



V1803-01

Instruction Manual

LOGBOX SE

Declaration of Conformity



Kipp & Zonen B.V.
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P.O. Box 507, 2600 AM Delft
The Netherlands

declares under our sole responsibility that the product

LOGBOX SE

to which this declaration relates, is in conformity with European Harmonised Standards as published in the Official Journal of the EU, based on the following standard

[EMC - Emissions] **EN 61326-1:2013** and **EN 61326-2-1:2013**
[EMC - Immunity] **EN 61326-1:2013** and **EN 61326-2-1:2013**
[Health and Safety] **EN 60950-1:2001**
[RF spectrum efficiency] **EN 301 511:v9.0.2**

following the provisions

EMC-directive **2014/30/EU**

LV-directive **2014/35/EU**

RED-directive **2014/35/EU**

also, this device complies to
[EMC - FCC] **Title 47CFR part 15**

Delft, 1 March 2017



E. Valks - CEO
Kipp & Zonen B.V.

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3 NOTES

Reading this entire manual is recommended for a full understanding of this product.



The exclamation mark within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance instructions in the literature accompanying the instrument.

Kipp & Zonen reserve the right to make changes in the specifications without prior notice.

WARRANTY AND LIABILITY

Kipp & Zonen guarantees that the product delivered has been thoroughly tested to ensure that it meets its published specifications. The warranty included in the conditions of delivery is valid only if the product has been installed and used according to the instructions supplied by Kipp & Zonen. This product is under warranty for 24 months from the date of purchase.

Modifications made by the customer or on customer request can affect the validity of the CE declaration.

Kipp & Zonen shall in no event be liable for incidental or consequential damages, including without limitation, lost profits, loss of income, loss of business opportunities, loss of use and other related exposures, however caused, arising from the faulty and incorrect use of the product.

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In the case you have questions, comments or need technical support, please contact us at the following address:

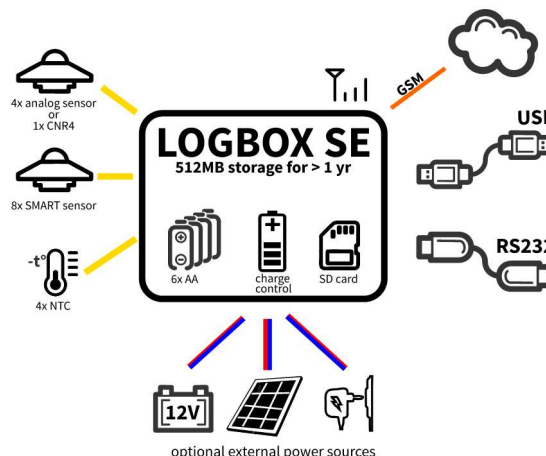
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Note: in case technical support is required please add the configuration file of the Software interface, the log files in TXT or XLS format, add the serial number of the LOGBOX SE, and please describe your inquiry in as much detail as possible.



4 INTRODUCTION

The LOGBOX SE is a data logger for slow varying low voltage 0-3V signals. It features low noise, high resolution and low power consumption.

The LOGBOX SE is a universal data logger, configurable by software, suitable for mobile as well as permanent installation and can be used in a laboratory and in the field. It can be used under all weather conditions. A mounting plate for installation on a mast or pole is provided.

5 OVERVIEW

The LOGBOX SE is designed for measuring, processing and recording (data logging) measured data in real time for the needs of relatively slow signals analyses. It is designed for ultra-low power consumption and will run many weeks unattended on the internal AA batteries.

It offers four analog inputs, which can be configured by software as unipolar inputs or as bipolar differential inputs with 24 bit resolution as well as four single ended inputs with 12 bit resolution. With definition of polynomial coefficients (of the 3-rd order) measured values can be converted to engineering units on the fly.

Four digital inputs are configurable by software for measuring frequency, time or as counters. Again, with definition of polynomial coefficients (of the 3-rd order) the measured values can be converted to engineering units.

Internal values that can be logged are: V_{RTC} , V_{MAIN} , V_{POWER} , V_{OUT} , GSM signal and Atmospheric pressure.

All logged data will be stored on the internal SD card which comes with 512MB capacity and is enough for a few years of data logging.

For optional communication to a PC the LOGBOX SE uses either its RS-232 communication port, the internal USB port or the GSM modem. For longer physical data lines the RS-232 signals can be converted to RS-485 by using locally bought RS-232 to RS-485 converters.

A Real Time Clock circuit keeps track of time and date and is powered from a standard C2032 lithium battery. Operational life is more than 10.000 hours. The clock can be synchronised daily using the GSM modem with the right 2G GPRS SIM card.

For signalling and powering external devices the LOGBOX SE has a built-in output capable of handling a current up to 200mA.

Additionally, a precise reference voltage of 2.5Vdc is available of which the exact value is printed on the calibration sheet supplied with each unit and stored in non-volatile memory.

The LOGBOX SE offers 6 waterproof cable glands for feeding cables to the internal connectors like sensors, solar panel or external power supply or battery.

6 SPECIFICATIONS

Differential inputs		
Number of analog inputs	4	A9 – A12
Input ranges	8	19, 38, 78,156, 312, 625, 1250, 2500mV
Max. number of instruments without temperature sensor	4	2-wire signal
Max. number of instruments with Pt100	1	2-wire signal & 4 wire Pt100 thermistor
Max. number of instruments with 10k NTC	4	2-wire signal & 2 wire 10k NTC to single ended
Max. voltage allowed on input	5V	
Resolution	24bit	
Single ended inputs		
Number of analog inputs	4	AIN1 – AIN4
Input ranges	2	0 – 2.5V on AIN1 & AIN2 0 – 3V on AIN3 & AIN4
Max. number of 10k thermistors	4	2-wire
Max. voltage allowed on input	5V	
Resolution	12bit	
Digital inputs		
Number of inputs	4	DIN1 – DIN4
Input selections	3	Time, Frequency, Counter
Max. voltage allowed	15V	
Max. input frequency	1500Hz	
Logic level	3V	CMOS, DIN4 0.5V for CDS3
Serial inputs		
Number of RS-485 inputs	8	Use one common RS-485 connection
Supported models	5	SMPxx, SGRxx, SHP1, SUVx, RT1
General specifications		
Input offset differential max.	0.5µV	
Inaccuracy differential	0.05%	
Inaccuracy single ended	0.1%	
Memory	SD card	512MB included, 4GB max FAT formatted And 16GB FAT32 formatted
Internal power supply	6x AA battery	
Power connection (PWR)	4 – 24V _{DC}	General input when internal batteries are not used
Solar power connection (SOLAR)	12 – 20V _{DC}	From optional solar panel
Battery power connection (BATT)	12V _{DC}	12V Pb battery, max. charge 750mA
Charger connection (CHARGER)	6 – 13V _{DC}	Used to charge the 12V Pb battery
Battery out (BATOUT)	12V -750mA	Constant power to drive instruments
Power out (PWROUT)	Follows PWR	Switched power max. 200mA
Power consumption	From 6x AA battery or PWR	1mA standby, 7mA short burst when storing data max. 100mA with GSM modem working Doesn't include powered instruments
Power via USB	Possible	Only with opened box, for logger setup
Temperature range	-40 to 60°C	
Dimensions	170x145x50mm	
Protection	IP65	
Mounting	∅ 45mm	Pole / mast mounting
RTC accuracy (without synchronization)	10ppm	
Time synchronization	once a day over internet	If ModemInterval is not zero
GSM modem specifications		
Model	Cinterion MC75i	www.gemalto.com/m2m/solutions/downloads

6.1 Power consumption estimates

For safe scenario's it is advised to calculate with 50-60% of the mAh capacity as indicated on the battery used. This takes into account the self-discharge of most batteries and the possibly needed peak current for the GSM modem.

Smart digital instrument need to remain powered all the time as the power-on sequence takes time and most instruments need to reach a temperature equilibrium. The switched on instruments will have a significant impact on the power consumption.

A Kipp & Zonen Smart instrument on average uses 8mA on low voltages (5-9V) and 4mA on higher voltages.

Tabel updated 20-03-2018 Valid for 12V power

Scenario	Instruments	Measurement interval seconds	GSM data transfer	LogboxSE and instrument current in mA	mAh per day LogboxSE and instruments
1	Analog	60	None	0.15	3.6
2	Analog	1	None	1.5	36
3	Analog	1	Every 24 hr	1.51	37.7
4	Analog	1	Every hr	3.2	76
5	Smart digital 1x	1	None	7	168
6	Smart digital 2x	1	None	11	264
7	Smart digital 4x	1	None	19	456
8	Smart digital 4x	1	Every 24 hr	19.07	457
9	Smart digital 4x	1	Every hr	20.7	496

Tabel updated 20-03-2018 Valid for power from 6x AA battery

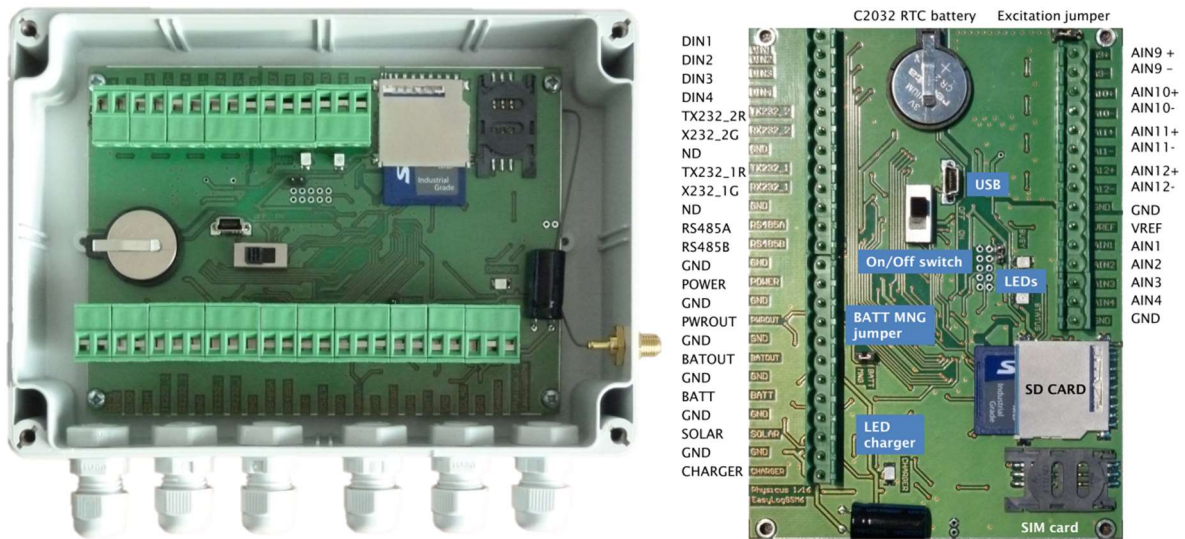
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4	Analog	1	Every hr	3.2	76
5	Smart digital 1x	1	None	11	264
6	Smart digital 2x	1	None	16	456
7	Smart digital 4x	1	None	35	840
8	Smart digital 4x	1	Every 24 hr	35.07	841
9	Smart digital 4x	1	Every hr	36.7	880

Running Smart instruments on 6x AA battery is not practical.

Estimated days of working time = mAh of batteries *50% ÷ (mAh per day LogboxSE and instruments)

Hardware

Mechanical solution of LOGBOX SE is based on single board design with minimal dimensions, weight and power consumption.



Thanks to clear layout the user can easily connect relatively large number of sensors. For better access to input connections, connectors are divided by two or three and removable.

The mounting plate can be used to connect the LOGBOX SE to a mast of 45 mm or smaller.

Unused cable glands are closed with an inside plug.

For permanent installation it is possible to use four screws $\varnothing 4\text{mm}$ for fixing, while retaining IP65 class protection.

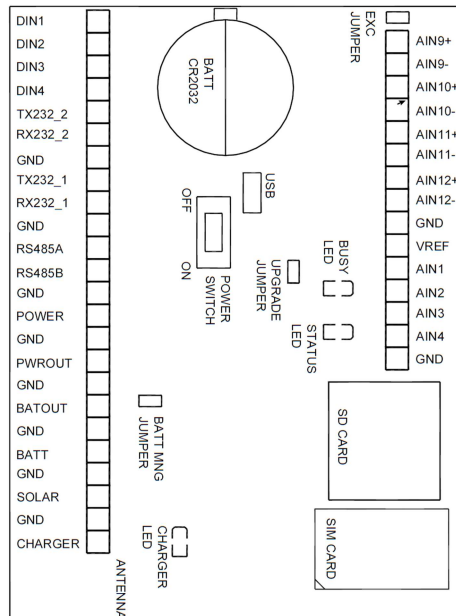


Fig.3 Description of major parts

The LOGBOX SE board has the following components and connectors:

Lithium battery, CR2032 - reserved for real time clock.

During normal operation the RTC is powered by the available power supply.

Off - On switch - small switch for turning the LOGBOX SE off (sleep except real time clock). It is used when exchanging the SD card or when the data logger is not used.

EXC jumper - this jumper offers excitation for Pt-100 sensors. It connects a $3.9\text{k}\Omega$ resistor from the 2.5V reference voltage to AIN9+. If no Pt-100 is used, do not connect it.

BATT MNG jumper - this jumper is used when your power supply is a 12Vdc solar panel or charger input (5Vdc to 12Vdc). If this jumper is removed, the only power source input is POWER and the control circuitry of the charger is disconnected. This leads to minimum power consumption during operation.

SD memory card - any SD memory card larger than 128MB can be used. The card is used only for data storage and is not intended for more manipulation (deleting or other operations). The unit comes with an industrial grade 512MB FAT formatted SD card.

GSM SIM card holder - this will take your full-size SIM card which must have appropriate internet data services.

STATUS LED - this RED LED flashes every 5 seconds to indicate data logger operation (switched on and powered). This feature is useful when long time between measurements is selected and the user needs indication that logger is operating.

BUSY LED - this GREEN LED is on when data is written to the SD card. Do not remove the card when this LED is on, as it will result in unwanted open files and data loss.

SOLAR LED - this BLUE LED indicates charging of your 12V Pb battery from the CHARGER input. When the battery voltage reaches its maximum value this indicator will flash, otherwise it will be on permanently. If there is no power on CHARGER or SOLAR this indicator will be off.

POWER - the user can connect any type of power source (ZnMn, alkaline, NiCd, NiMH, lithium, lead acid battery, solar panel, mains adapter) with output voltage in the range of 4Vdc - 24Vdc. The top lid can hold 6x AA battery.

PWRROUT - switched power output for powering local sensors or instruments.

VREF - switched reference voltage of 2.5V for bridge or similar instruments. The exact voltage can be found on the calibration sheet that came with the unit.

AIN1 to AIN4 - analog single ended inputs with 12 bit resolution. Input range is 0V to 2.5V for AIN1, AIN2 and 0V to 3.0V for AIN3 and AIN4.

A9 + and - to A12 + and - - differential input pairs with 24 bit resolution. The inputs can set as unipolar or bipolar inputs with range from 0...19mV (-19mV ... +19mV bipolar) to 0...2.5V (-2.5V ... +2.5V bipolar) by software.

GND - ground pins. All GND pins are electrically connected on the board. For analog inputs GND pins are separately routed for best low noise performance.

DIN1 to DIN4 - digital inputs. Can be selected as frequency input, counter input or time of logical one input by software.

RX232_1 and TX232_1 - Serial line COM1 signals. Software configurable serial port for communication with serial sensors. This COM1 is shared with the RS-485 port for SMART serial devices.

RS-485A and RS-485B - Serial line COM1 signals used for RS-485. Software configurable serial port for communication with SMART serial devices (e.g. SMP-series).

RX232_2 and TX232_2 - Serial line COM2 signals. Software configurable serial port for sending reports with logged or measured data and for communicating with the LOGBOX SE to check and change settings or read data.

BATOUT - output of power supply backed up by connected battery. This output is used for powering devices or sensors which needs continuous power (e.g. wind speed sensor). It has deep discharge protection feature.

BATT - input for connecting 12Vdc lead acid battery. The battery is conditioned (charged by approx. 350mA and protected from deep discharge condition at about 10.5V). BATT MNG jumper must be inserted for this to function.

SOLAR - input for solar panel with nominal 12Vdc output. BATT MNG jumper must be inserted.

CHARGER - input for charger source with 5Vdc to 12Vdc output. BATT MNG jumper must be inserted.

ANTENNA - GSM/GPRS antenna for remote data transfer.

