



SmartExplorer Software Manual

Software for Smart instruments

SmartExplorer v2.0.2.0.

Please check regularly for updates.

1. Important user information

Dear customer, thank you for downloading the Kipp & Zonen Smart Explorer. It is essential that you read this manual completely for a full understanding of the proper installation and use of this software in combination with your Kipp & Zonen Smart instrument.

We understand that no instruction manual is perfect, so should you have any comments regarding this manual we will be pleased to receive them at:

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Publication date: June 2019

Important changes:

- This version fully supports the DustIQ , SUV-A , B and E models and SG3, SGR4, RT1, PH1, PR1.

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2. Installation and configuration

The SmartExplorer software allows you to configure a smart sensor and to collect real-time data from a sensor.

- Configuration makes it possible to configure a smart sensor 'out of the box' and test the smart sensor before the sensor is used in an operational network.
- Collecting data makes it possible to store data from the smart sensor in a semicolon separated CSV file. The CSV file is created at the beginning of every new day or at the beginning of the first day of the week.
- The SmartExplorer software can also be used to monitor and/or log up to 10 instruments simultaneously and works with all Smart Radiometers (SMP, SHP, SGR, SUV, RT1) and the DustIQ.
-

2.1. Installation for Windows 7,8 and 10

The SmartExplorer uses the dot NET 4.5 frame work. For this reason the program cannot be used under Windows XP.

- Install the SmartExplorer program after downloading the latest version from the Kipp & Zonen [download page](#).

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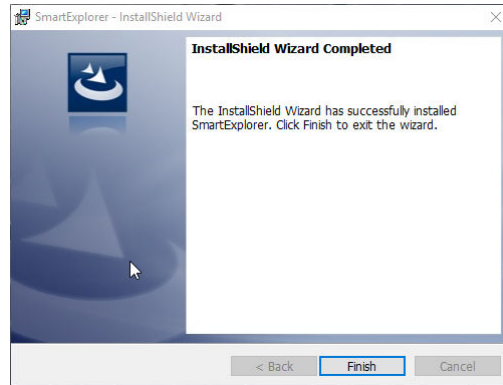
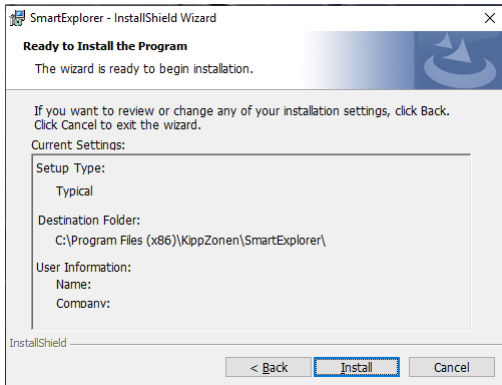
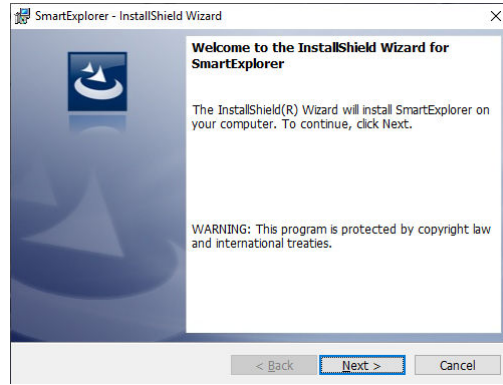
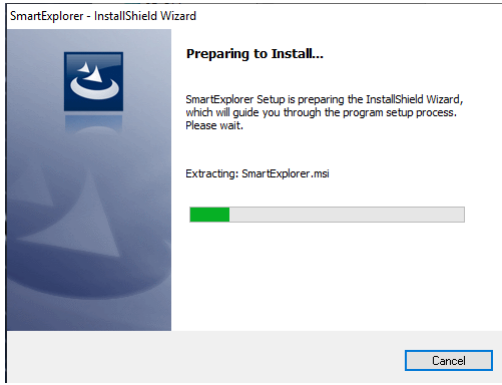
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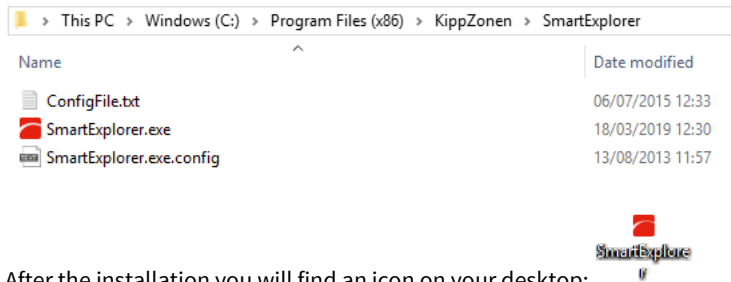
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Document	Title	Size
	Manual - SmartExplorer software	 3 MB
	SmartExplorer Software	 53 MB

As often executable files with an EXE file extension are blocked, the software is packaged in a compressed ZIP format. In your download folder you will find a ZIP file named `smartexplorer_vxxxxxx_setup.zip`. Double clicking on this file will reveal the contents `smartexplorer_vxxxxxx_setup.exe`.



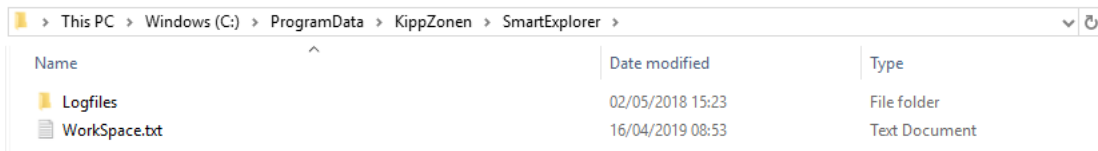
The program will be installed in:



After the installation you will find an icon on your desktop:

The installation program will create a work directory in the program data directory:

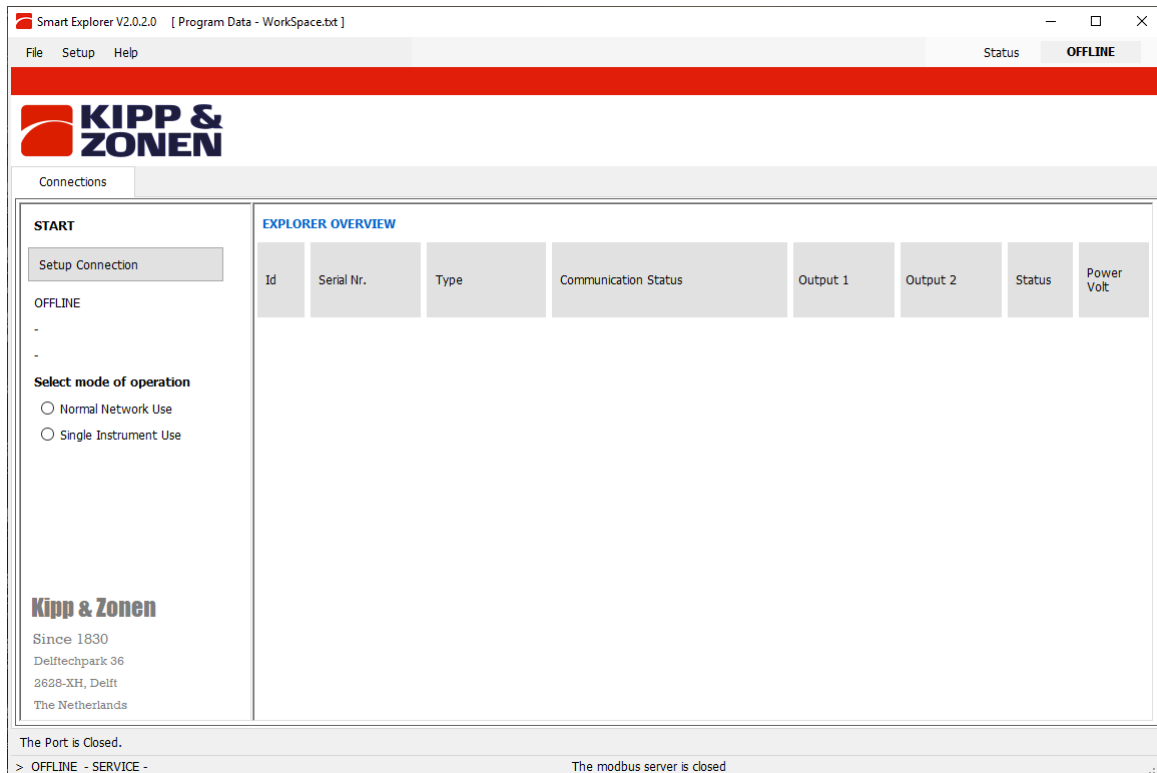
C:\ProgramData\KippZonen\SmartExplorer.



The program data directory on most computers is located on the C drive (please contact your network administrator for details). The program data directory is a hidden directory. Open the file browser and select the option to show hidden files and directories when you need access to this directory. This is not very likely.

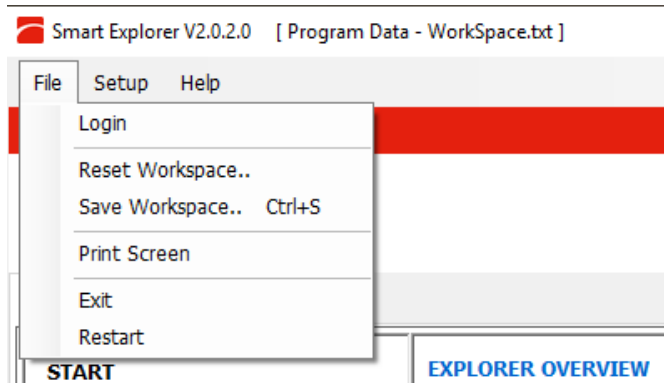
2.2. First start up

After the first start of the SmartExplorer software the window below will appear:



2.3. File tab

Clicking File will show



Login is for authorized service personnel only and is not needed for normal setup and operation.

