



DOKUMENTATION

MODBUS - LinOut

A part of the recordum airpointer system

Version 04.December 2019

1 Modbus Implementation:

The TCP (Ethernet) Modbus protocol has been implemented to output data measured or collected with the airpointer or the derivative products. The airpointer is working as Modbus server listening to port 1502. Starting with April 2018 also Modbus RTU, the RS232 (RS485 with external adapter) Version of the Modbus is supported. The program called LinOut is responsible to answer modbus request on port 1502 and it is also maintaining the Modbus RTU interface.

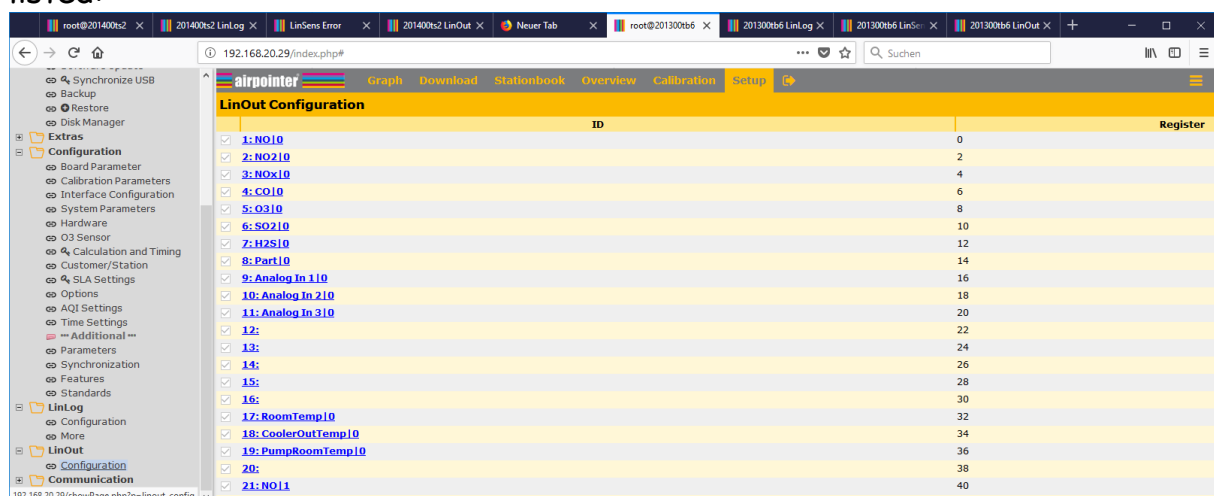
2 Data registers:

Each measured signal can be configured to be readable as register for the modbus protocol. Because a float value needs two 16bit registers for storage the value number times two gives the register address. A value of -9999 is indicating a missing value. A maximum of 100 values can be configured. The actual values are consolidated according to the status signal relevant for this signal. This means if a status fail or a status calibration is active the value is set to missing. This avoids wrong data (data not being sample or have failure) to be displayed on devices for public display. If the signal should be transmitted anyhow configure the according xxx_all value.

A default configuration is prepared; the user can change this setup. Values not measured on the system are set to missing.

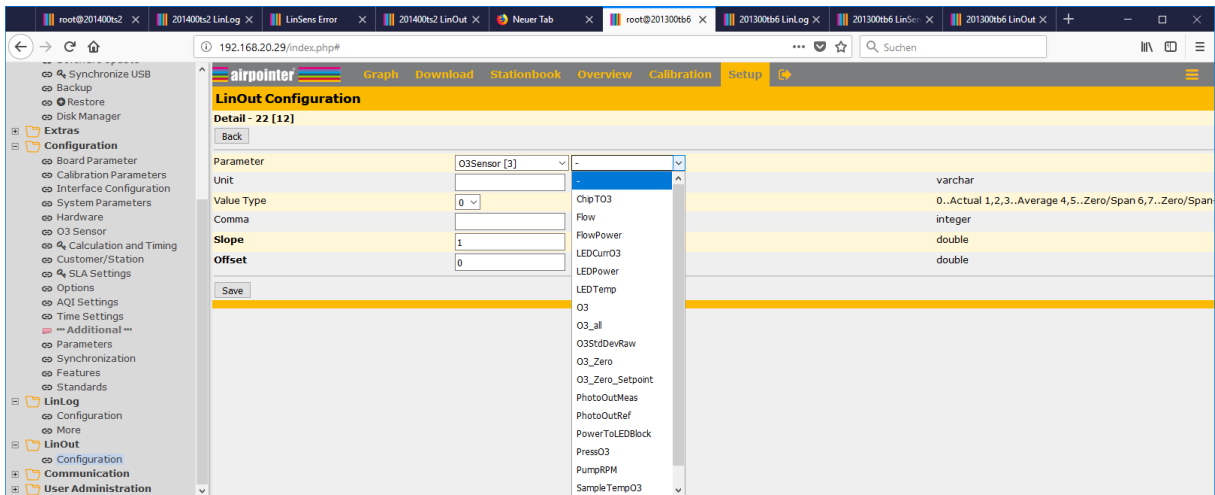
3 Configuration of data registers:

Using Setup-> LinOut -> Configuration a list of all 100 possible Modbus registers are listed:

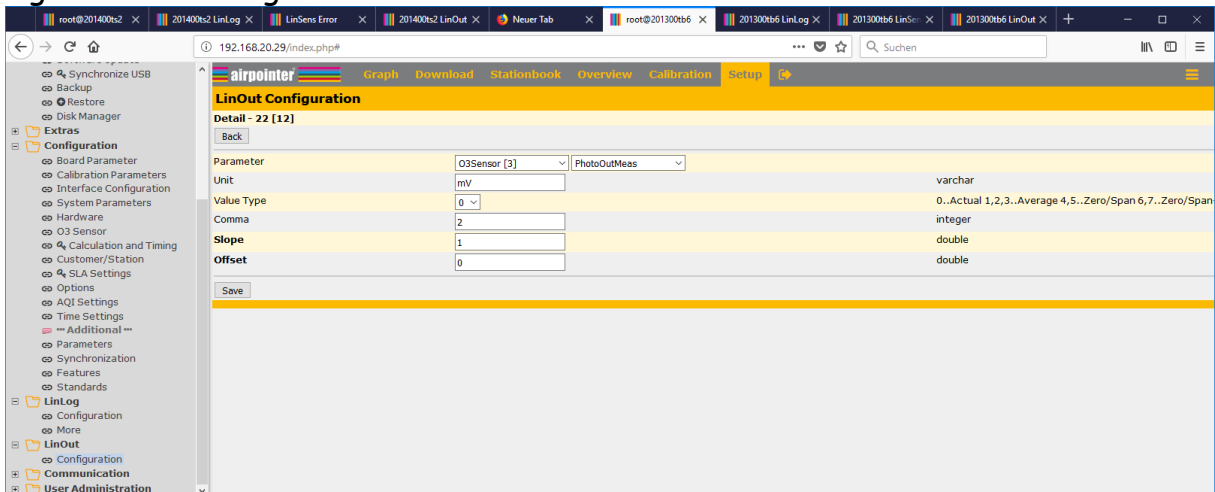


ID	Register
1: NO10	0
2: NO210	2
3: NOx10	4
4: CO10	6
5: O310	8
6: SO210	10
7: H2S10	12
8: Part10	14
9: Analog In 110	16
10: Analog In 210	18
11: Analog In 310	20
12:	22
13:	24
14:	26
15:	28
16:	30
17: RoomTemp10	32
18: CoolerOutTemp10	34
19: PumpRoomTemp10	36
20:	38
21: NO11	40

Clicking on a blue number opens the configuration page:



You choose the Sensor and the Parameter from the dropdown boxes to select the signal for that register.



