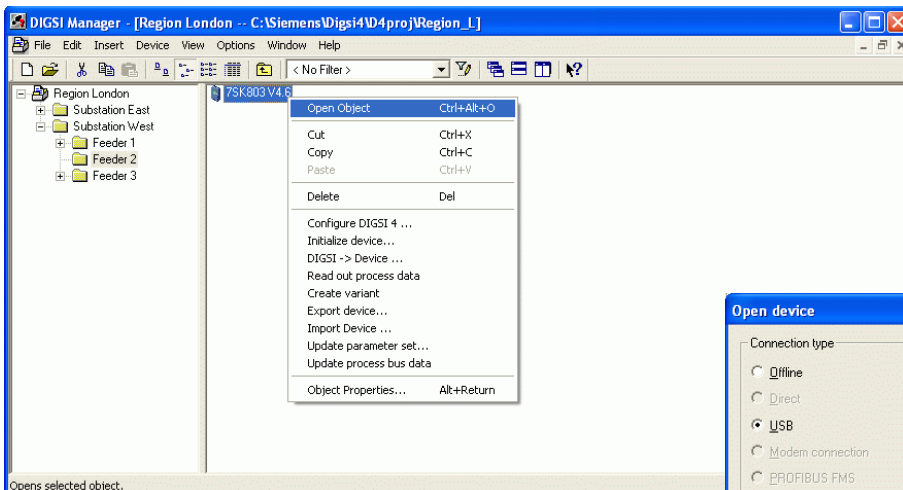
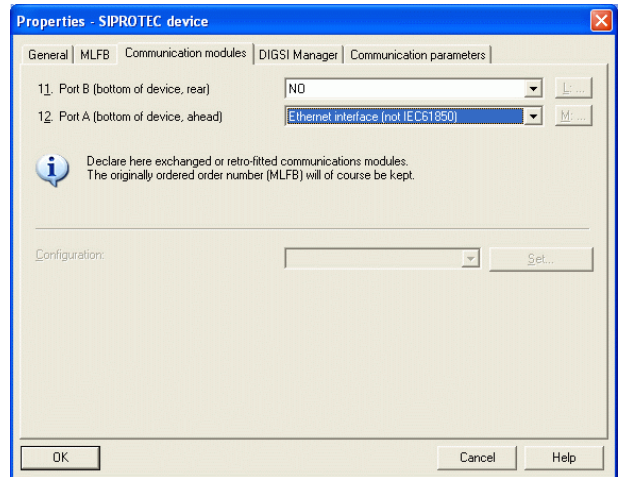
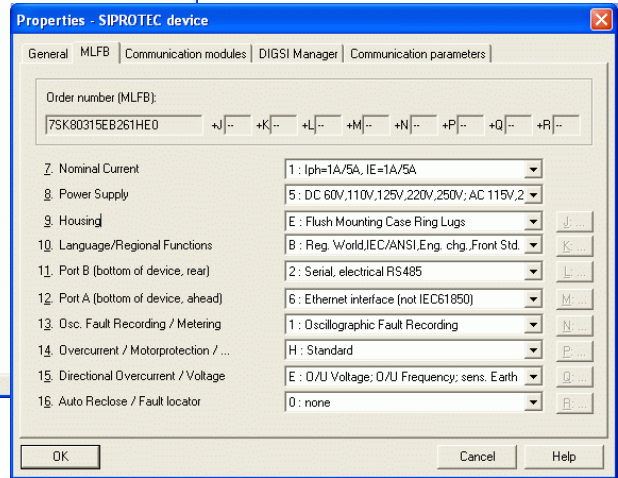


If the Ethernet interface “Port A” has already been installed at the factory as indicated by “**Order number (MLFB)**”, this can be checked under “**Object properties ...**“, „**MLFB**“.

Save with “**OK**”

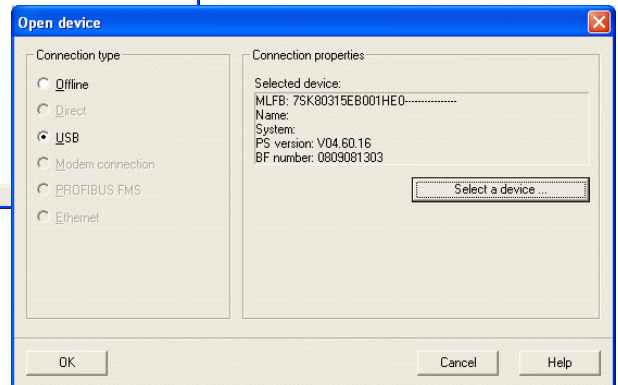
If the interface was retrofitted, “**Object properties ...**“, - “**Communication modules**” have to be opened and then be changed accordingly.

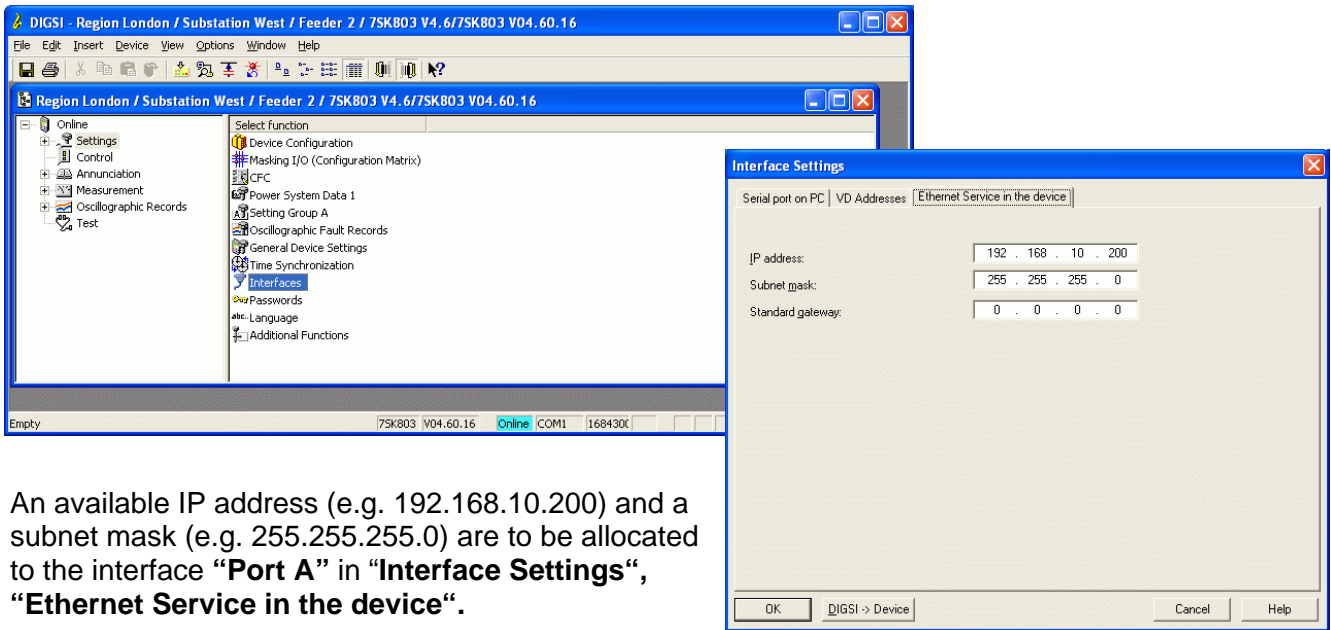
Save with “**OK**”



Open the protection device in DIGSI 4 with the connection type “**USB**” and “**Select a device ...**”.