Reset workspace will reset all SmartExplorer settings to factory default.

Save Workspace will locally save your settings. This can be done automatically as well.

Print screen does just that.

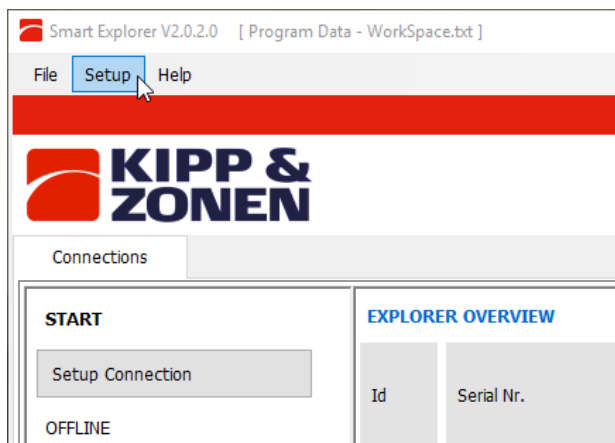
Exit will close the program.

Restart will restart the SmartExplorer program to put the changed settings into effect.

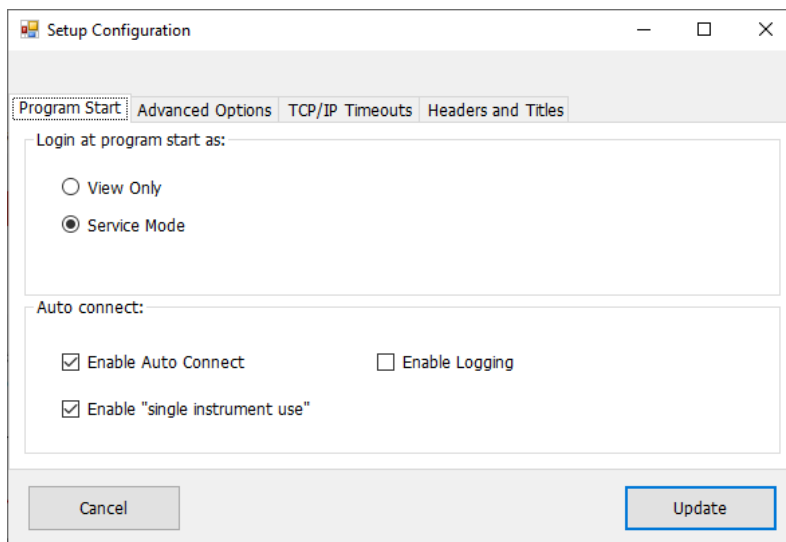
Note After changing the instrument with SmartExplorer running it is advised to Restart the program to force all readings and setting to be valid for the new device.

A configuration change of an instrument will automatically restart the software.

2.4. Setup tab



Clicking the Setup tab opens the window below:



2.4.1. Program start sub tab

Select the option Service mode if you want to configure smart-sensors. Select the option View only if you want to use the program as simple data-logger only.

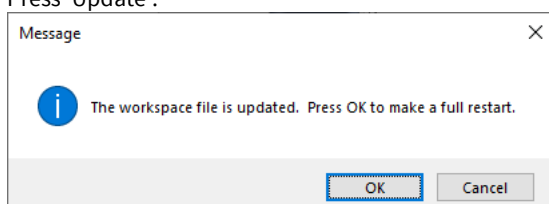
Select the option Enable Auto Connect if the application should make a connection with sensors every time when the application is started and select the option 'Enable logging' to start logging every time when the application is started.

Note: the option 'Enable logging' is shown only when the option 'Enable Auto Connect' is set.

Select the option 'Enable single instrument use' if you want to configure sensors, change the Modbus® address and change the communication parameters of the sensor.

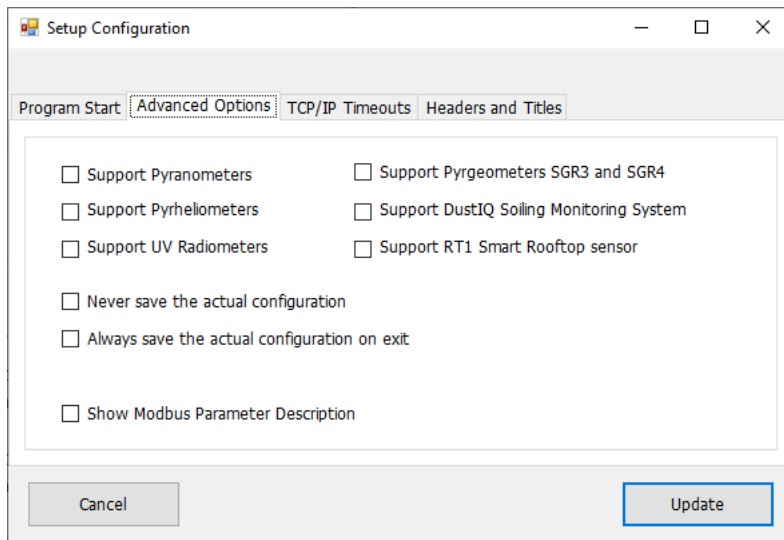
Check the following options after the very first installation: Service Mode, Enable Auto Connect and Enable 'single instrument use'.

Press 'Update'.



The changes are not applied until after a full restart. Press 'Ok' to make a full restart.

2.4.2. Advanced Options sub tab



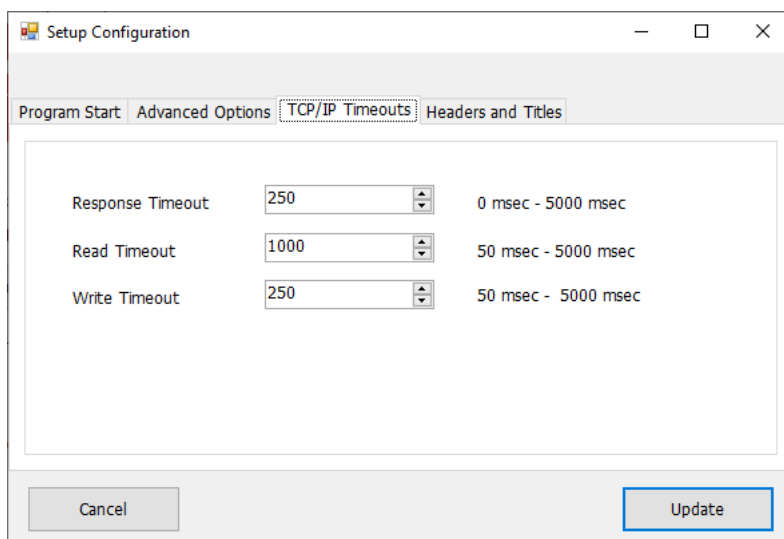
Select the instruments you want to setup and/ or log data from. This setting influences the Explorer view headings only.

Never save the actual configuration will make sure the SmartExplorer software always starts in the original configuration and changes are not stored.

Always save the actual configuration on exit is the preferred setting that will save all your changed settings automatically.

2.4.3. TCP/IP timeouts sub tab

When the SmartExplorer software is used to communicate with a smart instrument using the LAN and a LAN to Modbus converter specific time outs can be set.



2.4.4. Headers and titles sub tab

The image shows a 'Setup Configuration' dialog box with four tabs: 'Program Start', 'Advanced Options', 'TCP/IP Timeouts', and 'Headers and Titles'. The 'Headers and Titles' tab is active, showing five lines of text input fields:

Line	Text
Line 1	Kipp & Zonen
Line 2	Since 1830
Line 3	Delftechpark 36
Line 4	2628-XH, Delft
Line 5	The Netherlands

At the bottom of the dialog are 'Cancel' and 'Update' buttons. To the right, a status bar displays the following text:

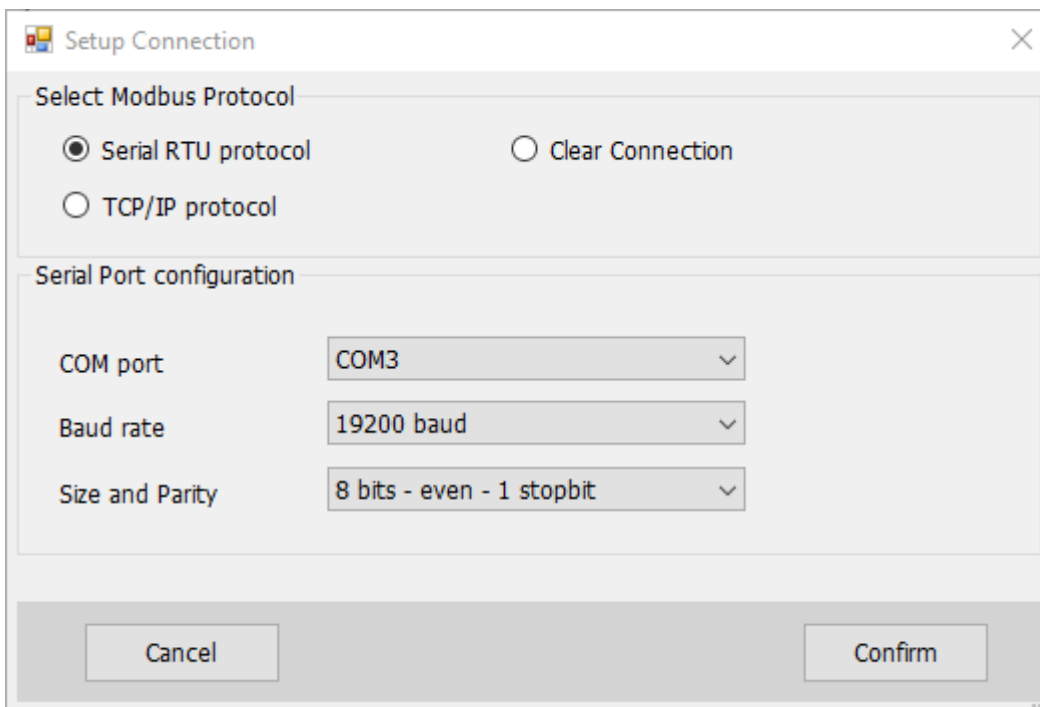
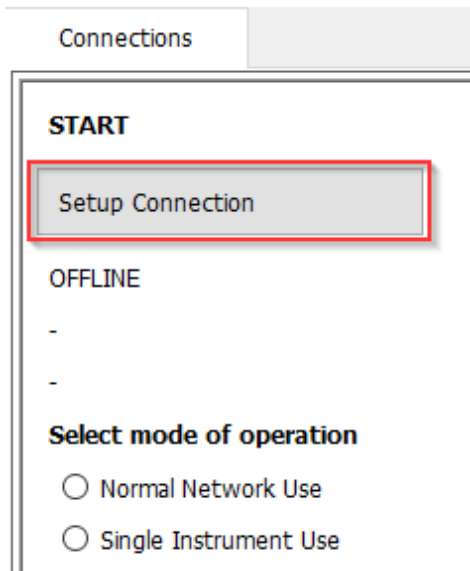
Kipp & Zonen
Since 1830
Delftechpark 36
2628-XH, Delft
The Netherlands

The Port is Closed.
> OFFLINE - SERVICE -

This simply changes the text as shown on the left bottom corner.