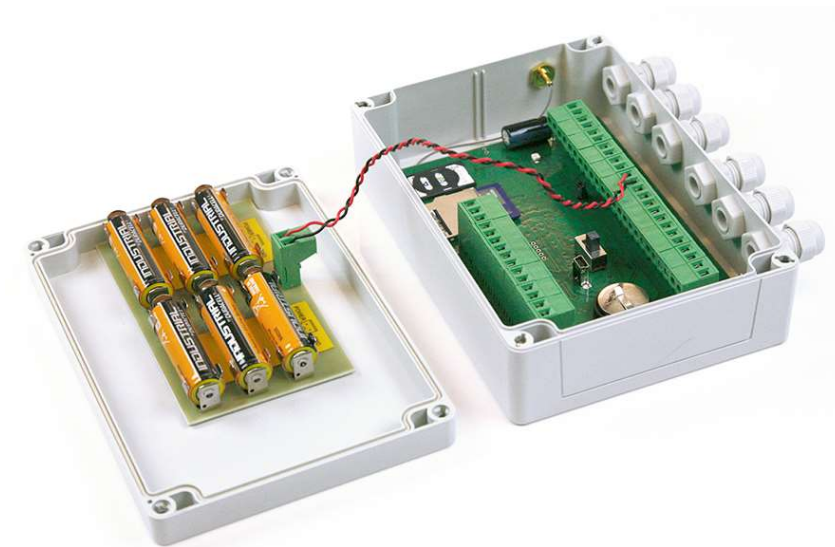
The instrument is mounted in a plastic enclosure (IP65 protection class) allowing outdoor installations. For smaller measuring systems it is possible to use 6 pieces of AA battery (mignon) inside the battery compartment which is attached to the lid of the enclosure. This results in a compact and portable solution using the LOGBOX SE.

7 QUICK START

The LOGBOX SE is supplied ready for use. After unpacking it is necessary to open the case by unscrewing the four screws.



With the switch in Off position now connect a power supply in the range of 4...20Vdc to POWER or CHARGER or the lead acid battery to BATT. For mobile power supply there is the holder for six AA type batteries that needs to be connected to POWER with the BATT jumper removed for the lowest power consumption possible.



Last step is to connect the supplied USB cable with the computer. The LOGBOX SE Setup software can be used to setup the logger and related sensors. Do not switch the LOGBOX SE on yet. The USB connection or 6 AA batteries can both supply the board enough electrical power to perform the setup.



The screw terminals for wire connections can easily be removed from the printed circuit board. Thus making cable screw down easier and preventing the printed circuit board from being damaged.



8 USING THE LOGBOX SE

8.1 Connecting power

There are various power supply options. Simple battery management (controlled charging and protection from deep discharge) is provided.

For minimum power consumption there is the POWER input. It is connected directly before power stabilizer, without any charging or battery management option. Only PWROUT output is enabled.

POWER input is used in systems where very small power consumption is expected and there is no charging source available (neither wall adapter, nor solar panel). Jumper BATT MNG must be removed. In this scenario it is possible to use 6xAA batteries with GPRS data transfer.

Alkaline AA batteries can be used but if the GSM modem is used it is advised to use properly charged NiMh rechargeable batteries $\geq 2500\text{mA}$. The LOGBOX SE does not charge the 6 batteries in the holder.

If there is mains power supply available, it is recommended to use the CHARGER input. The input voltage range is from 7Vdc to 13Vdc. In this configuration a 12V lead acid battery can be connected with power management. Jumper BAT MNG must be inserted. If correct CHARGER input is connected the SOLAR blue LED will light, indicating battery charging.

Very similar input is for solar panels on input SOLAR. It has the same features as CHARGER input. Maximum current from solar panel is approximately 1A. Jumper BAT MNG must be inserted. If a solar panel is connected SOLAR a constant blue LED will indicate charging. Once the battery is full, it will only flash.

Battery management cares for deep discharge condition of the attached 12V lead acid battery. If the voltage drops below approximately 10.5V the battery is disconnected.

BATOUT output is available for powering sensors that must be powered all of the time, like wind speed sensors, Kipp & Zonen SMART sensors or rain gauges.

Overall system operation is as follows: if main switch is in OFF position, only the real time clock is running. Most of other the tasks are disabled. The user can enter service mode and communicate with data logger using a USB service cable.

If main switch is in ON position, full functionality follows and measuring and logging is started, indicated by the flashing red and green LEDs.

8.2 Inserting the SIM and attaching GSM antenna

Before starting to send data over the internet you will need a SIM card with internet connection enabled. The SIM card holder is located on upper right corner.

Sending data via the GSM modem is optional and not needed when local data logging on the SD memory card is sufficient.



Location of the SIM card holder



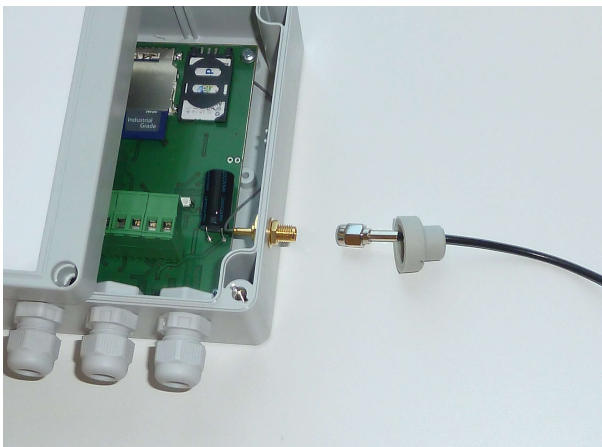
Open the SIM card holder



Place the SIM card

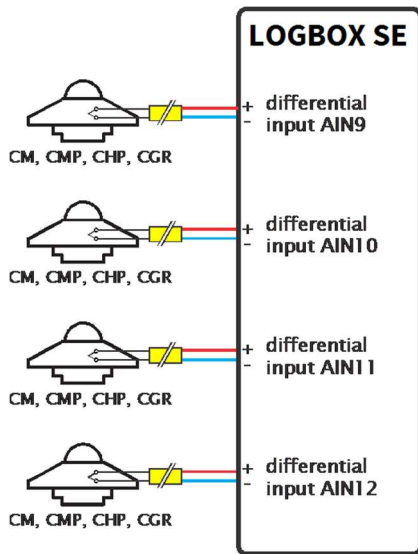


Close the SIM card holder



Now your data logger is ready for operation. For correct modem operation, you need to setup following parameters: ModemPIN, APN and EmailTo address as described in section 10.8

8.3 Connecting to differential inputs



The LOGBOX SE allows you to connect up to 4 sensors on the differential analog inputs AIN9 to AIN12 which have a selectable input from 19mV up to 2500mV.

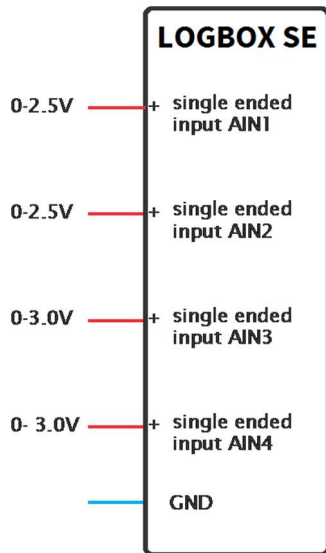
- AIN9+ and AIN9- (first sensor)
- AIN10+ and AIN10- (second sensor)
- AIN11+ and AIN11- (third sensor)
- AIN12+ and AIN12- (fourth sensor)

8.4 Connecting to single ended inputs

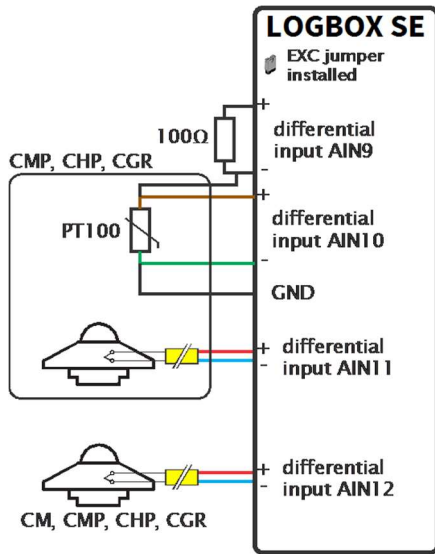
It's possible to connect up to four sensors on the analog single ended inputs AIN1 to AIN4.

Please note that AIN3 and AIN4 can be used to connect sensors which have a slightly higher voltage output up to 3Vdc (like Kipp & Zonen UVS or CSD3 sensors).

Since the ADC always uses 12 bit on the single ended input; the lowest bit on AIN1 & 2 equals 0,61035 mV and on AIN3 & 4 the lowest bit equal 0,73242 mV



8.5 Connecting a sensor with a Pt-100 thermistor



The LOGBOX SE allows you to connect one Pt-100 temperature sensor:

-AIN9+ & AIN9- voltage over 100Ω 0.05% 5ppm/°C reference resistor

$$I_{\text{measure}} = V_{\text{AIN9}} / 100$$

-AIN10+ & AIN10- voltage over Pt-100 thermistor

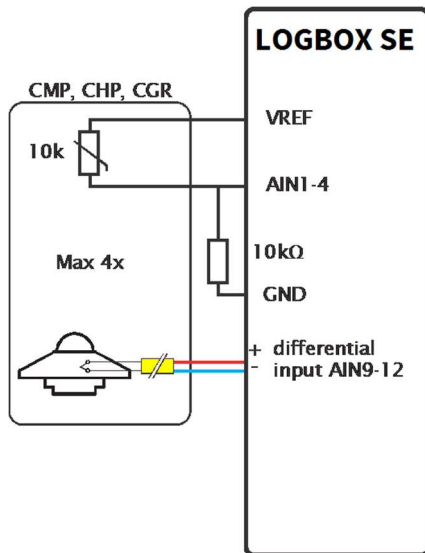
$$R_{\text{Pt-100}} = V_{\text{AIN10}} / I_{\text{measure}} \quad R_{\text{Pt-100}} = 100 \times \text{AIN10} / \text{AIN9}$$

The ratio selection in the setup software can take care of the calculations needed.

After connecting the Pt-100 it's still possible to connect up to two sensors on the differential analog inputs AIN 11 and AIN12.

8.6 Connecting a thermistor.

It's possible to connect up to four thermistors on the analog single ended inputs AIN1 to AIN4.



In the illustration the 10K thermistor is connected to AIN 1 but in practice it can be connected to any of the four analog single ended inputs AIN1 – AIN4.

The polynomials for AIN1&2 are different from the ones for AIN3&4 as these have a voltage divider and low 13.2kΩ input impedance.

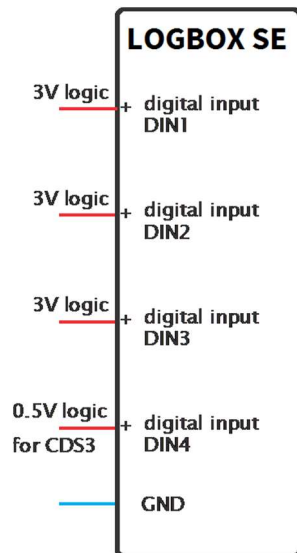
The thermistor can be connected to GND or VREF and polynomials change accordingly.

It's common for a pyrgeometer, pyrheliometer and high-end pyranometer to have a 10K thermistor and four of these instruments in total can be connected.

8.7 Connecting digital inputs

It's possible to connect up to four digital sensors or signals to DIN1 to DIN4.

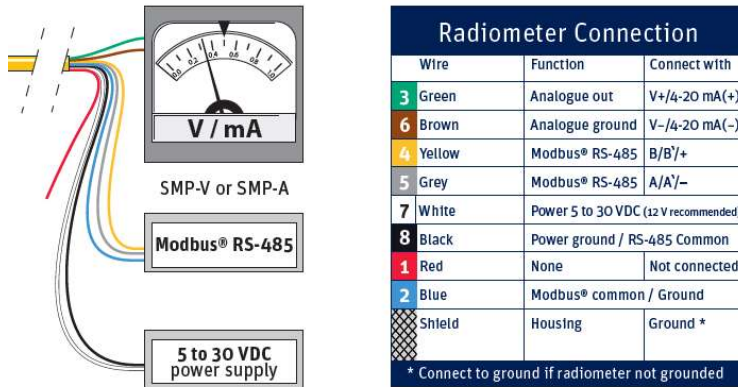
The digital inputs can measure frequency, time logical high, or count Hi-Lo changes.



8.8 Connecting a SMART sensor via RS-485

Up to 8 Modbus® SMART sensors can be addressed by the LOGBOX SE. Each one needs a unique address. Instructions for setting the address are in section 10.9

All Kipp & Zonen SMP sensors have the following connections:



The sensors need constant power to stabilise and to be able to provide fast response to irradiation level changes.

blue and black wire(s) → GND

white wire(s) → BATTOUT or parallel to POWER input

yellow Modbus® B/B'+ wire(s) → RS-485B+ on LOGBOX SE board

grey Modbus® A/A'- wire(s) → RS-485A- ""

The Kipp & Zonen RT1 rooftop sensor uses:

The black and green wire(s) → GND

The white wire(s) → BATTOUT or parallel to POWER input

The grey Modbus® Data + wire(s) → RS-485B+ on LOGBOX SE board

The yellow Modbus® Data - wire(s) → RS-485A- ""

All remaining wires need to be isolated properly.

Typical power consumption SMP-V for maximum output (1 V)		
5 VDC	50 mW	approx. 10.0 mA
12 VDC	55 mW	approx. 4.5 mA
24 VDC	60 mW	approx. 2.5 mA
Typical power consumption SMP-A for maximum output (20mA)		
5 VDC	77 mW	approx. 28 mA with 100Ω load resistor
12 VDC	83 mW	approx. 24 mA with 100Ω load resistor
24 VDC	100 mW	approx. 6 mA with 100 Ω load resistor

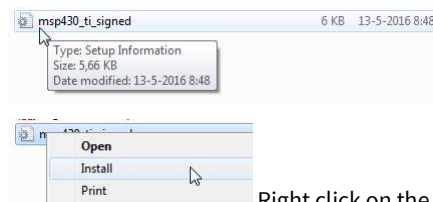
9 PC CONFIGURATION SOFTWARE

The LOGBOX SE Setup software is designed for easy set up of the LOGBOX SE. It is intuitive in use and a full configuration can be made in just a few minutes. The LOGBOX SE Setup software is a simple executable file, without the need for further installation. It is compatible with Windows™ 7, 8 and 10 operating systems 32 and 64 bit.

Name	Size	Date modified	Type
BSL_USB_GUI	454 KB	16-5-2016 8:01	Application
BSL430.dll	25 KB	16-5-2016 8:01	Application extens...
InitialConfig	4 KB	24-5-2016 12:53	Text Document
LogboxGSMSetup	2,565 KB	7-6-2016 17:28	Application
mSP430_ti_signed	6 KB	13-5-2016 8:48	Setup Information

First of all it is necessary to download the files to your computer. Please visit the www.kippzonen.com website, navigate to Data Loggers and the LOGBOX SE, click on Downloads and select LOGBOX SE - Software. Download the ZIP file and unzip the files to the directory on your local computer where you want to store LOGBOX SE Setup files. There is no need for further program installation. For maximum comfort it is advisable to create a shortcut on your desktop.

When the LOGBOX SE is attached via USB the driver will need installation. It is advised to stop the Windows installation of the driver and perform the installation manually.



Right click on the file “msp430_ti_signed” and select Install.

In only a few seconds the driver should be installed.

Now when the LOGBOX SE is attached via the USB cable a COM port will be created. For the software to operate you will need to know the COM port.

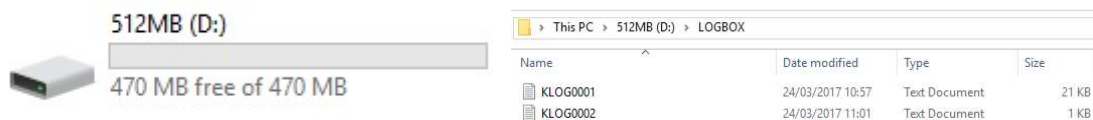
Open Device Manager by clicking on the Windows logo and typing Device Manager and Enter. Or Open the "Run" dialog box by pressing and holding the Windows key, then press the R key ("Run"). Type devmgmt.msc and Enter



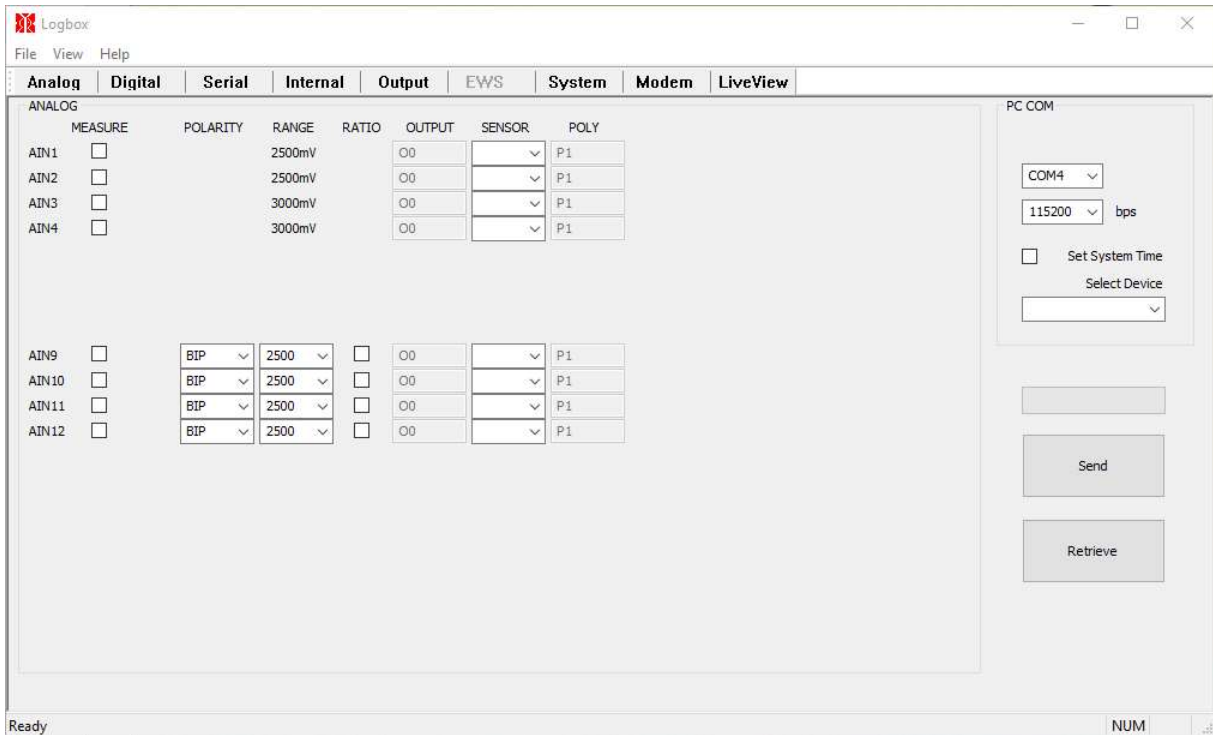
Note the new COM port with TI MSP430 in its name. Any extra LOGBOX SE attached later can get a new and higher COM port. TI MSP430 is only shown when the driver was manually installed. Otherwise a generic driver will be used.

