ACTEON 6000
Digital multi-parameter transmitter
User manual

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1. General

Safety instructions

In order to maintain and ensure the good working order of the device, users must comply with the safety precautions and warnings featured in this manual.

Field of application.
The ACTEON 6000 is intended for use in industrial environments (water and effluent treatment). It is classified as Group 1 – Class A in accordance with EN 55011.
Please note: this equipment is not intended for use in domestic environments and may not provide adequate protection for radio reception in such environments.

Exclusion from explosive atmospheres
The ACTEON 6000 must not be installed in an explosive atmosphere.

Its IP 65 protection rating protects it against dust and water jets, but not against immersion or high-pressure cleaning.

Assembly and activation:
- Assembly, electrical connection, activation, operation and maintenance of the measuring system must only be carried out by specialist personnel authorized by the user of the facilities.
- Trained personnel must be familiar with and comply with the instructions in this manual.
- Make sure the power supply complies with the specifications on the nameplate before connecting the device.
- A clearly labeled power switch must be installed near the device.
- Check all connections before turning the power on.
- Do not attempt to use damaged equipment: it may represent a hazard and should be labeled as faulty.
- Repairs must only be carried out by the manufacturer or by AQUALABO's after-sales service department.

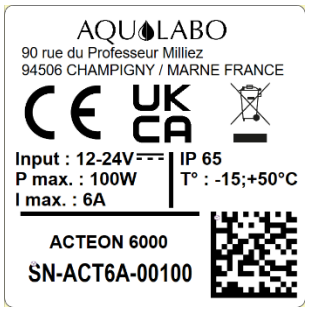
Labeling

Prior to any installation or start-up operation, check all the labels and symbols affixed to the measurement device.

	This symbol indicates there is a risk of electric shock or electrocution associated with the use of the device.
	This symbol indicates that the measuring device cannot be disposed of as conventional waste.

➢ Label on outside of device:

The ACTEON 6000 label on the right-hand face indicates the required power supply and the device's serial number.



2. Description of the equipment

2.1 ACTEON 6000 transmitters.

2.1.1 General description.

The ACTEON 6000 digital transmitter can be connected to up to 4 digital sensors in the DIGISENS range, other compatible digital sensors and also analogic current or voltage sensors to monitor the following parameters: pH, redox, temperature, dissolved oxygen (using optical technology), conductivity, salinity, turbidity (NTU, mg /L), Suspended Solid, Sludge blanket detection, COD, BOD, TOC (STACSENSE)….

The values measured are displayed and transmitted using analog or digital technology. The preconfigured regulation functions can be used to optimize the control of processes.

The ACTEON 6000 is used in combination with a wide range of interference-resistant digital sensors, offering pre-amplification features built into the sensor and digital signal processing. All the data regarding calibration, history, users and measurements is processed directly within the DIGISENS sensors, thus delivering very high levels of traceability and enhancing the reliability of the measurements.

2.1.2 Technical characteristics.

Software and functionalities	
Digital sensors input	Two separated RS-485 Modbus networks, named A and B, for digital sensors, one dedicated to DIGISENS sensors, the other configurable (baud rate ; framing). For network-A (DIGISENS dedicated), 4 directly available sockets. For network-B, one socket.
Analog inputs	2 analog inputs, raw signal type: Current (4-20mA) or Voltage (0-10V)
4 analog outputs	Choice of 4 programmable parameters depending on the sensor connected
4 relays/3 digital outputs	Setpoint: the measurement range (hysteresis/direction) and activation time can both be selected Control of the external cleaning system
Digital output	Modbus RTU ; Ethernet TCP IP
Data recording	Internal flash memory Recording journal of events, measure sensors.
Atmospheric pressure sensor	For dissolved oxygen concentration (mg/L)pressure compensation

Technical characteristics of the transmitter	
Display	7” Backlight LCD graphic touch screen, 1024x600
Analog outputs	0/4.00 – 25.00 mA with functional galvanic isolation Max. load 400 Ω
Relay outputs	6 A /50 V
Operating conditions	Range of operating temperatures: -15 °C to 50 °C Storage/shipping temperature -20 °C to 60 °C
Power supply/Electrical protection	12/24VDC (operating range of 10 to 28 V DC) Power limit: 100W Electrical protection: complies with IEC 61010-1

Casing	
Dimensions (WxHxD)	257x247x134 mm
Weight	1,6 Kg (device alone)
Material	Grey PC (box: polycarbonate; gasket : polyurethan)
Ingress protection rating	IP 65
Front face	display with cover glass ; grained polycarbonate labels

2.2 Digital sensors.

The digital sensors in the PONSEL range are equipped with galvanic isolation and can perform digital signal processing to optimize the reliability of the measurements and data sent to the ACTEON 6000 terminal.
All the data regarding the calibration, calibration history, users and measurements is processed directly within the sensor and transmitted via a Modbus RS-485 link.

The range of digital sensors can be used to measure a variety of parameters: temperature, dissolved oxygen, pH, redox potential, conductivity (4-electrode or inductive measurement principle), turbidity and suspended solids.

2.2.1 OPTOD sensor: dissolved oxygen (optical technology).

The OPTOD dissolved oxygen sensor applies the luminescence-based optical measurement technology and measures reliably and accurately without requiring calibration.
With no consumables or maintenance required, the OPTOD sensor gives an immediate return on the investment. The only intervention required is to replace the DO disk every two years.
Since it does not consume oxygen, the OPTOD sensor can be used in all media; even when there is a very weak flow of water.
The body is made of passivated 316 L stainless steel, Titanium or plastic for applications in corrosive media.

Measurements	
Measurement principle	Luminescence-based optical measurement
Measurement ranges	0.00 to 20.00 mg/L 0.00 to 20.00 ppm 0-200%
Resolution	0.01
Accuracy	+/- 0.1 mg/L Range 0-100 % +/- 0.1 ppm Range 0-100 % +/- 1 % Range 0-100 %
Response time	90% of the value in less than 60 seconds
Recommended measurement frequency	> 5 s
Water movement	No circulation required
Temperature compensation	Via an NTC thermistor
Storage temperature	- 10 °C to + 60 °C
Temperature measurement range	0 °C to 50 °C
Accuracy	+ /- 0.5 °C
Signal interface	Modbus RS-485 (or SDI-12)
Power supply for sensor	4,8 to 24 volts
Power consumption (5VDC)	Standby < 50 µA Average current RS485 (1 measure/second) : 8 mA Current pulse: 100 mA (2 mS)
Sensor	
Dimensions	Diameter: 25 mm; Length not including cable: 146 mm
Weight	Stainless steel version: 450 g (sensor + 3 m of cable) Titanium/Plastic version: 300 g (sensor + 3 m of cable)
Material in contact with the medium	Passivated 316L stainless steel. Titanium body – Plastic
Maximum pressure	5 bars
Cable	9-wire shielded conductor, uncoated-strand polyurethane sleeve
Ingress protection rating	IP68

2.2.2 PHEHT and PHT sensor: pH, ORP & temperature or pH/Temperature.

This PONSEL sensor is fitted with an Ag/AgCl reference electrode, used to measure pH and redox, in a "PLASTOGEL"® KCl-saturated plasticized electrolyte.
The Plastogel® electrolyte is in direct contact with the external environment without interposition of capillary or porous material. There is therefore no risk of fouling or deactivating the reference electrode.
The electrode used to measure the pH is a pH-sensitive glass bulb (made from special glass) welded to the end of a crystal tube, and the electrode for Redox measurements is a platinum disk.

Temperature: measured by an NTC thermistor inserted in a stainless-steel sheath.

pH measurement	
Measurement principle (pH)	pH/reference combined electrode: special glass, Ag/AgCl reference. Gel (KCl) electrolyte
Measurement range	0 – 14 pH
Resolution	0.01 pH
Accuracy	+/- 0.1 pH
Measurement of the Redox	
Measurement principle (Redox)	Redox/reference combined electrode: Platinum disk, Ag/AgCl reference. Gel (KCl) electrolyte
Measurement range	- 1000.0 to + 1000.0 mV
Resolution	0.1 mV
Accuracy	± 2 mV
Temperature measurement	
Measurement principle (T°C)	NTC thermistor
Operating temperature	0.00 °C to + 50.00 °C
Resolution	0.01 °C
Accuracy	± 0.5 °C
Response time	< 5 s
Storage temperature	0 °C to + 60 °C
Ingress protection rating	IP 68
Signal interface	Modbus RS-485 as standard and SDI-12 as an option
Measurement refresh rate	< 1 second maximum
Power supply for sensor	5 to 12 volts
Power consumption (5VDC)	Standby: <25 µA (ECO mode) Average current RS485 (1 measure/second) : 4.1 mA Current pulse: 75 mA
Sensor	
Dimensions of fitted sensor	Lower part: 21 mm in diameter; 92 mm long, Upper part: 27 mm in diameter; 103 mm long, Length of fitted sensor: without cable gland 210 mm; Length with cable gland: 260 mm.
Weight	350 g (sensor + cable)
Material in contact with the medium	PVC, POM-C, special pH glass, platinum, polyurethane
Maximum pressure	5 bar
Cable/connection hardware	9-wire shielded conductor, uncoated-strand polyurethane sleeve

2.2.3 PHEHT and PHT Monobloc sensor: pH, ORP & temperature or pH/Temperature.

The PHEHT/PHT combined sensor measures pH and ORP by comparing the potential between a reference electrode (Ag/AgCl) and a measuring electrode (glass for pH, platinum for ORP), with readings standardized at 25 °C.

The PH Monobloc sensor is designed for a wide range of environments, including lakes, rivers, seawater, and wastewater with high conductivity. It uses long-life Plastogel® technology, which extends probe lifespan and eliminates the need for refilling.

pH measurement	
Measurement principle (pH)	pH/reference combined electrode: special glass, Ag/AgCl reference. Gel (KCl) electrolyte
Measurement range	0 – 14 pH
Resolution	0.01 pH
Accuracy	+/- 0.1 pH
Measurement of the Redox	
Measurement principle (Redox)	Redox/reference combined electrode: Platinum disk, Ag/AgCl reference. Gel (KCl) electrolyte
Measurement range	- 1000.0 to + 1000.0 mV
Resolution	0.1 mV
Accuracy	± 2 mV
Temperature measurement	
Measurement principle (T°C)	NTC thermistor
Operating temperature	0.00 °C to + 50.00 °C
Resolution	0.01 °C
Accuracy	± 0.5 °C
Response time	< 5 s
Storage temperature	0 °C to + 60 °C
Ingress protection rating	IP 68
Signal interface	Modbus RS-485 as standard and SDI-12 as an option
Measurement refresh rate	< 1 second maximum
Power supply for sensor	5 to 12 volts
Power consumption (5VDC)	Standby: 15 µA Average current RS485 (1 measure/second): 5.7 mA Current pulse: 500 mA (1 mS)
Sensor	
Dimensions of fitted sensor	Diameter: 27 mm; Length: 171.5 mm
Weight	350 g (sensor + cable)
Material in contact with the medium	PVC, POM-C, special pH glass, platinum, polyamide
Maximum pressure	5 bars
Cable/connection hardware	9-wire shielded conductor, uncoated-strand polyurethane sleeve

2.2.4 EHAN sensor: Redox and temperature.

The PONSEL sensor incorporates a reference electrode, used for ORP measurements, such as Ag / AgCl in saturated KCl electrolyte plasticized "PLASTOGEL" ®.

The electrolyte "PLASTOGEL" ® communicates directly with the external environment without interposition of capillary or porous. So there is no risk of clogging or defusing the reference.