With value Type you can choose between the following values of the selected parameter:

Actual Value

Average 1 Value (1 minute average)

Average 2 Value (5 minute average is standard setup)

Average 3 Value (30/60 minute average is standard setup)

Zero Value (if available)

Span Value (if available)

Zero Setpoint (if available)

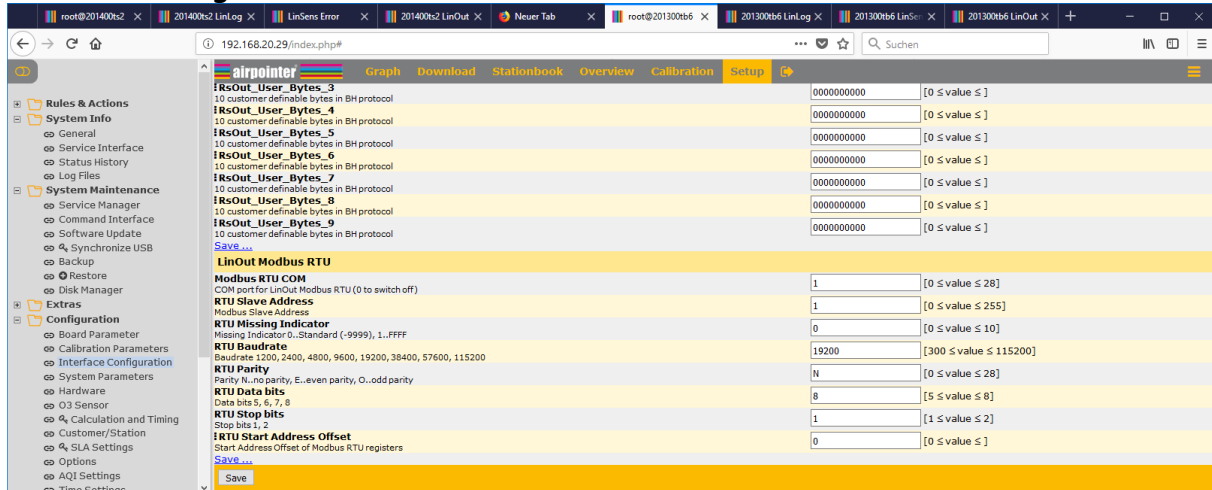
Span Setpoint (if available)

You also can compute the value with a slope and an offset factor. This is a possibility to display a value in $\mu\text{g}/\text{m}^3$ that is stored in ppb for example.

Please be aware that this register are used in both, the Modbus LAN and the Modbus RTU.

4 Setup for Modbus RTU

With Setup -> Configuration -> Interface Configuration -> LinOut Modbus RTU you find the configuration for the Modbus RTU:



You need to choose a free RS232 port in Modbus RTU COM and the according parameter for the interface. For Modbus RTU a slave address is mandatory, make sure you choose the same slave address on the Master device.

For some special setups you can choose to configure #FFFFFFFF instead of the normal missing indicator (-9999). You also can add an offset to the registers, that means for example if you choose a offset of 30000 ozone configured for register 8 will be presented at register 30008 on Modbus RTU.

After each change here, a restart of the LinLog software is needed to take over.

5 Service Interface

By adding /linout to the airpointer url the service interface of the LinOut opens.

Example: 172.17.2.140/linout

Choosing Actual a table of the values prepared in the Modbus registers are displayed.