2.5. Configuring the connection settings

In order to connect to your Smart instrument(s): click on Setup Connection



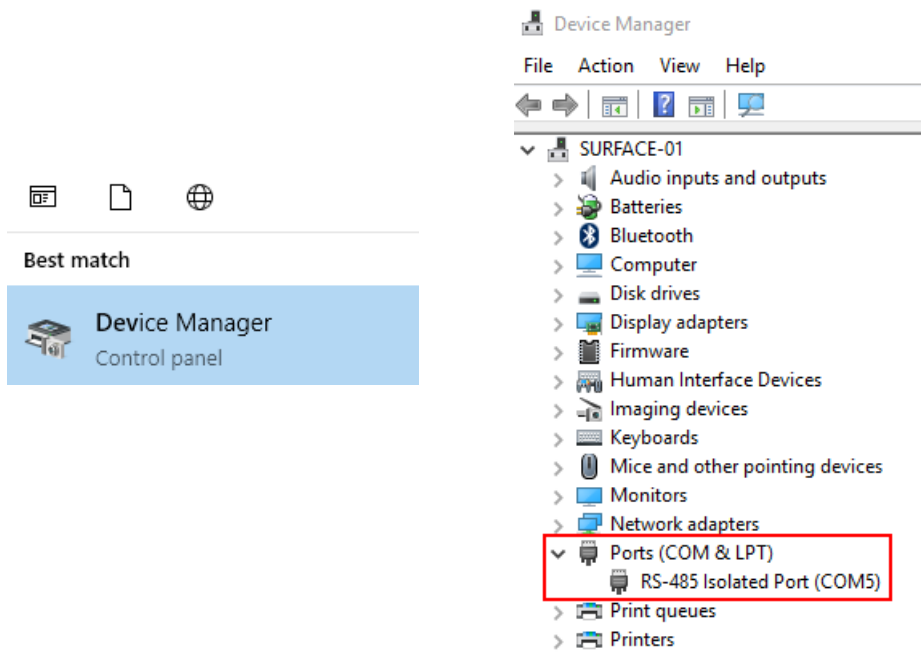
And the window above will open:

Select **Serial RTU protocol** for a direct RS485 connection.

Select the COM port that belongs to your USB-RS485 converter. This you can find in the Windows Device Manager. Leave the other settings unchanged if your instrument uses the Kipp & Zonen factory defaults.

If you use more than one instrument, these should all have the same settings apart from the Modbus address.

One way of checking the COM port number is by using the standard Windows Device Manager .

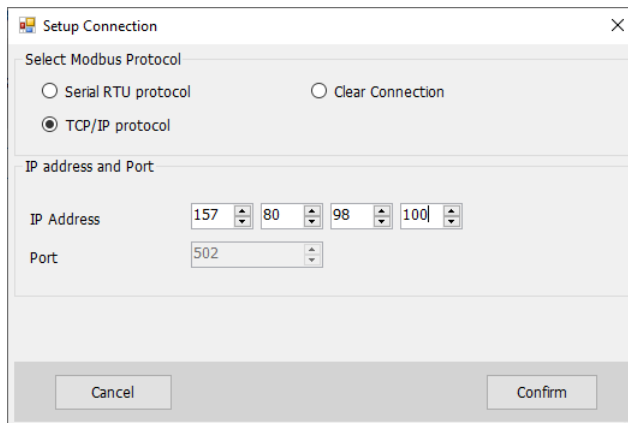


Click **Confirm** to save and use the settings.

Select **TCP/IP** when the SmartExplorer software is used to communicate with a smart instrument using the LAN and a LAN to Modbus gateway.

A LAN to Modbus TCP/IP gateway converts the MODBUS RTU protocol supported by the Smart sensor or Dust IQ to the MODBUS-TCP/IP protocol.

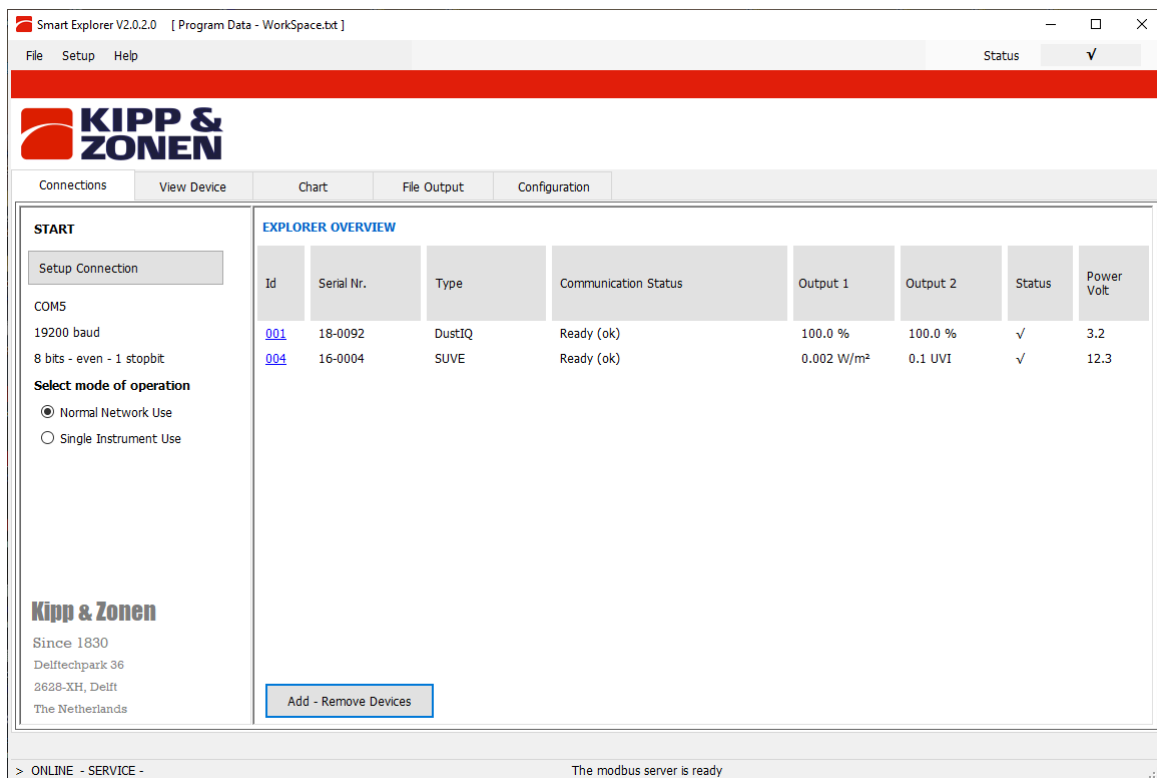
The SmartExplorer software can then use the LAN network to communicate with the instrument via the MODBUS TCP/IP gateway. Modbus gateways are provided by many suppliers of industrial network solutions (B&B electronics MOXA, ATOP and so on)



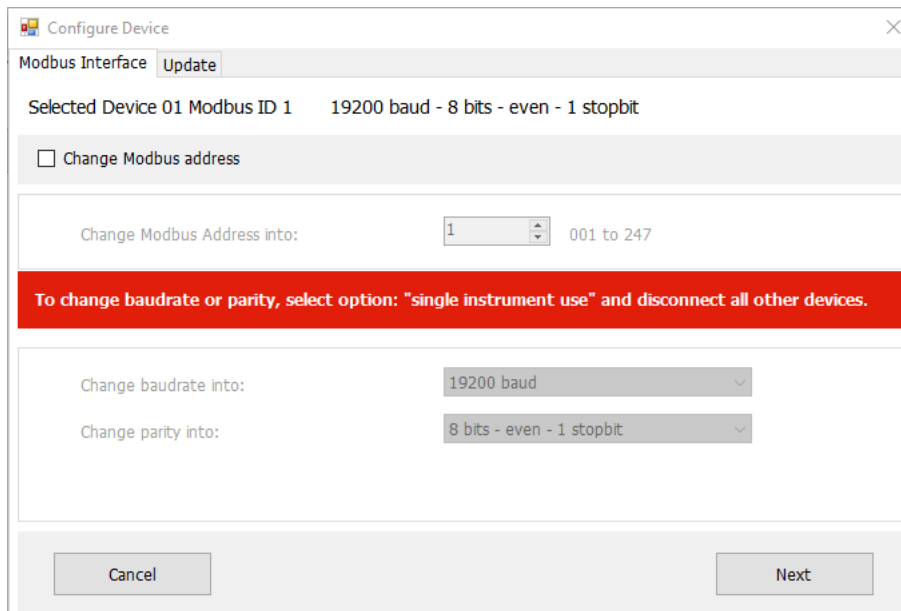
Enter the IP address as given to the converter and click confirm.