The measuring electrode is in platinum (3,5mm2) presented in sealed ring on a glass rod and is for in-situ measurements continuously

Temperature: measures via NTC.

ORP Measure	
Principle of ORP measure	Combination Electrode (ORP/reference) platinum ring, Reference Ag/AgCl. Gelled electrolyte (KCl)
Range of measures	- 1000.0 to + 1000.0 mV
Resolution	+/- 0.1 mV
Precision	+/- 10 mV
Answer time	< 90 s
Temperature measurement	
Principle of measure T°C	CTN
Temperature	0,00 °C to + 50.00°C
Resolution	0.01 °C
Precision	+/- 0.5 °C
T90	< 300 s
Temperature of storage	0°C to + 60°C
Protection scale	IP 68
Interface signal	Modbus RS-485 standard and SDI-12 in option
Refresh rate measurement	Maximum < 1 second
Sensor power	5 to 12 volts
Consumption (5VDC)	Standby: <25 µA Average current RS485 (1 measure/second): 3,7 mA Pulse current: 100 mA
Sensor	
Dimensions of sensor mounted	Mounted sensor length: 262 mm (gland not included); Length with gland: 324 mm.
Weight	350 g (sensor + cable)
Material in contact with the environment	PVC, POM-C, platinum, Polyurethane
Maximum Pression	5 bars
Cable/ connection	9-wire shielded conductor, uncoated-strand polyurethane sleeve

2.2.5 NTU sensor: Turbidity in NTU-mg/l.

The measuring principle is based on nephelometry: a diode emits infrared light (850 nm) and an IR receiving diode, set to one side at an angle of 90°, detects the amount of scattered light (standardized measurement). The sensor can be calibrated using a Formazine standard.
This very economical optical technology requires very little maintenance and no consumables.

Measurements		
Measurement principle	Scattering of IR at 90°	
Measurement ranges	**0 to 4,000 NTU in 5 ranges**: ▪ 5 - 50 NTU ▪ 5 – 200 NTU ▪ 5 – 1,000 NTU ▪ 5 – 4,000 NTU ▪ AUTO range	**0 to 4,500 mg/L range** **Calibration:** 0-500 mg/L range, as per standard NF EN 872 range >500 mg/l as per standard NF T 90 105 2
Resolution	from 0.1 to 1, set automatically as a function of the range	
Accuracy	< 5% of the NTU value recorded	
Response time	< 5 s	
Operating temperature	0 °C to + 50 °C	
Temperature measurement	Via an NTC thermistor	
Storage temperature	-10 °C to + 60 °C	
Signal interface	Modbus RS-485 as standard and SDI-12 as an option	
Maximum refresh rate	< 1 second	
Power supply to sensor	5 to 12 volts	
Power consumption (5VDC)	Standby: <40 µA Average current RS485 (1 measure/second): 1,3mA	
Sensor		
Dimensions	Diameter: 27 mm; Length not including cable: 170 mm	
Weight	300 g (with 3 meters of cable)	
Materials	PVC, POM-C, PMMA, Polyamide	
Maximum pressure	5 bar	
Cable/connection hardware	9-wire shielded conductor, uncoated-strand polyurethane sleeve	
Ingress protection rating	IP68	

2.2.6 C4E sensor: 4-electrode conductivity.

The operation of the sensor is based on 4-electrode conductivity technology: an alternating current at constant voltage is set up between a pair of primary graphite electrodes. The secondary electrodes, made from platinum, adjust the drive potential at the primary electrodes to compensate for any fouling. The voltage measured between the primary electrodes varies depending on the resistance of the medium, and thus the conductivity.

Measurements	
Measurement principle	4-electrode type conductivity sensor (2 graphite + 2 platinum).
Conductivity measurement range	0 - 200.0 µS/cm 0 - 2,000 µS/cm 0.00 - 20.00 mS/cm 0.0 - 200.0 mS/cm
Resolution	from 0.01 to 1, depending on the range
Accuracy	+/ 1 % of full scale
Salinity measurement range	5-60 g/kg
TDS-KCl range	0 – 133,000 ppm
Response time	< 5 s
Operating temperature	0 °C to 50 °C
Temperature compensation	Via an NTC thermistor
Storage temperature	- 10 °C to + 60 °C
Signal interface	Modbus RS-485 as standard and SDI-12 as an option
Measurement refresh rate	< 1 second maximum
Power supply for sensor	5 to 12 volts
Power consumption (5VDC)	Standby: <25 µA Average current RS485 (1 measure/second): 5.2 mA
Sensor	
Dimensions	Diameter: 27 mm; Length not including cable: 177 mm (not including temperature sensor)
Weight	350 g (sensor + 3 m of cable)
Materials in contact with the medium	PVC, POM-C, stainless steel
Maximum pressure	5 bar
Cable/connection hardware	9-wire shielded conductor, uncoated-strand polyurethane sleeve
Ingress protection rating	IP68

2.2.7 CTZN sensor: inductive conductivity.

The operation of the CTZN sensor is based on a conductive induction measurement principle.

A ring-type coil is excited at a fixed frequency, and the response is retrieved on a second coil, linked to the excited coil. The coupling between the coils varies depending on the conductivity of the conducting solution present.

Measurements	
Measurement principle	Inductive conductivity sensor with temperature compensation
Conductivity measurement range	0.0 to 100.0 mS/cm
Resolution	0.1
Salinity measurement range	5-60 g/kg
Operating temperature	0 to 50 °C
Temperature compensation	Via an NTC thermistor or an external measurement
Measurement accuracy of T°C	± 0.1 °C over a range of 0-40 °C
Response time	T90<30 s
Storage temperature	-10 °C to 60 °C
Signal interface	Modbus RS-485 and SDI-12
Measurement refresh rate	< 1 second maximum
Power supply for sensor	5 to 28 volts, max. voltage: 30 V
Power consumption (5VDC)	Automatic standby of < 50 µA, warm-up time: 100 ms Average current RS485 (1 measure/second): 108mA Max. current peak : 900 mA
Sensor	
Dimensions	Max. diameter: 62.4 mm, Length: 196 mm
Weight	700 g
Materials in contact with the medium	EPDM, PVC, stainless steel
Maximum pressure when immersed	5 bar
Cable/connection hardware	9-wire shielded conductor, uncoated-strand polyurethane sleeve
Ingress protection rating	IP68

2.2.8 VB5 sensor: Sludge Blanket detection.

The principle of measure is based on the mitigation of the Infra-Red signal in 870 nm through an optical path of 5mm. The sensor delivers measures in Sludge Blanket detection in % of transmission IR. For a better precision, the optics of the sensor are regulated in temperature.

Measurements	
Measurement principle	Optical IR (870 nm) based on IR absorption
Range of measure	Sludge blanket: 0-100 %
Resolution	Sludge blanket : 0.01 à 0.1 %
Accuracy	Sludge blanket: +/- 2%
Response time	< 35 secondes
Temperature measure	
Principle of measure	NTC
Working temperature	-5.00 °C to + 60,00°C
Resolution	0,01 °C
Accuracy	+/- 0.5 °C
Storage Temperature	-10°C to + 60°C
Degree of protection	IP 68
Singal Interface	Modbus RS-485 or SDI-12
Refreshment of the measure	Maximum < 1 seconde
Power supply	5 to 28 volts
Consumption (5VDC)	Standby : <25 µA (Average RS485 (1 measure/seconde) : 3.2 mA Curent Pulse : 100 mA
Sensor	
Weight	750 g (sensor)
Material	POM-C, Nickel-plated brass, EPDM
Pressure max.	5 bars
Cable/ connexions	9-wire shielded conductor, uncoated-strand polyurethane sleeve
Ingress protection rating	IP68

2.2.9 MES5 sensor: Sludge Blanket detection, Suspended Solid, Turbidity.

The principle of measure is based on the mitigation of the Infra-Red signal in 870 nm through an optical path of 5mm. The sensor delivers measures in Suspended Solid (g/l), Turbidity (FAU) and Sludge Blanket detection in % of transmission IR. For a better precision, the optics of the sensor are regulated in temperature.

For a measure of Suspended Solid, the sensor is directly calibrated on the material to be measured (sample of sludge).

In Turbidimeter version the sensor delivers measures on a range 0-4000 FAU (Formazine Attenuation Unit) and is calibrated with solutions of Formazine.

Temperature: measures and regulation of optics via CTN.

Suspended Solid measure	
Principle of measure	Optical IR (870 nm) based on IR absorption
Range of measure	SS: 0-50 g/L Turbidity: 0-4000 FAU Sludge blanket: 0-100 %
Resolution	SS : 0.01 g/L Turbidity : 0.01 à 1 FAU Sludge blanket : 0.01 à 0.1 %
Accuracy	SS< 10 % Turbidity: +/- 5% (range 200-4000 FAU) Sludge blanket: +/- 2%
Response time	< 35 secondes
Temperature measure	
Principle of measure	NTC
Working temperature	-5.00 °C to + 60,00°C
Resolution	0,01 °C
Accuracy	+/- 0.5 °C
Storage Temperature	-10°C to + 60°C
Degree of protection	IP 68
Singal Interface	Modbus RS-485 or SDI-12
Refreshment of the measure	Maximum < 1 seconde
Power supply	5 to 28 volts
Consumption (5VDC)	Standby : <25 µA (Average RS485 (1 measure/seconde) : 3.2 mA Curent Pulse : 100 mA
Sensor	
Weight	750 g (sensor)
Material	POM-C, Nickel-plated brass, EPDM
Pressure max.	5 bars
Cable/ connexions	9-wire shielded conductor, uncoated-strand polyurethane sleeve
Ingress protection rating	IP68

2.2.10 StacSense Sensor: parameter SAC254 and equivalent values of CODeq, BODeq, TOCeq and Turbidity eq.

The measuring principle of this sensor is based on the attenuation of the UV signal, centered on 254 nm, through an optical slot of 2 or 50mm (two models available). The sensor delivers observed fluid temperature measurements, SAC254 spectral attenuation coefficient (unit: 1/m), CODeq, BODeq and TOCeq equivalents in mg/l. Finally, the equivalent unit in turbidity is FAU (Formazine Attenuation Unit). The sensor also incorporates internal temperature measurements to optimize optical measurement.

For the main parameter SAC254 and the turbidity equivalence, the sensor is directly calibrated in clear water in two steps, by successive activation of the two optical sources, UV and green radiation.