Continue with “**OK**”

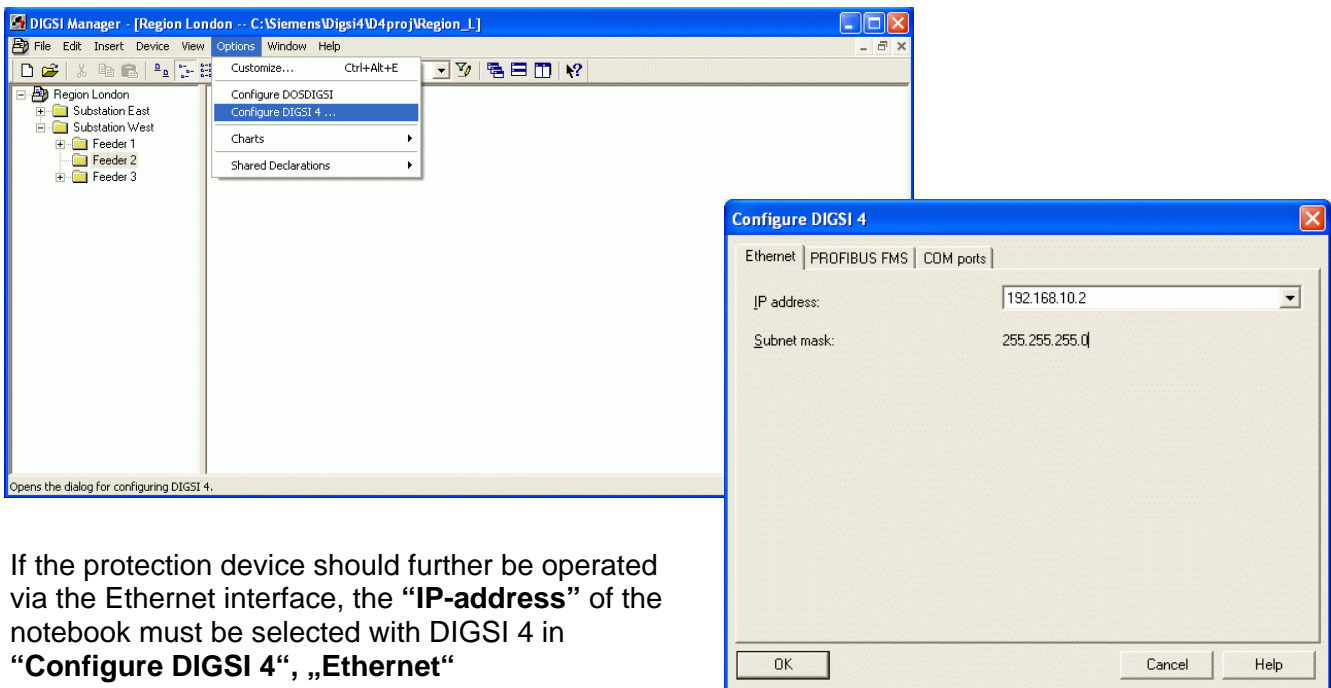
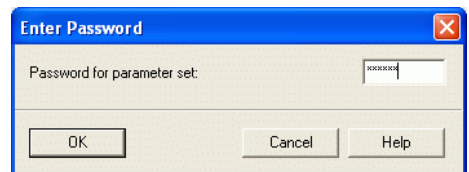




An available IP address (e.g. 192.168.10.200) and a subnet mask (e.g. 255.255.255.0) are to be allocated to the interface “**Port A**” in “**Interface Settings**“, “**Ethernet Service in the device**“.

Save in the protection device with “**DIGSI -> Device**“

After entering the password, continue with “**OK**“



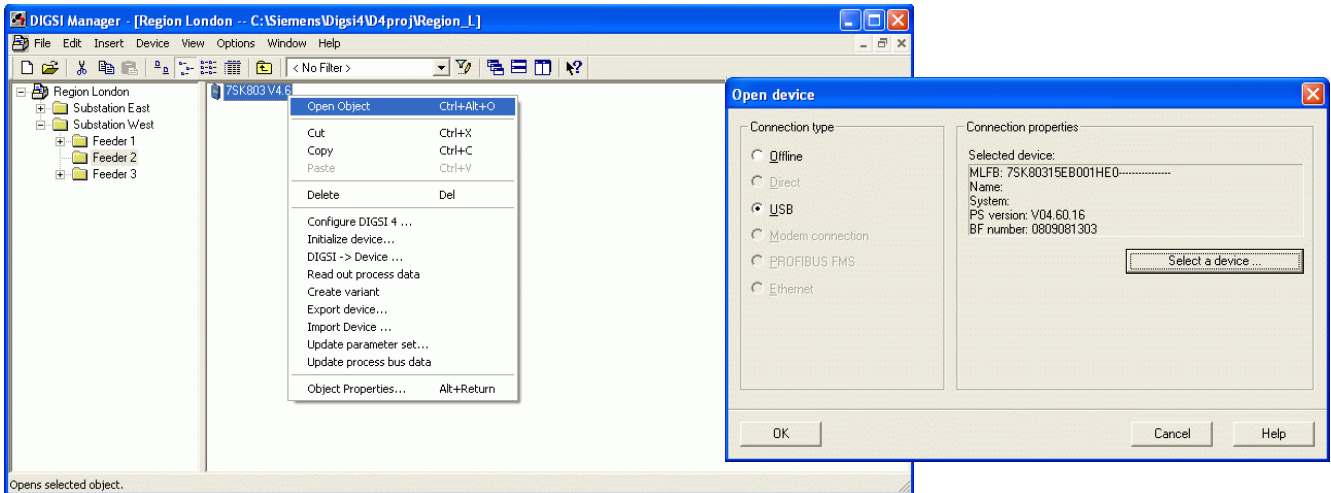
If the protection device should further be operated via the Ethernet interface, the “**IP-address**” of the notebook must be selected with DIGSI 4 in “**Configure DIGSI 4**“, „**Ethernet**“

NOTE: From DIGSI 4.82, the IP addresses of all the available Ethernet interfaces of the PC/notebooks are available for selection in the pull-down menu.

Take Care: If an “**IP address**” has not yet been selected, or if the “**IP address**“ has been changed (e.g. automatic allocation by HDCP), the input box will be empty.