Register	Type	Parameter	Value	Unit	Time	Register	Type	Parameter	Value	Unit	Time	Register	Type	Parameter	Value	Unit	Time
0	Actual	NO	-9999.0	ppb	-	68	Aug2	O3	5.8	ppb	20180425 14:59:40	136	-	-	-	-	-
2	Actual	NO2	-9999.0	ppb	-	70	Aug2	SO2	-9999.0	ppb	-	138	-	-	-	-	-
4	Actual	NOx	-9999.0	ppb	-	72	Aug2	H2S	-9999.0	ppb	-	140	Aug2	PM10 conc	0.8	µg/m³	20180425 14:59:40
6	Actual	CO	-9999.000	ppm	-	74	Aug2	Part	-9999.0	µg/m³	-	142	Aug2	PM2.5 conc	2.0	µg/m³	20180425 14:59:40
8	Actual	O3	5.7	ppb	20180425 14:59:37	76	-	-	-	-	-	144	Aug2	NO	-9999.0	ppb	-
10	Actual	SO2	-9999.0	ppb	-	78	-	-	-	-	-	146	Aug2	NO2	-9999.0	ppb	-
12	Actual	H2S	-9999.0	ppb	-	80	Aug3	NO	-9999.0	ppb	-	148	Aug2	Conc real time	-9999.000	ng/m³	-
14	Actual	Part	-9999.0	µg/m³	-	82	Aug3	NO2	-9999.0	ppb	-	150	Aug2	Conc hourly	-9999.000	ng/m³	-
16	Actual	Analog In 1	0.8	V	20180425 14:59:40	84	Aug3	NOx	-9999.0	ppb	-	152	Aug2	BC1	-9999	ng/m³	-
18	Actual	Analog In 2	2.0	V	20180425 14:59:40	86	Aug3	CO	-9999.000	ppm	-	154	Aug2	BC2	-9999	ng/m³	-
20	Actual	Analog In 3	2.9	V	20180425 14:59:40	88	Aug3	O3	7.2	ppb	20180425 14:30:00	156	-	-	-	-	-
22	-	-	-	-	-	90	Aug3	SO2	-9999.0	ppb	-	158	-	-	-	-	-
24	-	-	-	-	-	92	Aug3	H2S	-9999.0	ppb	-	160	Aug3	PM10 conc	0.8	µg/m³	20180425 14:30:00
26	-	-	-	-	-	94	Aug3	Part	-9999.0	µg/m³	-	162	Aug3	PM2.5 conc	2.0	µg/m³	20180425 14:30:00
28	-	-	-	-	-	96	-	-	-	-	-	164	Aug3	NO	-9999.0	ppb	-
30	-	-	-	-	-	98	-	-	-	-	-	166	Aug3	NO2	-9999.0	ppb	-
32	Actual	RoomTemp	-9999.0	°C	-	100	Actual	PM10 conc	0.8	µg/m³	20180425 14:59:40	168	Aug3	Conc real time	-9999.000	ng/m³	-
34	Actual	CoolerOutTemp	-9999.0	°C	-	102	Actual	PM2.5 conc	2.0	µg/m³	20180425 14:59:40	170	Aug3	Conc hourly	-9999.000	ng/m³	-
36	Actual	PumpRoomTemp	-9999.0	°C	-	104	Actual	NO	-9999.0	ppb	-	172	Aug3	BC1	-9999	ng/m³	-
38	-	-	-	-	-	106	Actual	NO2	-9999.0	ppb	-	174	Aug3	BC2	-9999	ng/m³	-
40	Aug1	NO	-9999.0	ppb	-	108	Actual	Conc real time	-9999.000	ng/m³	-	176	-	-	-	-	-
42	Aug1	NO2	-9999.0	ppb	-	110	Actual	Conc hourly	-9999.000	ng/m³	-	178	-	-	-	-	-
44	Aug1	NOx	-9999.0	ppb	-	112	Actual	BC1	-9999	ng/m³	-	180	-	-	-	-	-
46	Aug1	CO	-9999.000	ppm	-	114	Actual	BC2	-9999	ng/m³	-	182	-	-	-	-	-
48	Aug1	O3	6.0	ppb	20180425 14:59:00	116	-	-	-	-	-	184	-	-	-	-	-
50	Aug1	SO2	-9999.0	ppb	-	118	-	-	-	-	-	186	-	-	-	-	-
52	Aug1	H2S	-9999.0	ppb	-	120	Aug1	PM10 conc	0.8	µg/m³	20180425 14:59:00	188	-	-	-	-	-
54	Aug1	Part	-9999.0	µg/m³	-	122	Aug1	PM2.5 conc	2.0	µg/m³	20180425 14:59:00	190	-	-	-	-	-
56	-	-	-	-	-	124	Aug1	NO	-9999.0	ppb	-	192	-	-	-	-	-
58	-	-	-	-	-	126	Aug1	NO2	-9999.0	ppb	-	194	-	-	-	-	-
60	Aug2	NO	-9999.0	ppb	-	128	Aug1	Conc real time	-9999.000	ng/m³	-	196	-	-	-	-	-
62	Aug2	NO2	-9999.0	ppb	-	130	Aug1	Conc hourly	-9999.000	ng/m³	-	198	-	-	-	-	-
64	Aug2	NOx	-9999.0	ppb	-	132	Aug1	BC1	-9999	ng/m³	-	-	-	-	-	-	-
66	Aug2	CO	-9999.000	ppm	-	134	Aug1	BC2	-9999	ng/m³	-	-	-	-	-	-	-