Measurements	
Measurement principle	UV optics (254 nm) based on absorptiometry Turbidity compensation by optical measurement at 530 nm (green)
Measuring range	Optical path 2 mm : SAC254 : 0-750 1/m CODeq: 0-1300 mg/L BODeq : 0-350 mg/L TOCeq : 0-500 mg/L Turbidity eq : 0-500 FAU Optical path 50 mm : SAC254 : 0-30 1/m CODeq : 0-50 mg/L BODeq : 0-15 mg/L TOCeq : 0-20 mg/L Turbidity eq : 0-40 FAU
Resolution	SAC254: 0.01 1/m Turbidity eq : 0.01 to 1 FAU
Accuracy	SAC254: +/- 3% Turbidity eq: +/- 7%
Response time (T90)	Optical measure: < 5s Temperature: < 3mn
Temperature measurement	
Measuring principle T°C	NTC
Operating temperature	0.0 °C to + 40, 0°C
Resolution	0,01 °C
Accuracy	+/- 0.5 °C
Storage temperature	-10°C to + 50°C
Index of protection	IP 68
Signal interface	Modbus RTU (RS-485) / SDI-12 (TTL)
Speed of measurement refresh	Max : 1 measure / 2s
Sensor Power Supply	5.4 to 26 VDC
Consumption (5.4 VDC)	Standby: <10 µA Maximum current peak: 316 mA Average RS485 (1 measure/ 2secondes) : 16.7 mA
Sensor	
Weight	1600 – 1800 g depending on optical path (cable not included)
Materials in contact with the environment	Body: 316 stainless steel (1.4401)
Maximum pressure	Optical windows: Quartz (Corning 7980)
Cable/ connections	Cable: Bare Thread Polyurethane Sheath

Ingress Protection rating	IP68
Max. immersion depth	50 meters
Maximum pressure	5 bars
Operating temperature	0-40°C
Storage temperature	-10°C to +50°C
PH range	pH2 to.pH12
Dimensions (D x L) (mm)	48x371 or 48x419 (see overall dimensions diagram)
Weight	1600 - 1800g depending on the optical path (cable not included)
Equipment	Body: Stainless steel 316 (1.4401) Optical windows: Quartz (Corning 7980) Cable: Bare wire with polyurethane sheath Seals: Fluoroelastomer (FPM/FKM)
Cable	9 shielded conductors in 3, 7 and 15m. *Other lengths on request*

The StacSense needs 2 seconds to measure, treat and store a new measurement value. During this phase no communication is allowed in the modbus network. Measurement order on the network is a broadcast modbus command. Consequently, all DIGISENS sensors plugged on the network will see measurement order including StacSense. So, if a StacSense is connected to the network, the user must SCAN the network to identify the StacSense. Then the ACTEON 6000 device will manage the communication process taking account the StacSense.

2.2.11 Low Turbidity sensor LowTuS : Turbidity in NTU-mg/L.

The measurement principle is based on the measurement of Infra-Red light diffusion at 90° (ISO 7027) and allows continuous monitoring of the Turbidity measurement over low measurement ranges.

The new Low Turbidity sensor incorporates a new mechanical system for **automatic cleaning** of the measuring cell. This system prevents the build-up of contamination in the measuring field and on optical scattering and IR radiation cells.

An automatic de-bubbling system prevents bubbles from sticking to the optical windows so as not to introduce measurement errors

Control of calibration can be performed using a turbidity standard (Formazine) or using the reference cell (**Solid Tare**) supplied with each sensor, making the calibration process easier and reproducible

Measurements	
Measurement principle	Diffusion IR at 90° - ISO 7027
Measuring Range	0-100 NTU
Resolution	0,0001 NTU for [0,0002 to 9,9999 NTU] 0,001 NTU for [10,000 to 100,00 NTU]
Limit of determination	0,05 NTU (pure water)
Accuracy (*To be confirmed*)	Low range: +/-2% of reading High range: +/-5% or 0,3 NTU
Temperature	NTC
Temperature measuring Range	0-40 °C
Temperature Accuracy	+/- 0.5°C
Type of detector	Si photodiode
Light sources	IR LED 860 nm
Measurement frequency min	500ms

Ingress Protection rating	IP65
Maximum pressure	3.5 bar
Water Flow	100 ml/min to 500 ml/min
Operating temperature	0-40°C
Storage temperature	0-50°C
Weight	1800 – 2000g depending on the version
Equipment	Body: Polycarbonate, POM-C, PE, polyamide Optical windows: Fused silica Cable: Bare wire with polyurethane sheath Seals: Nitrile Wiper unit: Silicon, Stainless steel
Wetted materials	Measurement cell: POM-C, Fused silica, Nitrile Wiper unit: Silicon, Stainless steel
Cable	9 shielded conductors in 3, 7 and 15m. *Other lengths on request*

2.2.12 Free chlorine sensor

The chlorine sensors in the SensChlo-CYA and SensChlo-I ranges are 3-electrode systems fitted with protective membranes, designed to measure chlorine disinfectants. These sensors are suitable for use in swimming pools or water of a quality similar to that of drinking water.

These sensors are not suitable for verifying the absence of chlorine.

A complete measurement and/or control system generally comprises the following components:

- Sensor
- Electrical cables and connectors
- Flow chambers and fittings
- Measurement and control equipment

Measurements	
Measurement principle	membrane-type amperometric sensors, 3-electrode system, automatic temperature compensation
Measuring Range	0.005 to 2.00 mg/L or 0.05 to 20.0 mg/L
Temperature measuring Range	0-45 °C

Ingress Protection rating	IP68
Maximum pressure	0 to 0.5 bar without protective ring
Operating temperature	0-40°C
Storage temperature	5-40°C (dry sensor, without electrolyte)
Weight	250g without cable
Wetted materials	Body: U-PVC; PEEK; 1.4571 stainless steel hydrophilic microporous membrane
Cable/connector	Axial M12, 5pins connector; 5x0.34mm^2

NOTE: see SENSCHLO-I or SENSCHLO-CYA data sheets for more detailed informations.

3. Installation

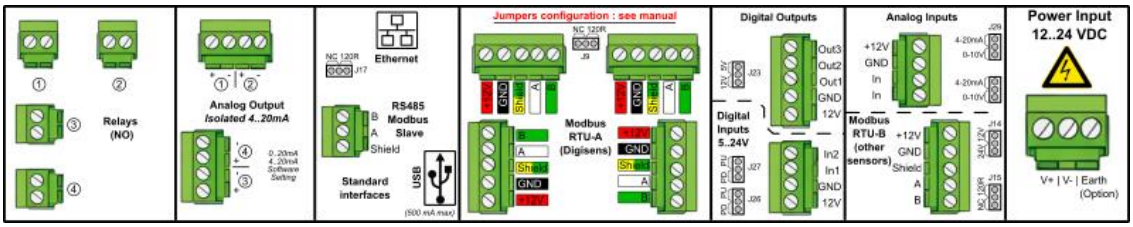
3.1 Description and mounting of the controller.

3.1.1 Description of the front face.

1	Touch screen
2	Upper cover – do not open.
3	Screws securing lower cover (2 screws)
4	Lower cover - remove to make electrical connections
5	Four 4-ways cable glands for inputs and outputs; one dedicated to power supply line

3.1.2 Equipment required.

The ACTEON 6000 unit is shipped with a set of 16 connectors (six 5-contacts connectors, four 4-contacts connectors, one 3-contacts connectors, four 2-contacts connectors and one 3-contacts connector specifically sized to connect up the power supply).



Equipment required for installing the unit and for making the electrical connections:
- PH1x75 mm cross head screwdriver for attaching the unit's mounting brackets and for the screws securing the cover which protects the electrical connections,
- 2.0 x 75 mm flat-blade screwdriver for working on the various electrical connection terminals.

To mount the ACTEON 6000 on a wall, use three M5 screws (with a head size of < 10.8).