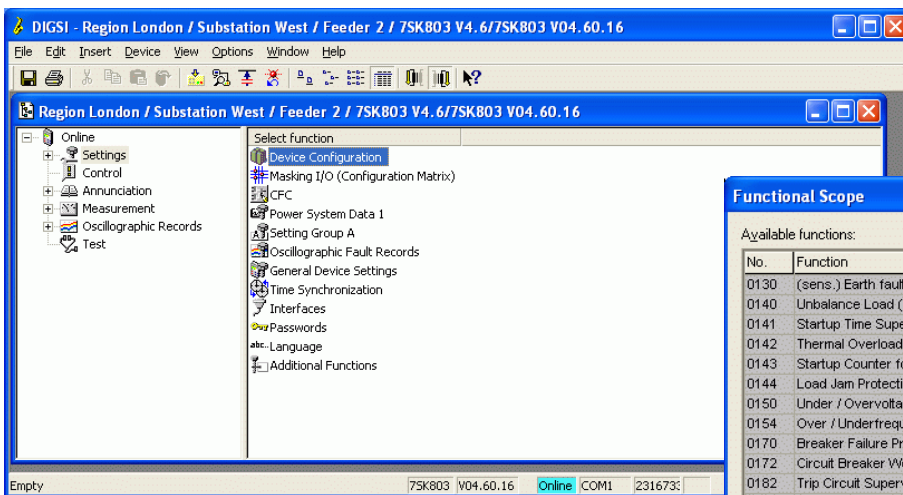
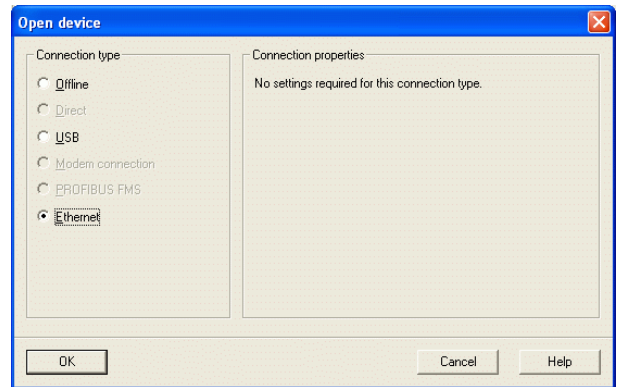
**An IP address must be selected here,
otherwise the operation of the protection device via Ethernet is not possible.**

In case the protection device is connected to the notebook either directly via a CAT5 patch cable or via a switch, all further settings of the protection device can now be applied with DIGSI 4 either through the USB front port or the bottom Ethernet service interface "Port A".



In the window "Open device" the device may be selected with "Connection type" – "USB", or the connection can be directly established through "Ethernet".

Continue with "OK"

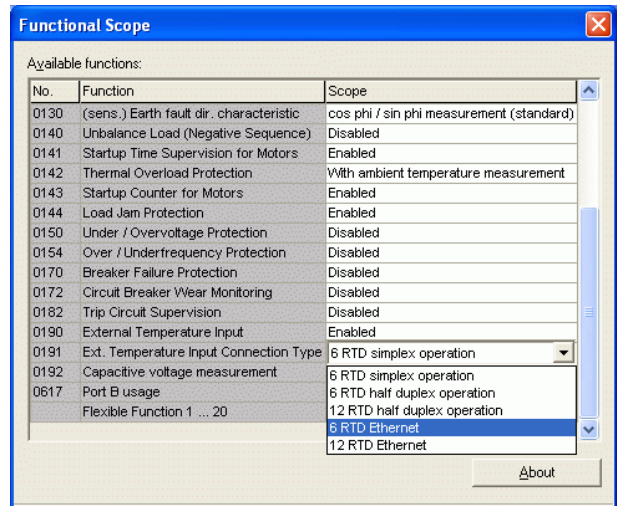


If the protection device is opened, "External Temperature Input" can be "Enabled" in "Settings", "Device Configurations" and "Functional Scope" (scroll down).

The default value for **“Ext. Temperature Input Connection Type”** is **“6 RTD simplex operation”**. It has to be changed accordingly.

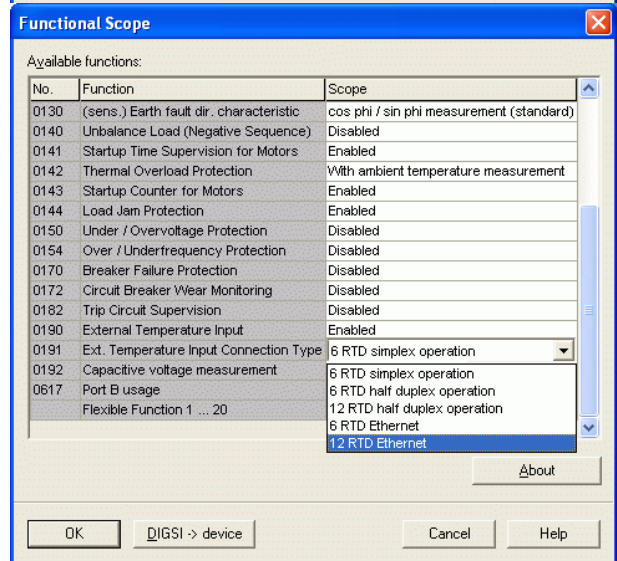
Interrogation of up to 6 sensors:

If only 6 temperature values of the TR1200 IP are interrogated from the protection device, **“Ext. Temperature Input Connection Type”**, **“6 RTD Ethernet”** will have to be selected.

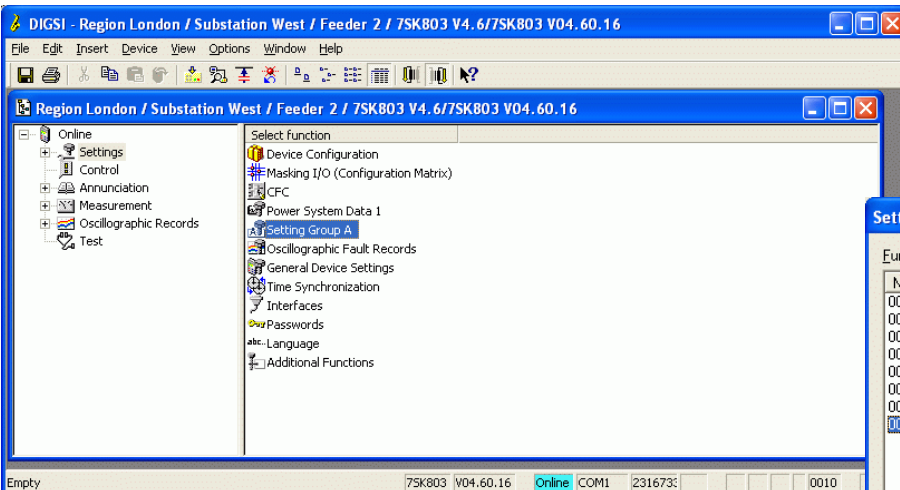


Interrogation of up to 12 sensors:

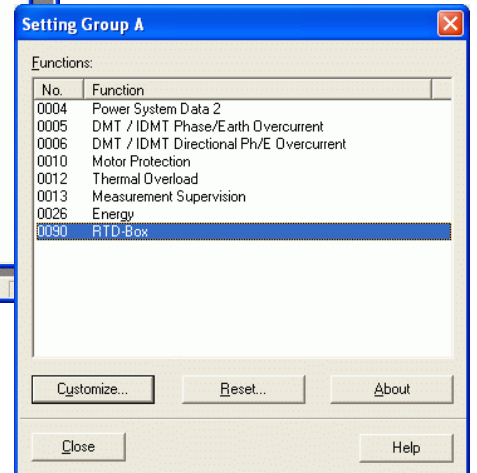
If more than 6 temperature values of the TR1200 IP are interrogated from the protection device, **“Ext. Temperature Input Connection Type”**, **“12 RTD Ethernet”** will have to be selected.



Save with **“OK”**



Under **“Setting Group A”** the function **“RTD-Box”** must be opened and **“Customize ...”** must be selected.

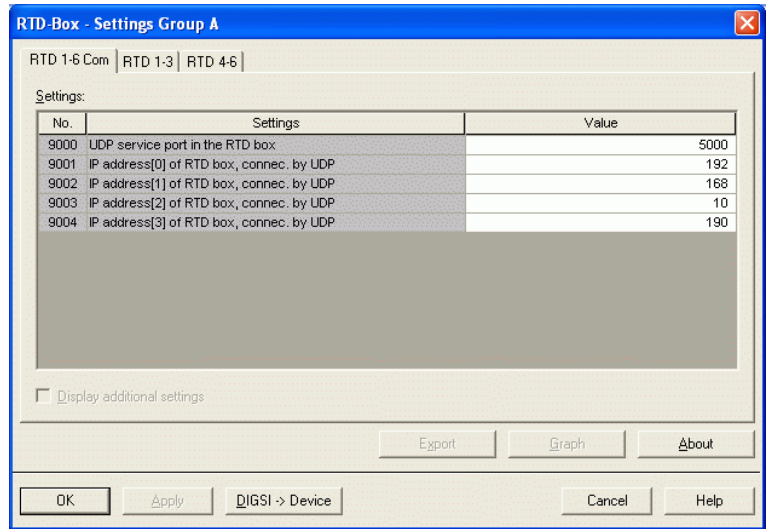


In the following section the protection device will get the UDP-Serviceport and the IP-Address of the RTD box. Through this address/port the protection device will later retrieve the temperature values.

If "Ext. Temperature Input Connection Type" "6 RTD Ethernet" was selected, the settings will be done under "RTD 1-6 Com".

The "UDP service port in the RTD box" might be changed if needed.

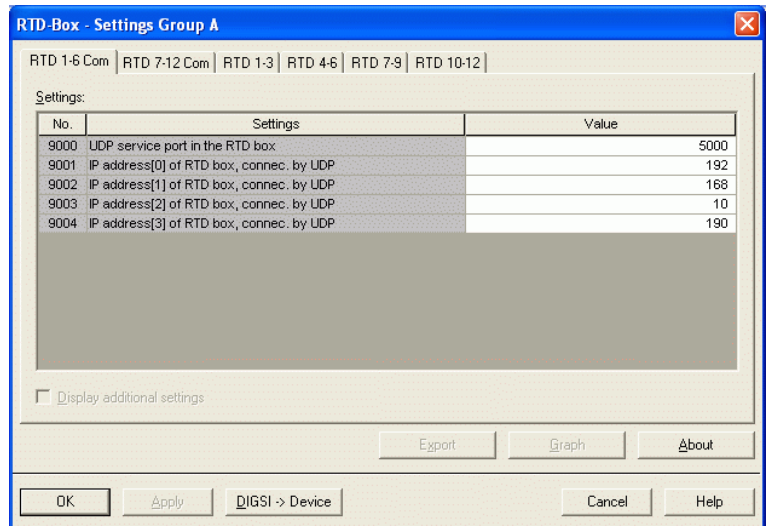
The "IP address(x) of RTD box ..." must always be in the address range (192.168.10.xxx) and is entered top down. Example: 192.168.10.190



If "Ext. Temperature Input Connection Type" "12 RTD Ethernet" was selected, the first set of settings will be entered under "RTD 1-6 Com".

The "UDP service port in the RTD box" might be changed if needed. Example: 5000

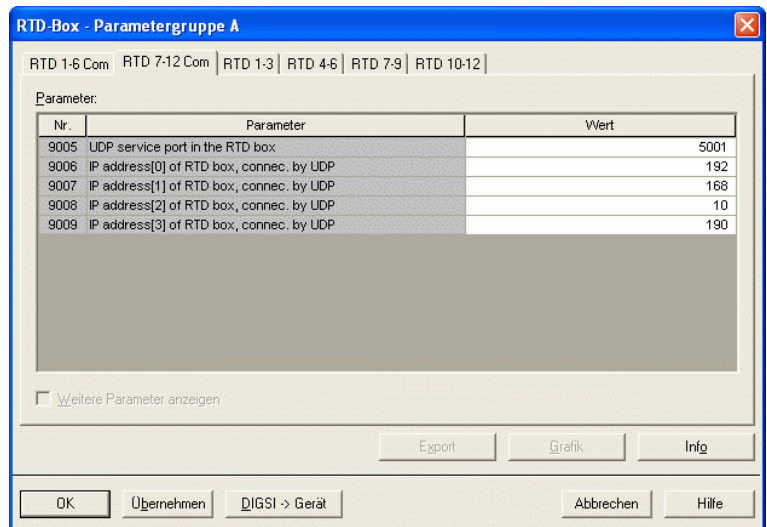
The first "IP address(x) of RTD box ..." is entered top down. Example: 192.168.10.190



The second set of settings is entered under "RTD 7-12 Com".