The files starting with BSL are for future use when a new firmware may be made available.

When the USB is connected also a new removable disk will appear. This allows for easy file management like copy and removal. The SD contents visible in the Windows Explorer will be updated when files are removed but will **not** be updated when the logger produces new log files. Then the USB cable must be unplugged and plugged in again.



After starting the software, the following window will appear.



If the software hasn't been able to detect the right COM port please select it in the first dropdown menu under PC COM. No other settings are needed right now.



Now click **Retrieve** to get the current settings from the LOGBOX SE.

After program start **always** click Retrieve to load the program with your current settings and the possibilities of your Logbox SE.

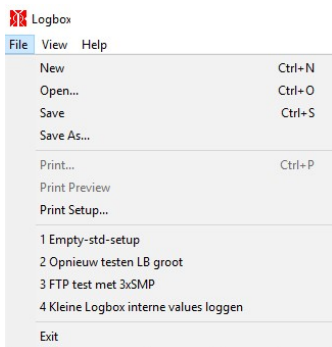


Do not click Send unless you are very certain that the settings in the software are correct. After program start all settings are off or zero and Send would reset your LOGBOX SE completely.

If by accident the LOGBOX SE is reset it is possible to go back to the original settings by selecting File, Open..... and selecting the file Empty-std-setup or your own saved config file and Open. Once this is done a click on Send will transfer the settings to your LOGBOX SE.

9.1 Toolbar

The File menu offers the following:



In this menu you can create new configurations (New) and save them (Save / Save As...), or you can open existing configuration (Open...). Print, Print Preview and Printer Setup are also possible to allow you to have a hardcopy of the settings at hand when changing some settings.

Last four configurations are directly accessible. With Exit you can close the application.



The View menu turns on or off the toolbar and status bars. It's best to leave these on.

9.2 Analog configuration.

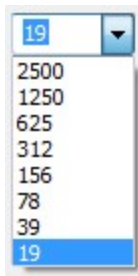
After clicking **Analog** you can select all parameters of the analog inputs. Analog inputs, which should be logged, must be checked in the Measure column.



Any UVS or CDS3 sensor needs to be attached to AIN3 or AIN4 because of their higher output voltage.

ANALOG									
	MEASURE	VECT	POLARITY	RANGE	RATIO	OUTPUT	SENSOR	POLY	
AIN1	<input checked="" type="checkbox"/>	<input type="checkbox"/>				O1		P1	
AIN2	<input checked="" type="checkbox"/>	<input type="checkbox"/>				O0		P1	
AIN3	<input checked="" type="checkbox"/>	<input type="checkbox"/>				O0		P1	
AIN4	<input type="checkbox"/>	<input type="checkbox"/>				O0		P1	
AIN9	<input type="checkbox"/>		BIP	2500	<input type="checkbox"/>	O0		P1	
AIN10	<input type="checkbox"/>		BIP	2500	<input type="checkbox"/>	O0		P1	
AIN11	<input type="checkbox"/>		BIP	2500	<input type="checkbox"/>	O0		P1	
AIN12	<input type="checkbox"/>		BIP	2500	<input type="checkbox"/>	O0		P1	

For the differential input AIN9 to AIN11 one needs to select Bipolar (BIP) and the input voltage range (19 – 2500mV). E.g. a CMP pyranometer will produce max. around 20mV so the 38mV range would be the right selection. A SP Lite2 or equivalent needs the 156mV setting for normal outdoor use.



Inputs AIN9 - AIN12 offer ratio measurements by checking RATIO box. It is designed for Pt-100 measurements, where AIN9 is connected to a high precision 100Ω reference resistor and AIN10 is connected to the Pt-100 sensor. This way the user can measure temperature with the 4 wire method (for highest precision). See section 9.5

When you select RATIO AIN10, the logger will make the following calculation:

$$\text{Value} = 100\Omega * U_{in10}/U_{in9} = \text{resistance of the Pt-100}$$

78mV would be the right voltage range for Pt-100 measurements.

9.3 Digital configuration

After clicking **Digital** you can select the parameters of the digital inputs.

DIGITAL					
	MEASURE	TYPE	OUTPUT	SENSOR	POLY
DIN1	<input type="checkbox"/>	FREQ	00		P1
DIN2	<input type="checkbox"/>	FREQ	00		P1
DIN3	<input type="checkbox"/>	FREQ	00		P1
DIN4	<input type="checkbox"/>	FREQ	00		P1

Digital inputs, which should be logged, must be checked in the Measure column.

The digital inputs can measure Frequency, Time or Count.

The logic level is CMOS at 3V and max. voltage is 15V, max. frequency is 1500Hz.

DIN4 is for CDS3 sunshine duration sensor and has a 0.5V logic level.

Time (when digital input is in high logical state) is measured in seconds.

Count will count the amount of Hi-Low transitions in the programmed measurement period.

Using polynomial coefficients of the 3-rd order the logged values can be converted to engineering units

9.4 Serial configuration

After clicking **Serial** you can select the parameters of the RS-485 serial inputs.

SERIAL								
	MEASURE	COM	BRATE	BITS	PARITY	STOPB	DRIVER	ADDRESS
SIN1	<input checked="" type="checkbox"/>	COM1	19200	8	E	1	KIPPZONEN_SMPX	1
SIN2	<input type="checkbox"/>	COM1	115200	8	N	1	NONE	
SIN3	<input type="checkbox"/>	COM1	115200	8	N	1	NONE	
SIN4	<input type="checkbox"/>	COM1	115200	8	N	1	NONE	
SIN5	<input type="checkbox"/>	COM1	115200	8	N	1	NONE	
SIN6	<input type="checkbox"/>	COM1	115200	8	N	1	NONE	
SIN7	<input type="checkbox"/>	COM1	115200	8	N	1	NONE	
SIN8	<input type="checkbox"/>	COM1	115200	8	N	1	NONE	

Serial inputs, which should be logged, must be checked in the Measure column.

The COM port used is COM1 as that is shared with the RS-485 port that is used for communication with Kipp & Zonen SMART sensors.

Kipp & Zonen SMART device standard settings are baudrate 19200, 8 bits, even parity and 1 stopbit.

The appropriate driver for the sensor model is selected under Driver. This only works after **Retrieving** the setup from the Logbox SE.

DRIVER
KIPPZONEN_SMPX
KIPPZONEN_SMPX
NONE
KIPPZONEN_SMPX
KIPPZONEN_SGRX
KIPPZONEN_SHP1
KIPPZONEN_SUVS

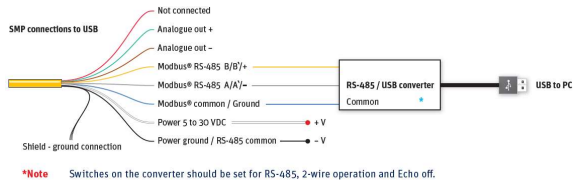
Currently supported are: SMPxx, SGRx, SPHx, RT1 and SUVx

More devices might be added in the future.

Each SMART sensor needs to have a unique Modbus® address programmed in advance when there is more than one sensor. Otherwise, the standard address 1 is fine.

ADDRESS
1

Modbus® address programming can be done with Kipp & Zonen SmartExplorer software that is available for download for free and a separately bought widely available USB – RS-485 converter.



9.5 Internal values

After clicking **Internal** you can see the internal values that are linked to internal sensors that can be logged.

INTERNAL	INPUT1	INPUT2	OUTPUT	SENSOR
IIN1			02	V3V
IIN2			00	VRTC
IIN3			00	VMAIN
IIN4			03	VPOWER
IIN5			00	VOUT
IIN6			00	PA
IIN7			00	GSM

V3V – system voltage 3.3V

VRTC – voltage of the CR2032 lithium battery

VMAIN – voltage on CHARGER or SOLAR input

VPOWER – voltage on POWER input

VOUT – voltage on PWROUT output (power supply for sensors)

All voltages are reported in mV.

PA – atmospheric pressure. On the board there is a simple barometer. If the box is closed and pressure needs to be measured, it is necessary to place a pressure port in one position of the cable glands.

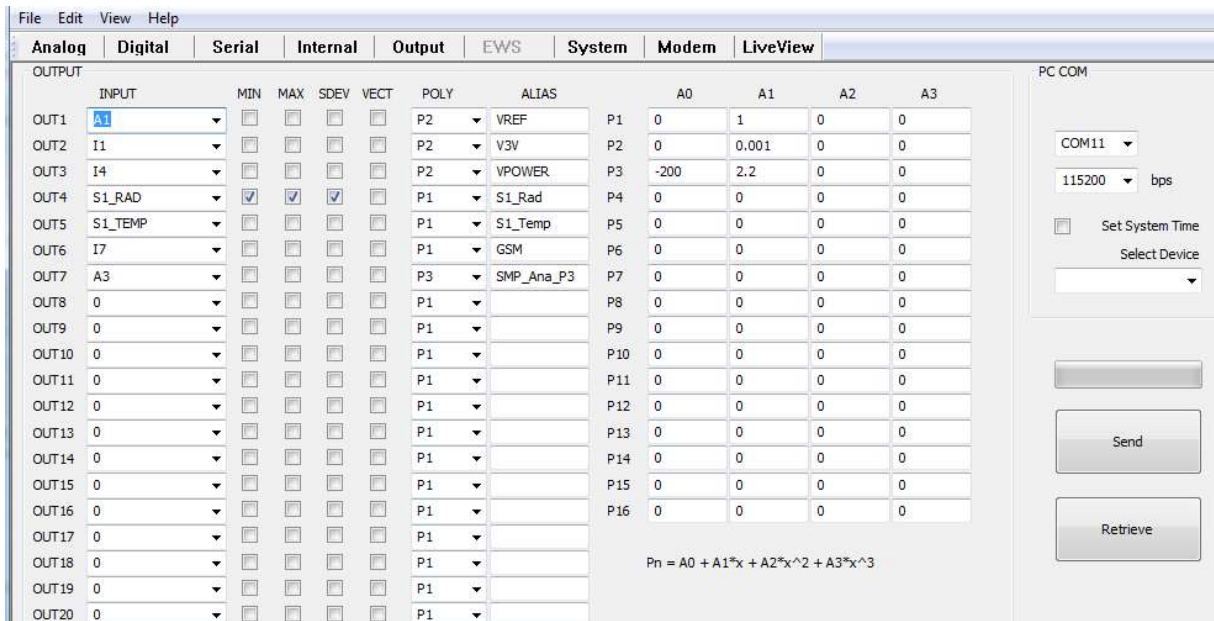
PA is reported in Pascal and for millibar needs to be divided by 100.

GSM – signal strength of GSM network. It is directly proportional to dBm value.

The polynomial to get dB is given in the next section.

9.6 Output

After clicking **Output** you can connect a measured input or internal value to an output, decide to log the average value, the min and max and standard deviation for your output and optionally vector if it is related to wind direction.



For easier reading of the logged values the outputs can be given an alias that will be reported in the logs and in the LiveView window.

The Kipp & Zonen SMART instruments (SMP, SHP, RT1 etc.) offer the choice of logging the radiation W/m^2 (Sx_RAD), the instruments temperature (Sx_TEMP) and the raw not linearised, not temperature compensated radiation from the sensor (Sx_RAW). For the pyrgeometers there's also the calculated downward atmospheric long-wave radiation Sx_DOWNRAD and the raw sensor data (Sx_RAW1) and the raw log wave down (Sx-RAW2) data both not linearised, not temperature compensated

Each logged measured output **must** be converted using a 3rd power polynomial. Sixteen polynomials can be setup and assigned. At least A1 needs to be set at the value 1.

$$P_n = A_0 + A_1 * x + A_2 * x^2 + A_3 * x^3$$

In the above example, P1 gives just the original millivolt value and **must** be used if no conversion is needed. P2 will convert millivolts to volts for easier reading or when needed when processing the logged data. P3 is for converting the **analog** voltage output of a SMART-V pyranometer to W/m^2 and is hardly ever used.

The logged digital SMART sensor reading needs no further action as the readings are in W/m^2 , thus A1 = 1. The temperature is in 0.1°C (see SMP manual) and needs to be divided by 10 thus giving a A1 value of 0.1.

For converting the internal GSM signal IIN7 to dBm A0 = -113, A1 = 2, A2 = 0, A3 = 0 must be used.

9.6.1 Polynomials for CMP, CHP, CGR etc

The sensitivity of the instrument (e.g. 10.60 $\mu V/W/m^2$) can be transformed to a simple polynomial: $A_1 = \frac{1000}{sensitivity}$ in $\mu V/W/m^2$ as indicated on the calibration certificate of the instrument.

For this example: where the sensitivity is 10.60 $\mu V/W/m^2$:

$$A_0 = 0$$

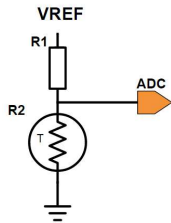
$$A_1 = 94.33962$$

$$A_2 = 0$$

$$A_3 = 0$$

9.6.2 Polynomials for Thermistors

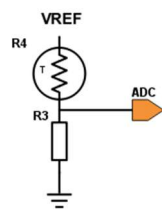
This section will explain how to use standard or create your own polynomials to be applied when you are using Pt-100 or TH10K components with given specifications.



Standard polynomials for 10k thermistor to GND, 10k resistor to V_{REF}

For AIN1 and 2:
 $y = -1.52813E-08x^3 + 6.29616E-05x^2 - 1.23747E-01x + 1.11104E+02$

For AIN3 and 4:
 $y = -1.39006E-07x^3 + 3.42417E-04x^2 - 3.47914E-01x + 1.63139E+02$



Standard polynomials for 10k thermistor to V_{REF} , 10k resistor to GND

For AIN1 and 2:
 $y = 1.52813E-08x^3 - 5.16481E-05x^2 + 9.54629E-02x - 4.35227E+01$

For AIN3 and 4:
 $y = 1.39006E-07x^3 - 7.00125E-04x^2 + 1.24218E+00x - 7.38502E+02$

$y = A3 x^3 + A2 x^2 + A1 x + A0$ as used in the LOGBOX SE

9.6.3 Polynomials for Pt-100

With the excitation jumper placed there will be a current of approximately 600µA available to flow through the 100Ω series precision resistor and Pt100 thermistor. (see section 9.5 for connections)

AIN9 is used to measure $U_{RESISTOR}$.

Expected voltage is in the range of 60mV and always positive and unipolar.

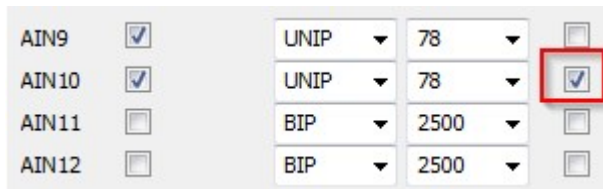
$$I_{MEASURE} = U_{RESISTOR} / 100$$

AIN10 is used for measuring the Pt-100 voltage U_{Pt-100} and again the expected voltage is in the range of 60mV and unipolar.

$$R_{Pt-100} = U_{Pt-100} / I_{MEASURE} = 100 * U_{Pt-100} / U_{RESISTOR}$$

Calculation of the temperature can be done on the computer after receiving the logged data. or the RATIO function in the Analog setup can be used.