2.6. Main window - connections

Once the SmartExplorer software can communicate with the attached instruments (e.g. DustIQ and SUV-E), the following window appears:



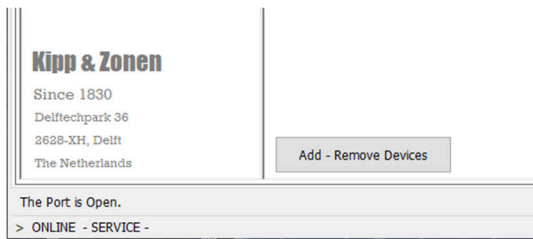
- The program starts in Normal Network Use, meaning you can have several instruments attached to monitor
- Changing setting can be done with only one instrument attached and in **Single Instrument Use**



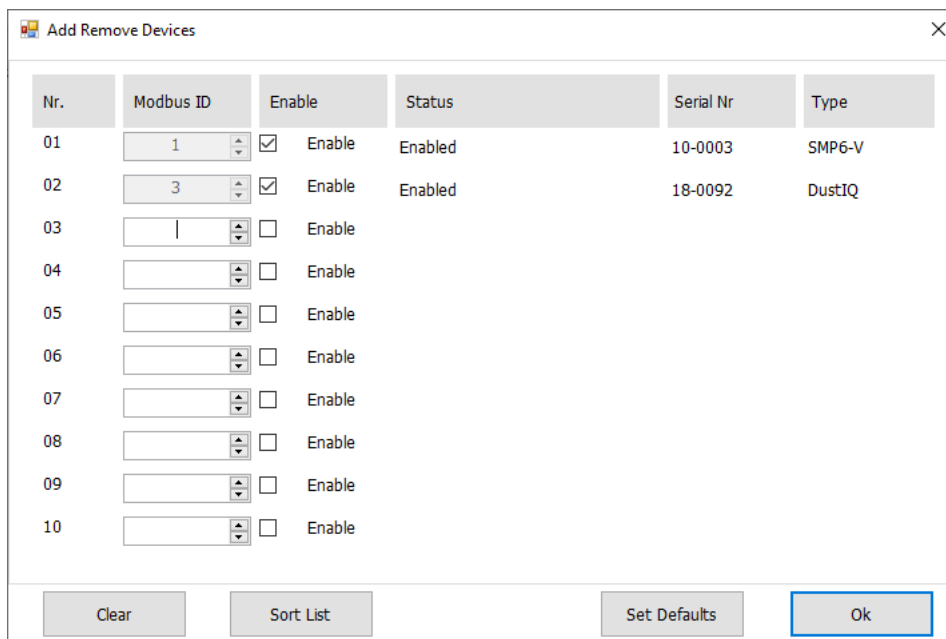
- Finding an instrument with unknown communication settings is only possible with one instrument attached
- Allow 5 to 10 minutes for the instrument to stabilise before really reading the measurements
- When started the first time and with a Kipp & Zonen instrument straight out of the box: 19.200, 8 Even 1 are the coms settings used and working.

2.6.1. Add – Remove devices

Clicking Add – Remove devices



Opens the following window.



For a device to show up in the list of connected devices it needs to be setup here.



Device Nr. 01 with Modbus address 1 and enabled is the default setting and works with one instrument attached that still has the Kipp & Zonen default settings.

Add more devices as needed. Making sure you fill in the right Modbus ID (a.k.a. address) and check the Enable box.

Sort list will sort the devices according to their Modbus ID.

When the Modbus ID of an instrument is changed using SmartExplorer **Configuration – Configure Device** this will be reflected in this list.

2.7. Main Window – View Device

Clicking on View Device will bring up the information for the first device. If there are more instruments attached, then use the arrows  01  to select the right one.

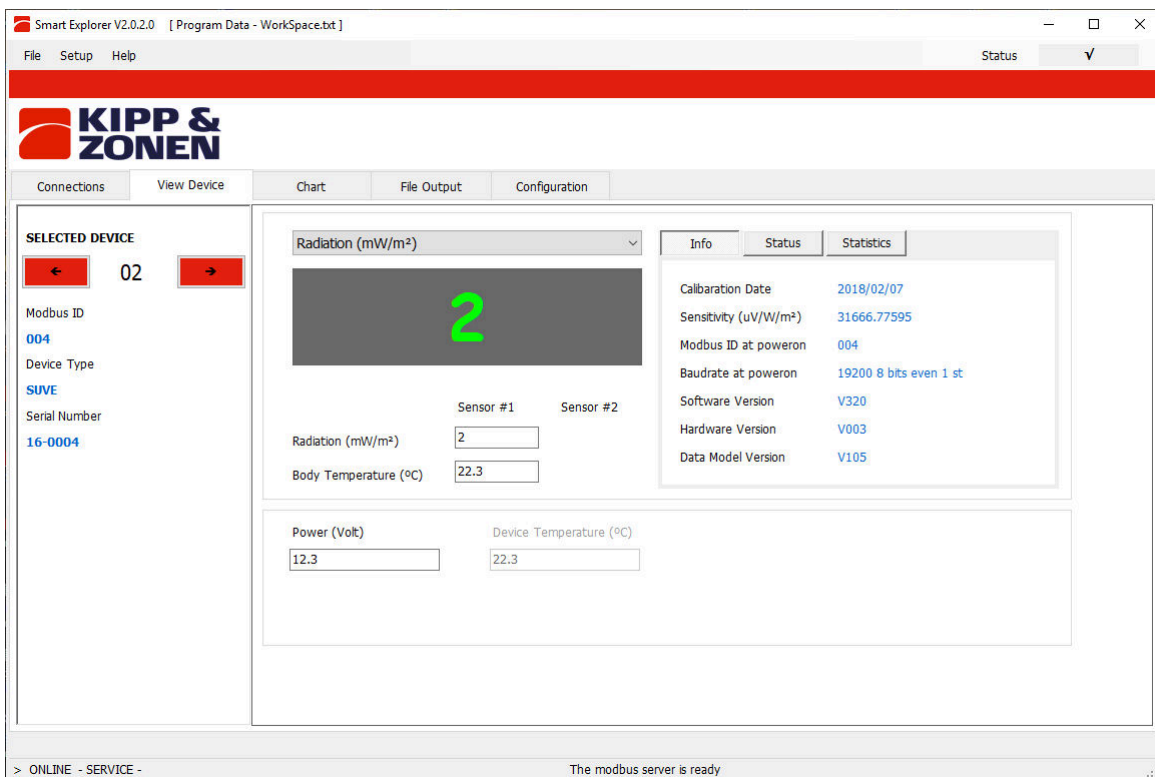


Figure 1 Example window for a SMP6 pyranometer

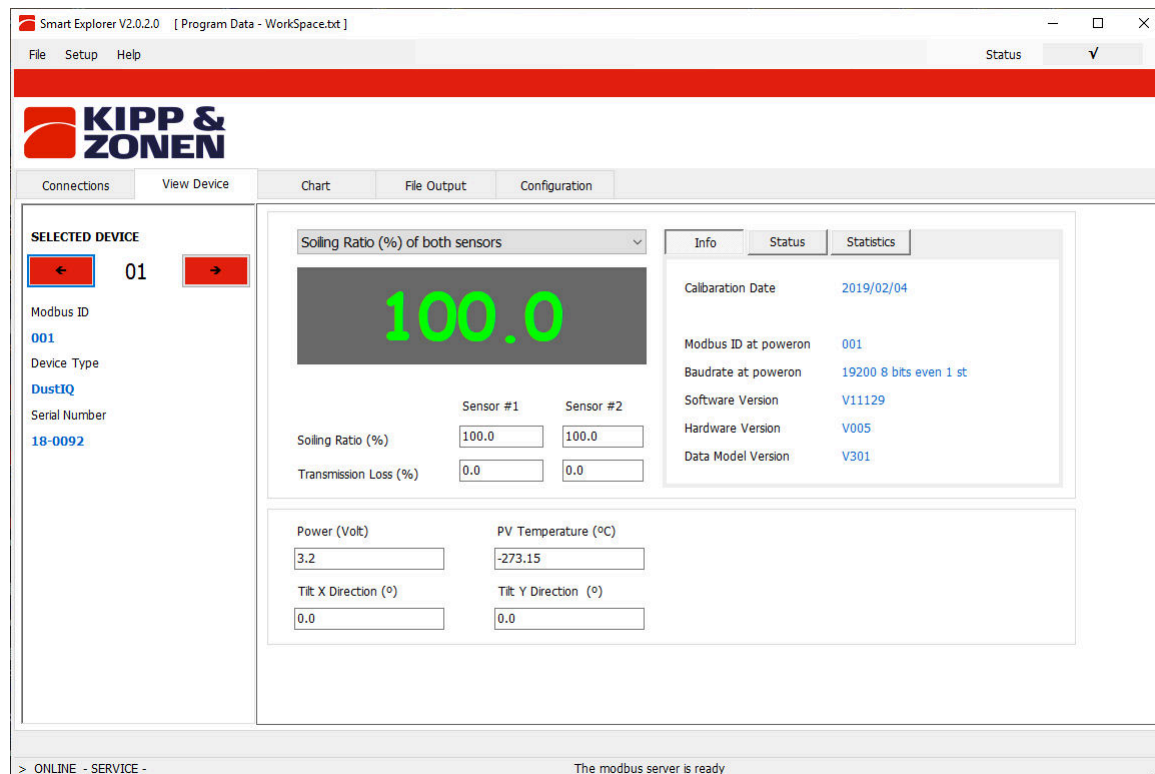
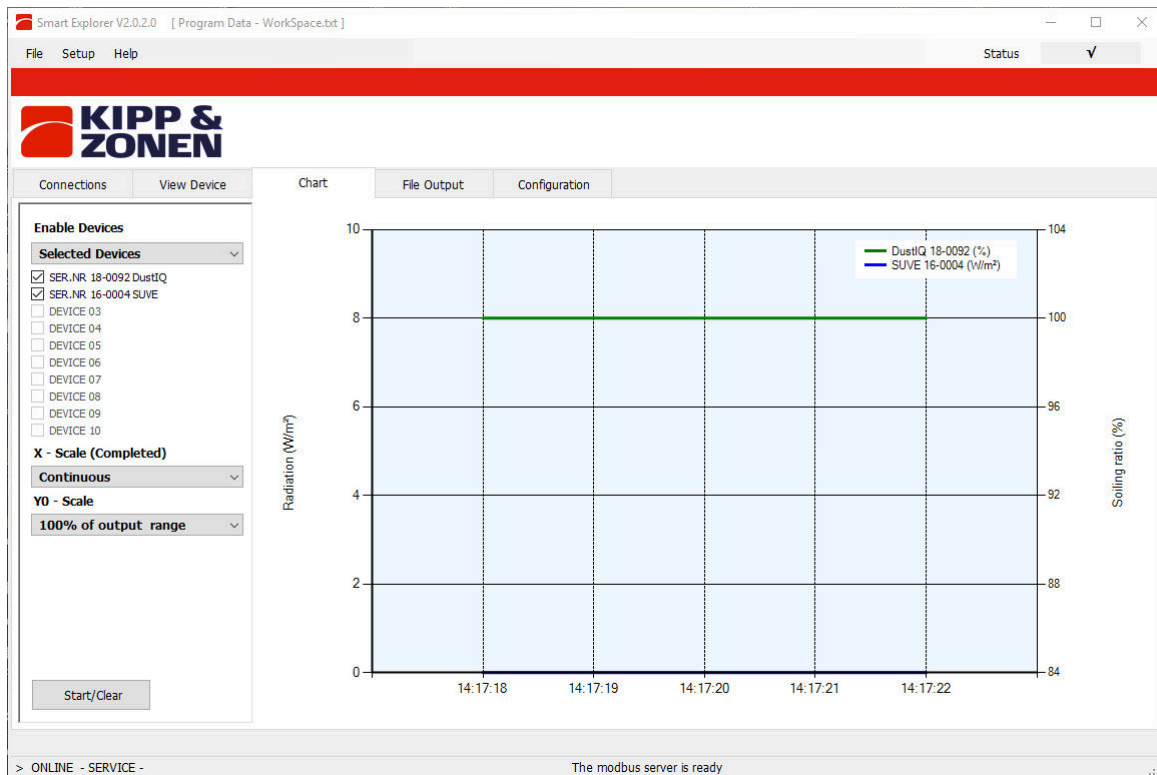