This document is generated by Modbus, the master part of the CDS system
Copyright by www.recordum.de

20180425 14:59:41

6 Default setup:

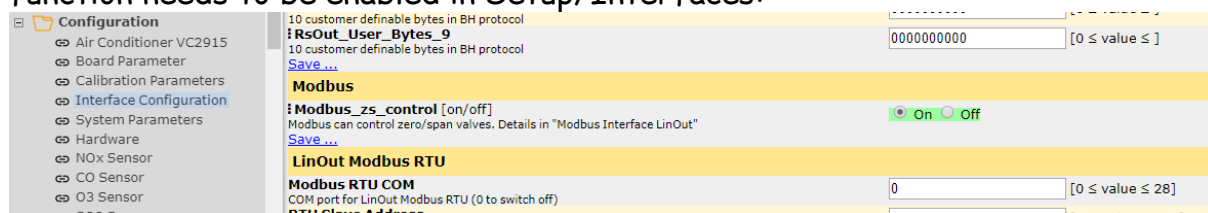
Register	Internal Id	Name	Unit	Type	Source
0	1	NO	ppb	actual value	linsens
2	2	NO2	ppb	actual value	linsens
4	3	NOx	ppb	actual value	linsens
6	4	CO	ppm	actual value	linsens
8	5	O3	ppb	actual value	linsens
10	6	SO2	ppb	actual value	linsens
12	7	H2S	ppb	actual value	linsens
14	9	PM	µg/m³	actual value	linsens
16					
18					
20					
22					
24					
26					
28					
30					
32	33	RoomTemp	°C	actual value	linsens
34	34	CoolerOutTemp	°C	actual value	linsens
36	32	PumpRoomTemp	°C	actual value	linsens
38					
40	1	NO	ppb	avg1 value	linsens

42	2	NO2	ppb	avg1 value	linsens
44	3	NOx	ppb	avg1 value	linsens
46	4	CO	ppm	avg1 value	linsens
48	5	O3	ppb	avg1 value	linsens
50	6	SO2	ppb	avg1 value	linsens
52	7	H2S	ppb	avg1 value	linsens
54	9	PM	µg/m ³	avg1 value	linsens
56					
58					
60	1	NO	ppb	avg2 value	linsens
62	2	NO2	ppb	avg2 value	linsens
64	3	NOx	ppb	avg2 value	linsens
66	4	CO	ppm	avg2 value	linsens
68	5	O3	ppb	avg2 value	linsens
70	6	SO2	ppb	avg2 value	linsens
72	7	H2S	ppb	avg2 value	linsens
74	9	PM	µg/m ³	avg2 value	linsens
76					
78					
80	1	NO	ppb	avg3 value	linsens
82	2	NO2	ppb	avg3 value	linsens
84	3	NOx	ppb	avg3 value	linsens
86	4	CO	ppm	avg3 value	linsens
88	5	O3	ppb	avg3 value	linsens
90	6	SO2	ppb	avg3 value	linsens
92	7	H2S	ppb	avg3 value	linsens
94	9	PM	µg/m ³	avg3 value	linsens
96					
98					
100	?	G1/P1		actual value	linlog
102	?	G1/P2		actual value	linlog
104	?	G2/P1		actual value	linlog
106	?	G2/P2		actual value	linlog
108	?	G3/P1		actual value	linlog
110	?	G3/P2		actual value	linlog
112	?	G4/P1		actual value	linlog
114	?	G4/P2		actual value	linlog
116	?	G5/P1		actual value	linlog
118	?	G5/P2		actual value	linlog
120	?	G1/P1		avg1 value	linlog
122	?	G1/P2		avg1 value	linlog
124	?	G2/P1		avg1 value	linlog
126	?	G2/P2		avg1 value	linlog
128	?	G3/P1		avg1 value	linlog
130	?	G3/P2		avg1 value	linlog
132	?	G4/P1		avg1 value	linlog
134	?	G4/P2		avg1 value	linlog