Inputs AIN9 - AIN12 offer ratio measurements by checking the RATIO box in the Analog window



It's designed for Pt-100 measurements, where AIN9 is connected to a high precision 100ohm reference resistor and AIN10 is connected to Pt-100 sensor. This way the user can measure temperature with 4 wire method (for highest precision). See section 9.5

When you select RATIO for AIN10 the, logger will make the following calculation:

$$\text{Logged value } OUTx = R_{Pt-100} = 100 * U_{Pt-100} / U_{RESISTOR} = 100 * U_{in10} / U_{in9}$$

A usable polynomial is calculated for °C and Fahrenheit in the Excel file that came with the downloaded software package.

$$T_{\text{Celcius}} = -3.89779\text{E-}06x^3 + 2.20939\text{E-}03x^2 + 2.23389\text{E+}00x - 241.600$$

$$T_{\text{Kelvin}} = -3.89779\text{E-}06x^3 + 2.20939\text{E-}03x^2 + 2.23389\text{E+}00x + 31.55$$

$$T_{\text{Fahrenheit}} = -7.01601\text{E-}06x^3 + 3.97691\text{E-}03x^2 + 4.02100\text{E+}00x - 4.02880\text{E+}02$$

You can apply the above polynomials to OUTx to convert resistance to temperature in degrees Celcius, Kelvin or Fahrenheit.

9.6.4 Polynomials for UVS:

Polynomial in mV:

To have the output values recorded in mV (millivolt) we will have to enter the following polynomial A1=1

If you are only interested in the UV values recorded by the instrument you would probably like to have these readings in W/m².

Polynomial for W/m²:

To have the output values recorded in W/m² we will need to make some calculations using the mean sensitivity values of the UVS instruments. The mean sensitivity values can be found on the supplied calibration certificates.

Example:

The calibration certificates state that the mean sensitivity of the UVS-A = 30.083 W/m²/V and the mean sensitivity of the UVS-B = 1.879 W/m²/V.

In order to have the correct engineering units, W/m², we need to apply the following equation: A1=Mean sensitivity/1000

For this example UVS-A A1 = 30.083/1000 = 0.030083

For this example UVS-B A1 = 1.879/1000 = 0.001879

A0 = A2 = A3 = 0

	A0	A1	A2	A3
P1	0	1	0	0
P2	0	0.001	0	0
P3	-200	2.2	0	0
P4	111.104	-0.123747	6.29616e-00	-1.52813e-00
P5	163.139	-0.347914	0.000342417	-1.39006e-00
P6	-43.522	0.0954629	-5.16481e-00	1.52813e-00
P7	-38.9862	0.123767	-8.11744e-00	2.5603e-008
P8	-241.6	2.23389	0.00220939	-3.89779e-00
P9	0	0	0	0
P10	0	0	0	0
P11	0	0	0	0
P12	0	0	0	0
P13	0	0	0	0
P14	0	0	0	0
P15	0	0	0	0
P16	0	0	0	0

Pn = A0 + A1*x + A2*x^2 + A3*x^3

Please note that this cannot be used in combination with the Kipp & Zonen Uviator software.

Uviator requires all logged outputs to be in Volt!

Polynomial for converting mV to Celsius:

In your UVS manual you will find a table to convert the voltage output of the UVS into the temperature (°C). Using the described way to create polynomials this leads to:

$$^{\circ}\text{C} = 1.97893\text{E-}09x^3 - 1.25261\text{E-}05x^2 + 4.60569\text{E-}02x - 4.28345\text{E+}01$$

These values can be entered in the polynomials section:

9.7 System

After clicking **System** the LOGBOX SE displays the settings related to measuring and logging.

SYSTEM	
SN	004/0716
Firmware	Version 9.4 Jun 3 2016
Name	LogboxGSM
MeasInterval	1 sec
MeasDelay	0 sec
LogInterval	2 sec
RepInterval	0 sec
Vref	2499.28 mV
Serial1	115200 bps
Serial2	115200 bps
DataFormat	Default
RS485	<input type="checkbox"/>
RS485Address	
Echo	<input type="checkbox"/>
Poll	<input type="checkbox"/>
EWS	<input type="checkbox"/>
Date	04 07 2016
Time	12 06 22

The LOGBOX SE can be given a unique name in the Name box.

MeasInterval [1-3600s] is the time in seconds between each measurement period start. The POWEROUT output is activated at the start of the measurement period and if needed a MeasDelay different from 0 can be entered to delay the actual measurement to let the instruments stabilise after POWEROUT has been applied.

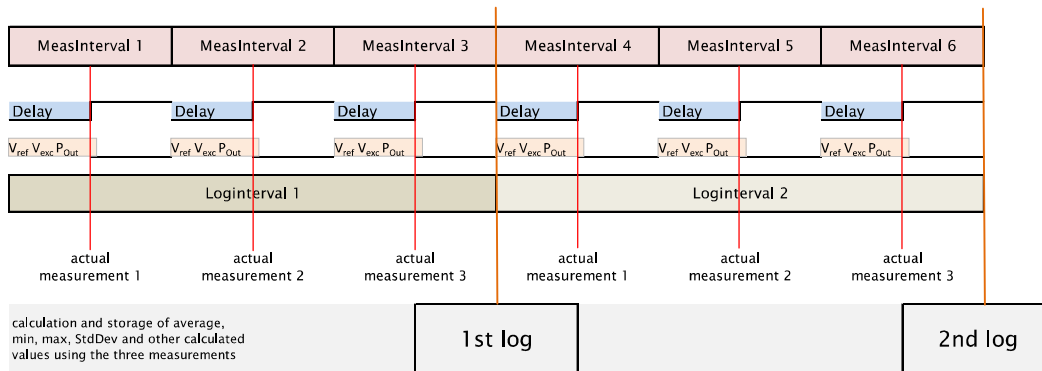
MeasInterval needs to be bigger than MeasDelay.

LogInterval [1-3600s] is the time between individual loggings of the gathered data. When this interval is finished the LOGBOX SE calculates average, min, max, std Dev and stores it on the SD card. On the SD card a new file is created for every day.

One second MeasInterval with 60 second LogInterval is often used

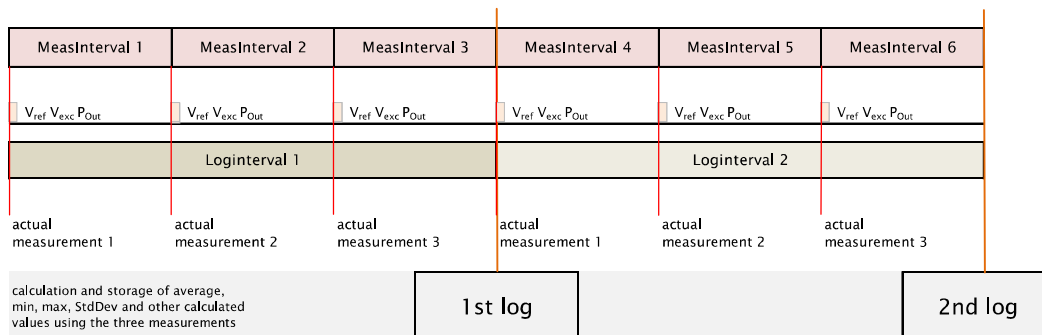
Logging with delay

MeasInterval = 2 sec
Delay = 1 sec
LogInterval = 6



Logging without delay

MeasInterval = 2 sec
Delay = 0
LogInterval = 6



ReplInterval [0...3600] – interval between reports in seconds on COM2 serial port. If ReplInterval is zero, there is no report on COM2. If ReplInterval is non zero and equal to LogInterval, reports on COM2 will be the same as logged data. If ReplInterval is non zero and different from LogInterval, reports on COM2 are generated from last measured data (without min, max, stdev).

The amount of measurements taken for each log is LogInterval / MeasInterval.

Serial 1 setting is for potential future use.

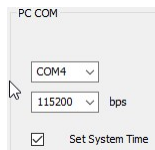
Serial 2 is the baudrate for communication via the RX/TX232_2 port. Other setting are fixed and 8 bit, no parity and 1 stopbit.

DataFormat sets the way that data is continuously sent via the emulated COM port on the USB connection and TX232_2 output when the LOGBOX SE is switched on and logging.

Default sends values separated by spaces: 03.08.2016 13:28:00 13.804 6.222 6.000 7.000 0.416 24.200 55.083 3.083 0.000 2.494

Making them easy to read. When the data needs to be logged and processed a comma separated format CSV can be easier to process. CSV (format 1) will send: 03.08.2016,13:26:00,13.803,10.061,9.000,11.000,0.851,24.200,91.952,3.083,0.000,2.494.

CSV also places the headers above the values.



Date and Time will be shown when retrieved from the LOGBOX SE and can be updated when needed. When the Set System Time box is checked the date and time and all other setting are sent to the LOGBOX SE when Send is clicked.

9.8 Modem

After clicking **Modem** the LOGBOX SE displays the settings related to the GSM modem, email and or FTP settings and time for communication.

ModemInterval	1	hr
ModemOnTime	0	0
ModemOnDuration	0	min
ModemPIN	0000	
APN	internet	
IP	smtp.webglobe.sk	
EmailFrom	sender@physicus.eu	
EmailTo	donaldivv@zonnet.nl	
UserName	sender@physicus.eu	
Password	Sender39	
TimeServer	sk.pool.ntp.org	
TimeZone	1	hr
ModemMode	EMAIL	
SMS Center		
IPConnect		
IPConfig		
UserNameConfig		
PasswordConfig		

ModemInterval [0 ... 24] is the interval between sending data over modem in hours. A setting of 0 means no sending via modem.

ModemOnTime] is the time at which modem will connect to GSM network and wait for an incoming call. For future use.

ModemOnDuration [0...30min] – divines how long modem will be connected to GSM network for a call.

ModemPIN [number] –PIN belonging to the installed SIM card (max 10 digits)

APN [string]– access point of your GSM/GPRS provider.

IP [string]– IP address for sending emails or IP address of FTP server.

EmailFrom [string]– your sender address for the email

EmailTo [string]– recipient address for the email. Here data will be sent to.

UserName [string]– user name for authorization on smtp server or FTP server. Minimum 5 characters. If less than 5 characters are used, access without authorization is activated (UserName and Password are then not used)

Password [string]– password for authorization on smtp server or FTP server. Minimum 4 characters. If less than 4 characters are used, access without authorization is activated

TimeServer [string]– time server for time synchronization. Synchronisation will take place at 00:00 hr using port 123 and is UTC/GMT time. Standard server to use is sk.pool.ntp.org .

TimeZone [-12...12]– your local time zone with regards to GMT/UTC. Best not to use daylight saving time.

ModemMode selects between sending the log files as email attachments or to an FTP server.

All other settings are for future use.

The following settings are standard settings when you don't have your own SMTP email gateway.

APN internet is unique for your GSM provider
IP smtp.webglobe.sk
EmailFrom sender@physicus.eu
EmailTo your.email@your-company.com
UserName sender@physicus.eu
Password Sender39

TimeServer sk.pool.ntp.org

If you do have your own email provider you have to change IP, UserName and Password to your login.

The LOGBOX SE does not allow for secure connection or secure authentication.

If your email provider doesn't even need user authentication for SMTP then leave UserName and Password empty.

If you want to send the log files to an FTP server than the IP, UserName and Password need to reflect your FTP server login. User settings on your FTP server need to be set correct and allow for writes for by the LOGBOX SE.

9.9 Setup flow

When starting with a LOGBOX SE it is best to use the following sequence:

1. Write your equipment and attachments to the LOGBOX SE using e.g. Planned Setup on page 39.
2. Make the analog instruments known using the first tab called Analog.
3. Make the digital signals known if you have using the Digital tab
4. Make the RS-485 Modbus instruments known using the Serial tab
5. Select which input to log and in which order using the Output tab
Select when needed the Min, Max and StdDev to be logged as well
Select the right polynomials
6. Select the measurement and logging interval using the System tab
DataFormat (Space delimited or Comma delimited) can be selected
7. If you do have a SIM card and data capabilities the systems can be personalised using the Modem tab
8. To check if the logging is working the LiveView tab can be used.

For just checking it is advised to use short measurement and logging intervals and finally change them to the desired values when ready.

9.10 LIVEVIEW

Clicking **LiveView** opens the window where live logged data can be viewed.

The switch in the LOGBOX SE must be in the On position for logging and Start will start the actual live view and as expected Stop will stop it.

The screenshot displays a software window with several tabs: Analog, Digital, Serial, Internal, Output, EWS, and System. The main area contains a data table with columns for Date, Time, 10kT, 10kT-par, VPOWER, and GSM. Below the table, there is a scrollable log area showing the latest entry. At the bottom, there are three buttons: Start, Measure, and Stop.

Date	Time	10kT	10kT-par	VPOWER	GSM
04.07.2016	13:06:12	5270.221	111.104	3.011	---
04.07.2016	13:06:10	5257.465	111.104	3.011	---

04.07.2016 13:06:12 5270.221 111.104 3.011 ---

Start Measure Stop

Measure is for future use.

--- means: No data received or this input was not selected in the Measure box in the Analog, Digital or Serial tab

Leaving the LiveView window doesn't stop the logging and the LiveView will be resumed when the LiveView window is selected again.



Do not forget to click Stop as functions like Send are disabled when LiveView is active.

10 FIRMWARE UPDATE

If needed to solve potential issues or enhance the functionality of the logger new firmware might be released on the Kipp & Zonen website under Downloads.

Download the software for performing the update and the actual firmware in TXT format.

BSL_USB_GUI.EXE

BSL430.DLL

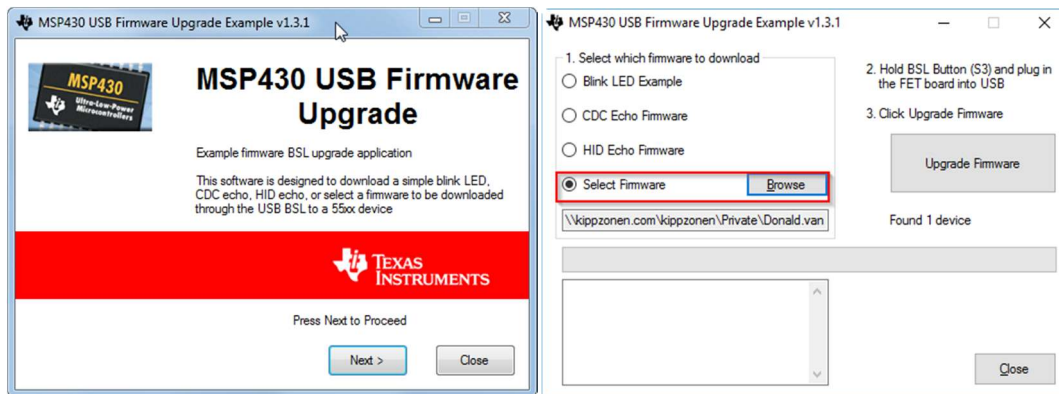
LOGBOX SExxx.TXT

SYSTEM		
SN	004/0716	
Firmware	Version 9.4 Jun 3 2016	
Name	LogboxGSM	
MeasInterval	1	sec
MeasDelay	0	sec
LogInterval	2	sec
RepInterval	0	sec
Vref	2499.28	mV

In order to check the current firmware start the LOGBOX SE Setup software and navigate to the system tab where there is a Firmware box.

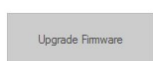
If there is a newer version available that you want to install, stop LOGBOX SE Setup.

- Disconnect **all** power supplies from the data logger **and** the USB service cable
- Place UPGRADE jumper on the circuit board (optionally borrow jumper from Batt or Exc)
- Connect power supply
- Reconnect USB service cable. You can check in DeviceManager that the COM port is gone
- Remove UPGRADE jumper. **Do not forget this step otherwise upgrade will fail.**
- Start the BSL-USB_GUI program and click Next
- Accept the license agreement and click Next



Check **Select Firmware**, click **Browse**, navigate to the directory where you downloaded and unzipped the update and select the TXT file. Click **Upgrade Firmware**.

The logger will be restarted when the update has finished. Click **Close**.



No device connected

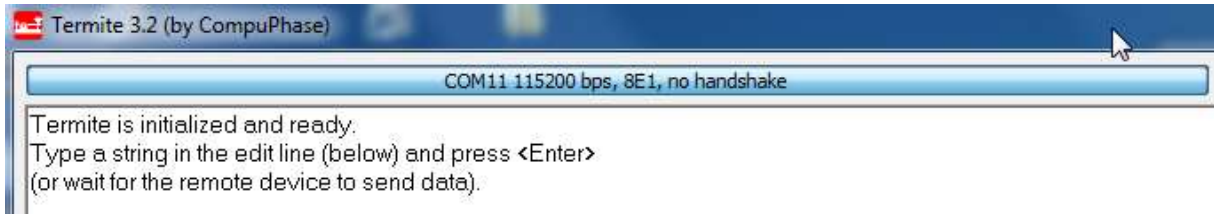
When there is a No device connected, please check if your USB connection is directly to your PC and that you followed above procedure and removed the jumper before starting the software.