3.1.3 Outline drawings of the ACTEON 6000.

➢ *Overall dimensions of the ACTEON 6000.*

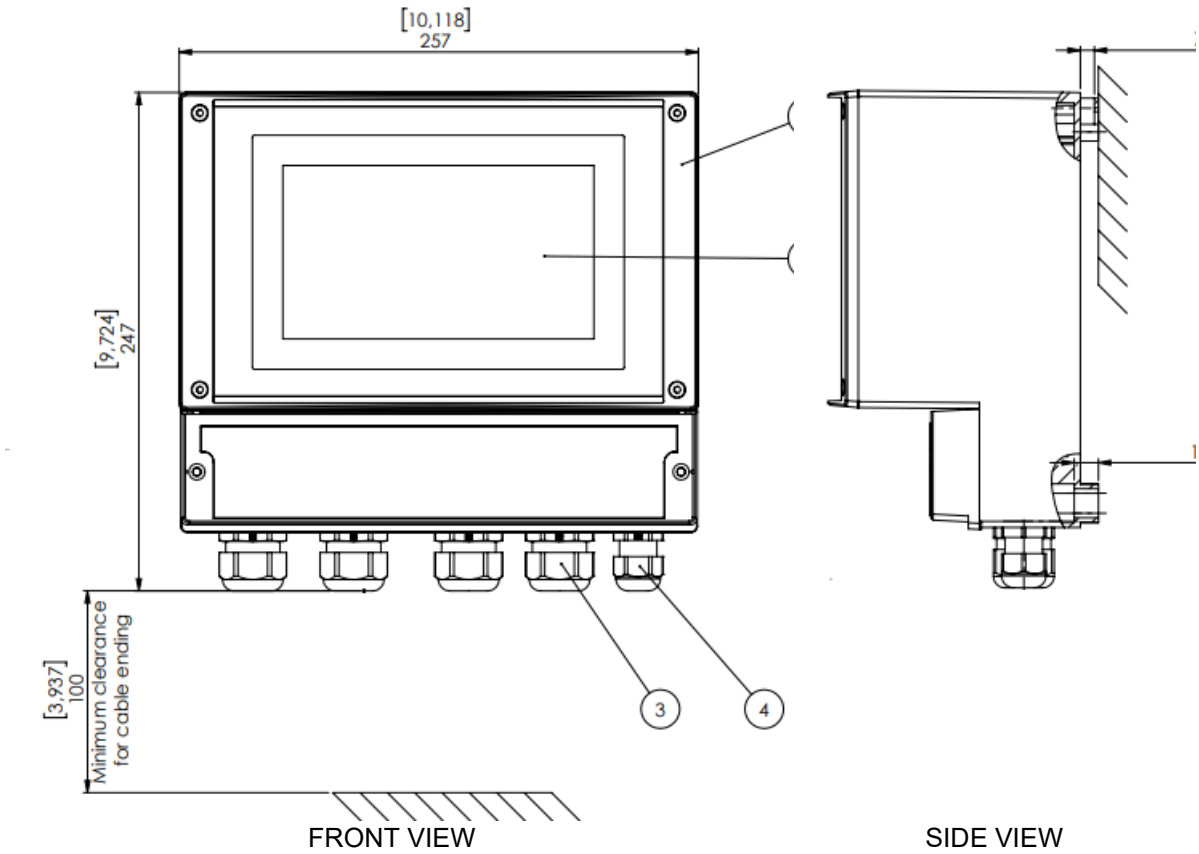


Diagram 1: Outline drawing for the ACTEON 6000 unit

1	Front panel
2	Touch screen
3	Four ways cable-glands: INPUTS or OUTPUTS
4	POWER SUPPLY dedicated cable-gland

➢ *Dimensions when mounted on a wall.*

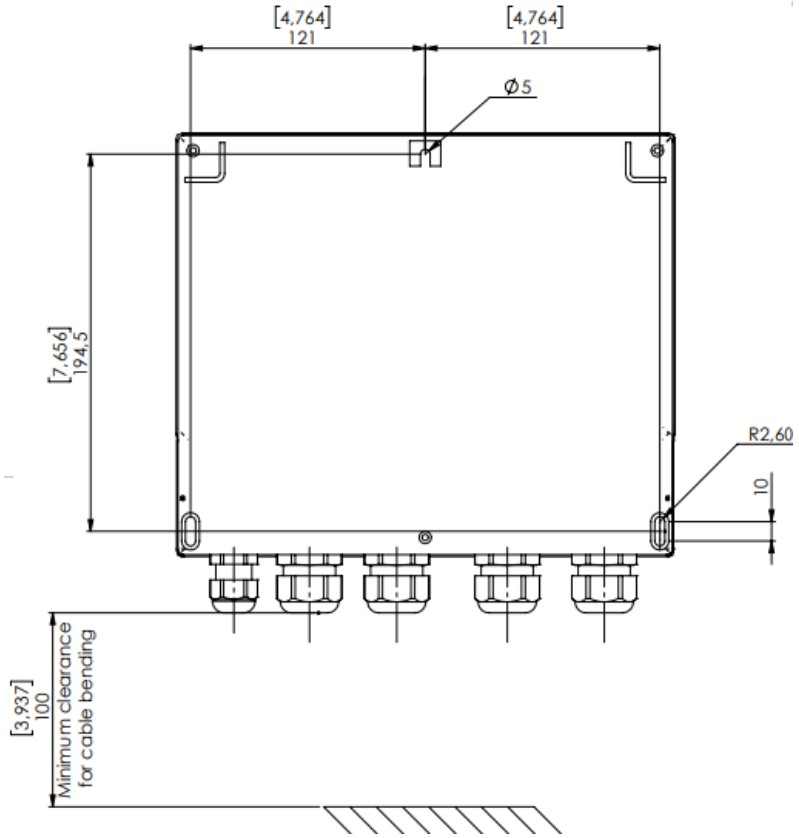


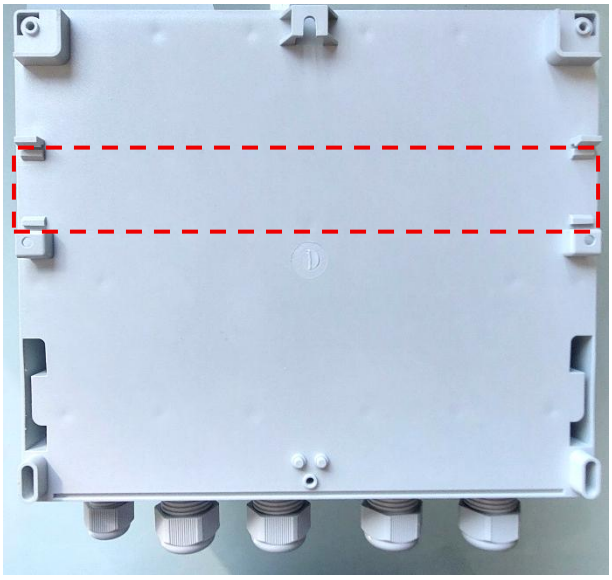
Diagram 2: Outline drawing for the ACTEON 6000 unit – wall mounting

3.1.4 Vertical mounting on a DIN rail

To mount the ACTEON 6000 on DIN rail, use the following parts:

- DIN 35 L=266,
- a set of 2 symmetrical fixing brackets.

Start by turning the ACTEON 6000 over so that you can insert the two symmetrical brackets at the rear.
Please note that the two brackets are symmetrical and cannot be reversed.
The area outlined in dotted lines indicates the final position of the DIN rail.



Push left and right brackets into their specific area.

Open position when left and right brackets are vertical.

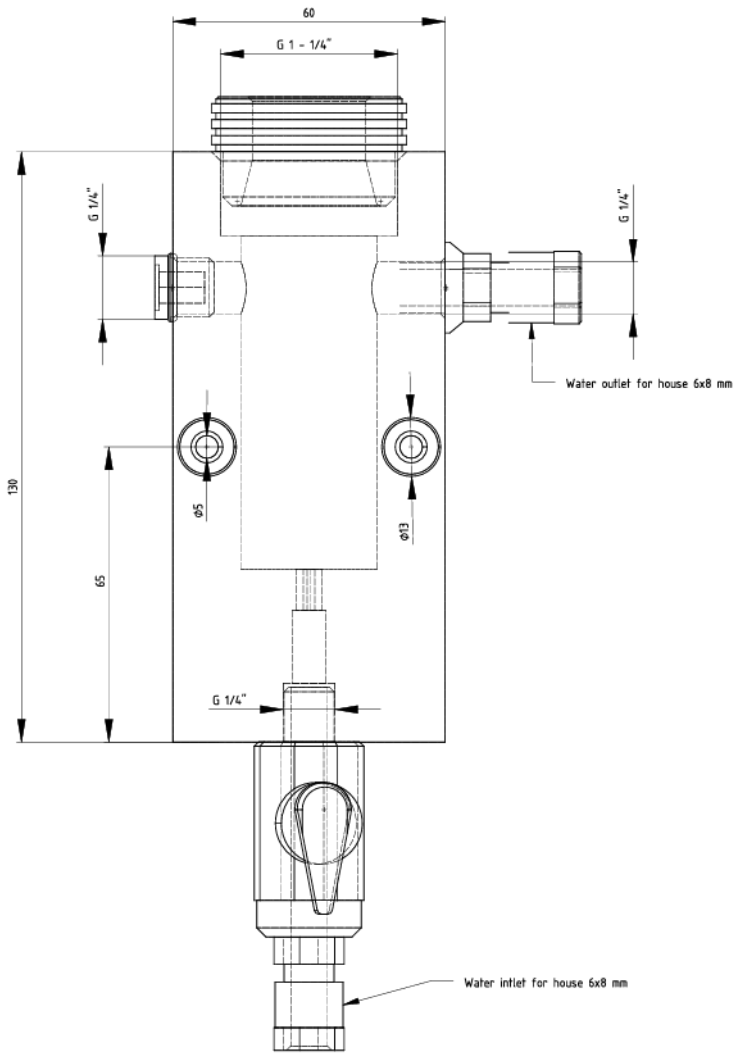
Locked position when left and right brackets are horizontal.

3.1.5 Free Chlorine measurement flow cell, wall mounting

If the ACTEON 6000 is used in conjunction with a free chlorine sensor, the user must install a wall-mounted flow cell near the transmitter to carry out the measurement.

Recommendations for Installing the Chlorine Sensor / Measurement Chamber

- Sensor insertion depth into the cell: Maintain 300 mm between the water inlet and the membrane
- Recommended pipe materials: PE, PP, or PVDF; dimensions: 6x8 mm
- Flow rate: The bottom fitting contains a valve and a free-moving ball. The ball is there solely to help you determine whether water is flowing through the probe holder.
- Screws for mounting the cell to the wall: Use M4 screws.
- The bottom and side connections are made of PVDF. The fluid must enter the cell through the lower axial inlet. It is discharged laterally, to the left or right depending on the installation constraints.
- The O-rings are made of Viton.
  The probe holder and O-rings can operate without replacement for more than 5 years. High concentrations of disinfectants or high fluid temperatures may require early replacement.



Free chlorine measurement – flow cell description (case of fluid output on the right)

3.2 Electrical connections.

3.2.1 Safety instructions – Installation.

Isolate the power supply to the measuring device before performing any electrical connection work.

	The electrical wiring and cabling work must be performed exclusively by authorized personnel.
	Due to the risk of electrocution, systematically isolate the power supply to the system before performing electrical connection work.
Warning for wiring the relays	
	Fire risk. Since the relay contacts have a nominal value of 6 A, the external loads connected to the relays must be fitted with devices which limit the current to < 6 A.

Open the unit's lower cover to access the controller's wiring terminals.
Unscrew the two screws which hold the lower protective cover.
Before removing the cover, loosen all the cable glands so that the cables can slide in and out.
Figure 3 shows the transmitter's wire connection zone when the lower protective cover is removed.

3.2.2 Description of the wiring.

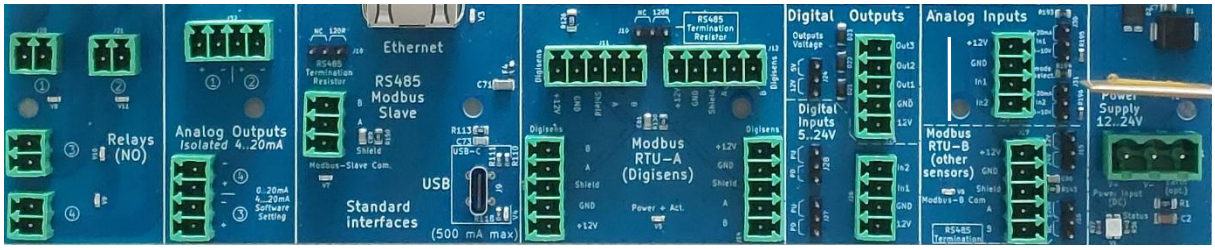


Diagram 3: terminals on the circuit card

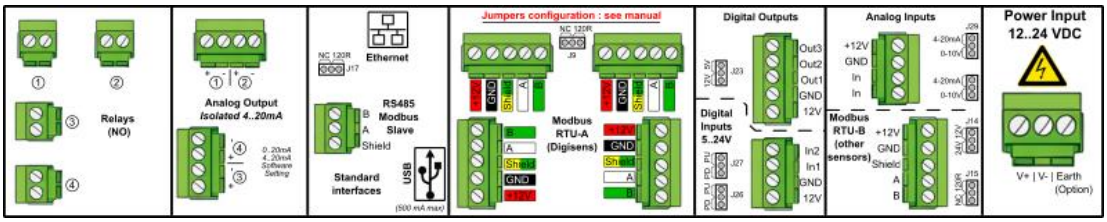
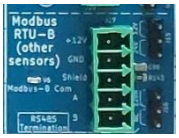
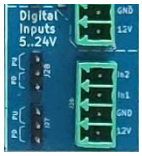
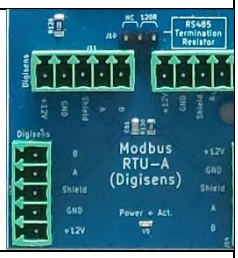
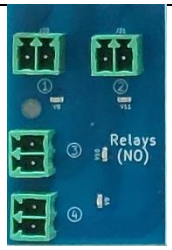


Diagram 4: Diagram of the terminals affixed (as a self-adhesive label) to the protective cover

NOTE: 4-way cable glands allow cables from the same family to be grouped together, for example, relay outputs.

Identification	Description	Terminal identification on circuit card	Views of terminals aeras on the circuit card
1-Power Supply	12/24VDC power supply One 3-pins connector	V- V+ Earth (option)	
2-Analogic inputs	Two inputs One 4-pins connector and two 3-male-contacts sockets for female jumpers	12V GND In1 In2 Jumper to select raw signal type: Current (4-20mA) or Voltage (0-10V)	
3-Sensor input, NETWORK-B RS485 Modbus RTU	One Modbus sensor input One 5-pins connector and two 3-male-contacts sockets for female jumpers	+12V GND Shield B A One jumper to switch 12V power supply to 24V*. One jumper to add a 120 ohms terminal resistor on the communication lines **When the jumper is in 24V position, modbus sensor connected to network B is directly powered by the main power supply of the device.*	
4-Digital inputs	Two inputs One 4-pins connector and two 3-male-contacts sockets for female jumpers	In2 In1 GND 12V For each input, a jumper to configurate Pull-up or pull-down logic level	
5-DIGISENS Sensor inputs, NETWORK-A RS485 Modbus RTU	Four modbus sensor inputs Four 5-pins connectors and one 3-male-contacts sockets for female jumpers	+12V GND Shield B A One jumper to add a 120 ohms terminal resistor on the communication lines	
6-Digital outputs	Three digital outputs One 5-pins connector and one 3-male-contacts sockets for female jumpers	Out3 Out2 Out1 GND 12V One jumper to switch 12V power supply to 5V.	
7-Dry relays	Four dry relays Normally open state Four 2-pins connectors	Relays labeled from 1 to 4.	