136	?	G5/P1	avg1 value	linlog
138	?	G5/P2	avg1 value	linlog
140	?	G1/P1	Avg2 value	linlog
142	?	G1/P2	Avg2 value	linlog
144	?	G2/P1	Avg2 value	linlog
146	?	G2/P2	Avg2 value	linlog
148	?	G3/P1	Avg2 value	linlog
150	?	G3/P2	Avg2 value	linlog
152	?	G4/P1	Avg2 value	linlog
154	?	G4/P2	Avg2 value	linlog
156	?	G5/P1	Avg2 value	linlog
158	?	G6/P2	Avg2 value	linlog
160	?	G1/P1	Avg3 value	linlog
162	?	G1/P2	Avg3 value	linlog
164	?	G2/P1	Avg3 value	linlog
166	?	G2/P2	Avg3 value	linlog
168	?	G3/P1	Avg3 value	linlog
170	?	G3/P2	Avg3 value	linlog
172	?	G4/P1	Avg3 value	linlog
174	?	G4/P2	Avg3 value	linlog
176	?	G5/P1	Avg3 value	linlog
178	?	G5/P2	Avg3 value	linlog

7 Status and Zero/Span control

The actual status and zero/span control registers are organized in a fixed register setup. There are two programs, LinLog and LinSens, having their modules and instruments organized in groups, for each group we have a register for zero/span control and a read only input-register with same number (address) for status. This function needs to be enabled in Setup/Interfaces:



Please restart the unit afterwards to make sure the changes are active.

7.1 Control:

After writing to the register the system will start up with the according operation if no other zero/span action is in progress. When the system accepts the command, the register is set to 0 by the system. If no calibration is possible on that group 255 will

be written as error indicator.

Coding for the control register:

- 1 switch to sample
- 2 switch to zero
- 4 switch to span
- 8 perform zero/span cycle

7.2 Status:

On the high byte of the status register is the status fail (FS) is coded, on the low byte the operational status (BS).

The coding of the FS Byte:

- Bit 0 (1) Flow
- Bit 1 (2) Pressure
- Bit 2 (4) Temperature
- Bit 3 (8) Lamp / Source / O3Gen / Flame / HVPS
- Bit 4 (16) SensorSignals wrong / BadCal
- Bit 5 (32) Warmup (WaterSens) / below detection limit / negative / Service_required / Sensor Lifetime expired / Old value
- Bit 6 (64) Cali check wrong
- Bit 7 (128) Sum Fail

The coding of the BS Byte:

- Bit 0 (1) Maintance
- Bit 1 (2) Zero
- Bit 2 (4) Span
- Bit 3 (8) PurgeOut / Servicemode (Thermo)
- Bit 4 (16)
- Bit 5 (32)
- Bit 6 (64)
- Bit 7 (128) UserTest On

7.3 Register organization:

Address	Holding register	Input register	Module (linsens)
0	Data configured		
...			
199	Data configured		
200	Not used	Not used	
201	LinSens grp 1 zs_contr	LinSens grp 1 status	NOx Module
202	LinSens grp 2 zs_contr	LinSens grp 2 status	CO Module
203	LinSens grp 3 zs_contr	LinSens grp 3 status	Ozone Module
206	LinSens grp 6 zs_contr	LinSens grp 6 status	SO2 Module
214	LinSens grp 14 zs_contr	LinSens grp 14 status	MSM VOC
218	LinSens grp 18 zs_contr	LinSens grp 18 status	H2S Module
219	LinSens grp 19 zs_contr	LinSens grp 19 status	NH3 Module
225	LinSens grp 25 zs_contr	LinSens grp 25 status	BTEX Module
...			
299	LinSens grp 99 zs_contr	LinSens grp 99 status	
300	Not used	Not used	
301	LinLog grp 1 zs_contr	LinLog grp 1 status	
302	LinLog grp 2 zs_contr	LinLog grp 2 status	
303	LinLog grp 3 zs_contr	LinLog grp 3 status	
...			
399	LinLog grp 99 zs_contr	LinLog grp 99 status	