Depending on the newer firmware and the advice in the readme file it might be needed to a) install newer LOGBOXSESetup software.

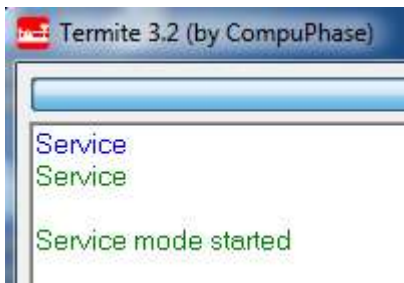
11 SERVICE MODE

To access service mode, you need to have a terminal program installed on your PC like e.g. Termit or the old Hyperterminal. Connect the LOGBOX SE via USB to the PC and connect your terminal program to the right COM port. The serial settings aren't really important.

Or attach the Serial2 port of the LOGBOX SE using RS-232 and when applicable an RS-232 – RS-485 converter. Then serial settings do matter of course.



Type Service at the bottom of the Termit window.



Now a wide range of commands is possible. Normally one would not need them as they offer no advantages over the LOGBOX SE program apart from a forced Reset, SetFactoryDefaults and switching on the GSM modem for testing and sending test emails.



Commands are Case sensitive.

After a few minutes Service Mode will be exited automatically



11.1 Setup and check commands

11.1.1 Help

Help displays all available commands.

a 1..8, Measure AIN1-4 are available
a 9..20, Measure, Gain, Unipolar, Ratio AIN9-12 are available
d 1..8, Measure, Frequency, Counter, Time
s 1..8, Measure, Comport, bpS, Bits, Parity, sTop, Driver, Address
o 1..32, Input, miN, maX, Stdev, Vector, Polynome, Alias
e 1..16, Input, Type, Logint, Modemint, Alarm, Bitmask, Units not used
p 1..16, 0..3=
Name StationName
Vref [mV]
Date 1.2.2016 to manually set the date | can be overwritten automatically
Time 11:45:20 to manually set the time, | when synchronisation via GSM is enabled
MeasInterval [sec]
MeasDelay [sec]
LogInterval [sec]
RepInterval [sec]
DataFormat 0..3
ModemInterval [hr]
ModemOnTime [09:00:00]
ModemOnDuration [min]
ModemPIN
APN
IP
EmailFrom
EmailTo
UserName
Password
TimeServer Server/GSMNetwork
TimeZone
Ftp 0/1
IPConnect
IPConfig
UserNameConfig
PasswordConfig
ModemDetail 0/1
SaveConfig - save configuration to Flash
ReadConfig - read configuration from Flash
? - show actual settings
Modem? - show actual modem settings
ModemDetail 1/0
Config? - show all acutal configuration
Config1?..5? - show parital actual configuration
SD? /prolog - show actual files on SD card
System? - show sw version
SerialDriver?
Serial1 300, 1200, 2400, 9600, 19200, 38400, 57600, 115200bps
Serial2 300, 1200, 2400, 9600, 19200, 38400, 57600, 115200bps
EWS 0/1 not used
SmsCenter +421905303303
SmsNumber 1..16 +421905123456
EarlyWarning?
LogVariables - show all logged variables with names
ReadData 10 - read last 10 records
ActualData - show actual measured data
Measure - execute one measurement
ReadFile /LOGBOX/KLOG0001.txt - read file from SD card
TestGprs
TestEmail
TestSync
TestSocket not used
TestSms not used
SetDefaultConfig
Service - enter service mode
Exit - exit from service mode
Help
Reset - reboot datalogger

11.1.2 Question mark command

Example: ?

```
SN 002/0115
Name PROlog
MeasInterval 5 sec
MeasDelay 0 sec
RepInterval 0 sec
Page 26 of 54
LogInterval 10 sec
Vref 2498.650 mV
Serial1 115200 bps
Serial2 115200 bps
RS-485 0
EWS 0
Date 01.02.2015
Time 08:12:26
```

11.1.3 Config

Config? displays all settings

```
a 1, M=1, V=0, P=3, O=1
a 2, M=0, V=0, P=1, O=0
a 3, M=1, V=0, P=4, O=2
a 4, M=0, V=0, P=1, O=0
a 5, M=0, V=0, P=1, O=0
a 6, M=0, V=0, P=1, O=0
a 7, M=0, V=0, P=1, O=0
a 8, M=0, V=0, P=1, O=0
a 9, M=0, U=0, G=1, R=0, P=1, O=0
a 10, M=0, U=0, G=1, R=0, P=1, O=0
a 11, M=0, U=0, G=1, R=0, P=1, O=0
a 12, M=0, U=0, G=1, R=0, P=1, O=0
a 13, M=0, U=0, G=1, R=0, P=1, O=0
a 14, M=0, U=0, G=1, R=0, P=1, O=0
a 15, M=0, U=0, G=1, R=0, P=1, O=0
a 16, M=0, U=0, G=1, R=0, P=1, O=0
a 17, M=0, U=0, G=1, R=0, P=1, O=0
a 18, M=0, U=0, G=1, R=0, P=1, O=0
a 19, M=0, U=0, G=1, R=0, P=1, O=0
a 20, M=0, U=0, G=1, R=0, P=1, O=0
d 1, M=0, F=1, C=0, T=0, P=1, O=0
d 2, M=0, F=1, C=0, T=0, P=1, O=0
d 3, M=0, F=1, C=0, T=0, P=1, O=0
d 4, M=0, F=1, C=0, T=0, P=1, O=0
d 5, M=0, F=1, C=0, T=0, P=1, O=0
d 6, M=0, F=1, C=0, T=0, P=1, O=0
d 7, M=0, F=1, C=0, T=0, P=1, O=0
d 8, M=0, F=1, C=0, T=0, P=1, O=0
i 1, P=2, O=0, A=V3V
i 2, P=1, O=0, A=VRTC
i 3, P=1, O=0, A=VMMAIN
i 4, P=2, O=3, A=VPOWER
i 5, P=1, O=0, A=VOUT
i 6, P=1, O=0, A=PA
i 7, P=1, O=4, A=GSM
i 8, P=1, O=0, A=RG10M
i 9, P=1, O=0, A=RG1H
i 10, P=1, O=0, A=RG6H
i 11, P=1, O=0, A=RG24H
s 1, M=0, C=1, S=115200, B=8, P=N, T=1, D=NONE, A=
s 2, M=0, C=1, S=115200, B=8, P=N, T=1, D=NONE, A=
s 3, M=0, C=1, S=115200, B=8, P=N, T=1, D=NONE, A=
s 4, M=0, C=1, S=115200, B=8, P=N, T=1, D=NONE, A=
s 5, M=0, C=1, S=115200, B=8, P=N, T=1, D=NONE, A=
s 6, M=0, C=1, S=115200, B=8, P=N, T=1, D=NONE, A=
s 7, M=0, C=1, S=115200, B=8, P=N, T=1, D=NONE, A=
s 8, M=0, C=1, S=115200, B=8, P=N, T=1, D=NONE, A=
o 1, I=A1, L=1, N=0, X=0, S=0, V=0, P=3, A=10kT
o 2, I=A3, L=1, N=0, X=0, S=0, V=0, P=4, A=10kT-par
o 3, I=I4, L=1, N=0, X=0, S=0, V=0, P=2, A=VPOWER
o 4, I=I7, L=1, N=0, X=0, S=0, V=0, P=1, A=GSM
o 5, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 6, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 7, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 8, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 9, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 10, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 11, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 12, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 13, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 14, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 15, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 16, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 17, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 18, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 19, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 20, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 21, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 22, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 23, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 24, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 25, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 26, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 27, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 28, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 29, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 30, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 31, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
o 32, I=0, L=1, N=0, X=0, S=0, V=0, P=1, A=
p 1, 0=0, 1=1, 2=0, 3=0
p 2, 0=0, 1=0.001, 2=0, 3=0
p 3, 0=-200, 1=2.2, 2=0, 3=0
p 4, 0=-111.104, 1=-0.123747, 2=6.29616e-05, 3=-1.52813e-08
p 5, 0=0, 1=0, 2=0, 3=0
p 6, 0=0, 1=0, 2=0, 3=0
p 7, 0=0, 1=0, 2=0, 3=0
p 8, 0=0, 1=0, 2=0, 3=0
p 9, 0=0, 1=0, 2=0, 3=0
p 10, 0=0, 1=0, 2=0, 3=0
p 11, 0=0, 1=0, 2=0, 3=0
p 12, 0=0, 1=0, 2=0, 3=0
p 13, 0=0, 1=0, 2=0, 3=0
p 14, 0=0, 1=0, 2=0, 3=0
p 15, 0=0, 1=0, 2=0, 3=0
p 16, 0=0, 1=0, 2=0, 3=0
```


11.1.4 Modem

Modem? displays all modem settings

```
Modem?
ModemInterval 1 hr
ModemDelay 0 min
ModemOnTime 00:00:00
ModemOnDuration 0 min
ModemPIN 0000
ModemNumber
APN internet
IP smtp.webglobe.sk
EmailFrom sender@physicus.eu
EmailTo your_name@email.com
UserName sender@physicus.eu
Password Sender39
TimeServer sk.pool.ntp.org
TimeZone 1
Ftp 0
IPConnect
IPConfig
UserNameConfig
PasswordConfig
```

11.1.5 System

System? – displays actual firmware version

System?

```
LOGBOX SE Version 9.4 Jun 3 2016
SystemOnTime (126660) 0.1 Days
```

11.1.6 SaveConfig

SaveConfig saves current settings to non-volatile memory. Necessary after changing settings via the terminal session.

11.1.7 ReadConfig

ReadConfig – reads current settings from nonvolatile memory

11.1.8 ReadData

ReadData [1...200] – reads last 1...200 records from memory.

Example: ReadData 2

Searching data...

Current Write Flash page 10

```
16.07.2009 12:09:00 264.887 239.766 267.539 7.702 55.770 0.000 600.366 0
.061 13.743 0.320 0.000 161.728 0.029 258.572 0.078 258.574 0.079
16.07.2009 13:00:00 267.189 267.188 267.539 0.018 54.427 1.252 600.366 0
.051 13.753 0.320 0.000 161.728 0.028 258.573 0.078 258.573 0.078
```

11.1.9 ActualData

ActualData – displays actual data from measured inputs

```
(O8) Vbatt 20.053
(O9) Ref100 100.000
(O10) Pt-100 22.344
((O4) SD 0.000
```

11.1.10 SD

SD? – displays all data files in the root directory of the SD memory card.

Example: SD?

Directory listing...

```
<dir> .
<dir> ..
KLOG0001.TXT 51559 2016/08/11 00:00
KLOG0002.TXT 49890 2016/08/11 09:31
Total Space 481920 kB
Free Space 481784 kB
Actual File /LOGBOX/KLOG0002.txt
OK
```

11.1.11 RS-485

RS-485 [0...1] – configures if using RS-485 port. For future extension

Example RS-485 1

11.1.12 ReadFile

ReadFile KLOG0001.TXT – displays requested file saved on SD memory card

Example: ReadFile /LOGBOX/KLOG0020.TXT

```
#Name LOGBOX SE
#SN 004/0716
#(O1) 10kT Avg;
#(O2) 10kT-par Avg;
#(O3) VPOWER Avg;
#(O4) GSM Avg;

04.07.2016 10:54:32 5244.709 111.104 3.006 ---
04.07.2016 10:54:34 5270.221 111.104 3.006 ---
04.07.2016 10:54:36 5270.892 111.104 3.008 ---
```

11.1.13 Miscellaneous

TestEmail – start to send testing email or FTP file via GSM modem

TestGprs – start to test GPRS connection

TestSocket – start to test socket connection

Exit – exit from Service mode

Service – enter Service mode

Reset – software reset of EasyLogGSM

SetDefaultConfig clears all settings and then sets logging on AIN1, V3V and VPOWER. To save use SaveConfig command

11.1.14 Settings via terminal session

Analog and digital inputs

a x, M=y, G=y, U=y, R=y
where:

a x [1-4, 9-12] – analog input number (AIN1-4 ... AIN9-12)
M=y [0,1] – if M=1, activate measurements on this input
G=y [1...8] – ranGe for differential inputs (a 9 ... a 12) 19, 38, 78,156, 312, 625, 1250, 2500mV
U=y [0,1] – unipolar setting (U=1) or bipolar setting (U=0) for differential inputs (a 9 ... a 12)
R=y [0,1] – calculating ratio to a9 for inputs a10 ... a12. a x becomes $100 * AINx / AIN9$ for Pt-100

Example a 1,M=1 (analog input 1 is configured for measuring)
a 9,M=1, G=8, U=1, R=0 (analog input 9 is configured for measuring, input range 8, unipolar and no ratio calculation)

Command format for configuring **digital inputs**:

d x, M=y, F=y, T=y, C=y
where:
d x [1...4] – digital input number (d 1 ... d 4)
M=y [0,1] – if M=1, activate measurements on this input
F=1 – frequency measurement
T=1 – time measurement
C=1 – counter

Example d 5, M=1, F=1 (digital input 5 is configured for measuring, input is frequency measuring)

Command format for configuring **serial inputs**:

s x, M=y, C=y, S=y, B=y, P=y, T=y, D=z, A=z
where:
s x [1...8] – serial input number (s 1 ... s 8)
M=y [0,1] – if M=1, activate measurements on this input
C=y [1, 2] – COM port selection
S=y [300, 1200, 2400, 9600, 19200, 38400, 57600, 115200] – communication speed bps
B=y [7, 8] – number of bits
P=y [N, E, O] – parity None, Even, Odd
T=y [1, 2] – number of stop bits
D=z [KIPPZONEN_SMPX...] – serial driver name. This name identifies type of serial sensor connected
A=z [1, ...] – address of serial sensor (mostly used for sensors communicating on the RS-485 bus)

example

s 5, M=1, C=1, S=19200, B=8, P=E, T=1, D=KIPPZONEN_SMPX, A=1
(serial sensor 5, connected on COM1 with 19200bps 8E1 settings; type of sensor is SMPx series and bus address is 1)

Command format for configuring **outputs**:

o x, l=y, L=y, N=y, X=y, S=y, V=y, P=y, A=z
where:
o x [1...32] – output number (o 1 ... o 32)
l=z [A1...A20, D1...D8, S1...S8, I1...I14] – map to measured input
L=y [0, 1] – logging
N=y [0, 1] – logging minimum value
X=y [0, 1] – logging maximum value
S=y [0, 1] – logging standard deviation value
V=y [0, 1] – vector calculation
P=z [1 ... 16] – polynomial number for calculation
A=z – alias – name of logged variable

Example o 1, I=A1, L=1, N=0, X=0, S=0, V=1, P=5, A=WD
(output 1 maps to AIN1 input channel with logging mean value, vector calculation is used with polynome nr. 5. Variable alias is WD)

o 5, I=I1, L=1, N=1, X=0, S=0, V=0, P=16, A=VPOWER
(output 5 maps to internal input 1 – voltage on POWER terminal with logging mean and minimum value with polynome 16. Variable alias is VPOWER.)
o 9, I=S1_RAD, L=1, N=0, X=0, S=1, V=0, P=1, A=GlobalRadiation
(output 9 maps to serial input 1 with logging mean and standard deviation value with polynome 1. Variable alias is GlobalRadiation.)

Command format for configuring **polynomials**:

p x, 0=a, 1=a, 2=a, 3=a

where:

p x [1...16] polynomial number

0=a, coefficient a0

1=a, coefficient a1

2=a, coefficient a2

3=a, coefficient a3

Example p 2, 0=-0.035, 1=0.1, 2=0, 3=0 (coefficients to polynomials are: a = -0.035, b = 0.1, c = 0, d = 0)

Command format for **system settings**:

MeasInterval [1...3600] – interval between measurements in seconds

Example MeasInterval 60 (configuring measuring interval to 60 seconds)

MeasDelay [0...60] – delay after MeasInterval to start measurements in seconds

Example MeasDelay 5 (configuring delay between beginning of measuring interval and actual measurement to 5 seconds)

LogInterval [0...3600] – interval between logging in seconds

Example LogInterval 600 (configuring logging interval to 600 seconds)

RepInterval [0...3600] – interval between reports in seconds on COM2 serial port. If RepInterval is zero, there is no report on Serial2 and it can be used for communication with serial sensors. If RepInterval is non zero and equal to

LogInterval, reports on COM2 will be the same as logged data (averaged, min, max... according to configuration). If RepInterval is non zero and different from LogInterval, reports on COM2 are generated from last measured data (without min, max, stdev).