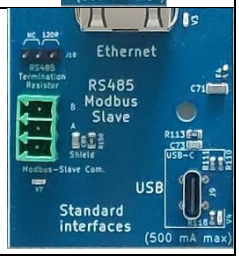
8-Analogic outputs	Four analogic outputs Two 4-pins connectors	Outputs labeled from 1 to 4. (+) and (–) symbols for each output	
9-USB	USB port For downloading data	USB type C socket	
10-RS485 modbus slave	Ethernet or serial port One 3-pins connector for serial port And one 3-male-contacts sockets for female jumpers	Classical RJ 45 socket for ethernet plug B A Shield One jumper to add a 120 ohms terminal resistor on the communication lines	

Table 1: Description of the electrical connections

➢ **Electrical connections for DIGISENS modbus sensors:**

Diagram 5 below shows the electrical connections required for DIGISENS sensors when the cable lengths are 15 meters or less, and when the cable lengths are more than 15 meters.

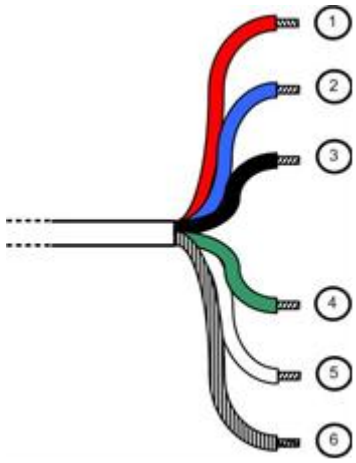
Colored wires in the cable	cable lengths are 15 meters or less	cable lengths are more than 15 meters
	1-RED: V+ power	RED+YELLOW+PINK+ORANGE+VIOLET V+ power
	2-BLUE: SDI-12 communication NOT CONNECTED	2-BLUE: SDI-12 communication NOT CONNECTED
	3-BLACK: Ground	3-BLACK: Ground
	4-GREEN: RS485, B	4-GREEN: RS485, B
	5-WHITE: RS485, A	5-WHITE: RS485, A
	6-GREEN/YELLOW: Cable shield	6-GREEN/YELLOW: Cable shield

Diagram 5: Sensor connection for a cable length of 15 meters or less, and of more than 15 meters.

➢ **Electrical connections for SensChlo_I & SensChlo_CYA free chlorine sensor:**

Diagram below shows the electrical connections required for SensChlo sensors.

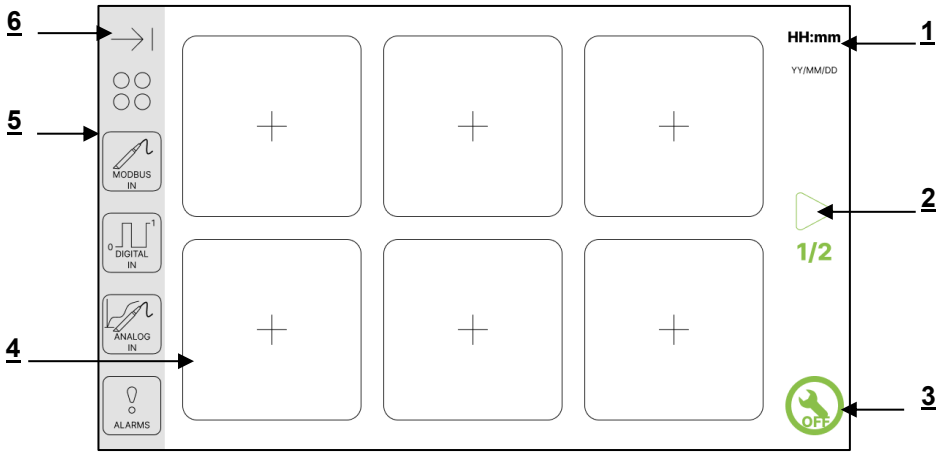
Wire color	Connexion
White	V+ power
Blue	GND Ground
Green	RS485 A
Black	RS485 B

Diagram 6: Sensor connection for free chlorine sensor.

4. User Interface

4.1 Home screen / dashboard.

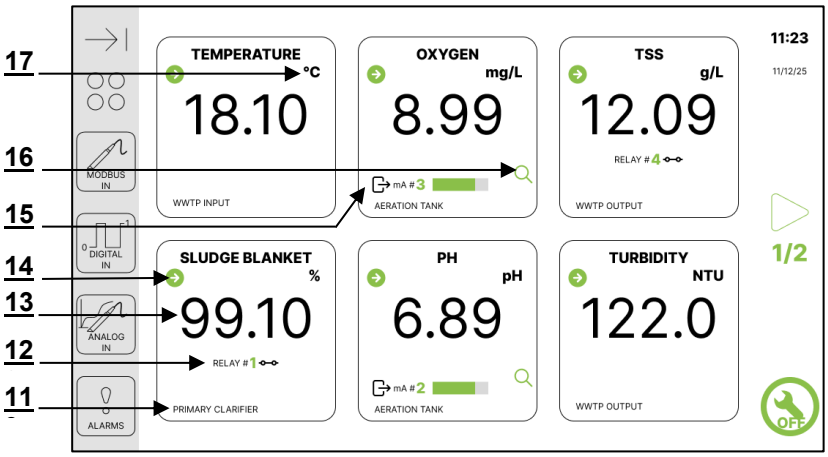
The figures below show the data displayed on the home screen when no parameter has been selected abd displayed.



1	Date and hour
2	Access to second tab with 6 additional tiles
3	Button/icon about Maintenance mode
4	Empty tile, (+) symbol gives access to new tile definition screen
5	Sidebar: Main Menu Left column permanently displayed Right column, visible on clic on horizontal arrow **6**, on top position of the sidebar.

Table 2a: description of the home screen/dashboard.

The user can configurate the dashboard to display various parameters coming from analogic or digital sensors. The figures below show a fully configurated dashboard with parameters displayed and associated outputs (relay or analogic output (current loop)).



11	Free text aera (for example: sensor location)
12	Relay icon with number (1 to 4) and status (open/closed)
13	Real time measurement value of the selected parameter
14	Stability icon (up, down or horizontal) depending on the change in measurement
15	Analogic output with number and progress bar (current level in the defined range 4-20 or 0-20mA)
16	Info icon: on click, access to information's and measurement status screen
17	Parameter unit

Table 2b: description of the home screen/dashboard.

NOTE: The dashboard contains two tabs of 6 tiles. The user can select every free tile to organize parameter displayed up to 12 measurements.

NOTE: If it is useful for the operator, a tile in tab-1 can contain the same parameter as a tile in tab-2.

4.2 Navigation icons.

The device has a touch screen so that the user can navigate through the various menus using the icons listed in the table below.

Buttons	Functionnality	Buttons	Functionnality
VALIDATE	Confirms selection and opens a new screen.	APPLY TO SENSOR	Generates a modbus communication with the sensor.
ABORT	Cancel an action and takes you back to the previous screen.	MANUAL ADDRESS	Opens the menu used to modify the Modbus address for the digital sensors.
DASHBO ARD	Take you back to the home screen.	ERASE TILE	Generates an erase of selected tile to reorganize the dashboard.

SETTINGS	Gives access to a settings screen	TREND LINE	Gives access to an auto-refreshed curve of the selected parameter
EDIT VALUE	Gives access to a keyboard to define a value.		Transfers data to a USB stick.
WRITE	In service mode only, initiate the modbus communication to write a value in a targeted register in the sensor.	READ	In service mode only, initiate the modbus communication to read a targeted register in the sensor.

Table 3: Functionalities of the navigation icons.

4.3 Navigation in a screen

The Acteon 6000 features configuration screens where visual elements—such as a list of detected sensors or a list of existing alarms—extend beyond the height of the screen. In such situations, the interface adjusts and displays a vertical bar on the right side of the screen. This bar indicates the actual page height. You can navigate the page directly by scrolling with your finger without having to tap this vertical bar.

5. Setting up

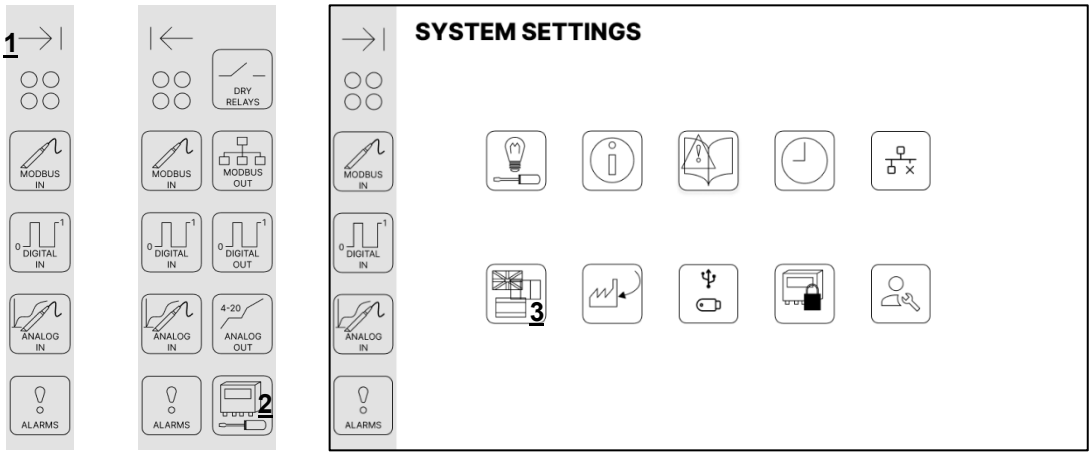
5.1 Initial start-up.

When the transmitter is switched on, the home screen (i.e. the main measurement screen) appears with no indication of the sensor(s) installed if no sensors have yet been detected, on RS485-modbus networks, or configured.
If the sensors connected have already been configured, measured values may be displayed in the selected tiles.

As an initial step, the operator can set the display language.

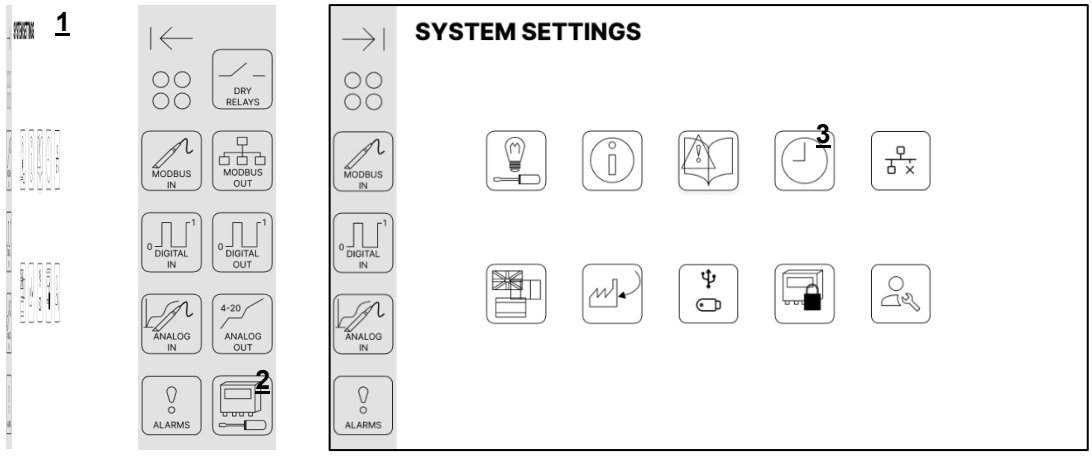
➢ *Setting the language:*

To access the language menu, follow the sequence shown below from the home screen:



At the home screen, use arrow to see the second column of sidebar, select the SYSTEM icon, then the Language icon, and finally the language button.