Figure 2 Example window for an attached DustIQ

2.8. Main window – Chart

The chart windows shows a simple rudimentary chart of the selected devices. The scale for the sensor 1&2 average soiling ratio is on the left-hand side.



Enable Devices

Selected Devices

- SER.NR 10-0003 SMP6-V
- SER.NR 18-0092 DustIQ
- DEVICE 03
- DEVICE 04
- DEVICE 05
- DEVICE 06
- DEVICE 07
- DEVICE 08
- DEVICE 09
- DEVICE 10

X - Scale (Completed)

Continuous

- Continuous**
- 1 minute
- 15 minutes
- 1 hour
- 12 hours
- 24 hours

Select the devices you want to monitor and the horizontal scale.

Y0 - Scale

100% of output range

- 100% of output range**
- 120% of output range
- 50% of output range
- 20% of output range
- 10% of output range
- 5% of output range
- 2% of output range
- 1% of output range
- 0.5% of output range
- 0.2% of output range
- 0.1% of output range

Select a y-axis scale appropriate for the expected maximum radiation.

An in-house test with a smartphone as radiation source and SMP6 as sensor would make it logical to select 5% of output range.

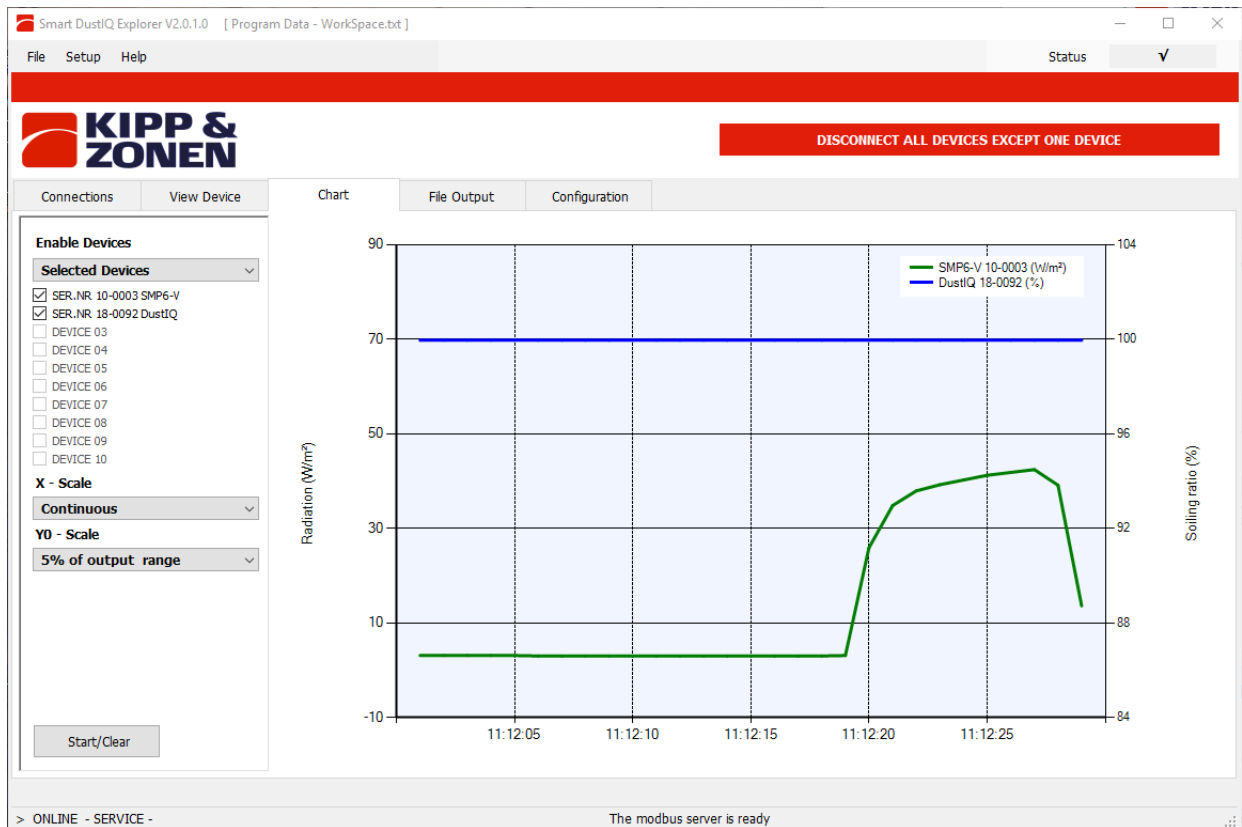
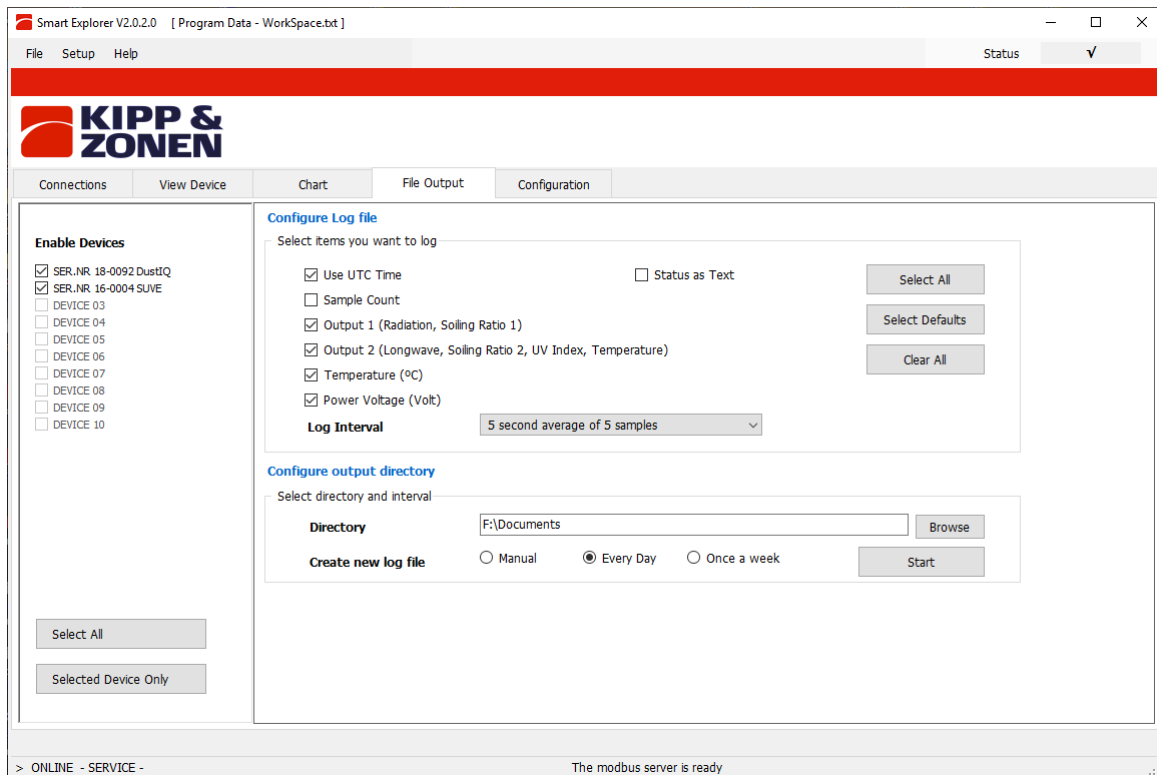


Figure 2 Example output of a pyranometer and smartphones light source using 5% for y-axis

Start/clear and Stop do exactly what they say.