Example RepInterval 600 (configuring report interval to 600 seconds)

Vref [2450...2550] – set reference voltage

Example Vref 2500.3 (setting reference voltage to 2500.3mV)

Serial2 [300,1200,2400,9600,19200,38400,57600,115200] – set communication speed on COM2 (report port)

Example Serial2 9600 (setting Serial2 baud rate to 9600 bps)

Date dd.mm.yyyy – set current date – day.month.year

Example Date 10.1.2011 (setting date to 10.1.2011)

Time hh:mm:ss – set current time - hours: minutes: seconds

Example Time 10:30:45 (setting time to 10:30:45)

Command format for modem settings:

- ModemInterval [0 ... 24] – interval between sending data over modem in hours. Parameter 0 means no modem sending.
Example ModemInterval 24 (configuring modem data transfer to every 24 hours)
- ModemDelay [0 ... 1439] – delay after ModemInterval to start sending data.
Example ModemDelay 5 (configuring modem delay to 5 minutes)
- ModemOnTime [hh:mm:ss] – time at which modem should connect to GSM network and waits for a call
example ModemOnTime 09:00:00

- ModemOnDuration [0...30] – interval how long modem will wait connected to GSM network for a call; in minutes.
Example ModemOnDuration 30
- ModemPIN [number] – modem PIN number (max 10 digits)
Example ModemPIN 485351 (configuring PIN number of inserted SIM card into the GSM modem to 485351)
- ModemNumber [number] – number of remote modem where GSM data will be transferred (if ModemGPRS 0 was set)
Example ModemNumber 0265428834
- APN [string]– access point of GSM/GPRS provider
Example APN internet (configuring APN to string internet)
- IP [string]– IP address for sending emails or IP address of FTP server
Example IP 213.151.208.170 (configuring IP to 213.151.208.170)
- EmailFrom [string]– sender address for the email
Example EmailFrom Testing@physicus.eu (configuring sender address to Testing@physicus.eu)
- EmailTo [string]– recipient address for the email. Here data will be received.
Example EmailTo physicus@physicus.eu (configuring recipient address to physicus@physicus.eu)
- UserName [string]– user name for authorization on smtp server or FTP server. Minimum 5 characters. If less than 5 characters are used, access without authorization is activated (UserName and Password are not used)
Example UserName data@physicus.eu (configuring user name to data@physicus.eu)
- Password [string]– password for authorization on smtp server or FTP server. Minimum 4 characters.
- If less than 4 characters are used, access without authorization is activated
Example Password data (configuring password to data)
- TimeServer [string]– time server for time synchronization.
Example TimeServer time.nist.gov (configuring time server to time.nist.gov)
- TimeZone [-12...12]– local time zone.
Example TimeZone -5 (configuring time zone to -5 hours from TimeServer)
- Ftp [0,1]- enable/disable FTP data transfer.
Example Ftp 0 (configuring data transfer to email)
- ModemDetail [0,1] – enables detailed messages from modem. Used only for problem solving with remote data transfer.

12 QUICK REFERENCE

Commands summary

Command	parameter	description
A	see text	analog inputs setup
D	see text	digital inputs setup
S	see text	serial inputs setup
O	see text	output setup
MeasInterval	1...3600	measuring interval in seconds
MeasDealy	1...60	measuring delay in seconds
LogInterval	0...3600	logging interval in seconds
ReplInterval	0...3600	report interval on COM2
DataFormat	0, 1, 2, 3	0=default spaces, 1 is CSV, 2 and 3 equal to 0
Vref	2450...2550	reference voltage in mV
Serial1	300, 1200, ---,115200	baud rate for Serial1 in bps, future use
Serial2	idem	baud rate for Serial2 in bps, 115200 not advisable
Date	dd.mm.yyyy	
Time	hh:mm:ss	
ModemInterval	0...24	period for modem to send data in hours
ModemDelay	0...1434	delay from modem period in seconds
ModemOnTime	hh:mm:ss	time, when modem will wake up and wait for a call every day
ModemOnDuration	0...1440	duration of modem on, waiting for a call in minutes
ModemPIN	number	
APN	string	GPRS provider access point
IP	string	smtp server IP address or FTP server IP address
EmailFrom	string	
EmailTo	string	
UserName	string	user name for authorized access to smtp server or FTP server
Password	string	password for authorized access to smtp server or FTP server
TimeServer	string	
TimeZone	-12...12	time shift from UTC in hours
Ftp	0..1	modem mode email (0) or FTP (1)
RS-485	0..1	using RS-485 line
TestGprs		start GPRS session for testing purposes
TestSync		start time synchronization over modem
TestEmail		start sending test email
TestSocket		start socket session
?		show system parameters
Config?		show full inputs configuration
Modem?		show modem parameter
SD?		show files on SD card
System?		show actual firmware version
SerialDriver?		show supported serial sensors
ReadFile	klog0001.txt	type one file from SD card via serial port
LogVariables		show format of logged variables
ReadData	1...200	read last nr. of records in memory
ActualData		show last measured data
SaveConfig		save current configuration to nonvolatile memory
ReadConfig		read configuration from nonvolatile memory
Help		print all commands
Exit		exit from Service mode
Reset		reboot datalogger
SetDefaultConfig		clears all settings and then sets logging on AIN1, V3V and VPOWER

13 LOGBOX SE POSSIBILITIES AND EXAMPLES

The LOGBOX SE can handle simultaneously:

- 4 sensors on the **differential** inputs AIN9 – AIN12
- 4 sensors on the **single ended** inputs AIN1-4
- 4 **digital** sensors (freq, count, time) on the digital inputs DIN1-4
- 8 **SMART** sensors on RS-485

Kipp & Zonen sensors need:

Sensor model	Always needed	Optional	Remark
CMP3, CMP6, CMP10, CMP11	1x differential		
CMP21 , CMP22 with 10k thermistor	1x differential	1x single ended temperature measurement	
CMP21 , CMP22 with Pt-100	1x differential	2x differential temperature measurement	Only 1x differential left
CGR3 , CGR4 with 10k thermistor	1x differential	1x single ended temperature measurement	
CGR3 , CGR4 with Pt-100	1x differential	2x differential temperature measurement	Only 1x differential left
CHP1 with 10k thermistor used	1x differential	1x single ended temperature measurement	
CHP1 with Pt-100 used	1x differential	2x differential temperature measurement	Only 1x differential left
CMA6 , CMA11	2x differential		
Albedometers with 2x CMP	2x differential		
CUV5	1x differential		Up to 2V output signal
UVS A, B and E	1x single ended Input AIN3 or AIN4	1x single ended temperature measurement	Radiation & temperature use AIN3 & 4. One sensor possible
NR2 Lite	1x differential		
CNR4	4x differential	1x single ended temperature measurement	Pt-100 not possible
PQS1	1x differential		
CSD3	1x digital for sunshine signal	1x single ended for DNI is optional	Max 1x sunshine duration on input DIN4
SMART SMP, SHP , SGR , SUV	Unique Modbus® address		Max. 8 sensors supported
CVF4, CNF4 ventilation unit (fan)		1x digital	Max. 3 supported, 4 th digital input is for CSD3

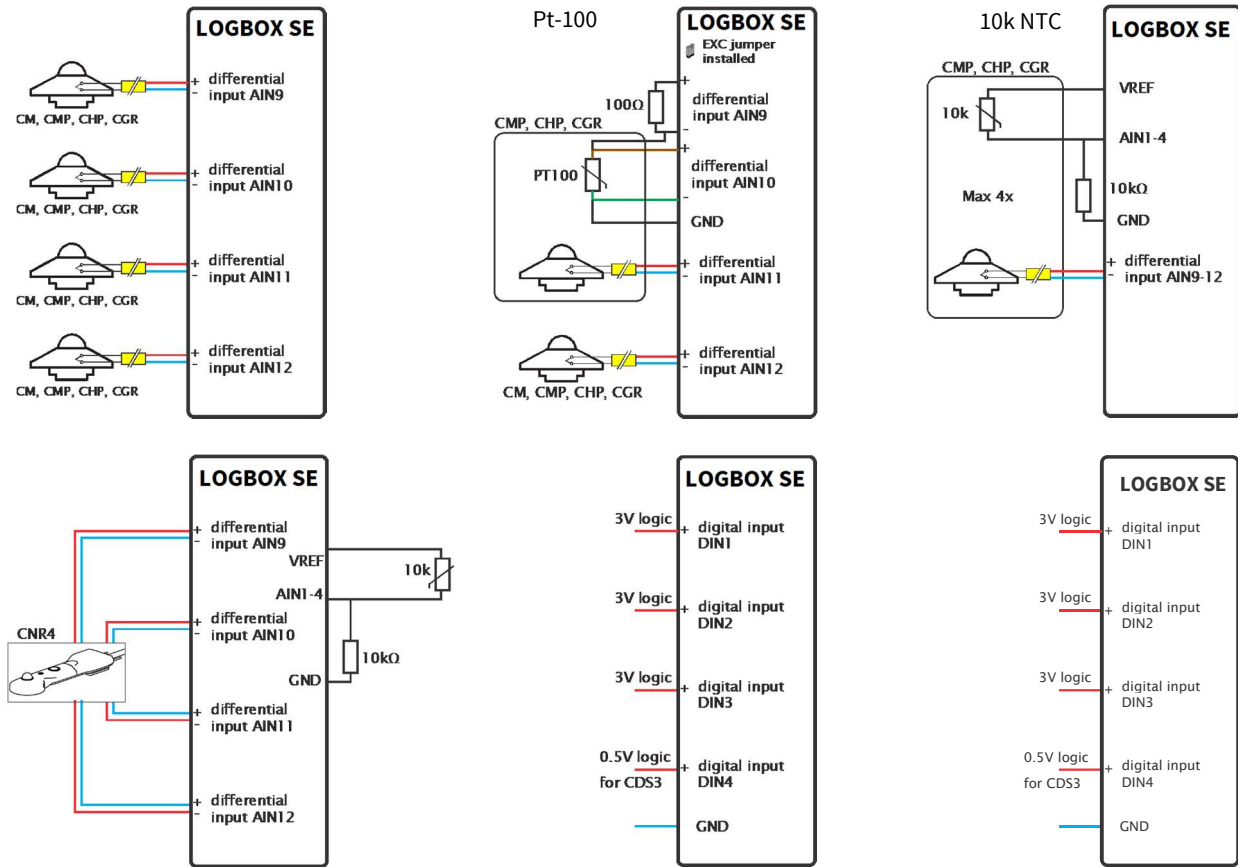
Your requirements:

Differential + + +	Max 4
Single ended + + +	Max 4
Digital + + +	Max 4

Continued on next page

Examples.

All inputs can be used at the same time.



Your planned setup:

Instrument model	Instrument number	Inputs needed (diff, single ended, digital)	Input used	Serial number	Sensitivity
	Nr.				
	Nr.				
	Nr.				
	Nr.				
	Nr.				
	Nr.				
	Nr.				
	Nr.				
	Nr.				

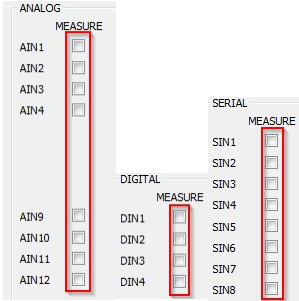
Examples:

Instrument model	Instrument number	Inputs needed (diff, single ended, digital, RS-485)	Input used	Serial number	Sensitivity
CMP10	Nr 1	Differential	AIN12	16005231	9.56
CMP22 Pt100	Nr 2	3x Differential	AIN9/10 and 11	16006354	9.78
<i>Small BSRN</i>					
CMP10 GHI	Nr 1	Differential	AIN9	16005231	9.56
CMP10 DHI	Nr 2	Differential	AIN10	16005232	9.58
CHP1 DNI	Nr 3	Differential	AIN11	16009835	9.47
CGR4 10k	Nr 4	Differential + SE	AIN12 + AIN1	15006893	9.86
<i>Optional</i>					
fan1 CMP10 tachometer	Nr 1F	Digital	DIN1	15689542	n.a.
fan2 CMP10 tachometer	Nr 2F	Digital	DIN2	15689544	n.a.
fan3 CGR4 tachometer	Nr 3F	Digital	DIN3	15689546	n.a.
<i>SMART only setup</i>					
SMP10	Nr 1	RS-485	Address 2	16003569	n.a.
SMP10	Nr 2	RS-485	Address 3	16003540	n.a.
SHP1	Nr 3	RS-485	Address 5	15012398	n.a.
SGR4	Nr 4	RS-485	Address 4	16005874	n.a.
<i>Optional</i>					
fan1 SMP10 tachometer	Nr 1F	Digital	DIN1	15689542	n.a.
fan2 SMP10 tachometer	Nr 2F	Digital	DIN1	15689542	n.a.
fan3 SGR4 tachometer	Nr 4F	Digital	DIN3	15689546	n.a.
<i>Optional</i>					
SMP10 reflected	Nr 8	RS-485	Address 6	16003549	n.a.
SGR4 up welling	Nr 9	RS-485	Address 7	16005878	n.a.
No tachometer possible					

14 MY LOGBOX SE DOESN'T WORK THE WAY I WANT IT

14.1 Common issues

14.1.1 When the results in LiveView remain ---



please check if Measure has been selected in the Analog, Digital or Serial window:and that in the Output window the correct INPUT is chosen, with optionally Min, Max, SDev and that the right Poly is selected.

When in doubt about the POLY we suggest to select one with A1=1 and recheck in LiveView.

When there is still not the expected result please check the wiring and if possible use a digital multimeter to measure the input voltages on AIN1-4 and GND or across AINx + and -

The instruction sheets of our products will give you an indication of the normal amount of irradiation to expect and by multiplying this by the given sensitivity one has an estimated voltage to be measured. Indoor all readings will always be very low and sometimes even negative due to warming and cooling as a result of holding the instrument.

14.1.2 Several intervals, I'm confused

SN	004/0716
Firmware	Version 9.4 Jun 3 2016
Name	Logbox
MeasInterval	2 sec
MeasDelay	1 sec
LogInterval	4 sec
RepInterval	0 sec
Vref	2499.28 mV

The settings to the left are save settings for diagnosis.

Every 2 seconds (MeasInterval) a measurement is started. VREF, Pt-100 excitation and POWER are switched on and after a 1 second wait (MeasDelay) the actual measurement is performed.

Two measurement periods of 2 seconds each fit the selected 4 seconds LogInterval. These measurements are averaged and used for Min, Max, SDev.

In LiveView every 4 seconds there will be a line with the selected outputs

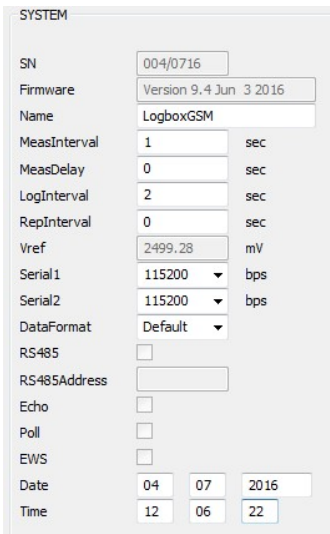
14.1.3 My modem doesn't work

There are many possible reasons for a failure in this inherently difficult area.

- 1) Check if the SIM card has working internet capabilities by temporarily putting it in a smartphone and perform internet serving or social media updates.
- 2) Make sure it has a PIN
- 3) The settings given in section 10.8 are a good starting point to have the LOGBOX SE sent e-mail log files using the Physicus mailbox and server. Once this works you can change to your own server and try again.
- 4) Often the GSM signal in the office or building can be too weak or unstable to work properly. Try to put the small antenna outside for a better signal.
- 5) The LOGBOX SE will wait with sending a log file until the internal clock reaches a whole hour like 14:00 hr.
- 6) When a TimeServer and TimeZone have been selected, at midnight the internal clock will be synchronised. Logged data afterwards could have a different time stamp but a big difference is only to be expected the first time there is a synchronisation and only when the time and or date weren't set properly.

14.1.4 I get no reports on the second RS-232 port

Please check your settings for COM2 on the System tab.



SN	004/0716
Firmware	Version 9.4 Jun 3 2016
Name	LogboxGSM
MeasInterval	1 sec
MeasDelay	0 sec
LogInterval	2 sec
RepInterval	0 sec
Vref	2499.28 mV
Serial1	115200 bps
Serial2	115200 bps
DataFormat	Default
RS485	<input type="checkbox"/>
RS485Address	
Echo	<input type="checkbox"/>
Poll	<input type="checkbox"/>
EWS	<input type="checkbox"/>
Date	04/07/2016
Time	12:06:22

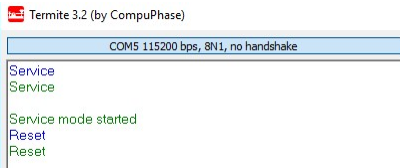
If RepInterval = 0, there is no activity on COM2

If RepInterval = LogInterval, then you will see logged data in real time sent via COM2.. All statistical values will appear and the baudrate set voor Serial2 is used. Other settings are fixed and 8 bit, no parity and 1 stopbit.

If RepInterval is different from LogInterval, on COM2 you will see actual last measured data without statistical processing. Values for min, max, stdev values, they will be **not** on the output

14.1.5 Resetting the LOGBOX SE

When in doubt or when the red or green LED stays on for more than 5 minutes it is possible to issue a Reset command via a terminal session.



Or fully power down the unit by disconnecting any power supply or battery and the USB cable and reconnecting.

14.1.6 I can't install the driver on Windows 8 or 10

How can I install drivers that are not digitally signed?