The "UDP service port in the RTD box" has to be increased by '1'. Example: 5001

The second "IP address(x) of RTD box ..." is identical to the first one. It has to be entered top down, too. Example: 192.168.10.190



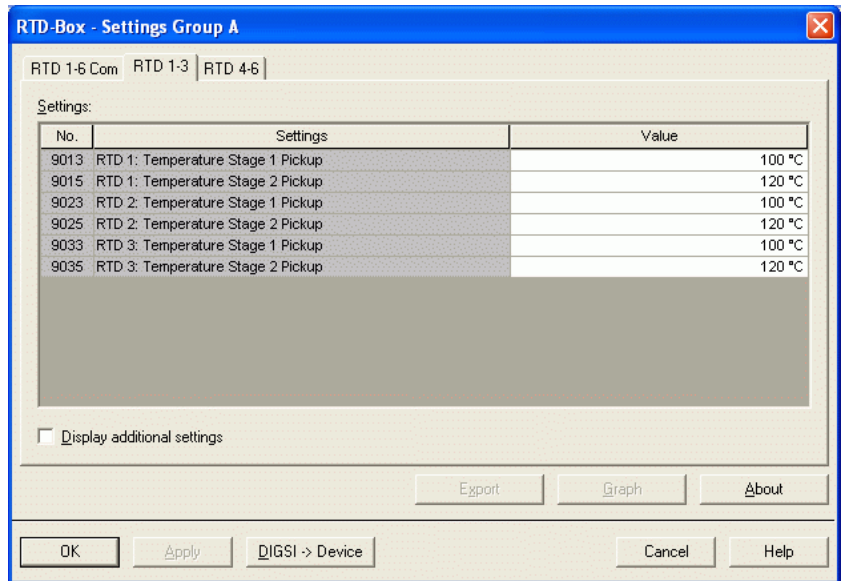
In the next step all required sensor inputs are configured. Depending on the application, 3 RTD inputs each are available in one page.

In the following example only the first measuring input is configured.

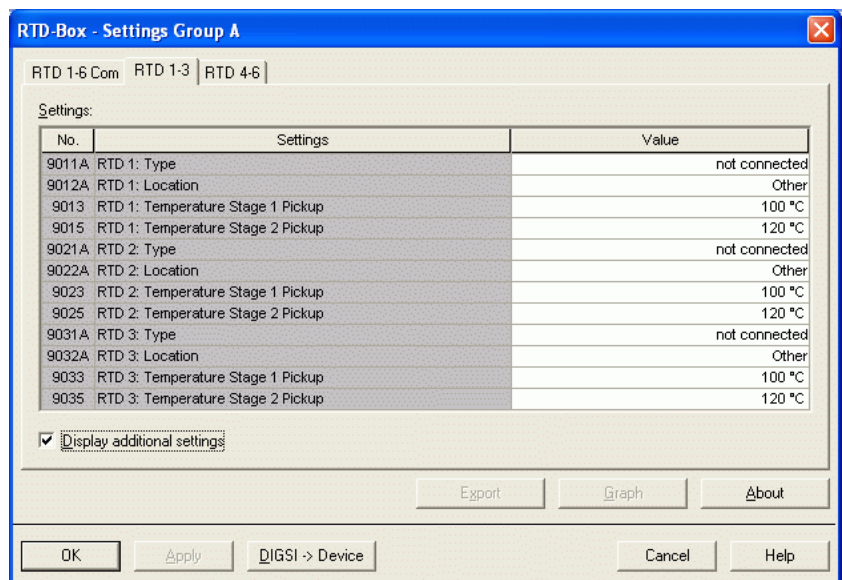
The same procedure applies to all other RTD inputs.

In the start menu only the pick-up values of the temperature stages are displayed.

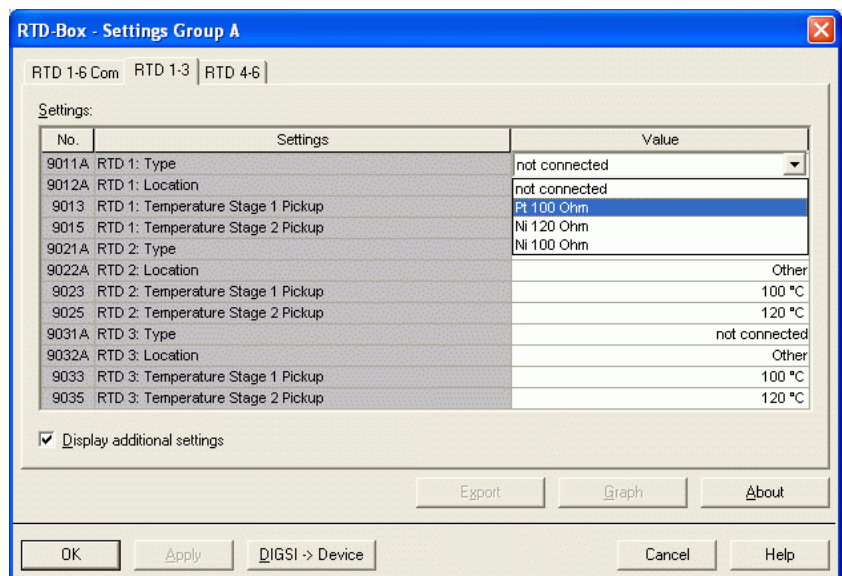
A check mark in the input box **“Display additional settings”** will show further settings.



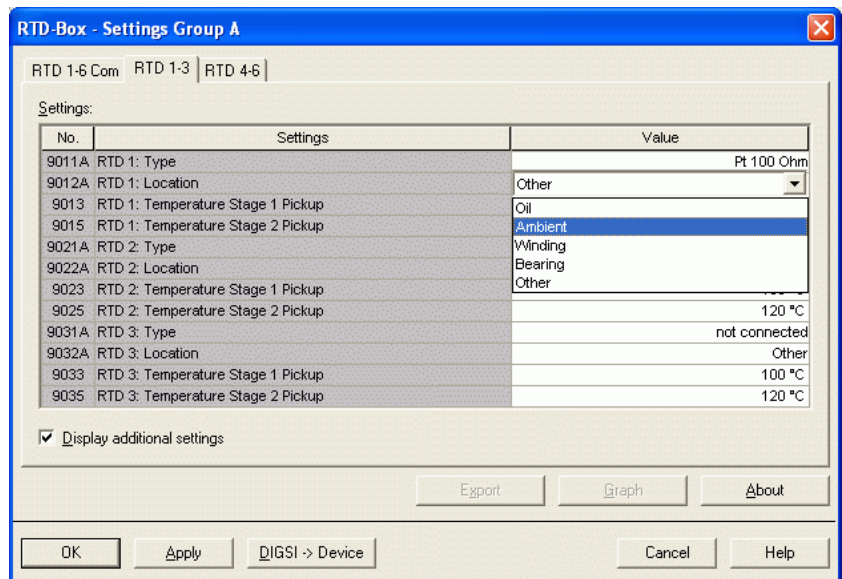
The settings for the first three sensor inputs can now be applied in the window **“RTD 1-3”**



