UPC·MARATHON

SGS™ & MGS™
User Manual

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MANUAL #: 102

Revision #	Revision Date	Revision Description
005	May 17, 2022	Updated recommended calibration interval to section 2.4
004	October 2, 2020	Added Minimum Exhaust Gas Flow to section 3.3.1 On the Furnace Exhaust
003	March 29, 2020	Reformatted; expanded Electrical Installation Pinout Tables, Communications section to include CANBUS and PROFIBUS
002		
001		

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WARRANTY:

UPC-Marathon warrants its goods as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to UPC-Marathon during the period of coverage, UPC-Marathon will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

DISCLAIMER:

The SGS and MGS are to be used by the industrial operator under his/her direction. UPC-Marathon is not responsible or liable for any product, process, damage or injury incurred while using the SGS or MGS. UPC-Marathon makes no representations or warranties with respect to the contents hereof and specifically disclaims any implied warranties or merchantability or fitness for any purpose.

Declaration of incorporation according to EC Machinery Directive 2006/42 / EC, Annex II B

Hereby we declare that the incomplete machine

SGS – Single Gas Sensor
MGS – Multi Gas Sensor

Due to its design and construction, as well as in the design it places on the market, as far as the scope of supply allows, it complies with the following basic requirements:

2014/30/EU	Electromagnetic Compatibility Directive
Harmonized standards:	
EN 61000-6-2:2008	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2008+A1:2012	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
EN 50581:2012	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

2006/95/EC Low-Voltage Directive

EN 61010-1:2011	Safety requirements of electrical equipment for measurement, control and laboratory use. Part1: General requirements

Compliant with 2002/95/EC RoHS Directive

Recycling: per 2002/96/EC W.E.E.E Directive

We declare that the special technical documentation in accordance with Annex VII, Part B has been prepared for this incomplete machine and we undertake to transmit it to the supervisory authorities in digital form on request.

For the purpose of the Machinery Directive 2006/42/EC, the partly completed machinery may not be put into service until it has been determined that the machine in which it is to be installed complies with the provisions of this Directive, provided that this Directive applies to this machinery.

We would like to point out that the following actions may affect the above attested conformity and the characteristics of the product:

- Installation and operating errors or failure to observe the instructions in the operating instructions supplied with the product.
- Replacement of parts or original accessories by unauthorized persons or replacement with parts that are not approved by the manufacturer.

To ensure EMC compliance, the device must always be connected to protective earth. This connection is made via the M12 connector.

AMS Conformity (North America)

CAN/CSA-C22.2 NO. 61010-1-12 - Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements (Tri-national standard, with UL 61010-1 and ANSI/ISA-61010-1 (82.02.01)

This product conforms to SAE Aerospace Material Specifications AMS 2759/10 for nitriding and 2759/12 for nitrocarburizing.

TECHNICAL ASSISTANCE

For all questions or concerns regarding the operation of the **SGS™** and **MGS™**, please consult the last page of this manual for contact information.

Table of Contents

1 INTRODUCTION

1.1 OVERVIEW

The SGS™ and MGS™ is an integrated thermal conductivity sampling system designed to measure the concentration of an extracted gas sample in binary or quasi-binary mixtures (more for MGS). It is especially suitable to measure hydrogen content or dissociation level with high accuracy in nitriding and nitrocarburizing atmospheres and to calculate the parameters necessary for nitriding process control. A unique measuring cell design and advanced electronics eliminate the need for a reference gas cell, thus simplifying the installation.

The MGS is equipped with a pressure measuring cell compensating for operating sample pressures.

The measuring block is maintained at 100°C (212°F). Note that the flange tubing or gas inlet area may also be hot.

The system status and measured results are displayed on a large, easy to read alphanumerical display.

Wetted material: Stainless Steel, Aluminum, glass, epoxy, PTFE, Silicone, Inconel sampling tube

2 SPECIFICATIONS

2.1 PHYSICAL

Width:	110 mm / (4.3”)
Height:	196 mm / (7.7”) (top to KF flange)
Depth:	110 mm / (4.3”)
Weight:	1.4 kg / (3.1 lbs)

2.2 PERFORMANCE

Accuracy:	+/- 1.0% of reading plus +/- 0.5% of full scale
Linearity:	< 0.5% of full scale
Repeatability:	< 0.5% of full scale
Zero drift:	< 0.5% of full scale per month
Sampling flow:	0.05 to 1.0 lpm / (0.1 to 1 cfh) not controlled
Atm. Flow speed:	0.1 to 60 m/sec (0.3 to 200 ft/sec)

Response time:	95% in 60 sec @ 0.2 lpm / (0.4 cfh)

Full accuracy is reached after 1h. It is recommended to keep the system powered up at all times.

2.3 OPERATING

Power requirements:	24VDC, 1.5 Amps max.
Input / Outputs:	2 x analog OUT, sourcing, isolated; 4 – 20 mA (R<500 Ohm) 2 x digital IN or OUT, 24 VDC, 700 mA max. (alarms)
Working pressure:	ambient +/- 35mbar (0.5PSI) (Can be used in equipment with vacuum purge, however measurements will be unreliable)
Operating Temperature:	0°C to 65°C (32°F to 140°F)
Storage Temperature:	-20°C to 80°C (-4°F to 176°F)
Relative Humidity:	20% to 95% (non-condensing)
Elevation:	Up to 2000m (6600 ft)
Orientation:	Upright Preferred. Never upside down.

2.4 RECOMMENDED CALIBRATION

Cleaning and Calibration	Where processes are performed that could contaminate the internal analyzer sampling path: **1 year** Installations where the analyzer is maintained in clean working order and a verification process is in place to ensure the calibration is within specifications: **2 years**

3 INSTALLATION

3.1 OVERVIEW

The SGS / MGS unit is to be installed away from direct sources of heat. Avoid proximity to open flames. The unit can be installed either in the exhaust piping or directly on the vessel via the Oxygen probe adapter.

Subjected temperatures must be less than 120C at the KF25 fitting (silicone O-ring). Use a heat shield / insulation to protect the electronic head. Do not allow electronics to heat up.

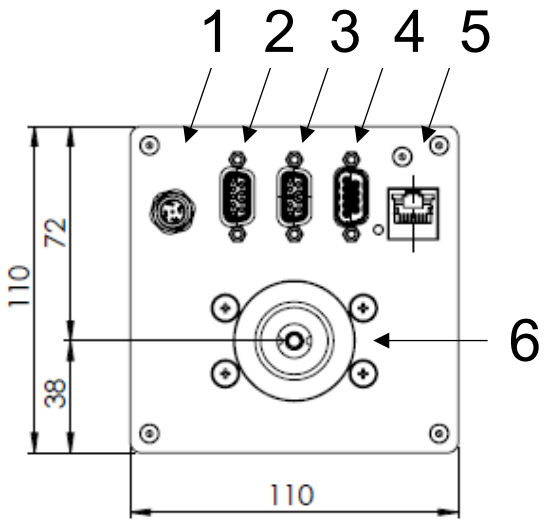
Handle with care, do not drop. The sensor is susceptible to shock, and it is a static sensitive device, use proper handling procedures.

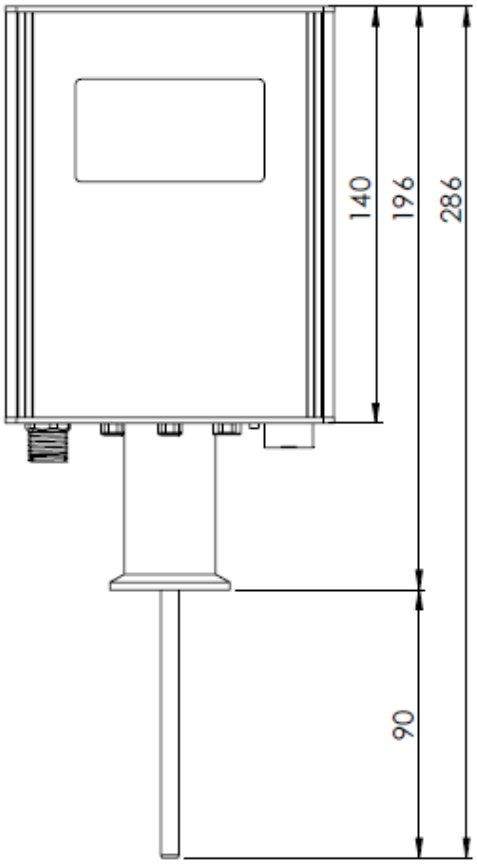
Installations with dirty atmospheres constitute examining the MGS / SGS monthly. Examples include: atmospheres with powder residues, atmospheres with injection, Malcomizing, treating parts with masking or stop-off paint, furnaces that have cover oil seals or the act of burning off oil or paint off the parts.

For ferritic nitrocarburizing, ensure that all parts of the inlet piping is above 65°C (149°F). This will ensure that the inlet tubing remains unobstructed. Insulate the inlet piping if needed.

3.2 PHYSICAL CHARACTERISTICS

3.2.1 Bottom / Front View



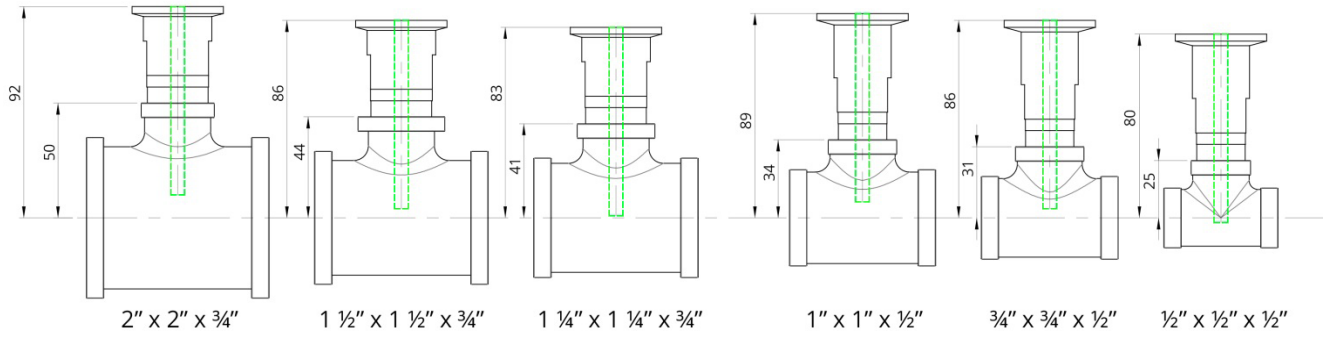


1	M12 Power / digital connector
2	Oxygen Probe connector (TC + mV)
3	Analog Output DB9 D-SUB female
4	Optional Interface for Profibus, Modbus or Canbus
5	RJ45 LAN connector
6	KF 25 Flange

3.3 INSTALLATION OPTIONS

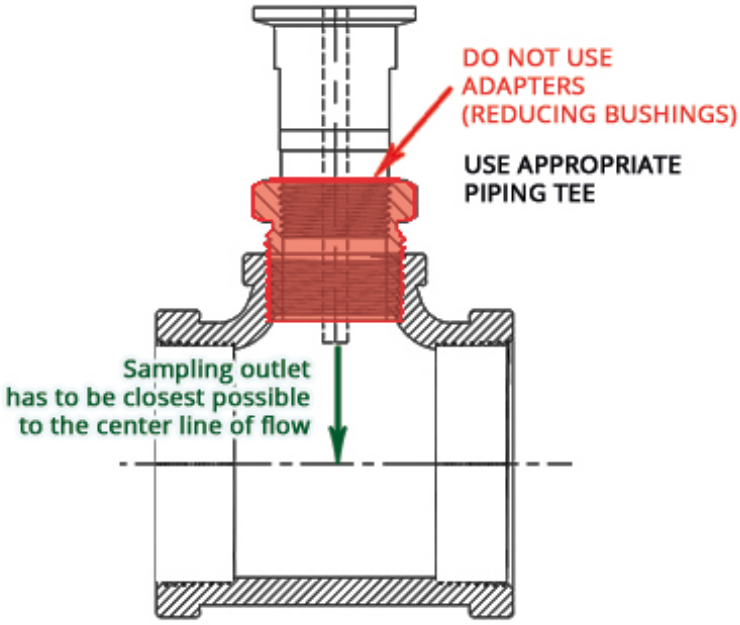
3.3.1 On the Furnace Exhaust

The analyzer must be installed with the sampling tube in the centerline of the exhaust pipe. Two adapter mounts are available that will accommodate exhausts ranging from ½" to 2 ¾". Always mount vertically (pointing up).