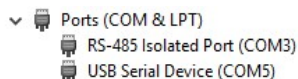
Windows 10 enforces driver signatures by default. This can be disabled to install drivers that are not digitally signed. Use the following steps to disable driver signature enforcement.

- Click the **Start** menu and select **Settings**.
- Click Update and Security.
- Click on **Recovery**.
- Click Restart now under Advanced Startup.
- Click Troubleshoot.
- Click **Advanced** options.
- Click **Startup** Settings.
- Click on **Restart**.

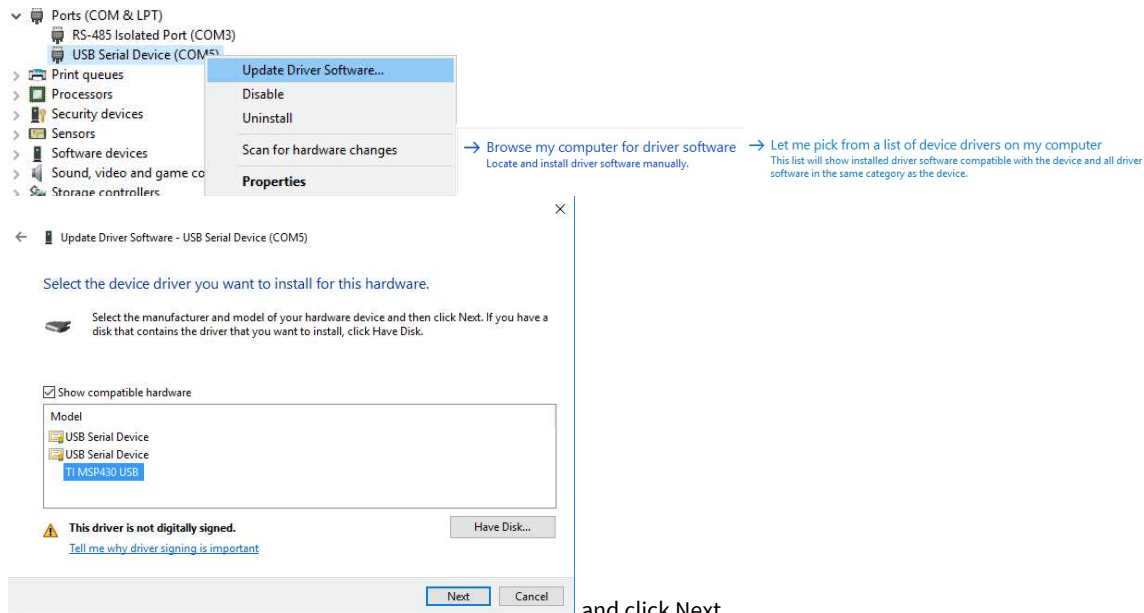
On the Startup Settings screen press 7 or F7 to disable driver signature enforcement.

Your computer will restart and you will be able to install non-digittally signed drivers. If you restart your computer again the driver signature enforcement will be re-enabled.

Now install the msp430_ti_signed driver. Probably nothing will have changed and you still see the standard Windows USB Serial Device in Windows Device Manager.

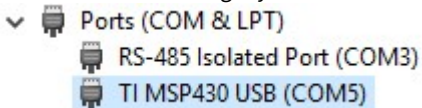


We'll force the driver to the msp430 version:



and click Next

Now in the Device Manager you should see



15 APPENDICES

15.1 Polynomials

Nonstandard polynomials

Kipp & Zonen uses a particular Pt-100 or TH10K in specific classes, behaving well documented to temperature changes. Therefore, it's vital to create a perfect polynomial for temperature sensors.

The tables below, taken from the manuals, show the values for a Kipp & Zonen 10k thermistor YSI 44031 and Pt-100

YSI Thermistor 44031 - Resistance versus Temperature in °C and °F						Pt-100 Temperature vs. Resistance											
Temperature [°C]	Temperature [°F]	Resistance [Ohm]	Temperature [°C]	Temperature [°F]	Resistance [Ohm]	Temperature [°C]	Temperature [°F]	Resistance [Ohm]	Temperature [°C]	Temperature [°F]	Resistance [Ohm]						
-30	-22.0	135,200	0	32.0	29,490	30	86.0	8,194	-30	-22.0	88.2	0	32.0	100.0	30	86.0	111.7
-29	-20.2	127,900	1	33.8	28,150	31	87.8	7,880	-29	-20.2	88.6	1	33.8	100.4	31	87.8	112.1
-28	-18.4	121,100	2	35.6	26,890	32	89.6	7,579	-28	-18.4	89.0	2	35.6	100.8	32	89.6	112.5
-27	-16.6	114,600	3	37.4	25,690	33	91.4	7,291	-27	-16.6	89.4	3	37.4	101.2	33	91.4	112.8
-26	-14.8	108,600	4	39.2	24,550	34	93.2	7,016	-26	-14.8	89.8	4	39.2	101.6	34	93.2	113.2
-25	-13.0	102,900	5	41.0	23,460	35	95.0	6,752	-25	-13.0	90.2	5	41.0	102.0	35	95.0	113.6
-24	-11.2	97,490	6	42.8	22,430	36	96.8	6,500	-24	-11.2	90.6	6	42.8	102.3	36	96.8	114.0
-23	-9.4	92,430	7	44.6	21,450	37	98.6	6,258	-23	-9.4	91.0	7	44.6	102.7	37	98.6	114.4
-22	-7.6	87,660	8	46.4	20,520	38	100.4	6,026	-22	-7.6	91.4	8	46.4	103.1	38	100.4	114.8
-21	-5.8	83,160	9	48.2	19,630	39	102.2	5,805	-21	-5.8	91.8	9	48.2	103.5	39	102.2	115.2
-20	-4.0	78,910	10	50.0	18,790	40	104.0	5,592	-20	-4.0	92.2	10	50.0	103.9	40	104.0	115.5
-19	-2.2	74,910	11	51.8	17,980	41	105.8	5,389	-19	-2.2	92.6	11	51.8	104.3	41	105.8	115.9
-18	-0.4	71,130	12	53.6	17,220	42	107.6	5,193	-18	-0.4	93.0	12	53.6	104.7	42	107.6	116.3
-17	1.4	67,570	13	55.4	16,490	43	109.4	5,006	-17	1.4	93.3	13	55.4	105.1	43	109.4	116.7
-16	3.2	64,200	14	57.2	15,790	44	111.2	4,827	-16	3.2	93.7	14	57.2	105.5	44	111.2	117.1
-15	5.0	61,020	15	59.0	15,130	45	113.0	4,655	-15	5.0	94.1	15	59.0	105.9	45	113.0	117.5
-14	6.8	58,010	16	60.8	14,500	46	114.8	4,489	-14	6.8	94.5	16	60.8	106.2	46	114.8	117.9
-13	8.6	55,170	17	62.6	13,900	47	116.6	4,331	-13	8.6	94.9	17	62.6	106.6	47	116.6	118.2
-12	10.4	52,480	18	64.4	13,330	48	118.4	4,179	-12	10.4	95.3	18	64.4	107.0	48	118.4	118.6
-11	12.2	49,940	19	66.2	12,790	49	120.2	4,033	-11	12.2	95.7	19	66.2	107.4	49	120.2	119.0
-10	14.0	47,540	20	68.0	12,260	50	122.0	3,893	-10	14.0	96.1	20	68.0	107.8	50	122.0	119.4
-9	15.8	45,270	21	69.8	11,770	51	123.8	3,758	-9	15.8	96.5	21	69.8	108.2	51	123.8	119.8
-8	17.6	43,100	22	71.6	11,290	52	125.6	3,629	-8	17.6	96.9	22	71.6	108.6	52	125.6	120.2
-7	19.4	41,070	23	73.4	10,840	53	127.4	3,504	-7	19.4	97.3	23	73.4	109.0	53	127.4	120.6
-6	21.2	39,140	24	75.2	10,410	54	129.2	3,385	-6	21.2	97.7	24	75.2	109.4	54	129.2	120.9
-5	23.0	37,310	25	77.0	10,000	55	131.0	3,270	-5	23.0	98.0	25	77.0	109.7	55	131.0	121.3
-4	24.8	35,570	26	78.8	9,605	56	132.8	3,160	-4	24.8	98.4	26	78.8	110.1	56	132.8	121.7
-3	26.6	33,930	27	80.6	9,227	57	134.6	3,054	-3	26.6	98.8	27	80.6	110.5	57	134.6	122.1
-2	28.4	32,370	28	82.4	8,867	58	136.4	2,952	-2	28.4	99.2	28	82.4	110.9	58	136.4	122.5
-1	30.2	30,890	29	84.2	8,523	59	138.2	2,854	-1	30.2	99.6	29	84.2	111.3	59	138.2	122.9

Let's begin to create your polynomials:

Step 1: Collect the information as shown in figure 1 and 2. The values for the Kipp & Zonen thermistors came with the software package downloaded earlier in the file "Table with 10k and Pt-100 thermistors"

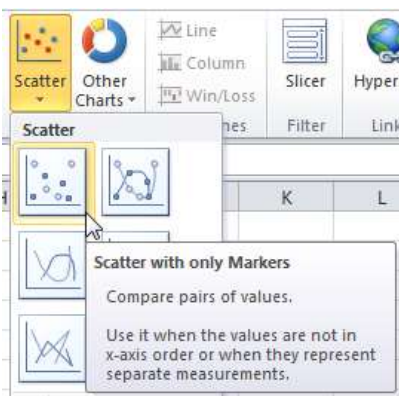
Step 2: Open the Excel file or insert all your NTC thermistor information in the excel sheet.

10k thermistor YSI 44031	
Temp °C	Resistance kΩ
-30	135,2
-29	127,9
-28	121,1
-27	114,6
-26	108,6
-25	102,9

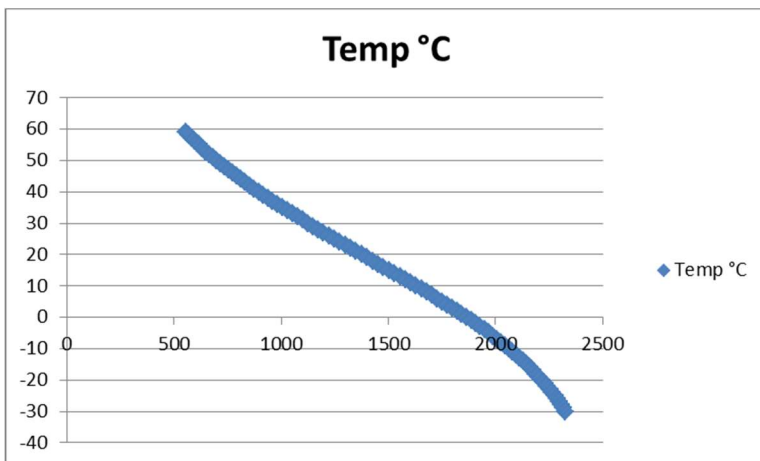
Input the V_{REF} value (close to 2.5V) as indicated on the calibration sheet and the series resistor used. The column V_{IN} will be recalculated

Step 3: Translate this information into a graphical chart.

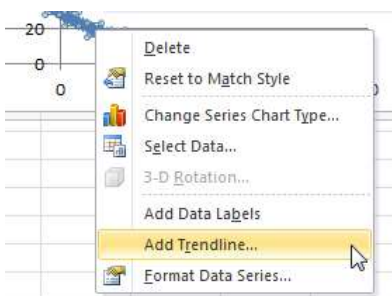
Temp °C	V_{in}
-30	2,496653
-29	2,496548
-28	2,496439
-27	2,496322



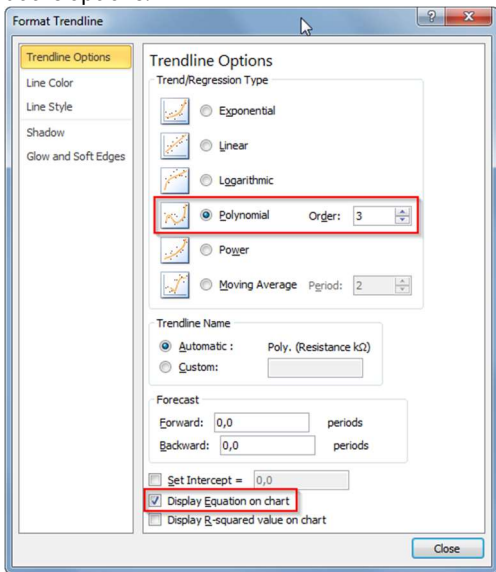
Select all of the Temp and V_{IN} values of interest to you and Insert, Scatter with only Markers



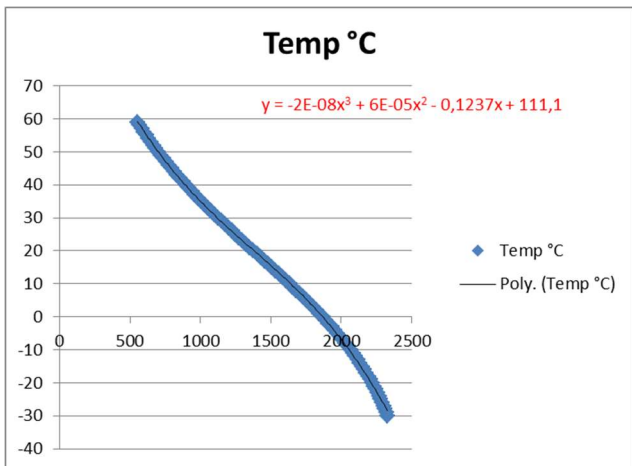
Step 4: Add a trendline by right clicking on the line inside the graphical chart and select “add trendline”



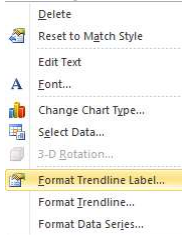
-Select the polynomial option, put it on 3rd degree , and do not forget to put a checkmark in the box “display equation on chart” at the options.



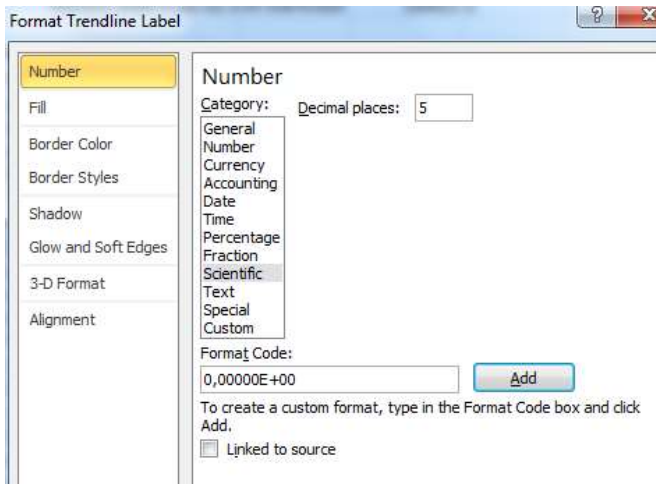
Step5: The result will be as below with a text box with the polynomial as calculated by e.g. Excel. It has been moved and made red here to be better visible.



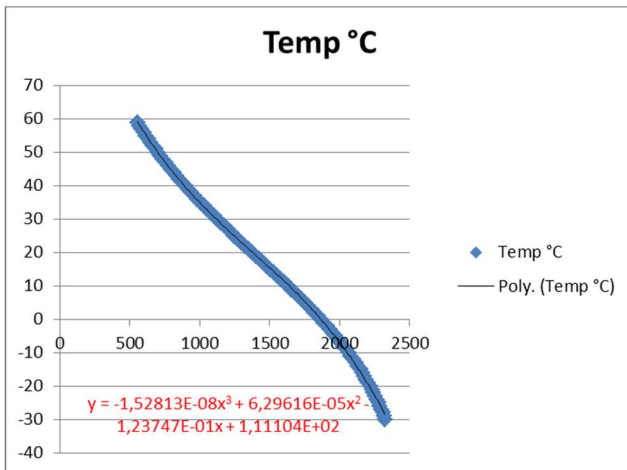
Now right click on the box with the polynomial and select



Format Trendline Label



Scientific, 5 decimal places and Add.