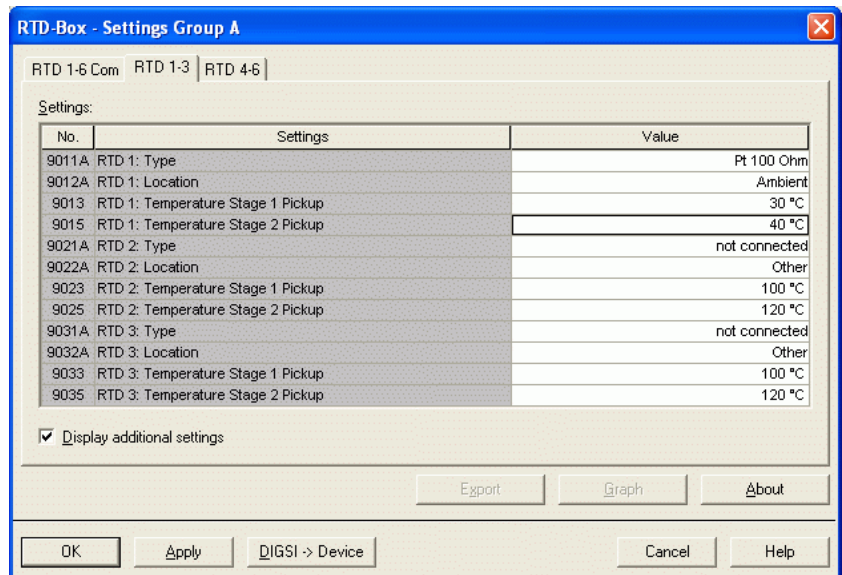
First, the **“Type”** of the sensor, e.g. Pt 100 Ohm, is selected for **“RTD 1”**.



In this menu a “**Location**” can be selected for the measured value “RTD 1”



Under “**Temperature Stage x Pickup**” two pick-up thresholds for alarms may be entered for the measured value “RTD 1”.

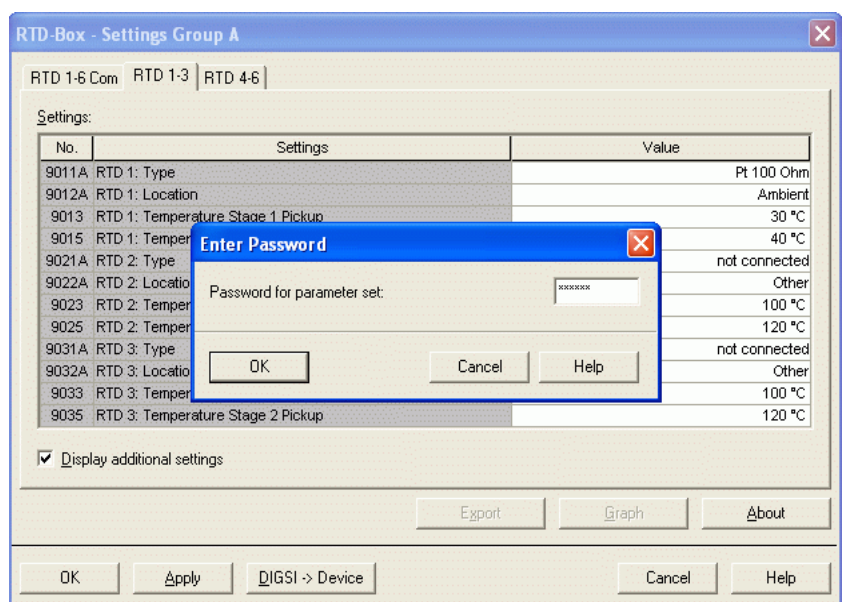


When all measuring inputs have been configured, the settings are transferred to the protection device through the button “**DIGSI -> Device**”.

The process will be completed by entering the password in the input box and then “**OK**”.

Note: Save settings to “file”.

The measured values will later be displayed in **DIGSI 4** under „**Measurement**“ – „**Others**“ – „**RTD-Box Measuring Values**“, or in the **Display** of the protection device under „**Measurement**“ – „**RTD-Box**“.



Setting the RTD-Box TR1200 IP by keypad

As per default the “**Code lock**” is set “**off**”. The **PIN** is **504**. To set the RTD box the code lock has to be switched off. This can exclusively be done with the front keys on the RTD box.
Detailed information on the settings can be seen in the operation manual TR1200 IP.

Setting the RTD-Box TR1200 IP by using a Web-Browser

The settings of the TR1200 IP can also be entered by using a PC/notebook through the Ethernet interface and a Web browser, e.g. Internet Explorer. Prior to starting the Web Browser some settings on PC/notebook and RTD-Box must however be applied.

Preparing the RTD-Box:

As per default the TR1200 IP has the **IP address 192.168.1.100**. Through **TCP/HTTP-Access “FULL”** unlimited access is given. The access protection through a Web browser (TCP/HTTP-Access) can exclusively be changed by the front keypad.

To open the menu you have to enter the IP-Address of the TR1200 IP in the input box of your Web browser, followed by “**OK**”.

If the IP-Address is unknown it can be read out on the display by means of the navigation keys. If the bottom key is pressed three times (Output IP) and then the right arrow key pressed once, the IP-Address is displayed in blocks by pressing the right arrow key repeatedly.

Set the same IP address 192.168.10.190 as in the protection device by using the 3 navigation keys (refer to manual).

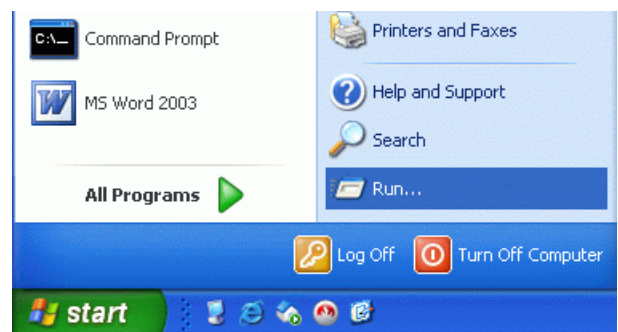
Preparing the PC/Notebook:

To operate the RTD-Box TR1200 IP with the Notebook both IP-Addresses must be in the same network segment, or the IP-Address of the RTD box must be routed to the PC.

Routing is the simplest solution as the basic settings of the PC/Notebook do not have to be changed. Routing is done in the Command Console under WINDOWS and is only active until the next start-up of the PC/Notebook.

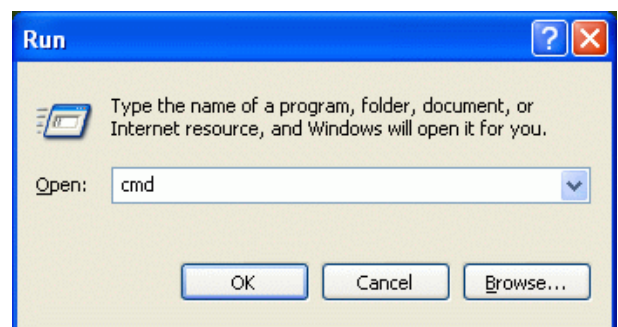
First the Command Console (DOS window) is opened.

Select “**Start**” and then “**Run...**”



Enter the command “**cmd**”.

Confirm with “**OK**”



The window with the active prompt (e.g. **C:\Documents and Settings\Alle**>) is opened.
The commands are always entered following the **">"**.