Piping TEE not included. Adapter is KF25 on one end, ½" or ¾" NPT male on the other.

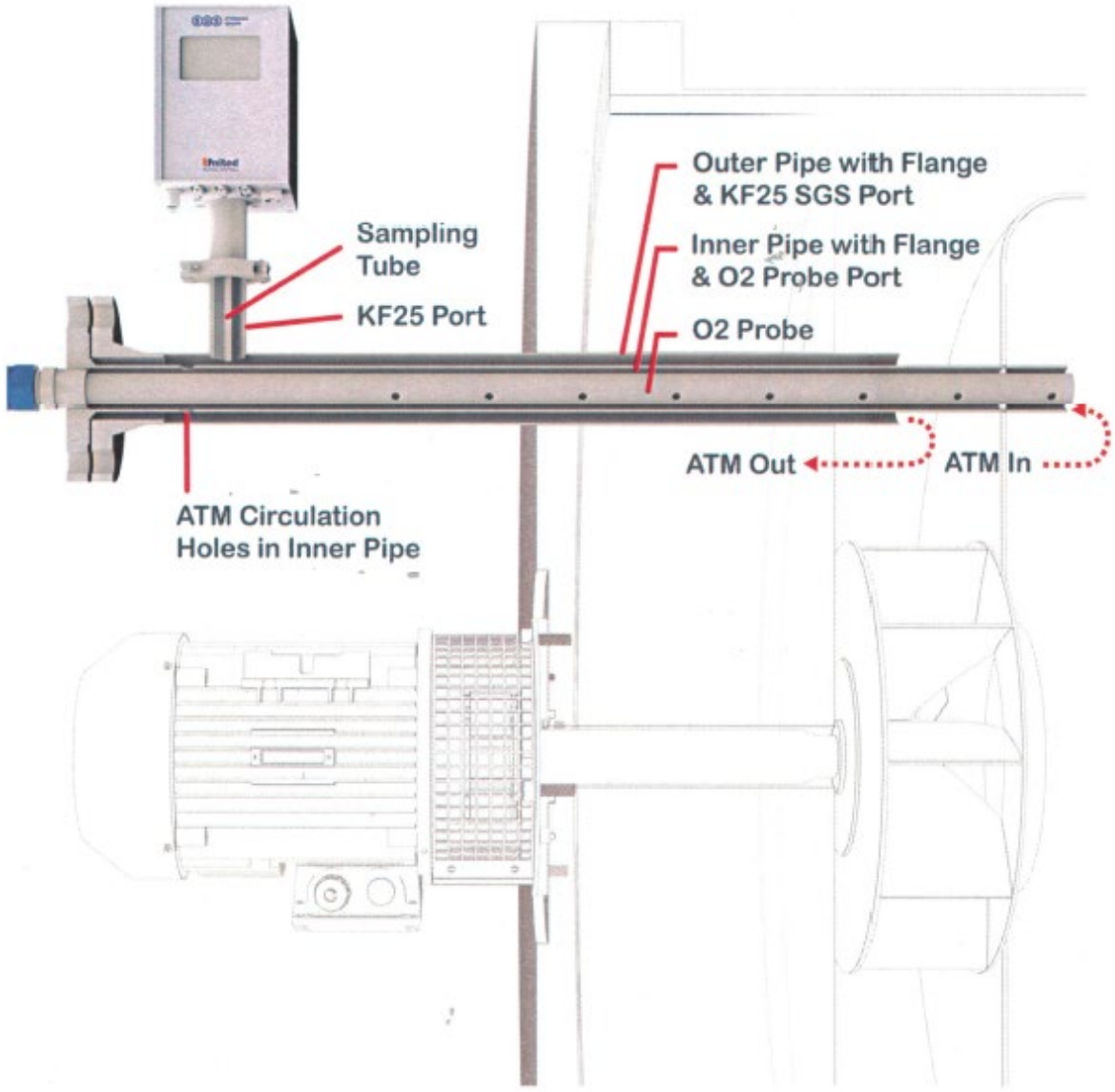
Minimum Exhaust Gas Flow for Accurate Measurement				
Pipe size		**Min Flow**		
Inches	**d [mm]**	**L/min**	**M³/hr**	**CFH**
1/2"	12.5	3.7	0.222	8
3/4"	19	8.5	0.51	18
1"	25	14.7	0.882	31.2
1-1/4"	32	24.2	1.446	51
1-1/2"	40	37.7	2.262	80
2"	50	58.9	3.534	125



3.3.2 On the Furnace Cover / Furnace Back Wall / Through The Shell

In systems with an oxygen probe, it may be advantageous to install the SGS / MGS directly on the same port as the Oxygen probe. In this case, a probe / analyzer adapter must be as described. Mount the analyzer upright (or up to horizontal) but never pointing down.

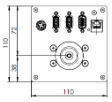
It is crucial that the atmosphere out pipe, the circulating fan, and the atmosphere in are respectively in the orientation as shown. (fan and out are in same axis – in is in higher pressure side)



4 ELECTRICAL INSTALLATION - PINOUT

Connect the system to a properly regulated 24VDC power supply capable of supplying 1.5A. The specified power consumption is only during start-up. Once the internal operating temperature reaches, the power consumption will decrease to 20% - 40% of the specified value, depending on ambient temperature.

To limit electrical noise, do not operate other heavy loads or solenoid valves from the same supply.



The SGS / MGS will be permanently damaged if connected to 115 or 230VAC.

Power 24 VDC - M12-5 connector		
Pin	**Description**	**Cable***
1	+24 VDC	BRN
2	DI/DO2 programmable	WHT
3	COM	BLU
4	DI/DO1 programmable	BLK
5	GND	YEL/GRN

Analog Out - DB9 Female		
Pin	**Description**	**Cable***
1	AO1 +	Brown
2	AO1 -	White
3	AO2 +	Yellow
4	AO2 -	Green
6, 7, 8, 9	NOT USED	-
5	GND	Shield

Opt. Communication – DB9 PROFIBUS	
Pin	**Description**
1	SHIELD
2	NC
3	RX/TX+
4	RTS
5	BUS GND
6	BUS VCC
7	NC
8	RX/TX-
9	NC

Opt. Communication – DB9 MODBUS RTU	
Pin	**Description**
1	SHIELD
2	NC

* Color designation of the cables supplied by UPC-Marathon

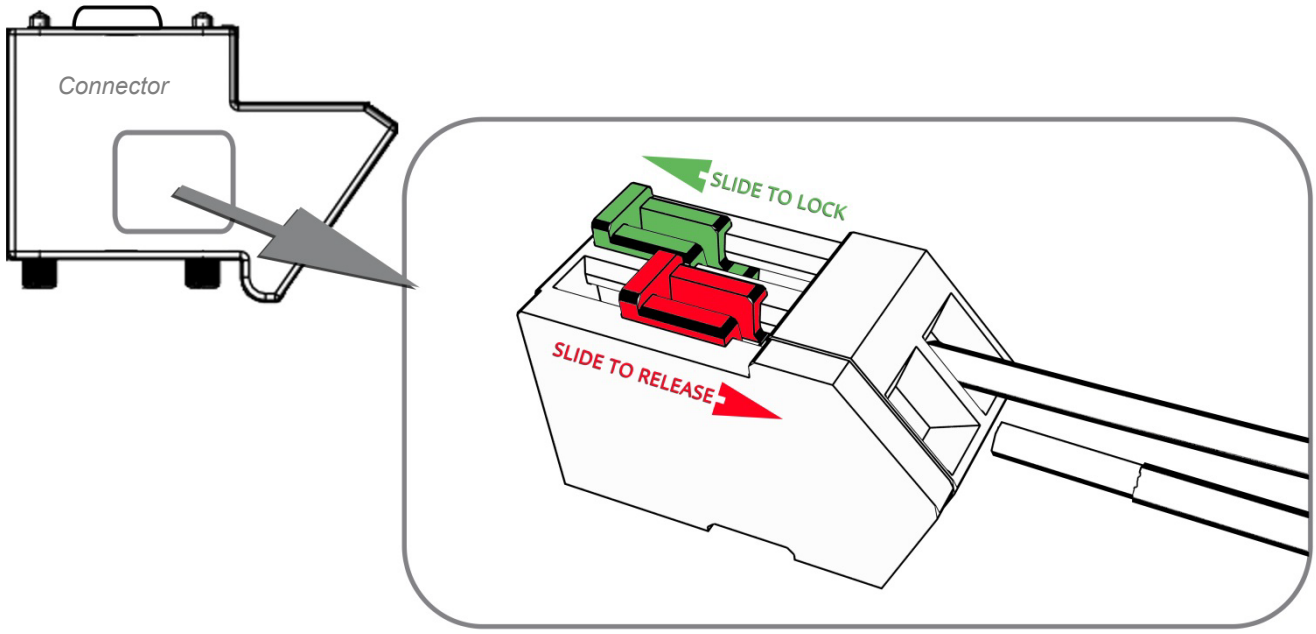
Opt. Communication – DB9 MODBUS RTU	
Pin	**Description**
3	RX/TX+
4	NC
5	BUS GND
6	BUS VCC
7	NC
8	RX/TX-
9	NC

Opt. Communication – DB9 CANBUS	
Pin	**Description**
1	NC
2	CAN L
3	BUS GND
4	NC
5	SHIELD
6	BUS GND
7	CAN H
8	NC
9	BUS VCC

Note: All connections to connector 1 (M12-5) must come from the same power source including the DI / DO.

4.1 OXYGEN PROBE CONNECTOR (OPTIONAL FEATURE – CONNECTOR AND ADD-ON CARD)

The optional oxygen probe card with high impedance input comes with a user-friendly DB9 connector where you can terminate the mV and TC signal from the oxygen probe using only a precision screwdriver. Move the slider to the right to release, left to grip (as shown in the drawing below).



PIN	O_2 Probe db9 connector
RED	Probe mV (+)
BLK	Probe mV (-)
GRN	Probe TC (+)
WHT	Probe TC (-)

Note that the SGS / MGS Oxygen Probe card's thermocouple input can be configured as type K or S. It is crucial to use the webserver to select the appropriate setting.

5 OPERATING INSTRUCTIONS

5.1 DISPLAY

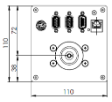
5.2 KN AND KC CALCULATION (PRO VERSION)

The KN and KC calculations run internally in the unit based on the furnace volume, the inlet gas flows, and the reading from the SGS / MGS sensor. To ensure a correct furnace atmosphere calculation, the actual process flows into the furnace must be updated continuously, even during non-nitriding stages. These changes would be made via the communication adaptor (MODBUS, ProfiBus or CANBus). The communication data register assignments can be found in the respective communication appendix.

Valid KN and KC calculated values require that the furnace be at nitriding temperatures.

6 PREVENTIVE CARE

All maintenance and preventive care must be carried out by trained personal only in compliance with the applicable safety standards.