2.9. Main window – File Output

For logging the data gathered from the devices the File Output tab is available. Depending on the attached instruments the proper selections are available.

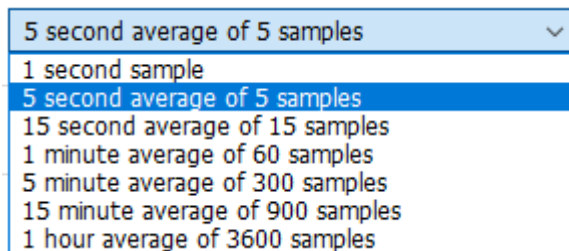


The instruments need to be selected under **Enable Devices**.

The measured values to be logged need to be selected under **Select items you want to log**.

For log files without Summer / Winter time issues it is advised to use UTC time (Universal Time Coordinated).

The **log interval needs** to be selected:



The **directory** where the log file will be saved needs to be selected by clicking on the **Browse** button and navigating to the right directory.

The moment when a new log file is created needs to be selected: **Manual** waits for the user to Start and Stop and Start again. A new file is created when the time between Stop and Start is more than 1 minute.

Every day starts a new file every day at 00:00 hr and **once a week** starts a new file on Sunday 00:00 hr.

After clicking **Start**  will be visible on the left-hand bottom.

After clicking **Stop** a CSV file is available in the selected directory and it is named LOGyymmdd-hrmm.CSV.

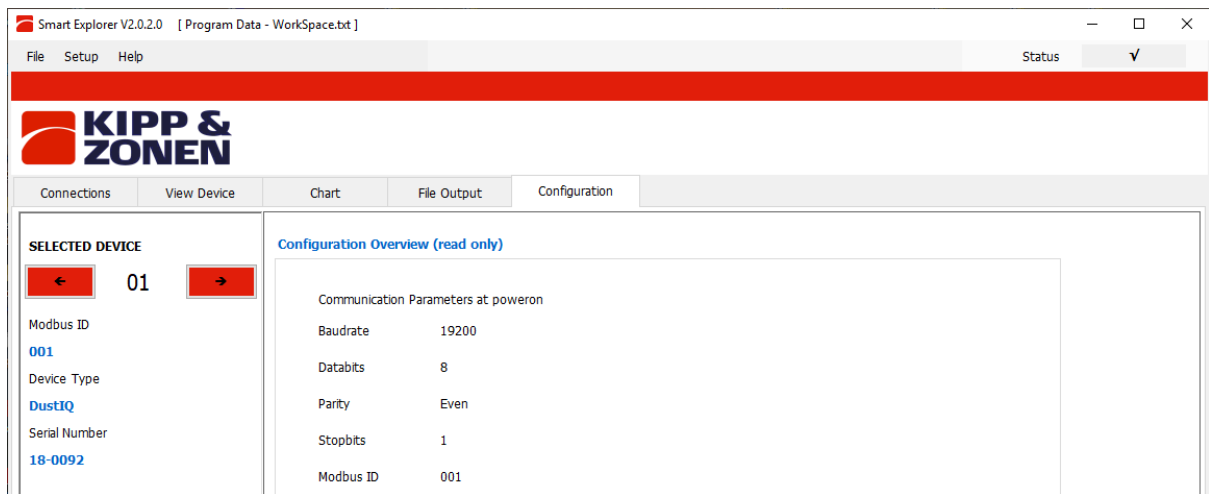
Where yymmdd is the date, e.g.190504 and hrmm the time the file was created e.g. 1315 or 0000.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	.text	Smart DustIQ Explorer												
2	.text	Version 2.0.1.0												
3	.text	Copyright (C) 2018 Kipp & Zonen												
4	.text													
5	.text	Logfile created on		26/04/2019										
6	.text													
7	.text	Date	Time	Channel	Status	Modbus II Serial Nr	Type	Softw. Rel	Hardw. Re	Sensitivity	Scalefactor			
8	.text	26/04/2019	09:22:50	1	Ready	1 10-0003	SMP6-V	V201	V002	14.6652	0.1			
9	.text	26/04/2019	09:22:50	2	Ready	3 18-0092	DustIQ	V11129	V005	1	0.1			
10	.text	26/04/2019	09:22:50	3	n.a.									
11	.text	26/04/2019	09:22:50	4	n.a.									
12	.text	26/04/2019	09:22:50	5	n.a.									
13	.text	26/04/2019	09:22:50	6	n.a.									
14	.text	26/04/2019	09:22:50	7	n.a.									
15	.text	26/04/2019	09:22:50	8	n.a.									
16	.text	26/04/2019	09:22:50	9	n.a.									
17	.text	26/04/2019	09:22:50	10	n.a.									
18	.text													
19	.text													
20	.text	Channel	<>	Ch.1				Ch.2				Ch.3		
21	.text	Info	<>	Radiation	<>	Body Tem	Power	Soiling Rat	Soiling Rat	PV Tempe	Power	Output 1	Output 2	Temperat
22	.text	Serial NR	<>	10-0003	10-0003	10-0003	10-0003	18-0092	18-0092	18-0092	18-0092	N/A	N/A	N/A
23	.text	Date	Time	W/m2	<>	Celcius	V	%	%	Celcius	V	<>	<>	Celcius
24	.data	26/04/2019	09:22:55	2.3	0	22.9	12.4	100	99.9	-273.15	3.2			
25	.data	26/04/2019	09:23:00	2.2	0	22.9	12.4	100	99.9	-273.15	3.2			
26	.data	26/04/2019	09:23:05	2.2	0	22.9	12.4	100	99.9	-273.15	3.2			
27	.data	26/04/2019	09:23:10	2.2	0	22.9	12.4	100	99.9	-273.15	3.2			
28	.data	26/04/2019	09:23:15	2.2	0	22.9	12.4	100	99.9	-273.15	3.2			
29	.data	26/04/2019	09:23:20	8.6	0	22.9	12.4	100	99.9	-273.15	3.2			
30	.data	26/04/2019	09:23:25	36.3	0	22.9	12.4	100	99.9	-273.15	3.2			
31	.data	26/04/2019	09:23:30	41.4	0	22.9	12.4	100	99.9	-273.15	3.2			
32	.data	26/04/2019	09:23:35	32.8	0	22.9	12.4	100	99.9	-273.15	3.2			
33	.data	26/04/2019	09:23:40	5.7	0	22.9	12.4	100	99.9	-273.15	3.2			
34	.data	26/04/2019	09:23:45	3.2	0	22.9	12.4	100	99.9	-273.15	3.2			
35	.data	26/04/2019	09:23:50	3	0	22.9	12.4	100	99.9	-273.15	3.2			
36														
37														
38														


Figure 3 Sample logged data

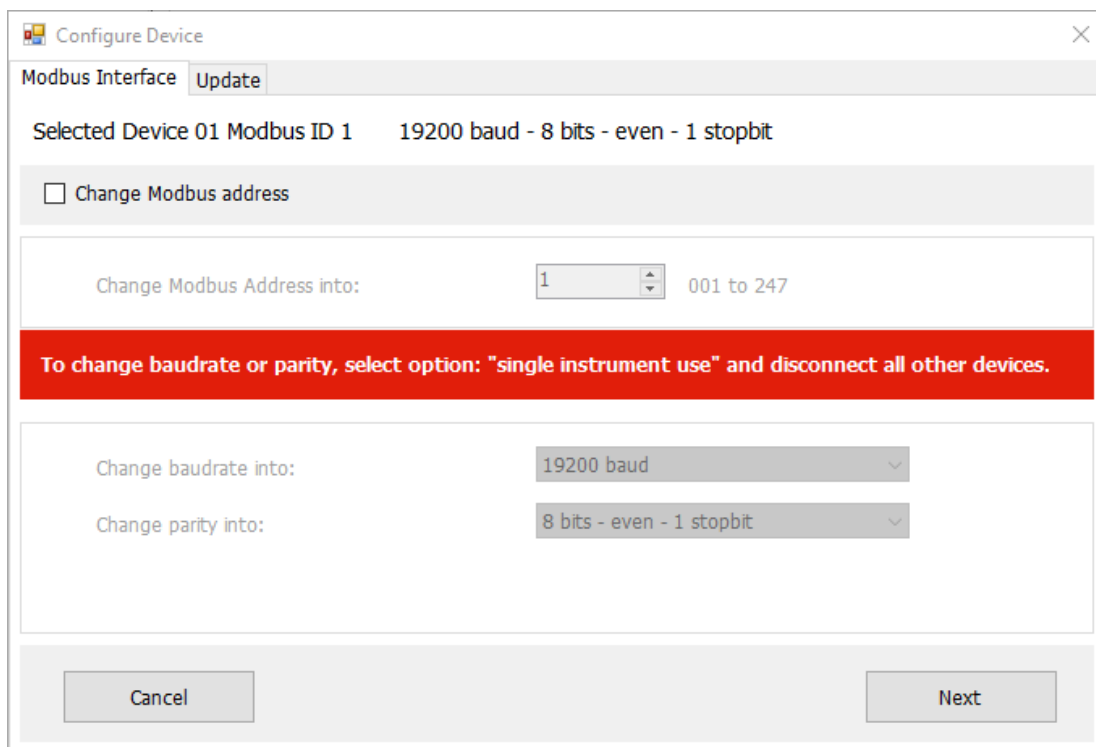
2.10. Main window – Configuration

Clicking the Configuration tab shows the current communications settings.



The place to change the instrument settings.

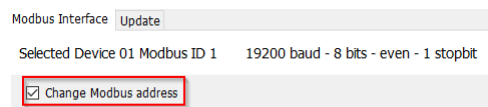
Click on  and a warning is shown. Read carefully.





Go back to the first Connections tab to change to **Single Instrument Use** when the baud rate or parity needs to be changed too. Modbus address changes work also in Normal Network Use.