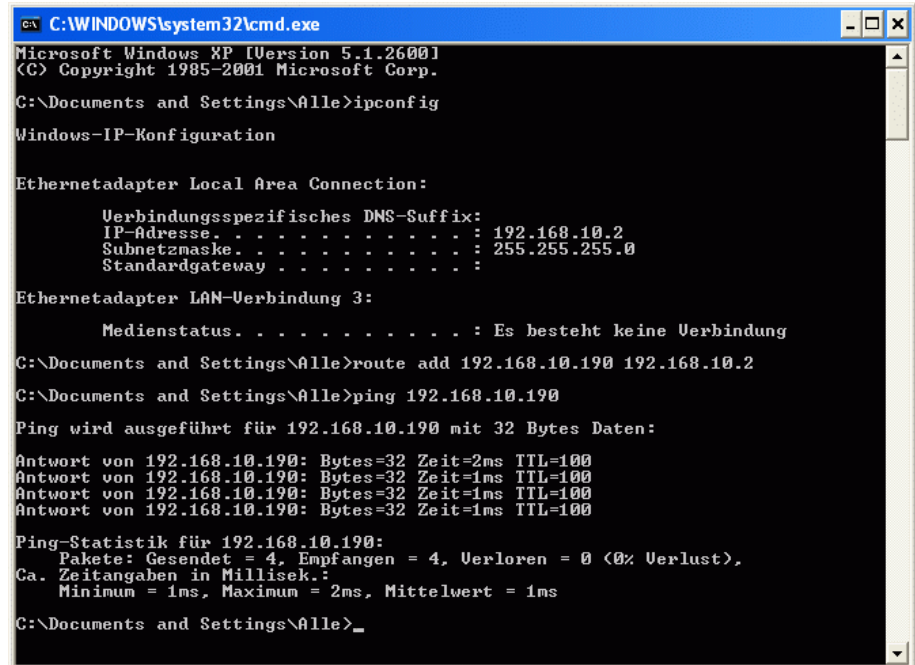
Initially the present IP-Address of the PC/Notebook is read out, then routed and finally the connection to the TR1200 IP is tested.

Read out IP address with:
"ipconfig"

In this case the IP address is:
192.168.10.2

Route to TR1200 IP:
**"route add
192.168.10.190
192.168.10.2"**

Test the connection:
**„ping
192.168.10.190"**
The TR1200 IP replies!



```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.
C:\Documents and Settings\Alle>ipconfig
Windows-IP-Konfiguration

Ethernetadapter Local Area Connection:

    Verbindungsspezifisches DNS-Suffix:
    IP-Adresse. . . . . : 192.168.10.2
    Subnetzmaske. . . . . : 255.255.255.0
    Standardgateway . . . . . :

Ethernetadapter LAN-Verbindung 3:

    Medienstatus. . . . . : Es besteht keine Verbindung

C:\Documents and Settings\Alle>route add 192.168.10.190 192.168.10.2
C:\Documents and Settings\Alle>ping 192.168.10.190
Ping wird ausgefuehrt fuer 192.168.10.190 mit 32 Bytes Daten:
Antwort von 192.168.10.190: Bytes=32 Zeit=2ms TTL=100
Antwort von 192.168.10.190: Bytes=32 Zeit=1ms TTL=100
Antwort von 192.168.10.190: Bytes=32 Zeit=1ms TTL=100
Antwort von 192.168.10.190: Bytes=32 Zeit=1ms TTL=100

Ping-Statistik fuer 192.168.10.190:
    Pakete: Gesendet = 4, Empfangen = 4, Verloren = 0 (0% Verlust),
    Ca. Zeitangaben in Millisek.:
        Minimum = 1ms, Maximum = 2ms, Mittelwert = 1ms
C:\Documents and Settings\Alle>
```

Open TR1200 IP Web Interface:

Now start a Web-Browser (e.g. Internet-Explorer), enter the IP-Address 192.168.10.190 and start by pressing "Return".

Note: The setting **TCP/HTTP-Access** in the TR1200 IP has to allow the access through a Web browser. This setting can exclusively be applied through the front keypad.

The start window displays the current **"Status"** of the TR1200 IP.

"sensor" shows sensor number and sensor name.

„actual" shows the current temperature of each sensor.

"min" und **"max"** display minimum and maximum measured temperature of each sensor. A click on **"Reset"** will reset these values.

"typical" are temperature values given to a sensor, that can be defined by the user as reference values in **"Sensor Config"**.

"Relay K1" shows the configuration and the position of the alarm contact.

The screenshot shows the ZIEHL TR 1200 IP web interface. At the top, there is a navigation bar with tabs: Status, Simulation, Sensor Config, IP Config, TCP/UDP Config, Firmware Update, and Help. The 'Status' tab is selected. Below the navigation bar is a table with the following data:

sensor	actual	min	max	typical
1 Sensor 1	26°C	26°C	26°C	24°C
2 Sensor 2	26°C	25°C	26°C	24°C
3 Sensor 3	26°C	25°C	26°C	24°C
4 Sensor 4	27°C	27°C	27°C	24°C
5 Sensor 5	27°C	26°C	27°C	80°C
6 Sensor 6	49°C	49°C	49°C	80°C
7 Sensor 7	47°C	46°C	47°C	80°C
8 Sensor 8	59°C	59°C	59°C	80°C
9 Sensor 9	73°C	73°C	73°C	80°C
10 Sensor 10	51°C	51°C	52°C	70°C
11 Sensor 11	nc °C	860°C	980°C	-°C
12 Sensor 12	58°C	58°C	58°C	80°C
max Sensor max	73°C	<input type="button" value="Reset"/>	<input type="button" value="Reset"/>	

Below the table, there is a diagram for Relay K1 showing terminals 11, 12, and 14. Terminal 11 is connected to terminal 14, and terminal 12 is also connected to terminal 14.

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Note: The „high“ temperature values (860/980°C) shown on the unconnected sensor inputs (e.g. sensor input 11 "nc °C") are "status alarms". They will not be evaluated in the protection device.

Configure network settings:

Initially the “**Network**”-parameters are set. These parameters must correspond to those of the notebook and protection device (see note on page 2). Through these parameters the protection device requests the data from the RTD box (see page 7).

Select “**IP Config**”.

The “**MAC-Address**” can not be changed.
The „**Hostname**” might be changed if needed.

The “**IP-Address**” (e.g. 190.168.10.190) and the corresponding “**Subnet Mask**” (e.g. 255.255.255.0) have to be set.

If a router is used, the “**Gateway**” must be set, too.