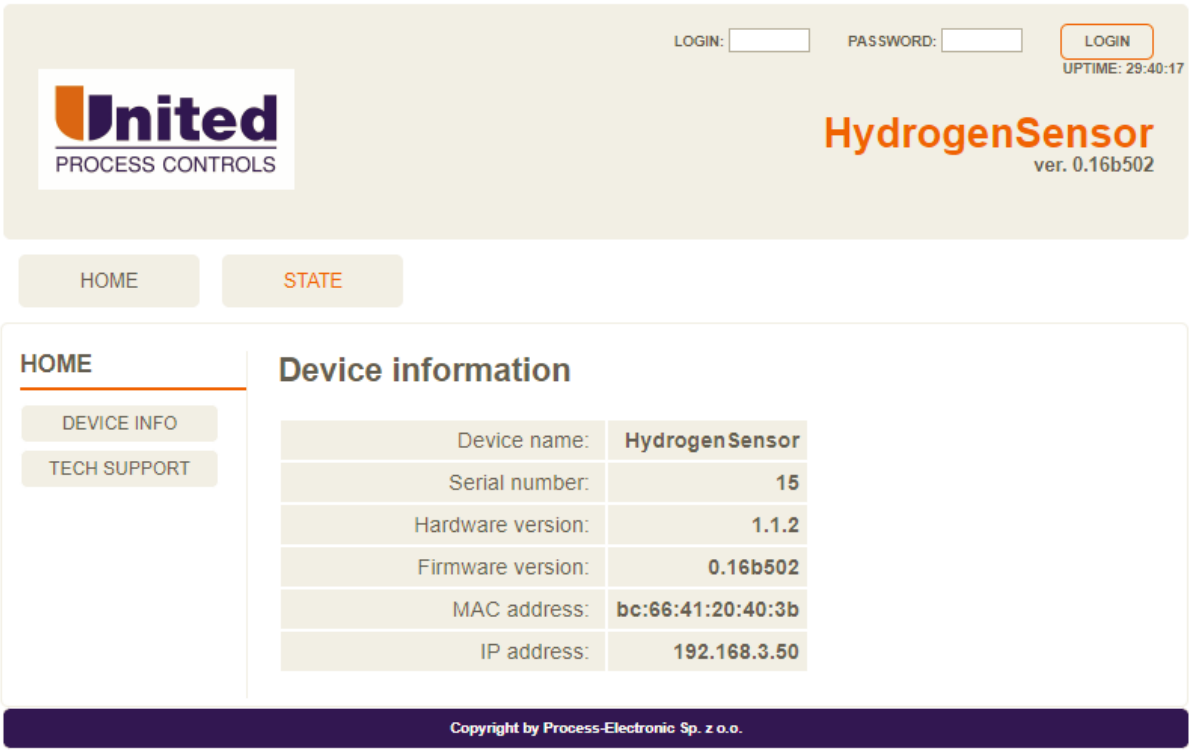
WARNING

Prevent liquids such as water or oil from entering the sampling line.

Never use compressed air to clean the SGS / MGS. This may create a health hazard and/or permanent instrument damage.

7 CONFIGURATION (INTEGRATED WEB SERVER)

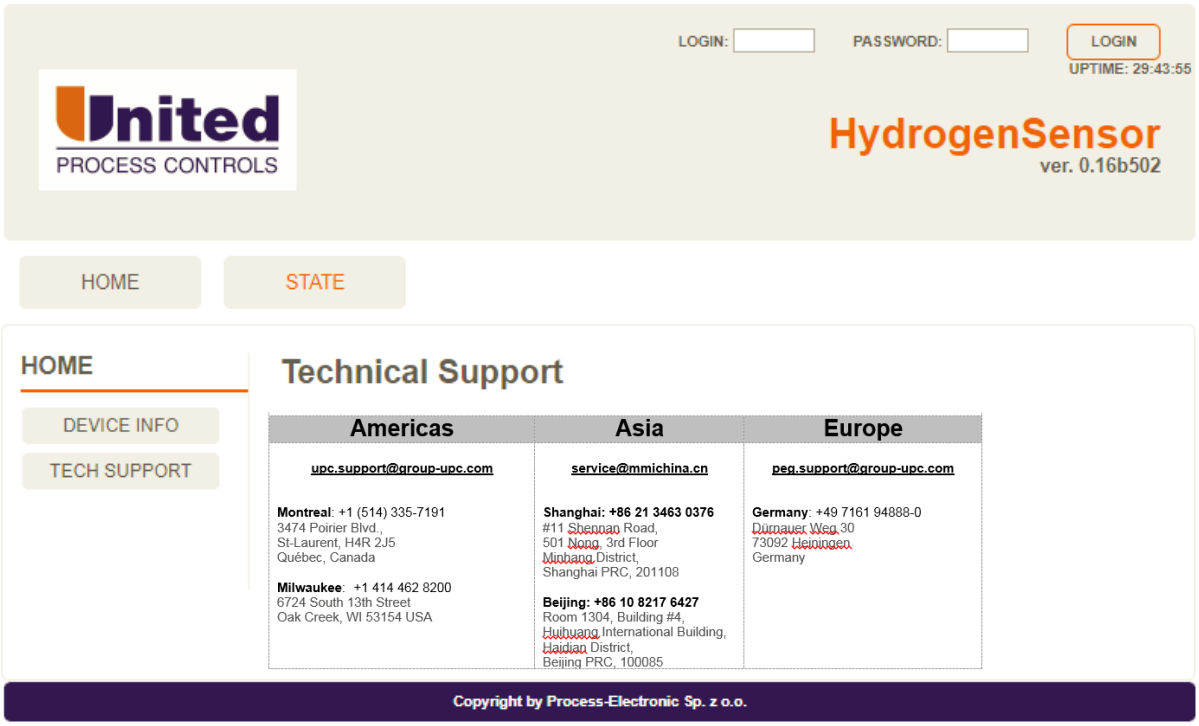
The SGS/MGS device information and status can be accessed through the webserver. Below is the home page:



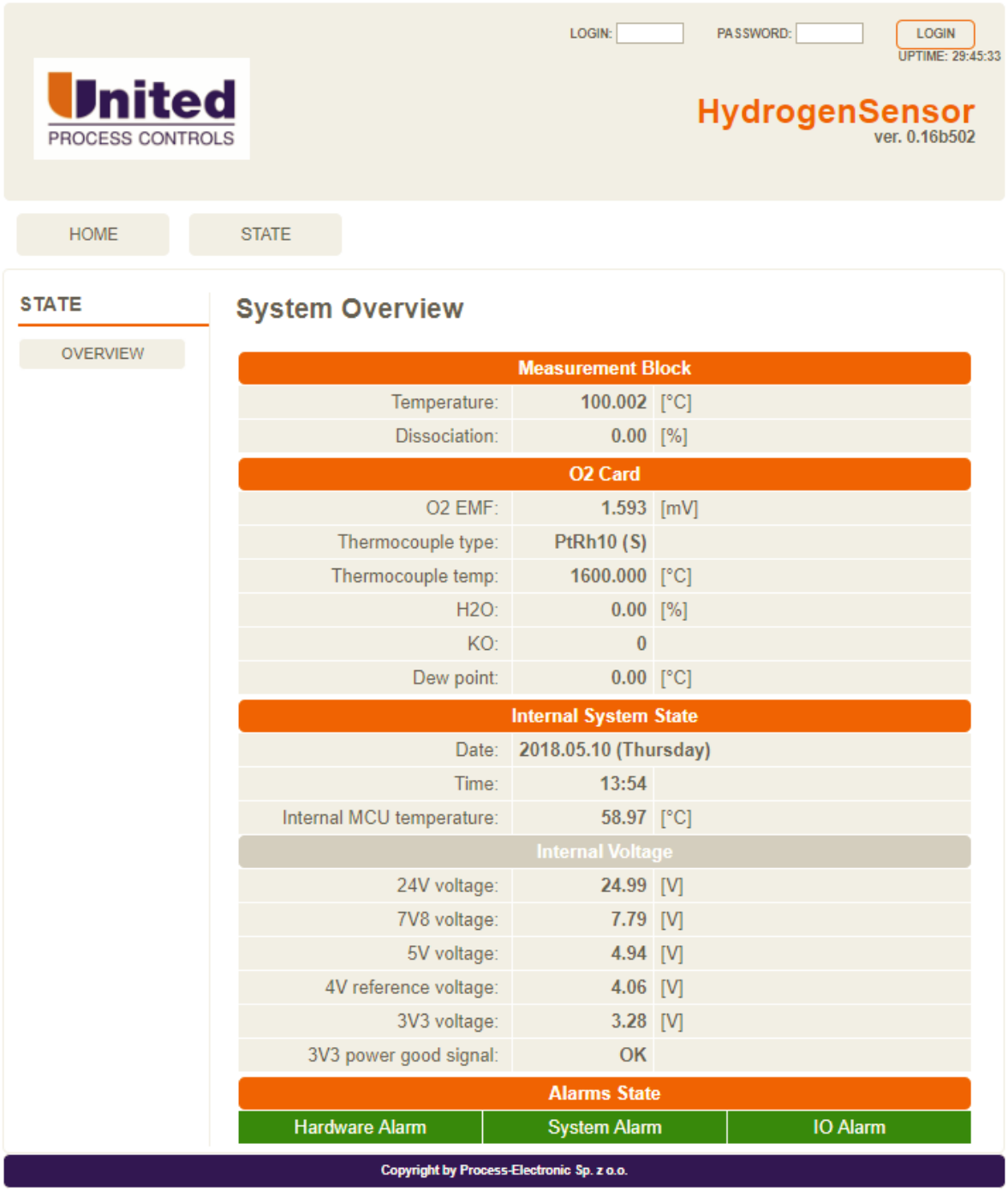
There are multiple sections which can be selected using the buttons across the top. Without logging in there are two sections, Home and State. Each section can have multiple pages. The

pages are listed on the left-hand side. Under the Home section there are two pages, Device Info and Tech Support.

Selecting Tech Support on the left side under Home will display the contact information for UPC-Marathon:

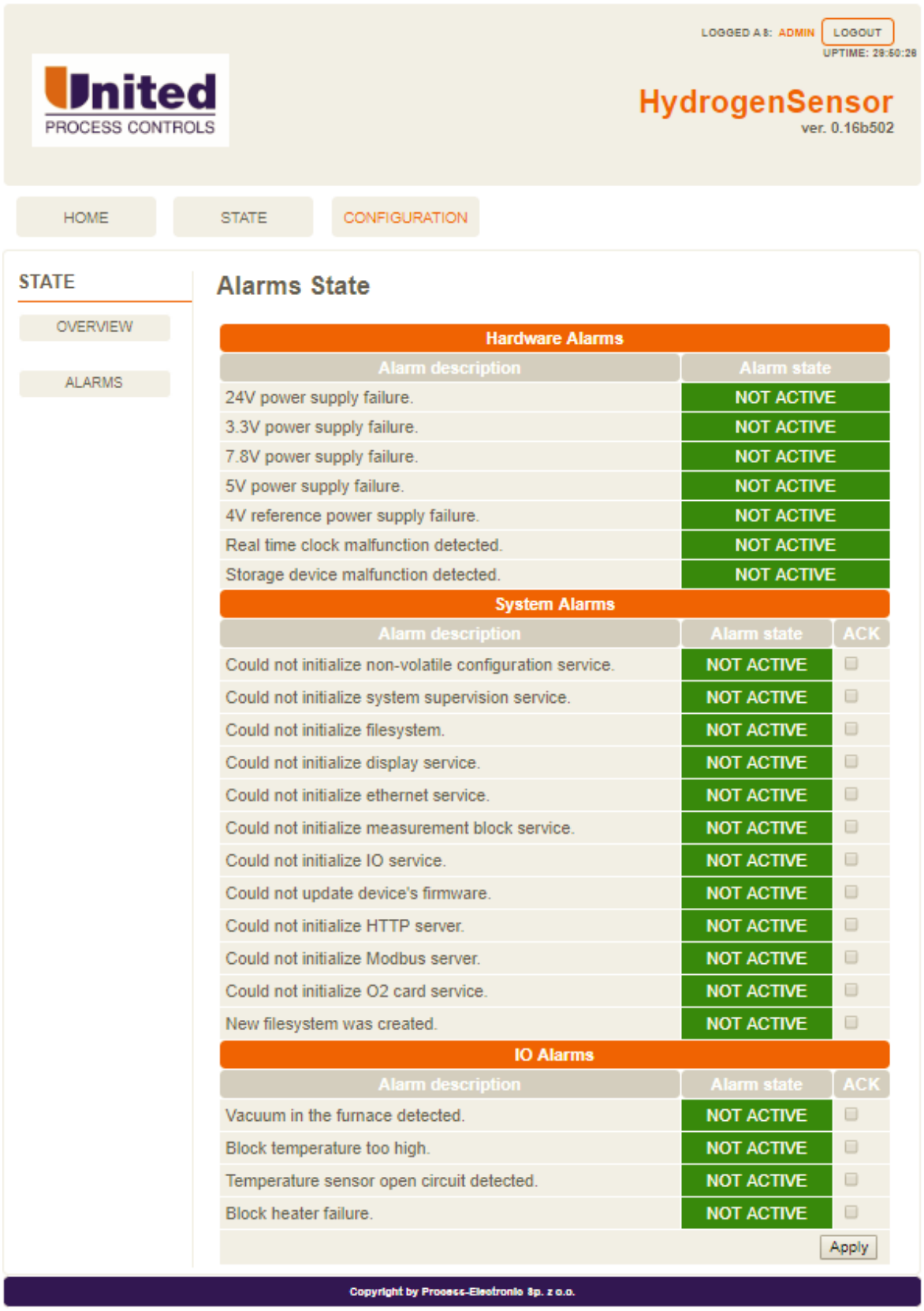


Selecting the State section will display the System Overview, including process readings and internal measurements as well as general alarm status:

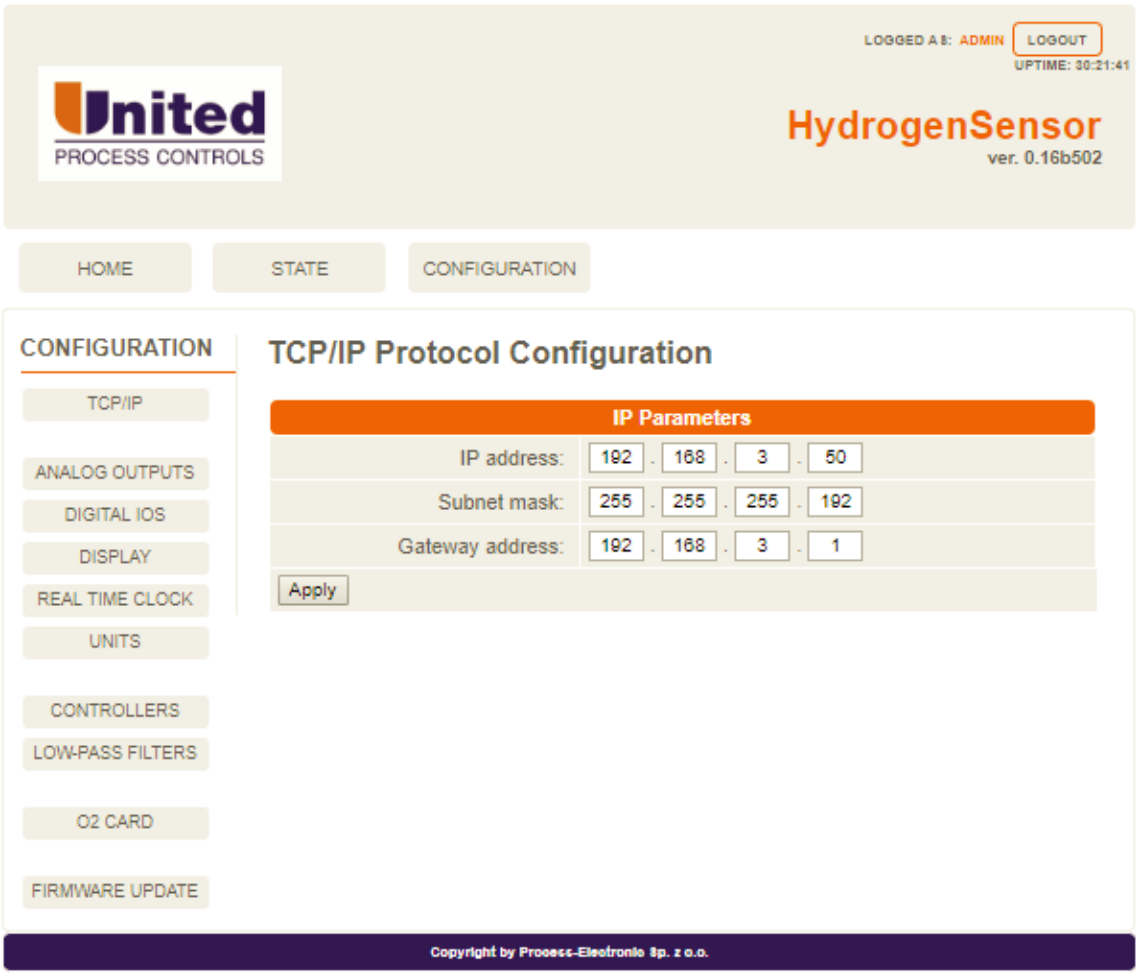


Using the Login and Password field in the top right corner of the screen, more options will become available. (Username: admin, Password: ammonia)

The Home pages are the same. In the State section there is a new page showing Alarms. There is also a new section Configuration. Below is the Alarms page under the State section:



The Configuration section is where all internal parameters can be set. Below is the TCP/IP page where the IP address of the device can be configured:



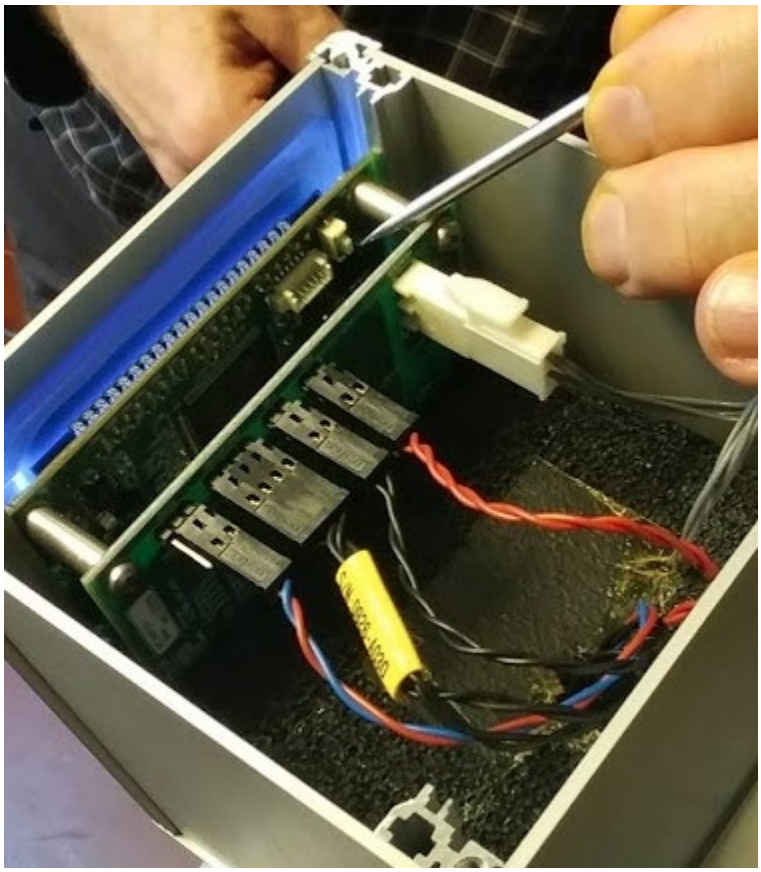
7.1 CHANGING THE IP ADDRESS

To change the device IP Address:

- Log on using the login ‘admin’ and password ‘ammonia’
- Select the Configuration section
- Change the IP Parameters as required
- Select the Apply button

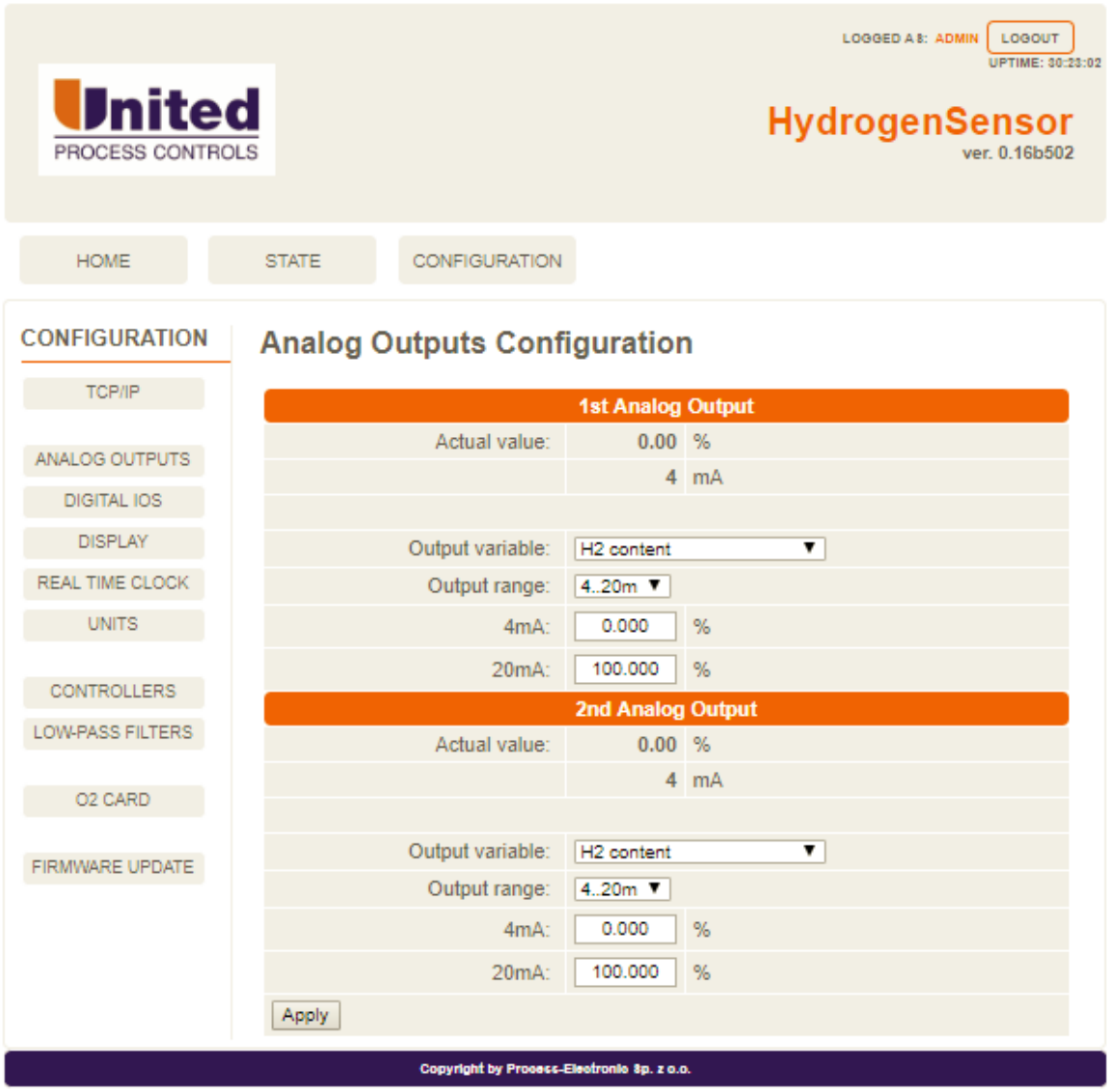
7.2 RESETTING THE IP ADDRESS

Resetting the IP address to default may be necessary if an improper netmask / gateway combination is accidentally saved. In order to reset the IP to default, Power off the device, Open the top cover. Hold the button while powering on the device. Confirm the IP on the display / release the button.