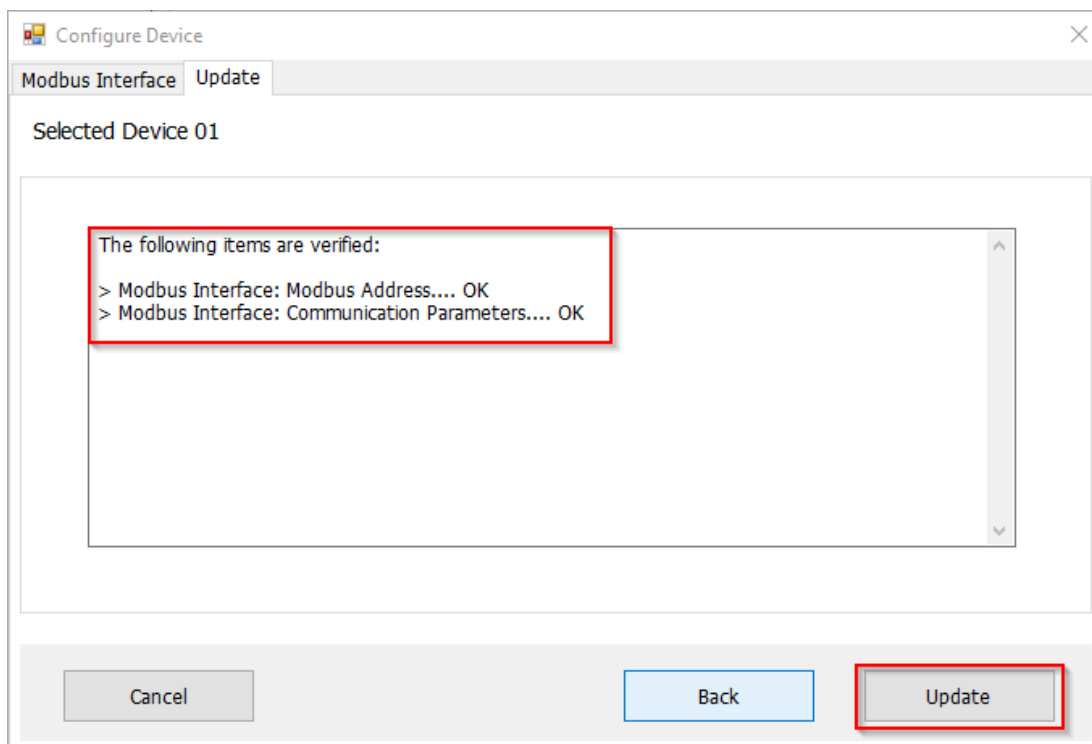
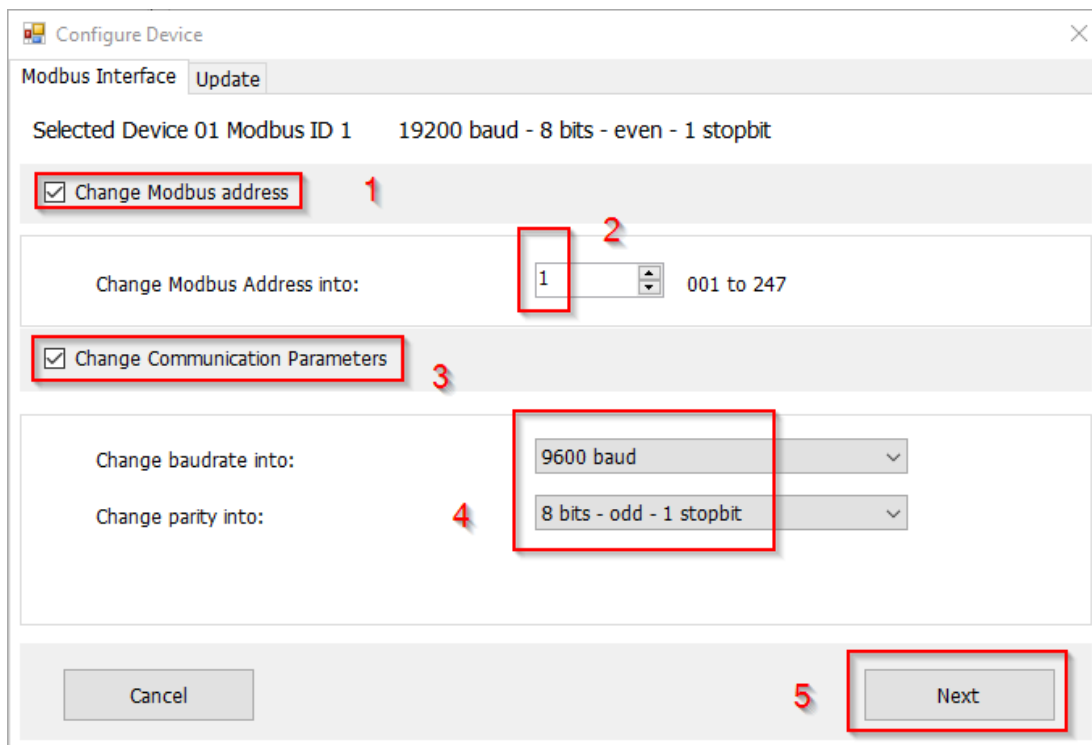
For changing just the Modbus address select **Change Modbus Address** and select the new Modbus address.



followed by Next and Update on the next screen.

Otherwise select the changes needed followed by Next

2.10.1. Changing the communications parameters



If OK with the changes click Update.

After updating the instrument will be reset and take about a minute to be ready again. The communication parameters of the SmartExplorer software have been changed accordingly and a working Connections tab should appear. When finished the program can be closed.

2.10.2. Changing analog output

For the instruments that offer a 0-1V output or 4-20mA the upper and lower range can be changed.

Configure Device

Modbus Interface Analog output Device Options Update

Selected Device 01 Radiation -200.0 W/m² to 2000.0 W/m²

Change Function and Analog output range

Select lower range 4 mA or 0 V ≈ -200.0 -4000 to 200 W/m²

Select upper range 20 mA or 1 V ≈ 2000.0 +250 to 4000 W/m²

Cancel Back Next

Click on the Change Function and Analog output range checkbox and change the upper and lower range to your wishes.

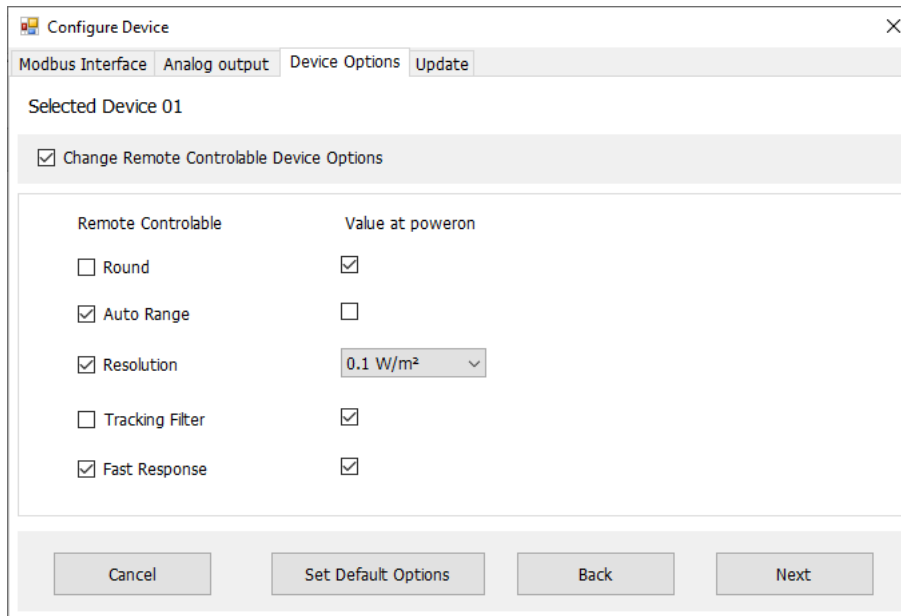
Click Next until you get to the Update tab and click Update.

Note: The settings will be updated and the instrument will be reset. This can take a minute or more.

2.10.3. Changing device options related to output

This tab allows you to select if changes to the mentioned settings are allowed once installed in the field.

A checkmark in front of the setting under the header Remote Controllable makes it possible to change the setting in the field.



A checkmark after the setting under the header Value at power on indicates the setting when the unit is powered Off and On again.

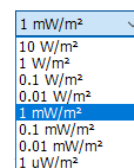
Round When selected the last digit is rounded and not discarded. Default at power on.

Auto Range Depending on the measurement the Resolution is changed. Not advised as one needs to read an extra Modbus register being register 4 – Scale factor. (see instrument manual) to be able to calculate the real value.

Resolution For most instruments 0.1W/m² but SUV A,B and E sensors need a higher resolution as the total amount of UV radiation is lower. Depending on the sensor up to 8 selections are offered.

Preferred resolution

SUV5	0-100 W/m ²	0.1 W/m ²
SUV-A	0- 90 W/m ²	0.1 W/m ²
SUV-B	0 to 9 W/m ²	0.01 W/m ²
SUV-E	0 to 0.9 W/m ²	0.001 W/m ² = 1mW/m ²



SUV-E example

When a wrong resolution is selected and update clicked the following warning will appear.

- > Device Options....
- Error : The selected resolution is not supported by the sensor.
 - The following recommended options are valid:
 - UV sensors (SUVA, SUVB, SUVE).... 0.01 W/m² or 1 mW/m²
 - Pyranometers (SMP3, SMP11 etc)... 1 W/m² or 0.1 W/m²
 - Pyrgeometers (SGR3, SGR3)..... 1 W/m² or 0.1 W/m²
 - Pyrheliometer (SHP1)..... 1 W/m² or 0.1 W/m²
 - To continue: Select the recommended resolution.