The screenshot shows the ZIEHL TR 1200 IP configuration web interface. At the top, there is a navigation bar with the ZIEHL logo and the text 'TR 1200 IP'. Below this is a menu with tabs: Status, Simulation, Sensor Config, IP Config (selected), TCP/UDP Config, Firmware Update, and Help. A warning message is displayed: 'Achtung: Falsche Einstellungen, führen zum Abbrechen der Verbindung! Warning: Incorrect settings lead to abort the connection!'. The main configuration area contains the following fields: MAC Adresse: 00:12:E4:00:02:59, Hostname: TR 1200 IP, IP Address: 192.168.10.190, Gateway: 192.168.10.1, and Subnet Mask: 255.255.255.0. A 'Save Config' button is located below the Subnet Mask field. The footer contains the text 'Copyright © 2009 ZIEHL industrie-elektronik GmbH + Co KG'.

Save the settings with “**Save Config**”. Then the Web-Browser has to be re-started with the new IP-Address.

Select “**TCP/UDP Config**”.

The “**UDP-Port**” “**5000**” can remain unchanged.

If it is changed the settings in the protection device have to be changed accordingly (see page 7).

Put “**RTD**” to “**On**” and “**Modbus**” to “**Off**”.

The settings are saved with “**Save Config**”.

The screenshot shows the ZIEHL TR 1200 IP configuration web interface with the TCP/UDP Config tab selected. The navigation bar and warning message are the same as in the previous screenshot. The main configuration area contains the following fields: RTD: On (selected), Off, UDP Port: 5000, and Modbus: On, Off (selected). A 'Save Config' button is located below the Modbus field. The footer contains the text 'Copyright © 2009 ZIEHL industrie-elektronik GmbH + Co KG'.

Set the sensor inputs:

Each of the 12 “Sensors” may be set as follows:

Select “Sensor Config”.

The “Sensor name” may be individually set. It will not be transferred to the protection device.

Under “sensortyp” (i.e. Pt 100) you may select “3-L” for 3-wire connection or enter the resistance value in “x.x Ohm” for 2-wire connection.

Under “Relay K1 on Error” the idle state of the alarm contact will be defined.

Under “typical” the user may give temperature values as reference values to a sensor. This does not influence the measurement or other functions.

Save all settings with “Send”.

sensor	sensortyp	typical	
1	Sensor 1	3-L	24 °C
2	Sensor 2	3-L	24 °C
3	Sensor 3	3-L	24 °C
4	Sensor 4	3-L	24 °C
5	Sensor 5	3-L	80 °C
6	Sensor 6	3-L	80 °C
7	Sensor 7	3-L	80 °C
8	Sensor 8	3-L	80 °C
9	Sensor 9	3-L	80 °C
10	Sensor 10	3-L	70 °C
11	Sensor 11	nc	- °C
12	Sensor 12	3-L	80 °C

Under “Firmware / Update” the present Firmware version is displayed, or a “Firmware-Update” may be carried out.

Note: Please consider the remarks on updates described in the manual.

During commissioning it will be beneficial if single temperature values can be simulated for the test of protection functions.

ATTENTION: The simulated temperatures are transferred in the same way as real measured temperatures.

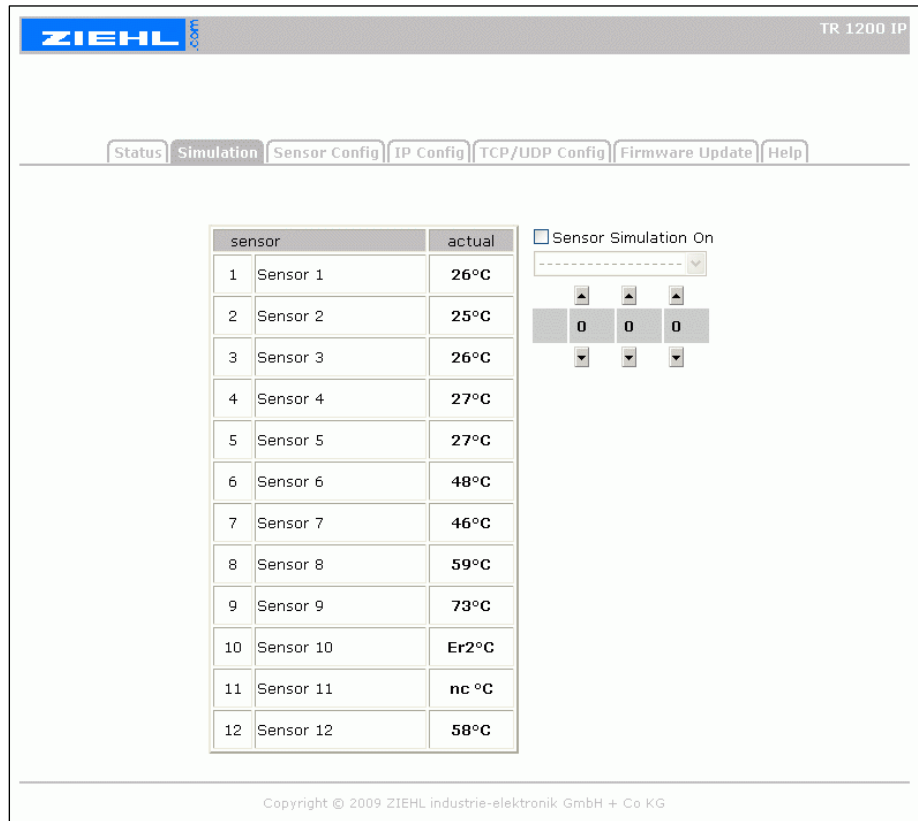
Under “**Simulation**“ you may simulate other temperature values on all configured sensor inputs.

1. Put a check mark on the input box “**Sensor Simulation On**“.

2. Select a configured sensor from the pulldown menu. The 3-digit temperature selector will be automatically set to the actual temperature value of the sensor to be tested.

3. Then the temperature of the selected sensor can be changed stepwise (max 850°C).

4. If another sensor is selected in the pulldown menu the previous selected sensor will be kept in the simulation state.



If this is unwanted the check mark “**Sensor Simulation On**“ has to be removed. After approximately 3 seconds the real (actual) measured values of all sensors will be displayed and transferred to the protection device.

5. To stop the simulation remove the check mark in the input box “**Sensor Simulation On**“. Then the real (actual) temperature values of all sensors will be displayed and transferred to the protection device.

6. Not configured sensors (shown as “nc”) can not be simulated.

7. If sensor inputs are configured without connecting sensors the message “Er2°C” will be displayed. In case of “**Sensor Simulation On**“ the temperature values at these sensor inputs will be immediately put to 0°C and transferred to the protection device. After selecting the related sensor this value can be changed stepwise. It will be immediately displayed and transferred to the protection device.

ATTENTION:

The simulation may cause severe damage when the devices are in service. Therefore the RTD box should be protected by setting “**TCP/HTTP-Access**“ against external access through a Web-Browser. This setting can exclusively be changed by the front keypad.

If the RTD box(es) and the protection device are correctly connected to the network, the measured values of the RTD box(es) are interrogated by the protection device and are available there.

Please refer to the device manuals for detailed descriptions of the settings in the devices.

Wish you much success