➢ *Setting the date and time:*

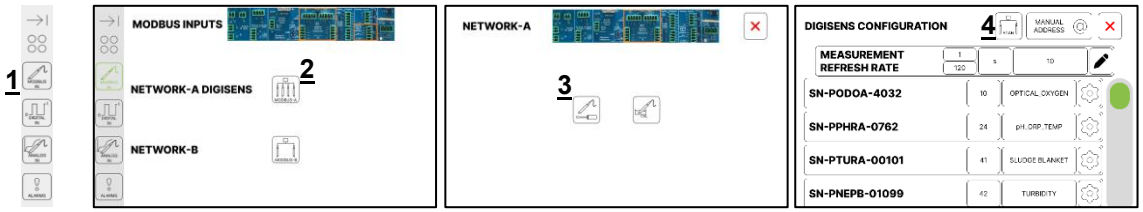


At the home screen, use arrow to see the second column of sidebar, select the SYSTEM icon, then the Language icon, and finally the clock button.

5.2 Installation of digital sensors.

When DIGISENS sensors are connected to the transmitter for the first time they must be installed by running a SCAN (to scan the addresses from 1 to 243).

On sidebar, click directly on MODBUS IN button, select the NETWORK-A, then the Configuration icon, and finally the SCAN button.



1	MODBUS-IN button in the sidebar
2	NETWORK-A button
3	Configuration button
4	Network-A SCAN button (start or stop)

As soon as the transmitter detects a sensor, it displays its address, its serial number (which is also engraved on the body of the sensor) and a description of the sensor.

In the example above, oxygen, pH, sludge blanket and turbidity sensors have been detected. The OPTOD sensor is at address 10, the serial number is SN-PODOA-4032 and its description is OPTICAL_OXYGEN. Moreover, the pH sensor is at address 24, the sensor's serial number is SN-PPHRA-0762 and the description of the sensor is pH_ORP_TEMP.

NOTE :

During network-A scan process, the SCAN button is in green state. A message is automatically refreshed at each address to inform the user about sensor detection. The operator can stop the SCAN operation at any time by pressing again SCAN button. The message changes to a summary with the quantity of detected sensors.

Inactive SCAN :

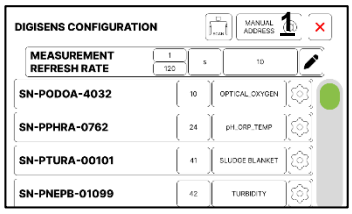
SCAN running:

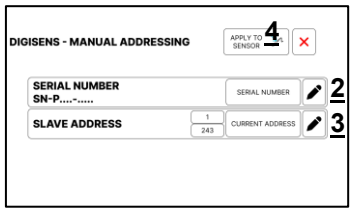
NOTE: Sometimes, an address conflict (two sensors have the same address), an energy default or a communication error could affect sensor detection.

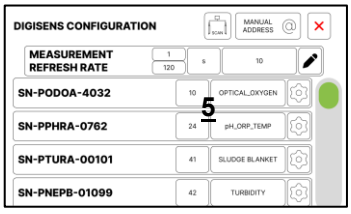
➢ *DIGISENS sensor, manual addressing:*

A special function of DIGISENS sensor exits to change the modbus address of one known sensor using his serial number printed on sensor enclosure. This process is useful when an address conflict exists.

Using MANUAL ADDRESSING button in DIGISENS CONFIGURATION screen, the user enters sensor serial number and the new modbus address. After communication with the sensor, the new address is displayed into scanned sensor list.







1	Manual addressing button
2	Slave address edition button
3	Serial number definition, like SN-XXXXX-nnnnn
4	APPLY TO SENSOR button to communicate with sensor

The sensor's serial number is engraved on the body of the sensor and comprises the following information:

Set-up line	Functionality
Type SN-XXXX	PODO or ODO2 for an OPTOD sensor PNEP for a Turbidity sensor PC4E for a C4E sensor PPHR or PPHO for a PHEHT sensor PORP for an ORP sensor PTUR for a VB5 – MES 5 sensor PUVT for a Stacsense PLTS for a LowTuS
Revision	Represented by a letter (A in the example above)
Number	A 4 or 5-digit number (4032 in the example above)
Address	Between 1 and 243

5.3 Selection of the displayed parameters.

Once ACTEON has detected the DIGISENS sensors on modbus network-A, the parameters measured by the sensors must be set up.
Considering all the sensors, analogic or digital, plugged to the device, the user must select the useful parameters and create up to 12 tiles in the dashboard to display measurements data.

In dashboard, the user can select a free tile to affect one parameter to it. On clic, for example the tile of tab1/2 on the top right, the NEW TILE CONFIGURATION screen appears to, firstly, select the type of input between four proposals:

- MODBUS NETWORK-A,
- MODBUS NETWORK-B,
- ANALOGIC INPUT,
- DIGITAL INPUT.

In the example below, the parameter targeted, Temperature, is from a DIGISENS sensor (SN-PODOA-33333) previously scanned in the network-A. In the step-by-step configuration process, the system displays the list of known sensors and after the available parameters from the selected sensor.

When the parameter is selected, the tile is immediately refreshed with the parameter value with title (parameter name) and unit. Then, by clicking on this active tile, the user can access PARAMETER INFO screen with information about the source sensor and measurements status.

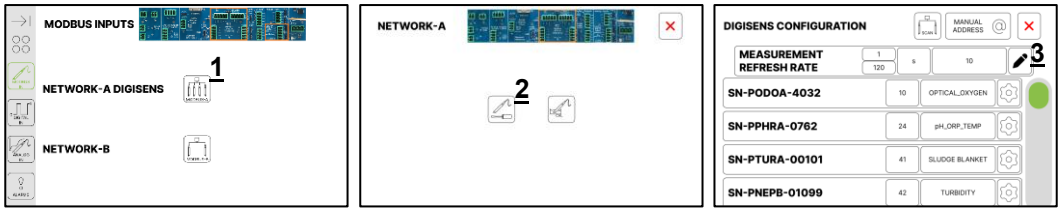
1	(+) button on an empty tile
2	Selection of input type (4 choices)
3	Access to the list of already scanned sensors in the network-A
4	Access to the list of parameters delivered by the selected DIGISENS.
5	Validation button (or red cross to escape)
6	New validated tile displayed in the previously selected position (tab1 or tab2)
7	Parameter info screen for an existing tile

NOTE: A similar process must be realized to display measurements values coming from digital sensor on the network-B and, also, coming from an active analogic sensor plugged on one of the two analogic inputs.

➢ *Case of DIGISENS sensors:*

In the DIGISENS CONFIGURATION screen, the MEASUREMENT REFRESH RATE applied to all scanned DIGISENS can be adjusted.

NOTE: The shorter the selected period, the greater the processing resources consumed.

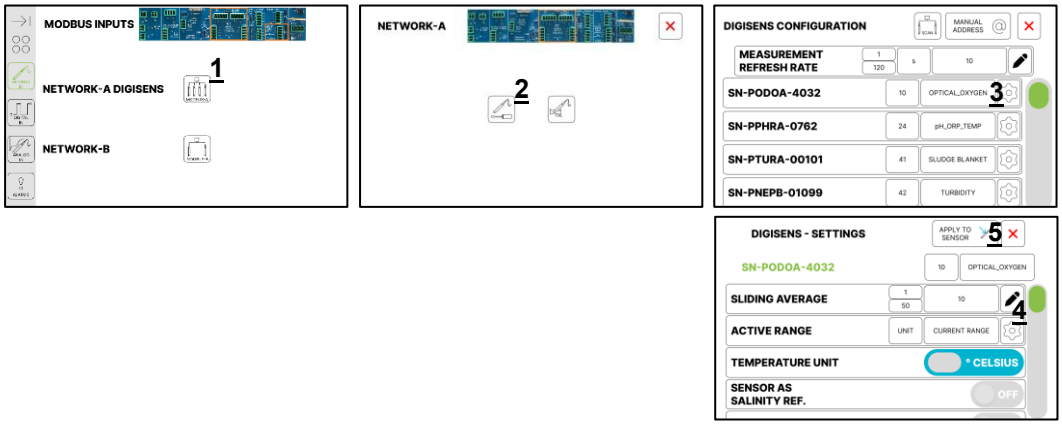


1	NETWORK-A button
2	Configuration button
3	Measurement refresh rate edition button

Moreover, the settings of each scanned DIGISENS sensor can be adjusted.

- sliding average for all DIGISENS between 1 and 50,
- active range if the main parameter of the sensor uses measurement ranges (AUTO and defined range).

At the home screen, select MODBUS-IN button in the sidebar. Use NETWORK-A DIGISENS button and configuration button. In DIGISENS CONFIGURATION screen, on each line of scanned sensor, a gear button gives access to SETTINGS screen. After values definition, the APPLY TO SENSOR button generates modbus communication with the DIGISENS sensor.



1	NETWORK-A button
2	Configuration button
3	Gear button to access selected sensor settings
4	Settings list
5	When all settings have been adjusted, APPLY TO SENSOR button for communication.

The DIGISENS sensors can measure up to 4 parameters, as described below:

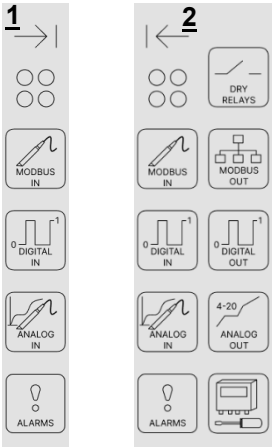
Sensor	Parameters measured	Measurement range options
OPTOD	Temperature Oxygen as a % of saturation Oxygen in mg/L Oxygen in ppm	
PHEHT & PHT **PHEHT**	Temperature pH Redox in mV	
EHAN	Temperature Redox in mV	
C4E	Temperature Conductivity in µS/cm or mS/cm Salinity in g/kg TDS in ppm	Conductivity: Auto (Automatic range) 0-200 µS/cm 0-2,000 µS/cm 0-20 mS/cm 0-200 mS/cm
NTU	Temperature	Turbidity:

	Turbidity in NTU Turbidity in FNU Turbidity in mg/L	Auto (Automatic range) 0-50 NTU 0-200 NTU 0-1,000 NTU 0-4,000 NTU
CTZN	Temperature Conductivity in mS/cm (default parameter) Salinity in g/kg Conductivity (not compensated for temperature) in mS/cm	
VB5	Temperature Sludge Blanket detection	
MES	Temperature Sludge Blanket detection Suspended Solid Turbidity	
Stacsense	Temperature SAC254 CODeq BODeq TOCeq Abs.UV Abs.green Turbidity Transm.UV Transm.green	
LowTuS	Temperature Turbidity in NTU Adjusted turbidity in NTU Turbidity in mg/L	

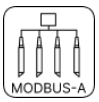
6. Programming

6.1 Main menu.

The main menu takes place in the sidebar. The first column contains INPUTS and ALARMS. The second column contains OUTPUTS and access to SYSTEM menu. The arrow at the top left allows you to show or hide the sidebar.

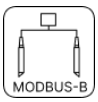


Icon	Functionality
	This icon gives access to 2 modbus networks, named A and B.



Network-A is pre-configurated for DIGISENS Modbus digital sensors.

It is used to set up the 4 inputs, including: the sensor detection function (SCAN), the setting-up of the parameters measured by the sensors, the calibration of the sensors and the setting of each sensor's Modbus address.



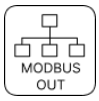
Network-B is configurable:
- communication baud rate,
- parity,
- data bits,
- stop bits.

It gives the possibility to connect other Modbus sensors (not available in DIGISENS range).