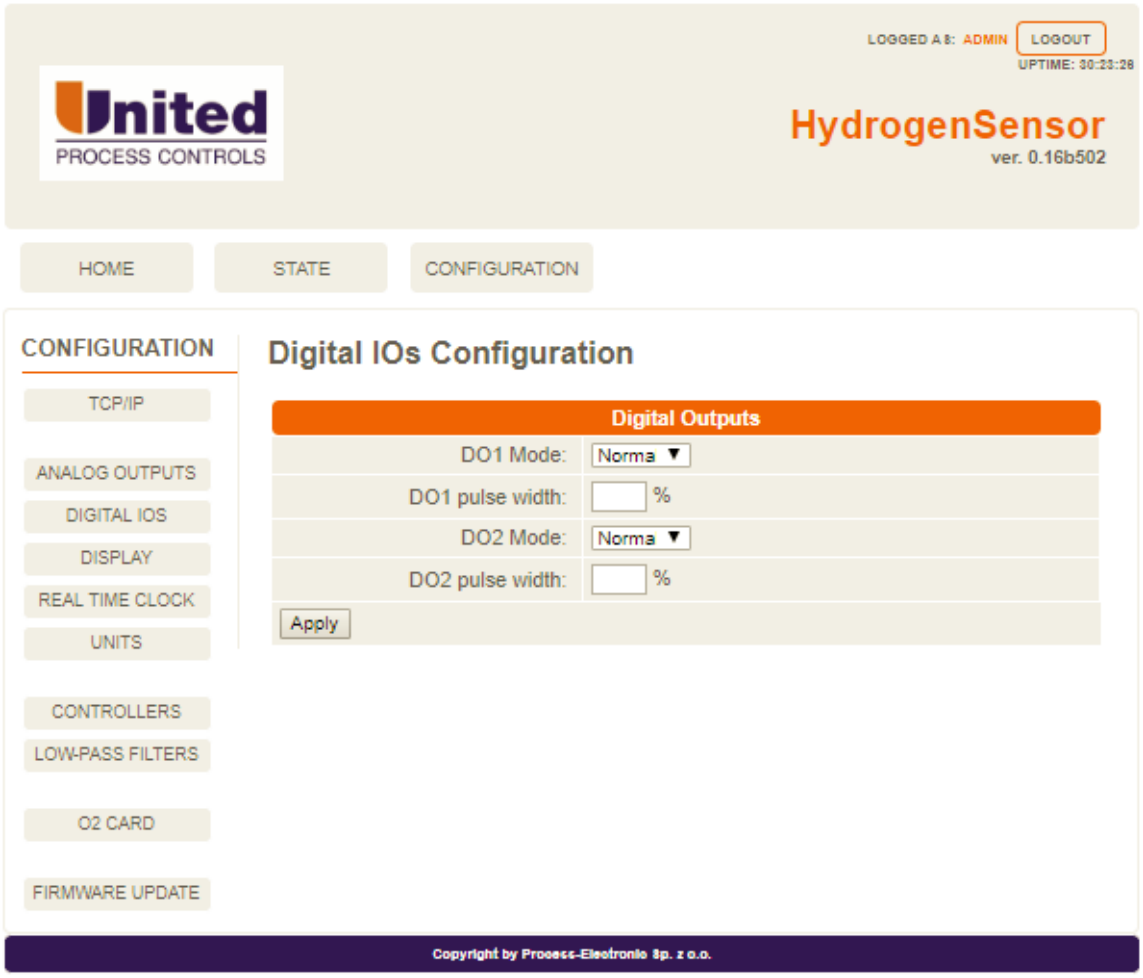


The default will be:
IP=192.168.6.202
GW=192.168.6.1
NM=255.255.255.0

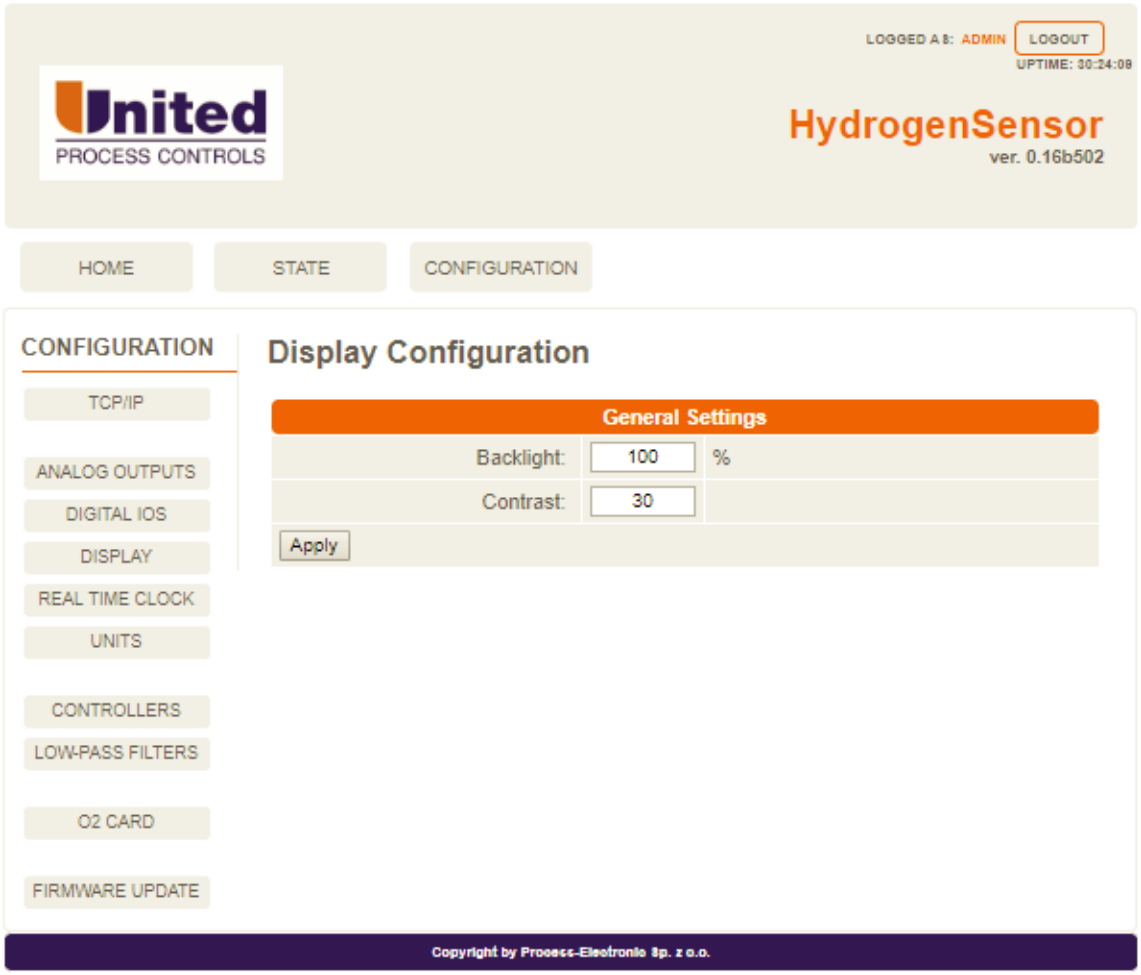
Analog Outputs:



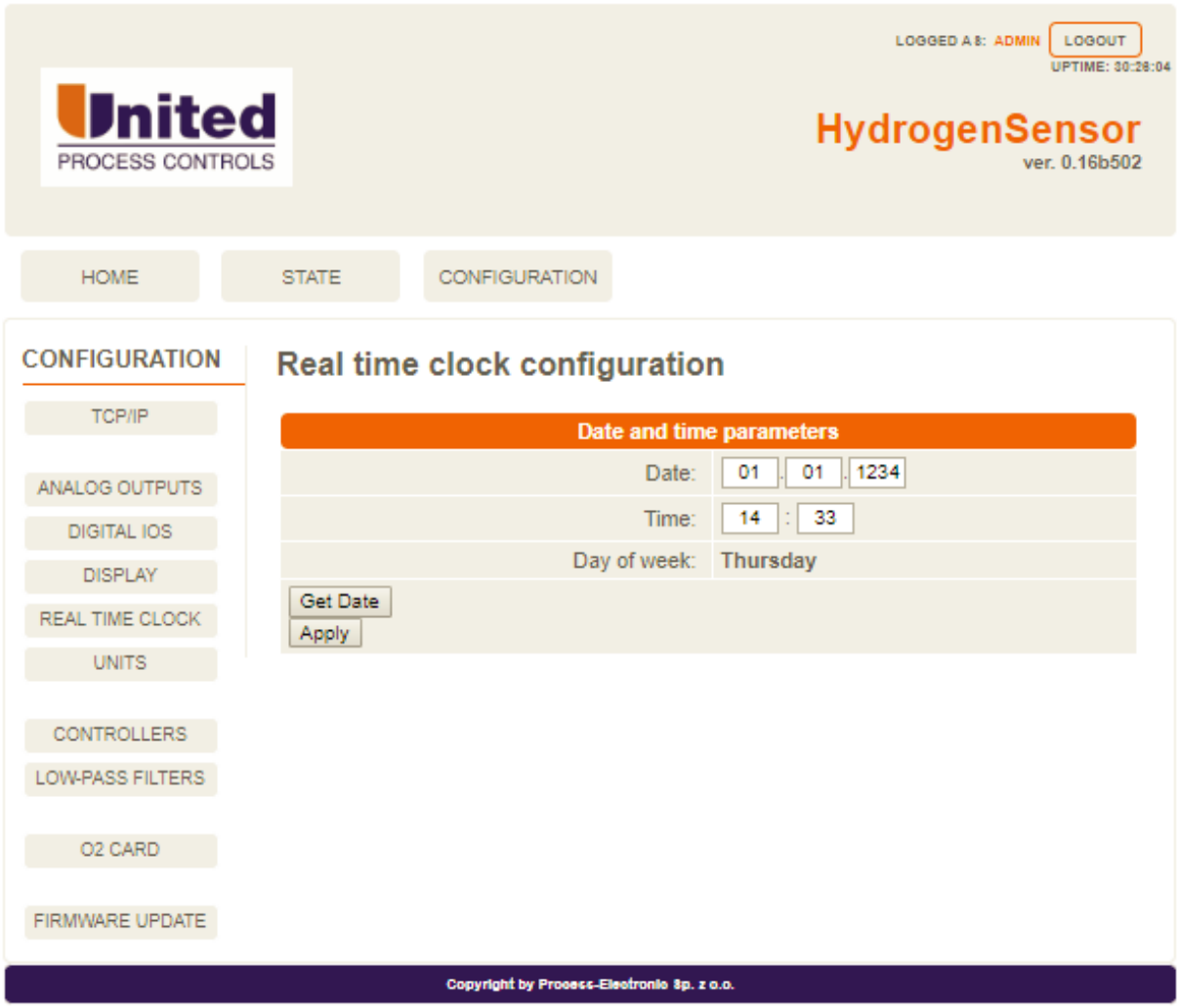
Digital IOs:



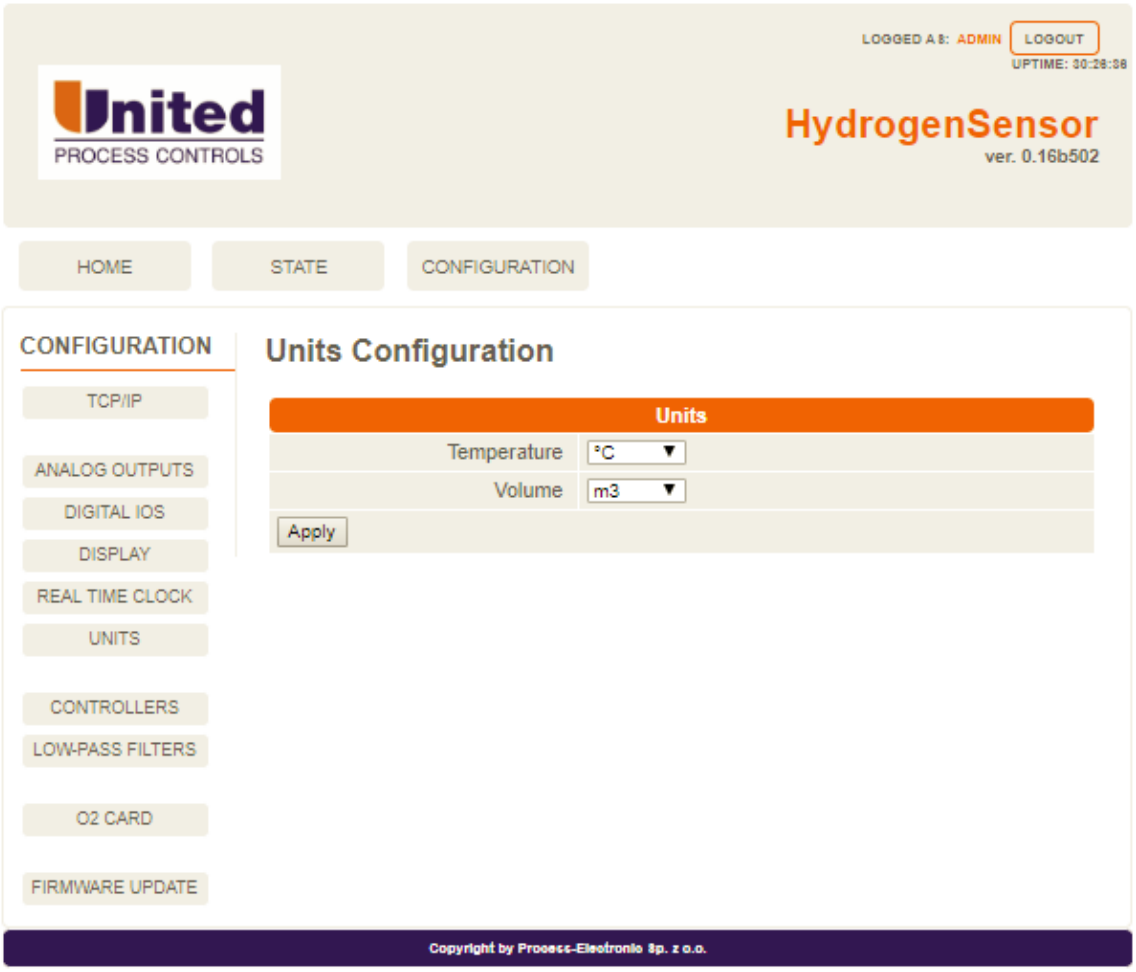
Display:



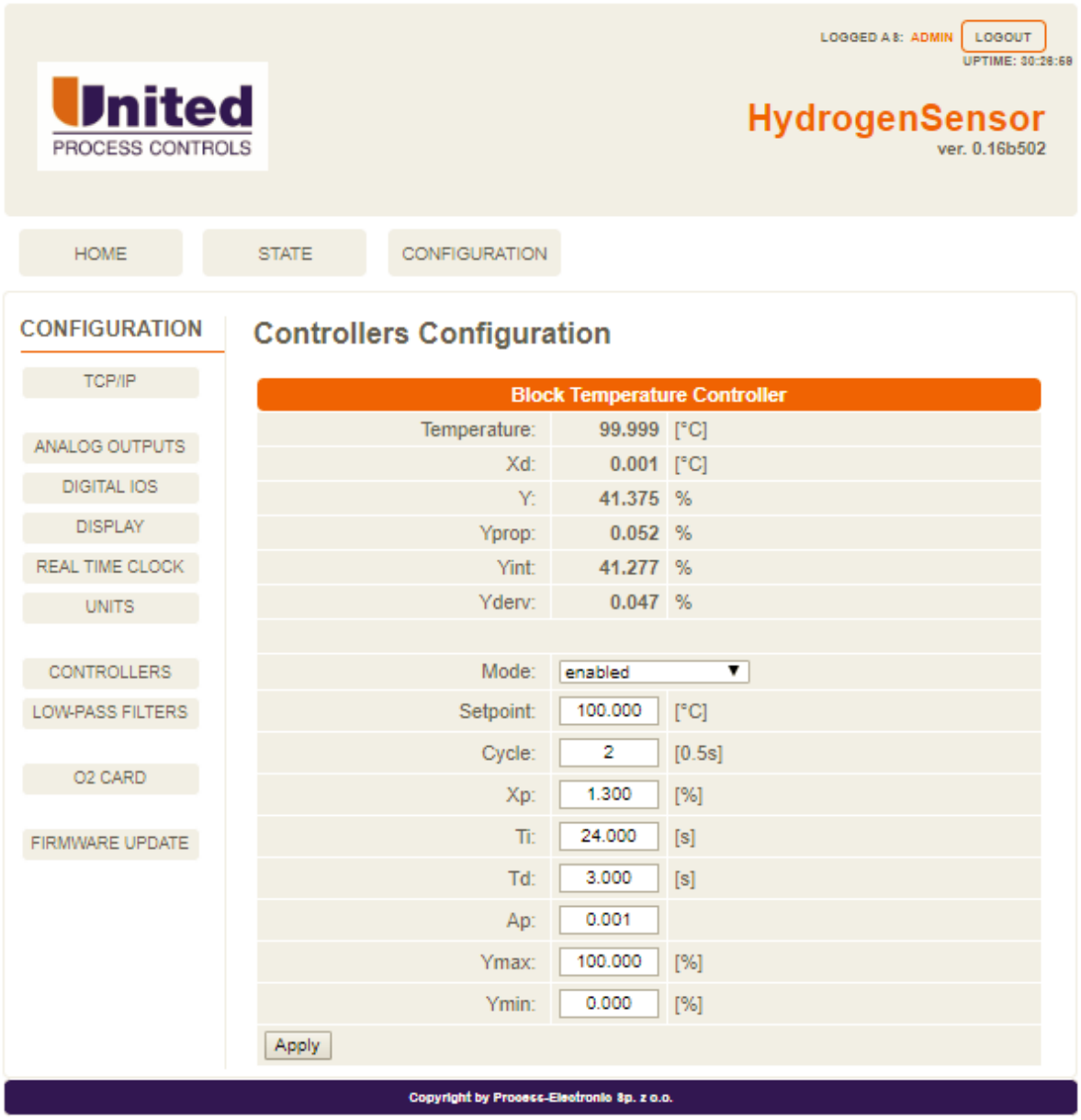
Real Time Clock:



Units:

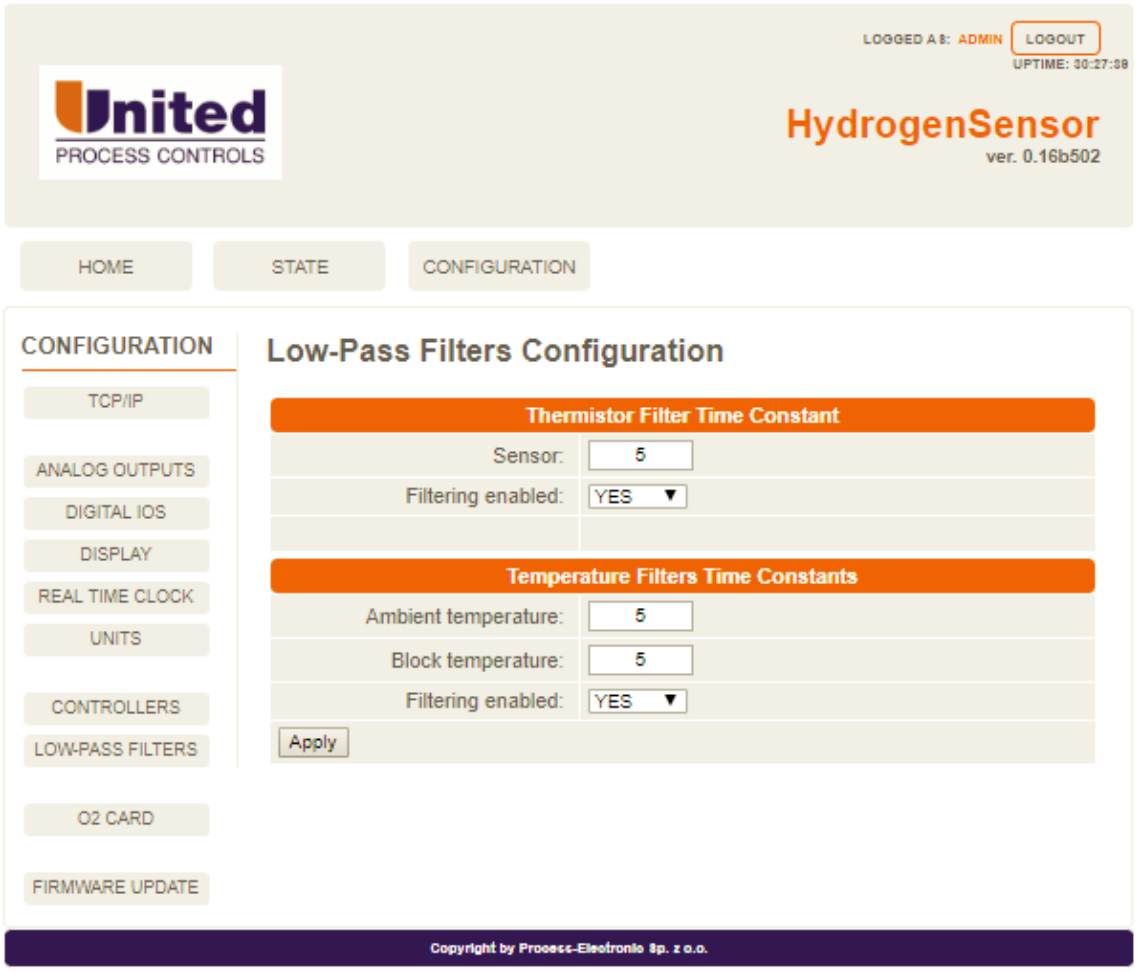


Controllers:

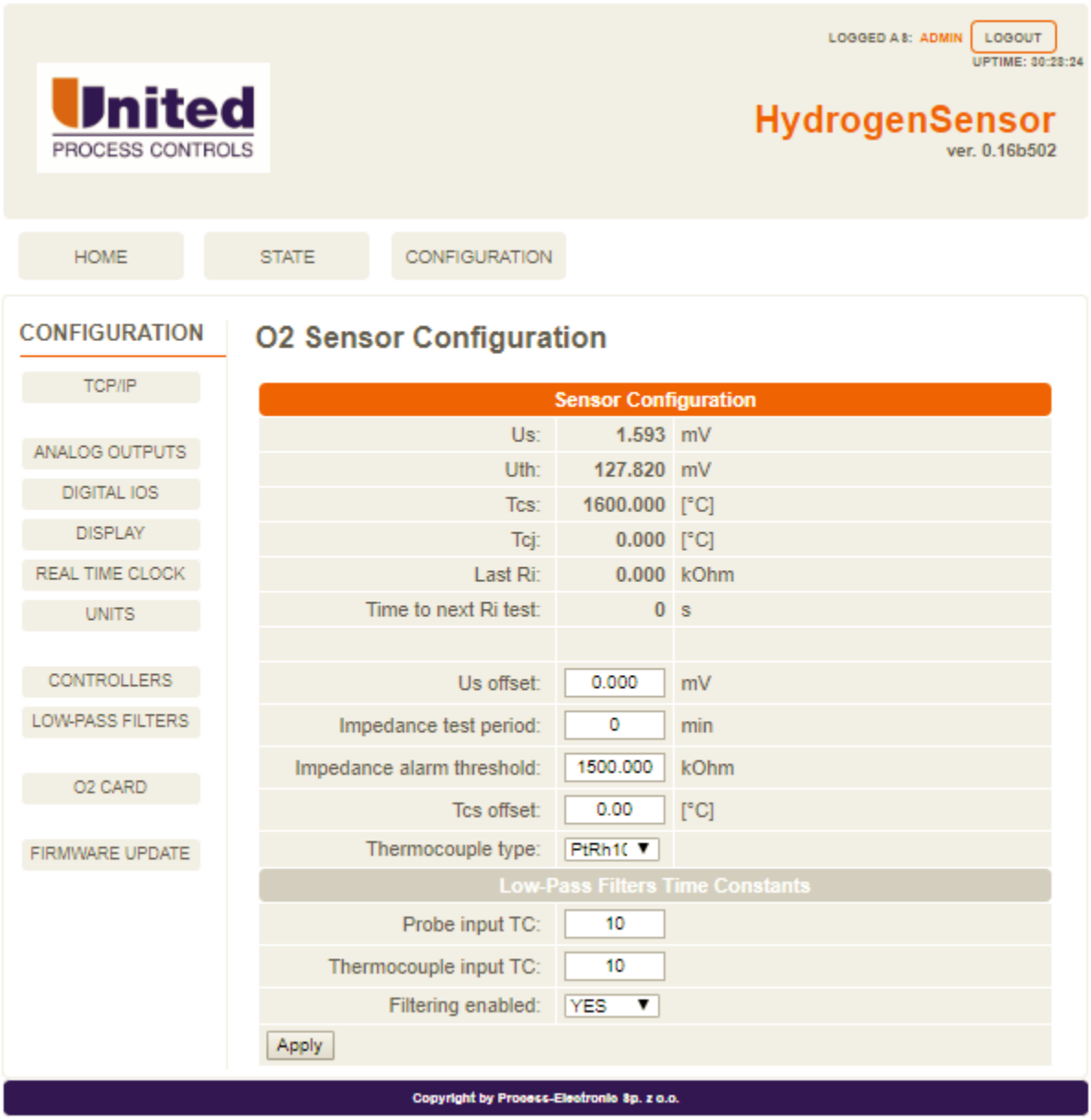


(*) some parameters require UPC-Marathon service access in order to change them.

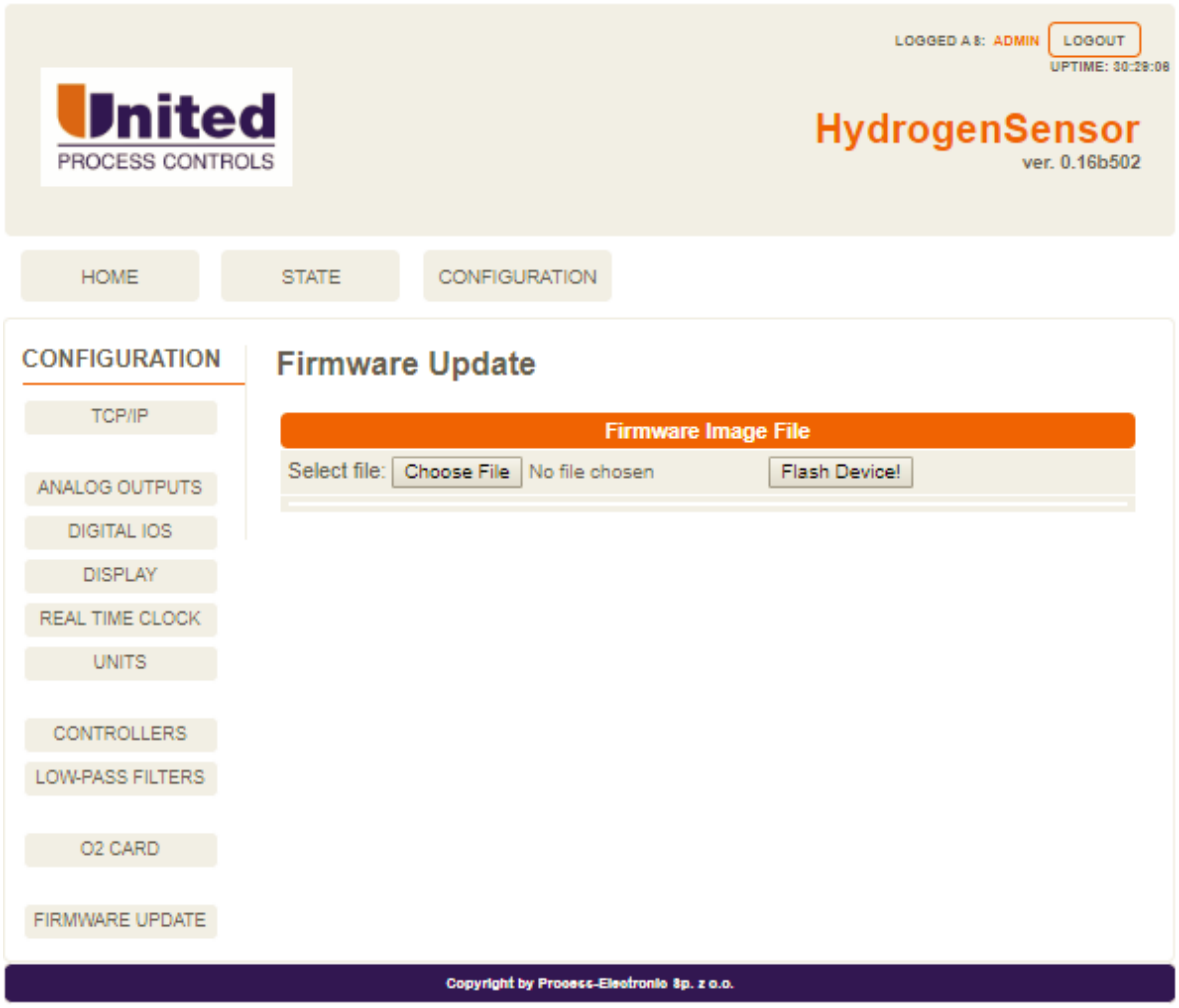
Low-Pass Filters:



O2 Card:

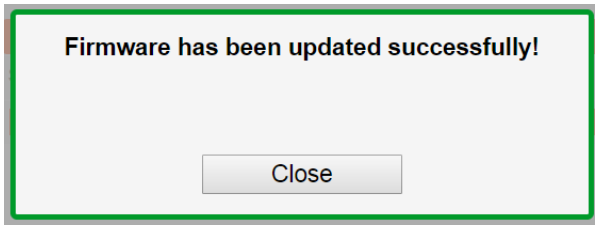


Firmware Update:



Please wait for the confirmation message to appear!

Note that this could take 3 minutes.



7.3 SCREEN

SGS:

MGS:

8 COMMUNICATIONS

8.1 MODBUS TCP REGISTERS

Input register	Data	Type	Low/High word	Details	SGS	MGS
999	test register	Ushort		always 1234 readout	☑	☑
1000	System State	UINT	Hi	reserved	☑	☑
1001			Lo	reserved	☑	☑
1002	Hardware Alarms	UINT	Hi	reserved	☑	☑
1003			Lo	BIT0: 24V power supply failure	☑	☑
				BIT1: 3.3V power supply failure	☑	☑
				BIT2: 7.8V power supply failure	☑	☑
				BIT3: 5.0V power supply failure	☑	☑
				BIT4: 4.0V power supply failure	☑	☑
				BIT5: Realtime clock malfunction detected	☑	☑
				BIT6: Device storage malfunction detected	☑	☑
				reserved	☑	☑
1004	System Alarms	UINT	Hi	reserved	☐	☐
1005			Lo	BIT0: Non-Volatile Configuration not initialized	☑	☑
				BIT1: System supervision system not initialized	☑	☑
				BIT2: Filesystem not initialized	☑	☑
				BIT3: Display service not initialized	☑	☑
				BIT4: Ethernet Service not initialized	☑	☑
				BIT5: Measurement block service not initialized	☑	☑
				BIT6: IO service not initialized	☑	☑
				BIT7: HTTP server service not initialized	☑	☑
				BIT8: Modbus service not initialized	☑	☑
				BIT9: O2Card Service not initialized	☑	☑
				BIT10: No filesystem detected	☑	☑
				BIT11: Profibus server not initialized	☑	☑
				BIT12: CAN server not initialized	☑	☑
				* BIT13: Furnace model not initialized	☑	☒
				BIT30: Firmware update failed	☑	☑
				BIT31: Empty EEPROM detected	☑	☑
1006	IO Alarms	UINT	Hi	reserved		
1007			Lo	BIT0: Vacuum in furnace detected	☒	☑
				BIT1: Block temperature too high	☑	☑
				BIT2: Temperature sensor open circuit	☑	☑
				BIT3: Block heater failure	☑	☑
				BIT4: Thermistor out of range	☒	☑
				BIT5: Pellistor out of range	☑	☒
				BIT6: Thermocouple open circuit detected	☑	☑
				BIT7: O2 probe impedance test failure	☑	☑
				BIT8: Analog out 1 open loop detected	☑	☑
				BIT9: Analog out 2 open loop detected	☑	☑
1008	[H2]/[Dissociation] %	Float	Hi	READ: Percentage of Hydrogen [%] (%Dissociation only available on SGS)	☑	☑
1009			Lo			
1010	Block Temperature	Float	Hi	READ: BlockTemperature [°C]	☑	☑
1011			Lo			
1012	Thrermocouple temperature	Float	Hi	READ: Thrermocouple temperature [°C]	☑	☑
1013			Lo			
1014	O2 Probe - Temperature emf	Float	Hi	READ: O2 probe emf [mV] (Only if optional card is installed)	☑	☑
1015			Lo			
1016	KN/aC	Float	Hi	** READ: KN/aC (aC only available on MGS)	☑	☑
1017			Lo			
1018	NH3/CH4 content	Float	Hi	READ: NH3/CH4 content [%]	☒	☑
1019			Lo			
1020	Serial Number	Ushort		Serial number of unit	☑	☑
1021	Total Working Hours	UINT	Hi	Total powered up hours	☑	☑
1022			Lo			