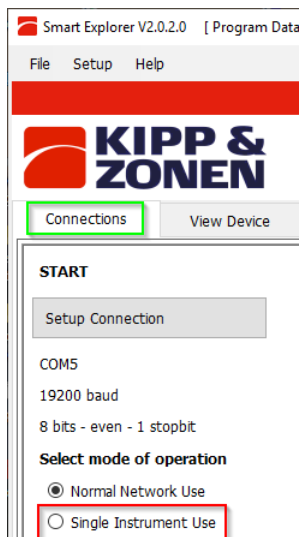
Tracking With tracking on, the instrument will closely follow larger signal changes and suppress very small changes due to noise or fast and small atmospheric changes. Default at power on

Fast Response Improves the response of the sensor. Default at power on for all sensors apart from RT1 and all SUV models as these are fast already and Fast Response could influence the desired output.

3. Finding an instrument with unknown communication parameters

When unsure of the current communication settings of your Kipp & Zonen Smart instrument and unable to connect, there are two ways to try and find a single connected instrument.

First change to Single Instrument Use in the Connections tab.



When the communication parameters are known and properly setup and only the Modbus ID is unknown, a Send Broadcast will find the attached instrument and show it.

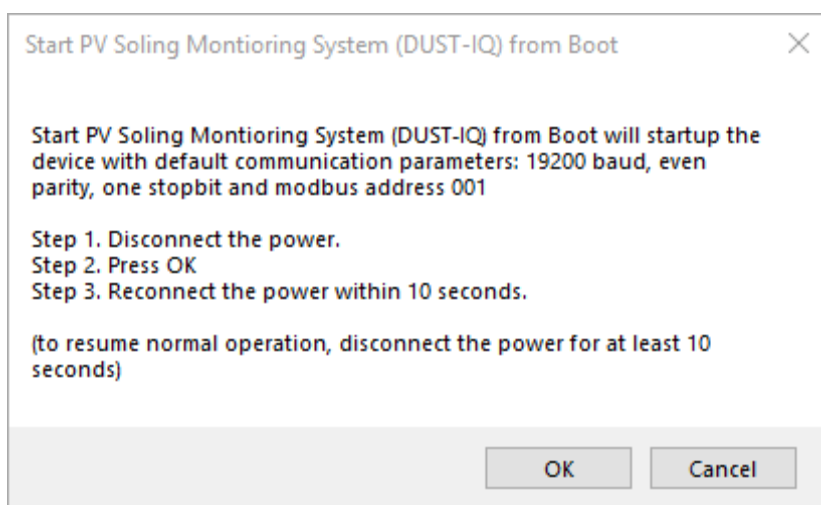
EXPLORER OVERVIEW

Id	Serial Nr.	Type	Communication Status
001	16-0001	DUST-IQ	Ready (ok)

If no instrument is found then mostlikely also one of the communication parameters is wrong or unknown.

To always find a Smart instrument, there is the **Start From Boot** procedure that involves shortly switching the power removing the cable from the instrument to perform a Power Off – Power On.

Click on Start From Boot and the following window will appear:



Follow the instructions given and the instrument will be found.

EXPLORER OVERVIEW

Id	Serial Nr.	Type	Communication Status
001	16-0009	DustIQ	Device started from boot

Info	Status	Statistics
Calibration Date	2018/02/07	
Sensitivity (uV/W/m ²)	31666.77595	
Modbus ID at poweron	004 (Actual 001)	
Baudrate at poweron	19200 8 bits even 1 st	
Software Version	V320	
Hardware Version	V003	
Data Model Version	V105	

Modbus ID (or address) of the device is 4. After **Start From Boot** the ID temporary is 1.

After about a minute the Connections tab will show reliable measurement results and the communication parameters setup of the instrument can be seen, written down and when needed, be changed using the **Configuration** tab.

Chart	File Output	Configuration
-------	-------------	---------------

Configuration Overview (read only)

Communication Parameters at poweron	
Baudrate	19200
Databits	8
Parity	Even
Stopbits	1
Modbus ID	004

Once the instrument has been detected the following temporary settings are used: baud rate 19200, 8 bit, even, 1 stop bit.

Note: After connecting the instrument using **Start From Boot** and being finished with observation or configuration the instrument must be powered down for at least 10 seconds and then powered up again to be connected in a normal way.

4. Connecting your sensor

Please follow the instructions that came with your instrument to properly attach the wire ends of the cable to your USB-RS485 converter or LAN to RS485 converter.

For this you will also need the manual that came with your converter.

RT1 rooftop sensor with black data cable (early models)

Electrical Connection		
Wire	Function	Connect with
Yellow	Modbus® RS-485	Data +
Grey	Modbus® RS-485	Data -
Green	Modbus® common / Ground	
Red	Power 5 to 30 VDC (12 V recommended) 60 mW max.	
Blue	Power ground	
Shield	Housing	Ground *

* Connect to ground if radiometer not grounded

RT1 rooftop sensor with yellow data cable (later models)

Electrical Connection		
Wire	Function	Connect with
Yellow	Modbus® RS-485	Data +
Grey	Modbus® RS-485	Data -
Green	Modbus® common / Ground	
White	Power 5 to 30 VDC (12 V recommended) 60 mW max.	
Black	Power ground	
Shield	Housing	Ground *

* Connect to ground if radiometer not grounded

All SMP, SGR, SHP, SUV models

Radiometer Connection		
Anschluss • Raccordement • Conexión		
Wire Kabel Fil Cable	Function Funktion Fonction Función	Connect with Anschluss an Relier à Conectar con
3 Green Grün • Vert • Verde	Analogue out	
6 Brown Braun • Brun • Marrón	Analogue ground	
4 Yellow Gelb • Jaune • Amarillo	Modbus® RS-485	Data +
5 Grey Grau • Gris • Gris	Modbus® RS-485	Data -
7 White Weiss • Blanc • Blanco	Power 5 to 30 VDC (12 V recommended)	
8 Black Schwarz • Noir • Negro	Power ground	
1 Red Rot • Rouge • Rojo	None	Not connected
2 Blue Blau • Bleu • Azul	Modbus® common / Ground	
Shield Abschirmung Protection Malla	Housing Gehäuse Boîte Cubierta	Ground * Erde Terre Tierra

* Connect to ground if radiometer not grounded
Mit Erde verbinden, wenn das Radiometer nicht geerdet ist
Reliez à la terre si le radiomètre n'est pas connecté
Conectar a tierra si el radiómetro no lo está

DustIQ

Cable connection

Wire	Function	Connect with
Yellow	Modbus® RS-485	Data +
Grey	Modbus® RS-485	Data -
White	Power 12 to 30 VDC	
Black	Power ground	
Blue	Modbus® common / Ground	Ground
Shield	Housing	Ground*

* Connect to ground if DustIQ is not grounded

5. Command line options

For advanced users.

The SmartExplorer software can be started from the Command prompt (DOS box) and use previously saved settings in a Workspace file. Even several instances can be started independently when needed. This can be done manually or automated using the Task Scheduler built in Windows.

Open a Command prompt in Windows.



Command Prompt
Desktop app

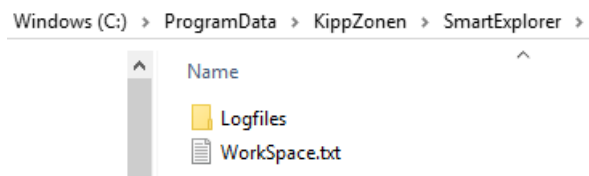
Use the CD command to go to the right directory

E.g. `cd "Program Files (x86)\KippZonen\SmartExplorer"`

```
Administrator: Command Prompt
C:\>cd "Program Files (x86)\KippZonen\SmartExplorer"
C:\Program Files (x86)\KippZonen\SmartExplorer>_
```

Then type `SmartExplorer filename.txt` where `filename.txt` has the complete path to the saved and optionally copied workspace file.

Normally the workspace is saved in: `"C:\ProgramData\KippZonen\SmartExplorer"`.



The SmartExplorer program will then start and open with the settings as saved in the used workspace.

6. Trouble shooting

Q: I get no connection whatsoever with my instrument.

A:

- Did you check the power to the instrument?
- Are the data signals connected correctly ? Kipp prefers to use Data + and - as A, A' and B, B' are not used consistently between suppliers. When in doubt, a voltmeter can help as the Data + input of the converter should have a slight higher voltage than the Data - input.
- Are you using the right COM port ?
- Did you try **Start from boot** ?
- Did you restart the SmartExplorer software ?
- Do you have another instrument that works ?

Q: Why am I getting strange results for “Value at power on” and my current setting ?

A: Did you use Start From Boot and continued working **without** 10 seconds Power down and Power On ? Then power off, wait more than 10 seconds and power on again. The unit then uses the stored power on settings.

When using an industry standard USB-RS485 converter the following connections need to be made.

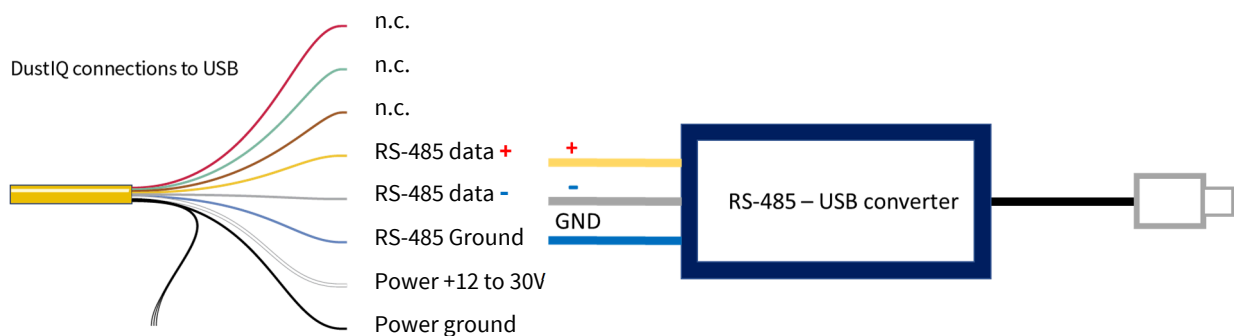


Figure 4 DustIQ example but other instruments are often the same.
Check the instrument's manual.



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Meteorology Division of