This menu is used to set up the two On/Off inputs to push information into the device about external events like washing, maintenance action…

This menu is used to configurate analog inputs (raw signal, voltage or current, depending on jumper position) and describe the measurement parameter delivered by the analogic sensor plugged to device (2 inputs available).

This menu is dedicated to configuring the ACTEON 6000 and is used to: set-up the screen; consult the hardware/software version and the events log; set the date/time and language; return to factory settings and set passwords.



This menu is used to set up the optional MODBUS Ethernet or serial output.

This menu is dedicated to configuring rules using measurements values (inputs data), based on thresholds, to manage actuators (outputs like relays).

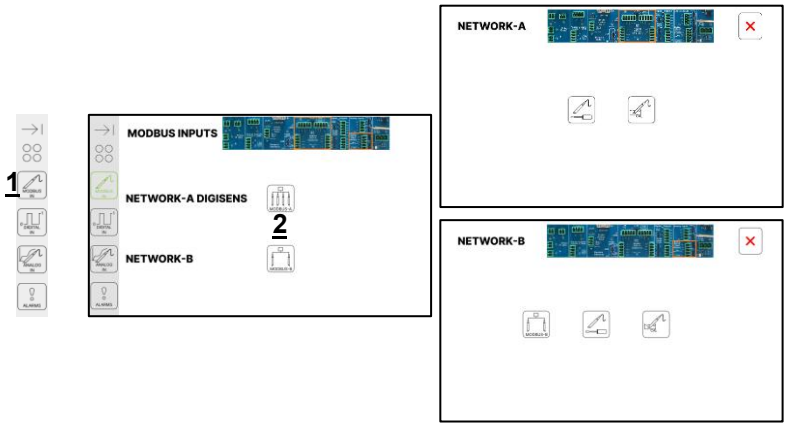
This menu is used to set up the relays.

This menu is used to set up the analog outputs for the 0/4-20 mA or PID linking functions.

This menu is used to set up the digital outputs (set or unset).

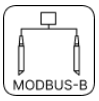
6.2 Description of the menus.

6.2.1 Configuring the Modbus inputs.



To access the MODBUS inputs window from the Main menu, select the MODBUS-IN button in the side bar. Then the configuration of sensors is similar for the two Modbus networks (A and B).

Icon	Functionality
	Used to access the setting up of modbus sensors (parameter selection, etc.).
	This button lets you scan and detect the DIGISENS sensors connected to the network-A.
	This button lets the user initiate the calibration process of the modbus sensors and set up the compensation parameters.
	This button lets the operator modify the Modbus address of a sensor (notably used when two identical sensors are installed on the device).



This button allows the operator to change the Modbus-B network configuration (baud rate, parity, data bits, stop bits) to enable communication with the associated sensor

6.2.1.1 Setting up DIGISENS Modbus sensors (Modbus network-A).

For DIGISENS sensors, the configuration screens give access to the following elements:

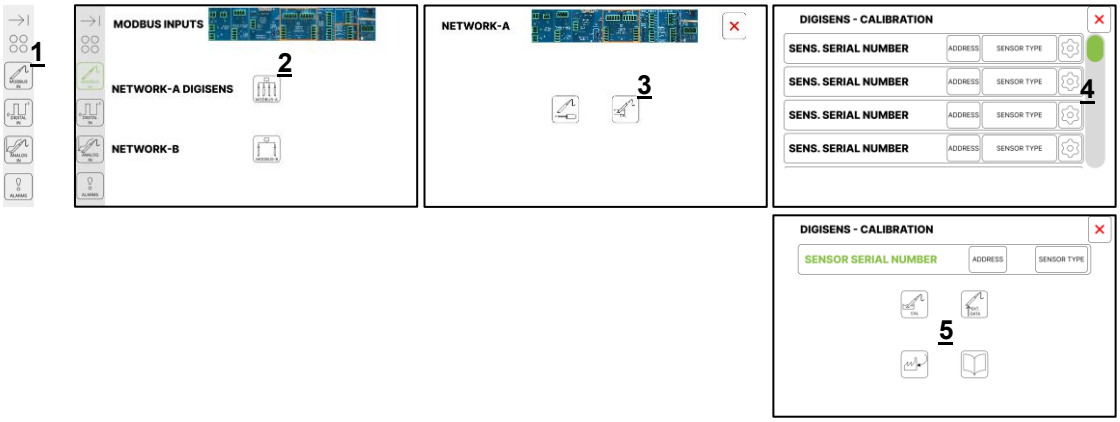
- the global measurement refresh rate,
- the number of values from which the average is calculated (sliding average),
- the temperature unit (if necessary),
- the active range, only if the sensor works with range for the active parameter.

NOTE: The configuration list is managed dynamically. As a result, additional lines are displayed depending on the capabilities of the DIGISENS sensors.

6.2.1.2 Scan of the DIGISENS sensors connected to the transmitter.

The SCAN functionality detects and identifies the sensors connected to the ACTEON 6000. This task is only performed when the device is switched on and when a DIGISENS sensor in the measurement chain is added or changed.

6.2.1.3 Calibration of DIGISENS sensors .



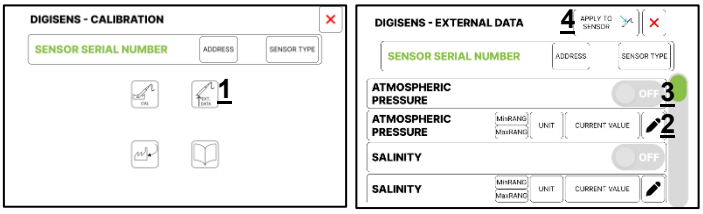
From the main menu (sidebar), select MODBUS-IN button to access to NETWORK-A screens serie. Using the CAL button, the list of already detected by network-A scan DIGISENS sensors is displayed. At this stage, the user must select a sensor to be calibrate, using gear button on the line. Once the sensor is selected, a four choices sub-menu is displayed.

Icon	Functionality
	Used to access a screen of definition and activation of external data used for compensation purposes in DIGISENS sensors, especially for the dissolved oxygen probe.
	Used to reset the calibration coefficients store during factory calibration process.
	Used to access the parameter from DIGISENS sensor calibration steps.

Used to consult parameter calibration history.

6.2.1.4 External data

External data for measurement compensation, like atmospheric pressure must be adjusted, activated and, at the end, push into the sensor using APPLY TO SENSOR button.



The **external compensation data** is detailed in the table below:

Set-up line	Functionality
Atmo. pressure	Atmospheric pressure compensation is applied to the OPTOD sensor (measurement of oxygen levels using optical technology). The atmospheric pressure sensor is built into the ACTEON 6000. The first line is used to activate compensation and to access a second line which is used to adjust this parameter (possible values: 0 to 2,000 hPa).
Salinity	Salinity compensation can be applied to the Oxygen concentration, mg/L or ppm, parameter measured by the OPTOD sensor. The first line is used to activate compensation and to access a second line which is the salinity value. This salinity value used to adjust oxygen concentration in mg/L or ppm could be : - static : user defined value into EXTERNAL DATA screen of the Oxygen sensor. This is the default case. - dynamic : coming from real time measurement of a DIGISENS conductivity/salinity sensor. To create this dynamic relationship 4 elements must be activated : 1/ a conductivity/salinity sensor is plugged on network-A input, 2/ this conductivity/salinity sensor have been detected during network-A scan, 3/ In the DIGISENS SETTINGS of the conductivity/salinity sensor, the toggle button of SENSOR AS SALINITY REFERENCE line is ON. 4/ In the dashboard, a new tile has been configured for salinity parameter coming from this conductivity sensor.

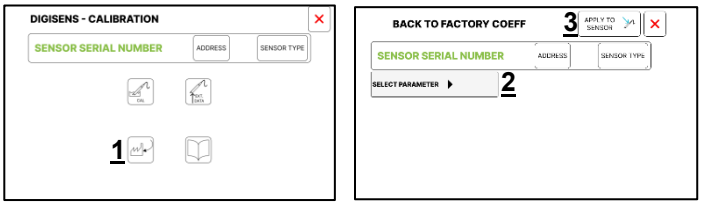
NOTE: When the user clicks on a tile displaying an oxygen concentration parameter, he will see a specific message such as “Salinity reference from [sensor serial number]”.

NOTE: If the user selects two conductivity sensors as salinity reference, only the second one is considered.

NOTE: If the conductivity sensor used as salinity reference is unplugged or her salinity tile is erased, then the salinity value comes back to the last defined static value. This salinity value is instantaneously used as external data for oxygen concentration compensation.

6.2.1.5 Back to factory calibration coefficient's function

For a defined DIGISENS sensor, after selection of the parameter, the factory calibration coefficients are reactivated just after using APPLY TO SENSOR button.

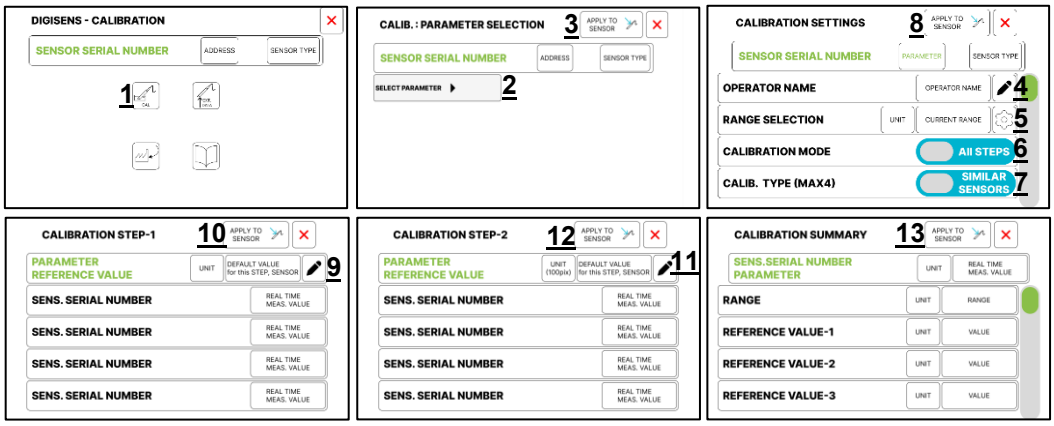


6.2.1.6 User calibration steps and validation

For a given DIGISENS sensor, once the parameter has been selected, the user can carry out their own calibration process in just a few steps. The 'APPLY TO SENSOR' button allows communication with the sensor and enables the user to proceed step by step. The sensor calculates and saves the new calibration coefficients itself. The final step in the user calibration process, known as the 'calibration summary', allows the user to validate all the results. The sensor will then use the new coefficients to measure this parameter. At the same time, the sensor stores the old and new coefficients as current and historic.

At each step, the user aborts the process using the red cross button. Then, the sensor erases temporary coefficients and realizes measurement using the coefficients fully validated in the past.

The number of calibration steps with real time measurement is related to the selected parameter.
At the beginning of the calibration process of DIGISENS sensors using range, like C4E conductivity, a range must be selected. This selection remains active after calibration for the real time measurements displayed in the associated tile. Consequently, another range or AUTO must be selected going to DIGISENS configuration screen.
Considering the necessary time for communication between DIGISENS sensor and ACTEON, a spinner will be often displayed.