Input register	Data	Type	Low/High word	Details	SGS	MGS
1023	Hours to service	Ushort		Hours Remaining until next calibration	☑	☑
1024 - 1029 - RESERVED						
1030	FMO: CO Content	Float	Hi	* READ: [%] concentration	☑	☒
1031			Lo			
1032	FMO: CO2 Content	Float	Hi	* READ: [%] concentration	☑	☒
1033			Lo			
1034	FMO: CH4 Content	Float	Hi	* READ: [%] concentration	☑	☒
1035			Lo			
1036	FMO: H2 Content	Float	Hi	* READ: [%] concentration	☑	☒
1037			Lo			
1038	FMO: H2O Content	Float	Hi	* READ: [%] concentration	☑	☒
1039			Lo			
1040	FMO: NH3 Content	Float	Hi	* READ: [%] concentration	☑	☒
1041			Lo			
1042	FMO: N3 Content	Float	Hi	* READ: [%] concentration	☑	☒
1043			Lo			
1044	FMO: O2 Content	Float	Hi	* READ: [%] concentration	☑	☒
1045			Lo			
1046	FMO: Diccociation	Float	Hi	* READ: [%] dissociation	☑	☒
1047			Lo			
1048	FMO: KN	Float	Hi	* READ: KN	☑	☒
1049			Lo			
1050	FMO: aC	Float	Hi	* READ: aC	☑	☒
1051			Lo			
1052	FMO: KO	Float	Hi	* READ: KO	☑	☒
1053			Lo			
1054	FMO: KC	Float	Hi	* READ: KC	☑	☒
1055			Lo			
1056	FMO: logpO2	Float	Hi	* READ: logpO2	☑	☒
1057			Lo			
1058	FMO Simplified calculations	Byte		* 1 = active / 0 = not active	☑	☒

FMO = Furnace Model Output
* = Furnace Model option needed
** = Nitriding Potential option needed

Holding register	Data	Type	Low/high word	Details	SGS	MGS
1000	DO1	Byte		Input value will be mirrored to DO1	☑	☒
1001	DO2			Input value will be mirrored to DO2		
1002 - 1029 Reserved						
1030		Float	Hi	Gas 1 ACT. Flow [m3/hr]	☑	☒
1031			Lo			
1032		Float	Hi	Gas 2 ACT. Flow [m3/hr]	☑	☒
1033			Lo			
1034		Float	Hi	Gas 3 ACT. Flow [m3/hr]	☑	☒
1035			Lo			
1036		Float	Hi	Gas 4 ACT. Flow [m3/hr]	☑	☒
1037			Lo			
1038		Float	Hi	Gas 5 ACT. Flow [m3/hr]	☑	☒
1039			Lo			
1040		Float	Hi	Gas 6 ACT. Flow [m3/hr]	☑	☒
1041			Lo			
1042		Float	Hi	Gas 7 ACT. Flow [m3/hr]	☑	☒
1043			Lo			
1044		Float	Hi	Gas 8 ACT. Flow [m3/hr]	☑	☒
1045			Lo			
1046		Float	Hi	Furnace Temperature [deg. C]	☑	☒
1047			Lo			
1048	1 = initialize	Byte		Reinitialize furnace model calculations	☑	☒

Holding register	Data	Type	Low/high word	Details	SGS	MGS
1049	1 = Force simplified	Byte		Simplified furnace model calculations	☑	☑

8.2 CANBUS REGISTERS

Input Registers	Message	Id	Byte offset	Data	Type	License required	Comments
H2Smart/iHS06	TPDO1	0x0180	0	Reserved			
H2Smart	TPDO2	0x0280	0	H2 / Dissociation	Ushort	Standard	in 0.01 %
			2	Reserved	Ushort		
			4	Block temperature	Ushort		in 0.01 [temperature unit]
			6	Kn	Ushort	Nitriding potential	in 0.01
iHS06	TPDO2	0x0280	0	Threrrmocouple temperature [°C]	Float	Standard	Only if o2 card is present
			4	O2 probe emf [mV]	Float		
H2Smart	TPDO3	0x0380	0	O2 probe emf	Ushort	Standard	in 0.01 [mV]. Only if o2 card is present
			2	Threrrmocouple temperature	Ushort		in 0.01 [temperature unit]. 300°C if o2 card is not present
			4	Cold junction temperature	Ushort		in 0.01 [temperature unit]. Only if o2 card is present
			6	O2 probe last impedance value	Ushort		in 0.01 [kOhm]. Only if o2 card is present
iHS06	TPDO3	0x0380	0	Furnace model output: Ko	Ushort	Furnace model	in 0.1
			2	Furnace model output: Kc	Ushort		in 0.01
			4	Furnace model output: LogpO2	Ushort		in 0.001
H2Smart	TPDO4	0x0480	0	Furnace model output: NH3 content	Ushort	Furnace model	in 0.1 %
			2	Furnace model output: Kn	Ushort		in 0.01
			4	Furnace model output: Dissociation	Ushort		in 0.1 %
			6	Furnace model output: LogpO2	Ushort		in 0.001
iHS06	TPDO4	0x0480	0	H2 / Dissociation	Ushort	Standard	in 0.1 %
			2	Block temperature	Ushort		in 0.01 °C

Output Registers	Message	Id	Byte offset	Data	Type	License required	Comments
H2Smart/iHS06	RPDO1	0x0200	0	Reserved			
			2	Reinitialize furnace model calculations	Byte	Furnace model	1 = activate
			4	Furnace temperature	Ushort		in 0.1 °C
H2Smart/iHS06	RPDO2	0x0300	0	Actual gas1 inlet flow	Ushort	Furnace model	in 0.001 m3/h
			2	Actual gas2 inlet flow	Ushort		
			4	Actual gas3 inlet flow	Ushort		
			6	Actual gas4 inlet flow	Ushort		
H2Smart/iHS06	RPDO3	0x0400	0	Actual gas5 inlet flow	Ushort	Furnace model	in 0.001 m3/h
			2	Actual gas6 inlet flow	Ushort		

Output Registers	Message	Id	Byte offset	Data	Type	License required	Comments
			4	Actual gas7 inlet flow	Ushort		
			6	Actual gas8 inlet flow	Ushort		

8.3 PROFIBUS REGISTERS

Input Register	Data	Type	License Required	Comments
0	System state	Uint	Standard	Reserved
4	Hardware alarms	Uint	Standard	Bit0: 24V power supply failure
				Bit1: 3V3 power supply failure
				Bit2: 7V8 power supply failure
				Bit3: 5V power supply failure
				Bit4: 4V reference power supply failure
				Bit5: Real time clock malfunction
				Bit6: Storage device malfunction
8	System alarms	Uint	Standard	Bit0: Could not initialize non-volatile configuration service
				Bit1: Could not initialize system supervision service
				Bit2: Could not initialize filesystem
				Bit3: Could not initialize display service
				Bit4: Could not initialize ethernet service
				Bit5: Could not initialize measurement block service
				Bit6: Could not initialize IO service
				Bit7: Could not initialize HTTP server
				Bit8: Could not initialize Modbus server
				Bit9: Could not initialize O2 card service
				Bit10: No filesystem detected
				Bit11: Could not initialize Profibus server
				Bit12: Could not initialize CAN server
			Furnace model	Bit13: Could not initialize furnace model service
			Standard	Bit30: Could not update device's firmware
				Bit31: Empty EEPROM detected
12	IO alarms	Uint	Standard	Bit0: Reserved
				Bit1: Block temperature to high
				Bit2: Temperature sensor open circuit detected
				Bit3: Block heater failure
				Bit4: Reserved
				Bit5: Reserved
				Bit6: Thermocouple open circuit detected
				Bit7: O2 probe impedance test failure
				Bit8: Analog output 1 open circuit detected
				Bit9: Analog output 2 open circuit detected
16	H2/Dissociation [%]	Float	Standard	
20	Block temperature [°C]	Float	Standard	
24	Threrrmocouple temperature [°C]	Float	Standard	Only if o2 card is present
28	O2 probe emf [mV]	Float	Standard	
32	Kn	Float	Nitriding potential	
36	Ko	Float	Nitriding potential	Only if o2 card is present
40	Serial number	Ushort	Standard	
42	Total working hours	Uint	Standard	
46	Hours to next service	Ushort	Standard	
48	Reserved			Reserved
60	Furnace model output: CO content	Float	Furnace model	
64	Furnace model output: CO2 content	Float	Furnace model	

Input Register	Data	Type	License Required	Comments
68	Furnace model output: CH4 content	Float	Furnace model	
72	Furnace model output: H2 content	Float	Furnace model	
76	Furnace model output: H2O content	Float	Furnace model	
80	Furnace model output: NH3 content	Float	Furnace model	
84	Furnace model output: N2 content	Float	Furnace model	
88	Furnace model output: O2 content	Float	Furnace model	
92	Furnace model output: Dissociation	Float	Furnace model	
96	Furnace model output: Kn	Float	Furnace model	
100	Furnace model output: Ac	Float	Furnace model	
104	Furnace model output: Ko	Float	Furnace model	
108	Furnace model output: Kc	Float	Furnace model	
112	Furnace model output: LogpO2	Float	Furnace model	
116	Furnace model simplified calculations	Byte	Furnace model	0 = not active, 1 = active

Output Registers	Data	Type	License required	Comments
0	Digital output 1 mirror	Byte	Standard	Input value will be mirrored on DO 1
1	Digital output 2 mirror	Byte		Input value will be mirrored on DO 2
3	Reserved			Reserved
20	Actual gas1 inlet flow [m^3/h]	Float	Furnace model	Profibus input for furnace model
24	Actual gas2 inlet flow [m^3/h]	Float	Furnace model	
28	Actual gas3 inlet flow [m^3/h]	Float	Furnace model	
32	Actual gas4 inlet flow [m^3/h]	Float	Furnace model	
36	Actual gas5 inlet flow [m^3/h]	Float	Furnace model	
40	Actual gas6 inlet flow [m^3/h]	Float	Furnace model	
44	Actual gas7 inlet flow [m^3/h]	Float	Furnace model	
48	Actual gas8 inlet flow [m^3/h]	Float	Furnace model	
52	Furnace temperature [°C]	Float	Furnace model	
56	Reinitialize furnace model calculations	Byte	Furnace model	1 = activate
57	Force simplified model calculations	Byte	Furnace model	1 = activate, 0 = deactivate

9 OPTIONS / ORDERING CODES

SGS-S	Standard Device

SGS-SO	Standard Device with O2/TC Probe Input Card
Communication Options	
XGS-COM-CAN	Canbus Communication Option
XGS-COM-RS485	RS485/Modbus RTU Communication Option
XGS-COM-PBS	Profibus Slave Communication Option
Calibration Option	
SGS-CAL-AD	One Gas Calibration – CUSTOM (specify zero, span)
SGS-CAL-NH	One Gas Calibration – STANDARD (N2 / H2)
Firmware	
SGS-FRM-KN	Basic Nitriding Potential
SGS-FRM-FUM	Furnace Model
Accessories	
XGS-ACS-CBL-PS-3	M12 Cable – Power supply – 3m (10ft)
XGS-ACS-CBL-PS-5	M12 Cable – Power supply – 5m (15ft)
XGS-ACS-CBL-PS-10	M12 Cable – Power supply – 10m (30ft)
XGS-ACS-CBL-AN-3	DB9 Cable – Analog – 3m (10ft)
XGS-ACS-CBL-AN-5	DB9 Cable – Analog – 5m (15ft)
XGS-ACS-CBL-AN-10	DB9 Cable – Analog – 10m (30ft)
XGS-ACS-CBL-ETH-3	RJ45 Cable Ethernet Double Insulated Industrial Grade – 3m (5ft)
XGS-ACS-CBL-ETH-5	RJ45 Cable Ethernet Double Insulated Industrial Grade – 5m (15ft)
XGS-ACS-CBL-ETH-10	RJ45 Cable Ethernet Double Insulated Industrial Grade – 10m (30ft)
XGS-ACS-KF-050	KF Adapter ½” valid for ½”, ¾” and 1” Tee’s
XGS-ACS-KF-075	KF Adapter ¾” valid for 1 ¼”, 1 ½” and 2”
XGS-ACS-KF-XXX	KF Adapter XXX = length in mm
XGS-ACS-O2A	O2/TC Input Adapter
XGS-SRV-CAL-AD	One Gas Calibration – CUSTOM (specify zero, span)
XGS-SRV-CAL-NH	One Gas Calibration – STANDARD (N2 / H2)
XGS-SRV-CAL-MG	Multi Gas Calibration – CUSTOM (contact UPC)

10 CUSTOMER SUPPORT

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