Now with 5 decimal places

15.2 Example output of TestGprs

TestGprs	OK	at+cgatt=1	^SISO: 3,
TestGprs	at+creg?	at+cgatt=1	"Socket", "2", "1", "0", "0", "0.0.0.0"
	+CREG: 0,2	OK	", "0.0.0.0:0"
OK	OK	at^sics=0,contype,gprs0	^SISO: 4, ""
Modem On	at+creg?	OK	^SISO: 5, ""
^SYSSTART	+CREG: 0,1	at^sics=0,apn,	^SISO: 6, ""
at	OK	OK	^SISO: 7, ""
at	at+cgatt=1	at^sics=0,alphabet,1	^SISO: 8, ""
	at+cgatt=1	OK	^SISO: 9, ""
OK	ERROR	at^sics=0,user,	OK
ate0	at+cgatt=1	OK	at+csq
ate0	ERROR	at^sics=0,passwd,	+CSQ: 30,99
	at+cgatt=1	OK	OK
OK	ERROR	at^siss=0,svrtype,smtp	at^sisi?
at+cpin?	at+cgatt=1	OK	^SISI: 0,2,0,0,0,0
+CPIN: SIM PIN	ERROR	at^siss=1,svrtype,socket	^SISI: 1,2,0,0,0,0
OK	Reinit Modem Off	OK	^SISI: 2,2,0,0,0,0
at+cpin=	Reinit Modem On	at^siss=2,svrtype,http	^SISI: 3,2,0,0,0,0
at+cpin=	Modem On	OK	OK
OK	^SYSSTART	at^siss=3,svrtype,socket	at^siso?
at+creg?	at	OK	^SISO: 0,
+CREG: 0,2	at	at^sico=0	"Smtpp", "2", "1", "0", "0", "0.0.0.0:",
OK		OK	"0.0.0.0:0"
at+creg?	OK	at^sici?	^SISO: 1,
+CREG: 0,2	ate0	^SICI: 0,2,0, "10.248.103.102"	"Socket", "2", "1", "0", "0", "0.0.0.0"
OK	ate0	OK	", "0.0.0.0:0"
at+creg?		at+csq	^SISO: 2,
+CREG: 0,2	OK	+CSQ: 30,99	"Http", "2", "1", "0", "0", "0.0.0.0:",
OK	at+cpin?	OK	0.0.0.0:0"
at+creg?	+CPIN: SIM PIN	at^sisi?	^SISO: 3,
+CREG: 0,2	OK	^SISI: 0,2,0,0,0,0	"Socket", "2", "1", "0", "0", "0.0.0.0"
OK	at+cpin=	^SISI: 1,2,0,0,0,0	", "0.0.0.0:0"
at+creg?	at+cpin=	^SISI: 2,2,0,0,0,0	^SISO: 4, ""
+CREG: 0,2	OK	^SISI: 3,2,0,0,0,0	^SISO: 5, ""
OK	at+creg?	OK	^SISO: 6, ""
at+creg?	+CREG: 0,2	at^siso?	^SISO: 7, ""
+CREG: 0,2	OK	^SISO: 0,	^SISO: 8, ""
OK	at+creg?	"Smtpp", "2", "1", "0", "0", "0.0.0.0:",	^SISO: 9, ""
at+creg?	+CREG: 0,2	"0.0.0.0:0"	OK
+CREG: 0,2	OK	^SISO: 1,	at^sicc=0
OK	at+creg?	"Socket", "2", "1", "0", "0", "0.0.0.0:0"	OK
at+creg?	+CREG: 0,2	", "0.0.0.0:0"	at^smso
+CREG: 0,2	OK	^SISO: 2,	^SMSO: MS OFF
OK	at+creg?	"Http", "2", "1", "0", "0", "0.0.0.0:0:",	OK
at+creg?	+CREG: 0,1	0.0.0.0:0"	Modem Off
+CREG: 0,2	OK		

15.3 Example output of TestEmail

TestEmail	at+cpin=	+CREG: 0,2	OK
TestEmail	OK	OK	at^sics=0,apn,
	at+creg?	at+creg?	OK
OK	+CREG: 0,2	+CREG: 0,2	at^sics=0,alphabet,1
Modem On	OK	OK	OK
^SYSSTART	at+creg?	at+creg?	at^sics=0,user,
at	+CREG: 0,2	+CREG: 0,2	OK
at	OK	OK	at^sics=0,passwd,
	at+creg?	at+creg?	OK
OK	+CREG: 0,2	+CREG: 0,2	at^siss=0,svrtype,smtp
ate0	OK	OK	OK
ate0	at+creg?	at+creg?	at^siss=1,svrtype,socket
	+CREG: 0,2	+CREG: 0,1	OK
OK	OK	OK	at^siss=2,svrtype,http
at+cpin?	at+creg?	at+cgatt=1	OK
+CPIN: SIM PIN	+CREG: 0,2	at+cgatt=1	at^siss=3,svrtype,socket
OK	OK	OK	OK
at+cpin=	at+creg?	at^sics=0,contype,gprs0	at^sico=0

OK	at^siss=0,smauth,	^SISI: 1,2,0,0,0,0	^SISO: 3,
at^sici?	OK	^SISI: 2,2,0,0,0,0	"Socket", "2", "1", "0", "0", "0.0.0.0:0"
^SICI: 0,2,0,"100.121.202.228"	at^siso=0	^SISI: 3,2,0,0,0,0	", "0.0.0.0:0"
OK	OK	OK	^SISO: 4, ""
at+csq	^SISW: 0, 1	at^siso?	^SISO: 5, ""
+CSQ: 28,99	at+csq	^SISO: 0,	^SISO: 6, ""
OK	+CSQ: 28,99	"Smtplib", "6", "1", "0", "261", "100.121	^SISO: 7, ""
at^sisi?	OK	.202.228:1024", "212.57.32.39:25"	^SISO: 8, ""
^SISI: 0,2,0,0,0,0	at^sisi?	^SISO: 1,	^SISO: 9, ""
^SISI: 1,2,0,0,0,0	^SISI: 0,3,0,0,0,0	"Socket", "2", "1", "0", "0", "0.0.0.0:0"	OK
^SISI: 2,2,0,0,0,0	^SISI: 1,2,0,0,0,0	", "0.0.0.0:0"	at^sisc=0
^SISI: 3,2,0,0,0,0	^SISI: 2,2,0,0,0,0	^SISO: 2,	OK
OK	^SISI: 3,2,0,0,0,0	"Http", "2", "1", "0", "0", "0.0.0.0:0", "	at^siss=0,srvtype,smtplib
at^siso?	OK	0.0.0.0:0"	OK
^SISO: 0,	at^siso?	^SISO: 3,	at+csq
"Smtplib", "2", "1", "0", "0", "0.0.0.0:0", "	^SISO: 0,	"Socket", "2", "1", "0", "0", "0.0.0.0:0"	+CSQ: 28,99
"0.0.0.0:0"	"Smtplib", "3", "1", "0", "0", "100.121.2	", "0.0.0.0:0"	OK
^SISO: 1,	02.228:0", "212.57.32.39:0"	^SISO: 4, ""	at^sisi?
"Socket", "2", "1", "0", "0", "0.0.0.0:0"	^SISO: 1,	^SISO: 5, ""	^SISI: 0,2,0,0,0,0
", "0.0.0.0:0"	"Socket", "2", "1", "0", "0", "0.0.0.0:0"	^SISO: 6, ""	^SISI: 1,2,0,0,0,0
^SISO: 2,	", "0.0.0.0:0"	^SISO: 7, ""	^SISI: 2,2,0,0,0,0
"Http", "2", "1", "0", "0", "0.0.0.0:0", "	^SISO: 2,	^SISO: 8, ""	^SISI: 3,2,0,0,0,0
0.0.0.0:0"	"Http", "2", "1", "0", "0", "0.0.0.0:0", "	^SISO: 9, ""	OK
^SISO: 3,	0.0.0.0:0"	OK	at^siso?
"Socket", "2", "1", "0", "0", "0.0.0.0:0"	^SISO: 3,	OK	^SISO: 0,
", "0.0.0.0:0"	"Socket", "2", "1", "0", "0", "0.0.0.0:0"	OK	"Smtplib", "2", "1", "0", "0", "0.0.0.0:0", "
^SISO: 4, ""	", "0.0.0.0:0"	at^sisc=0	"0.0.0.0:0"
^SISO: 5, ""	^SISO: 4, ""	OK	^SISO: 1,
^SISO: 6, ""	^SISO: 5, ""	134 Bytes sent	"Socket", "2", "1", "0", "0", "0.0.0.0:0"
^SISO: 7, ""	^SISO: 6, ""	Data Transfer Finished	", "0.0.0.0:0"
^SISO: 8, ""	^SISO: 7, ""	at+csq	^SISO: 2,
^SISO: 9, ""	^SISO: 8, ""	+CSQ: 28,99	"Http", "2", "1", "0", "0", "0.0.0.0:0", "
OK	^SISO: 9, ""	OK	0.0.0.0:0"
at^siss=0,conid,0	OK	at^sisi?	^SISO: 3,
OK	at^sisw=0,127	^SISI: 0,2,0,0,0,0	"Socket", "2", "1", "0", "0", "0.0.0.0:0"
at^siss=0,alphabet,1	^SISW: 0, 127, 0	^SISI: 1,2,0,0,0,0	", "0.0.0.0:0"
OK	OK	^SISI: 2,2,0,0,0,0	^SISO: 4, ""
at^siss=0,srvtype,	^SISW: 0, 1	^SISI: 3,2,0,0,0,0	^SISO: 5, ""
OK	at^sisw=0,134	OK	^SISO: 6, ""
at^siss=0,address,	^SISW: 0, 134, 0	at^siso?	^SISO: 7, ""
OK	OK	^SISO: 0,	^SISO: 8, ""
at^siss=0,smfrom,	^SISW: 0, 1	"Smtplib", "2", "1", "0", "0", "0.0.0.0:0", "	^SISO: 9, ""
OK	at^sisw=0,0,1	"0.0.0.0:0"	at^sicc=0
at^siss=0,smrcpt,	^SISW: 0, 0, 0	^SISO: 1,	OK
OK	OK	"Socket", "2", "1", "0", "0", "0.0.0.0:0"	at^smso
at^siss=0,smsubj,	^SISW: 0, 2	", "0.0.0.0:0"	^SMSO: MS OFF
OK	at+csq	^SISO: 2,	OK
at^siss=0,user,	+CSQ: 28,99	"Http", "2", "1", "0", "0", "0.0.0.0:0", "	Modem Off
OK	OK	0.0.0.0:0"	
at^siss=0,passwd,	at^sisi?		
OK	^SISI: 0,6,0,261,0,0		

15.4 Example output of TestSync

TestSync		+CREG: 0,2	+CREG: 0,2
TestSync	OK	OK	OK
OK	at+cpin?	at+creg?	at+creg?
Modem On	+CPIN: SIM PIN	+CREG: 0,2	+CREG: 0,2
^SYSSTART	OK	OK	OK
at	at+cpin=	at+creg?	at+creg?
at	at+cpin=	+CREG: 0,2	+CREG: 0,2
OK	OK	OK	OK
OK	at+creg?	at+creg?	at+creg?
ate0	+CREG: 0,2	+CREG: 0,2	+CREG: 0,2
ate0	OK	OK	OK
	at+creg?	at+creg?	at+creg?

+CREG: 0,1	OK	^SISO: 3,	^SISO: 1,
OK	^SISW: 1, 1	"Socket", "2", "1", "0", "0", "0.0.0.0:0"	"Socket", "2", "1", "0", "0", "0.0.0.0:0"
at+cgatt=1	at+csq	", "0.0.0.0:0"	", "0.0.0.0:0"
at+cgatt=1	+CSQ: 29,99	^SISO: 4, ""	^SISO: 2,
OK	OK	^SISO: 5, ""	"Http", "2", "1", "0", "0", "0.0.0.0:0", "
at^sics=0,contype,gprs0	at^sisi?	^SISO: 6, ""	0.0.0.0:0"
OK	^SISI: 0,2,0,0,0,0	^SISO: 7, ""	^SISO: 3,
at^sics=0,apn,	^SISI: 1,4,0,0,0,0	^SISO: 8, ""	"Socket", "2", "1", "0", "0", "0.0.0.0:0"
OK	^SISI: 2,2,0,0,0,0	^SISO: 9, ""	", "0.0.0.0:0"
at^sics=0,alphabet,1	^SISI: 3,2,0,0,0,0	OK	^SISO: 4, ""
OK	OK	at^sisw=1,48	^SISO: 5, ""
at^sics=0,user,	at^siso?	^SISW: 1, 48, 0	^SISO: 6, ""
OK	^SISO: 0,	OK	^SISO: 7, ""
at^sics=0,passwd,	"Smtpr", "2", "1", "0", "0", "0.0.0.0:0", "	^SISW: 1, 1	^SISO: 8, ""
OK	"0.0.0.0:0"	^SISR: 1, 1	^SISO: 9, ""
at^siss=0,svrtype,smtp	^SISO: 1,	at^sirs=1,128	OK
OK	"Socket", "4", "2", "0", "0", "10.103.1	^SISR: 1, 48	at^sicc=0
at^siss=1,svrtype,socket	76.85:1025", "193.87.160.18:123"	^SISR: 1, 48	OK
OK	^SISO: 2,	\$[02][06]é[00][00][02][0B][00][00][at^smso
at^siss=2,svrtype,http	"Http", "2", "1", "0", "0", "0.0.0.0:0", "	04]ñ"ç[02][06]ÛaÄŠfñi[00][00][00]	^SMSO: MS OFF
OK	0.0.0.0:0"][00][00][00][00][00]ÛaÄ@ ?'ÛaÄ@	OK
at^siss=3,svrtype,socket	^SISO: 3,	@Ž³WOK	Modem Off
OK	"Socket", "2", "1", "0", "0", "0.0.0.0:0"	Time Received 19.08.2016 17:46:51	
at^sico=0	", "0.0.0.0:0"	at+csq	
OK	^SISO: 4, ""	+CSQ: 29,99	
at^sici?	^SISO: 5, ""	OK	
^SICI: 0,2,0,"10.103.176.85"	^SISO: 6, ""	at^sisi?	
OK	^SISO: 7, ""	^SISI: 0,2,0,0,0,0	
at+csq	^SISO: 8, ""	^SISI: 1,4,96,96,0,0	
+CSQ: 29,99	^SISO: 9, ""	^SISI: 2,2,0,0,0,0	
OK	OK	^SISI: 3,2,0,0,0,0	
at^sisi?	at^sisw=1,48	OK	
^SISI: 0,2,0,0,0,0	^SISW: 1, 48, 0	at^siso?	
^SISI: 1,2,0,0,0,0	OK	^SISO: 0,	
^SISI: 2,2,0,0,0,0	^SISW: 1, 1	"Smtpr", "2", "1", "0", "0", "0.0.0.0:0", "	
^SISI: 3,2,0,0,0,0	^SISR: 1, 1	"0.0.0.0:0"	
OK	at^sirs=1,128	^SISO: 1,	
at^siso?	^SISR: 1, 48	"Socket", "4", "2", "96", "96", "10.103	
^SISO: 0,	^SISR: 1, 48	.176.85:1025", "193.87.160.18:123"	
"Smtpr", "2", "1", "0", "0", "0.0.0.0:0", "	\$(02)[06]é[00][00][02]	^SISO: 2,	
"0.0.0.0:0"	[00][00]	"Http", "2", "1", "0", "0", "0.0.0.0:0", "	
^SISO: 1,	Û"ç[02][06]ÛaÄšfñi[00][0.0.0.0:0"	
"Socket", "2", "1", "0", "0", "0.0.0.0:0"	00][00][00][00][00][00]ÛaÄ%oU	^SISO: 3,	
", "0.0.0.0:0"	#ÛfÛaÄ%oU%ÄPOK	"Socket", "2", "1", "0", "0", "0.0.0.0:0"	
^SISO: 2,	Time Received 19.08.2016 17:46:49	", "0.0.0.0:0"	
"Http", "2", "1", "0", "0", "0.0.0.0:0", "	at+csq	^SISO: 4, ""	
0.0.0.0:0"	at+csq	^SISO: 5, ""	
^SISO: 3,	+CSQ: 29,99	^SISO: 6, ""	
"Socket", "2", "1", "0", "0", "0.0.0.0:0"	OK	^SISO: 7, ""	
", "0.0.0.0:0"	at^sisi?	^SISO: 8, ""	
^SISO: 4, ""	^SISI: 0,2,0,0,0,0	^SISO: 9, ""	
^SISO: 5, ""	^SISI: 1,4,48,48,0,0	OK	
^SISO: 6, ""	^SISI: 2,2,0,0,0,0	at^sisc=1	
^SISO: 7, ""	^SISI: 3,2,0,0,0,0	OK	
^SISO: 8, ""	OK	at+csq	
^SISO: 9, ""	at^siso?	+CSQ: 29,99	
OK	^SISO: 0,	OK	
at^siss=1,conid,0	"Smtpr", "2", "1", "0", "0", "0.0.0.0:0", "	at^sisi?	
OK	"0.0.0.0:0"	^SISI: 0,2,0,0,0,0	
at^siss=1,alphabet,1	^SISO: 1,	^SISI: 1,2,0,0,0,0	
OK	"Socket", "4", "2", "48", "48", "10.103	^SISI: 2,2,0,0,0,0	
at^siss=1,svrtype,socket	.176.85:1025", "193.87.160.18:123"	^SISI: 3,2,0,0,0,0	
OK	^SISO: 2,	OK	
at^siss=1,address,sockudp://	"Http", "2", "1", "0", "0", "0.0.0.0:0", "	at^siso?	
OK	0.0.0.0:0"	^SISO: 0,	
at^siso=1		"Smtpr", "2", "1", "0", "0", "0.0.0.0:0", "	
		"0.0.0.0:0"	



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