1	Selected DIGISENS sensor, calibration button
2	Selection of the parameter to be calibrate in the list
3	APPLY TO SENSOR button to initiate calibration process
4	Edition button to create operator name
5	Gear button to access available range list
6	Toggle button for calibration mode
7	Toggle button for calibration type
8	APPLY TO SENSOR button to start calibration process in step-1 with real time measurement
9	Edition button to adjust the reference value used in step-1
10	APPLY TO SENSOR button to validate step-1 calibration process and go to step-2 with real time measurement
11	Edition button to adjust the reference value used in step-2
12	APPLY TO SENSOR button to validate step-2 calibration process and go to summary with real time measurement
13	APPLY TO SENSOR button for final validation

The **Calibration settings** window lets the user enter the operator's name, select a range if necessary, select a calibration mode and the calibration type.

Set-up line	Functionality
Operator	This menu is used to enter the Operator's name which will be saved with the results of a calibration process.
Mode	This line appears if, for a defined parameter, the calibration process could be adapted. For example, SHORT mode exists for oxygen as a %Sat calibration, because a single-point calibration (GAIN only) in AIR is easy to realize.
Type	The available options are ‘This sensor’ or ‘Similar sensors. The first option is used to calibrate a parameter for a single sensor. However, when several sensors of the same type are connected, it is possible to calibrate a parameter common to all these sensors. In practice, it is possible to calibrate up to 4 DIGISENS sensors simultaneously, using the same calibration solutions (for example, pH in buffers).

In the window for the first step of the calibration process, the first line shows the reference value, for example the pH of the buffer. This value is usually pre-set and cannot be changed; the edit button is therefore greyed out. Real time measurement is active in the line below for each sensor. A message indicates if the value measured by the sensor is stable or not. The confirmation of the first calibration step (APPLY TO SENSOR button) initiates the second step.
Once the second calibration step has been confirmed, a summary window appears which presents information about the values of the standards used and the coefficients calculated.
Green or orange icons give information about new coefficients quality.

The table below presents the calibration steps for each parameter:

PARAMETER	STANDARD 1	STANDARD 2/3
Temperature °C	Water at a temperature close to 0 °C (bath of crushed ice, with T°C measured using a certified thermometer)	Stable bath with setpoint between 25 and 30°C, with T°C measured using a certified thermometer
O2 % Sat	0.0 % (water + sodium sulfite powder (2% w/w))	100.0 % (Humid, oxygen-saturated air)
pH	7.01 (buffer solution at 25 °C) Enter the corresponding pH value at the temperature of the standard solution.	4.01 ; 9.01 or 10.01 buffer solutions at 25 °C Enter the corresponding pH value at the temperature of the standard solution.
ORP	0 mV (sensor exposed to air for an electronic 0)	240 mV (or 470 mV ORP standard solution)
Conductivity - C4E sensor **Range 0.0-200.0 µS/cm** **Range 0-2,000 µS/cm** **Range 0.00-20.00 mS/cm** **Range 0.0-200.0 mS/cm**	0 µS/cm Sensor exposed to air	Enter the value of the solution at 25 °C. 84 µS/cm 1,413 µS/cm 12,880 µS/cm 111.8 mS/cm
Conductivity – CTZ sensor **Range 0.00 - 100.0 mS/cm**	Deionized water at 0.0mS/cm	Select the second point based on the measurement target: 56.84 mS/cm (by default)
NTU Sensor Turbidity **Range 0.00-50.00 NTU** **Range 0.0-200.0 NTU** **Range 0-1,000 NTU** **Range 0 - 4,000 NTU**	0 NTU clear water (Deionized water)	25.00 NTU (from a 4,000 NTU stock solution) 100.0 NTU (from a 4,000 NTU stock solution) 500.0 NTU (from a 4,000 NTU stock solution) 2,000 NTU (from a 4,000 NTU stock solution)
NTU sensor in mg/l	0.0 mg/L clear water (Deionized water)	Sludge sample Delayed calibration in 2 steps.
For Step 2 on the sample: The sensor records a raw value. Then bring the sample to the laboratory for dry weight analysis in mg/L. Later, return to the calibration menu, select Dry Weight and enter the value obtained in the laboratory.		
Sludge blanket detection	100 % clear water (Deionized water)	/
MES in FAU	0 FAU clear water (Deionized water)	Formazine solution at 2000 FAU for example
MES in g/l	0.0 g/L clear water (Deionized water)	Sludge sample Delayed calibration in 2 steps.

For Step 2 on the sample: The sensor records a raw value. Then bring the sample to the laboratory for dry weight analysis in g/L Later, return to the calibration menu, select Dry Weight and enter the value obtained in the laboratory.		
SAC254 **Turbidity eq**	Clear water (active UV source)	Clear water (530nm (green) active source)
SAC 254 is a parameter for organic substances dissolved in water that absorb UV radiation. It provides information on water contamination. Despite the similarities, the parameters cannot always be inter-converted. However, a correlation can be established between the SAC 254 parameter and another parameter such as TOC or COD. The STACSENSE sensor then provides equivalence data. To obtain the correlation, it is recommended to measure the SAC for a few days on samples of polluted water which will also be analysed using laboratory measuring equipment according to the standardized method. The conditions for obtaining useful data for efficient conversion represent daily monitoring with periods of low and high loads, as in the case of urban effluent. During these peak periods, you must: • read the SAC value delivered by the StacSense sensor, • take a representative fluid sample at the sensor location, • stabilize and store successive samples at 4°C until analysis, • perform laboratory analyses of the parameter to be correlated. • use the data to determine a conversion law. COD, BOD or TOC equivalences are calculated directly in the sensor according to a first degree law. This pair of coefficients (offset and slope) is specific to each parameter. Example: COD eq. = SlopeCOD* SAC254 + OffsetCOD The default conversion coefficients, filled in at the factory, are as follows: • DCOeq = 1,81 * SAC254 + 0,0 • DBOeq = 0,48 * SAC254 + 0,0 • TOCeq = 0,69 * SAC254 + 0,0 As per the usual calibration process, the user value of the coefficient, offset or slope, such as a reference input value, is entered in a sensor register instead of the factory coefficient. The user evolves this linear relationship according to the results of a significant measurement campaign with two techniques in parallel, the UV sensor and the laboratory analysis of samples taken regularly, in the same place. Example of experimental determination of the conversion coefficient SAC to COD (50mm sensor optical path): At the beginning of the measurement and sampling campaign, the conversion coefficient SAC254 to factory COD is active (slope value at 1.81; offset zero). Average COD value provided by the sensor = 36mg/L Mean laboratory sample test result = 22 mg/L The conversion slope SAC254 to COD is therefore adjusted in the sensor such as 1,81x22/36 = 1,11 As an example, this coefficient equal to 1.11 was determined on water leaving the treatment plant.		
DCOeq **DBOeq** **COTeq**	Offset from lab measurements as calculated above Offset Offset	Slope from lab measurements as calculated above Slope Slope
LowTuS Turbidity sensor Range 0.00-10.0 NTU Range 5.00-100 NTU	0 NTU clear water (Deionized water)	8.00 NTU (from a 4,000 NTU stock solution) 80.0 NTU (from a 4,000 NTU stock solution)

Adjusted Turbidity	Only offset adjustment, negative or positive between -2.000 NTU to 2.000 NTU	
Turbidity in mg/l	0.00 mg/L in Distilled water	Sludge sample Delayed calibration in 2 steps.
For Step 2 on the sample :The sensor records a raw value. Then bring the sample to the laboratory for dry weight analysis in mg/L Later, return to the calibration menu, select Dry Weight and enter the value obtained in the laboratory.		

6.2.1.7 Setting up a Modbus sensor connected to network-B.

For a modbus sensor, not included in the DIGISENS range, the configuration screen gives access to the following elements:

- the global measurement refresh rate,
- a line of description of the registered sensor :
  - first field: user defined serial number,
  - second field: modbus address in the network-B,
  - type of sensor (for example: free chlorine)

At the end of the line, a gear-shaped button lets you view the details:

- Sensor serial number,
- current modbus address (editable value),
- sensor type,
- the available parameters with unit and range. For example, a free chlorine sensor will deliver:
  - free chlorine concentration in mg/L,
  - cell current (raw signal),
  - temperature in °C.

NOTE: The configuration list is managed dynamically. As a result, additional lines are displayed depending on the capabilities of the sensor.

NOTE: The MEASUREMENT SETTINGS DETAILS screen also contains an ERASE SENSOR button that allows you to delete the sensor before adding a new one to Network B.

6.2.1.8 MANUAL SENSOR DEFINITION button

The SCAN function is not implemented for Modbus network-B. The user must define the sensor manually.

A free field is available to define the sensor serial number. To accommodate different serial number formats, the user has access to an alphanumeric keyboard. The text entered in this field will then be used to distinguish this sensor from others.

In the second line, the operator must define the default Modbus address of the sensor: value available in the data sheet of the sensor.

The third line contains a gear-shaped button to select the sensor type in a list.

This list of registered sensors is managed by Aqualabo manufacturer taking account the validated compatibility between ACTEON 6000 device and Modbus sensors.

6.2.1.9 Calibration of free chlorine sensor.

Similarly to DIGISENS (Modbus network-A) calibration menu, the free chlorine sensor offers 3 functionalizes:

Icon	Functionality
	Used to reset the calibration coefficients store during factory calibration process: Offset = 0 nA and nominal slope in nA.L/mg.
	Used to access sensor calibration steps. For the free chlorine sensor, offset adjustment is separate from slope correction (Toggle button for calibration mode).
	Used to consult parameter calibration history.

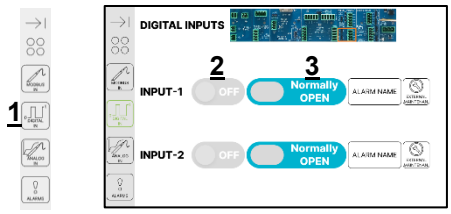
The table below presents the calibration steps for each parameter:

PARAMETER	STANDARD 1	STANDARD 2/3
Free chlorine	To adjust the offset, the sensor is removed from the circuit and placed in a breaker containing water free of disinfectants. After signal stabilization, the raw signal, in nA, near zero value, is considered to calculate offset.	The slope is adjusted without removing the sensor from the system (flow cell). Once the real-time measurement has stabilized, a sample is taken for photometric analysis using the DPD-1 method. The result of this analysis, expressed in mg/L, is entered into the ACTEON interface as a reference value to calculate a new slope, which is then transmitted to the sensor.
Temperature	Factory calibration only	/

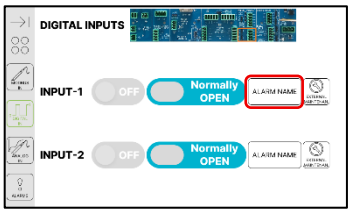
6.2.2 Configuring the digital inputs.

The digital inputs menu can be accessed directly from the sidebar.
This menu is used to:

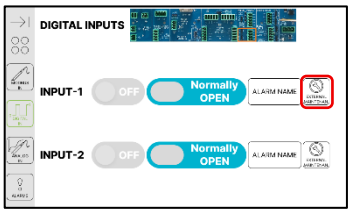
- activate the input using ON/OFF toggle button,
- define the default state of the input (normally open/ normally closed) with the second toggle button



In addition, if the digital input has been selected in an alarm (see ALARMS paragraph), the alarm name is visible in a field.



On each line of input, a two states button permits the creation of a link between a switching of input state and the automatic activation maintenance mode. In this way, an external event could impact on the device state.



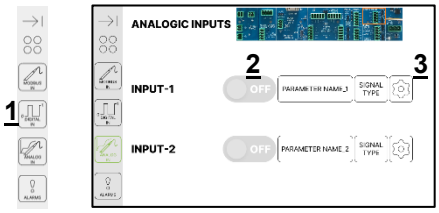
When the button is green, the activation of the equipment's maintenance mode is controlled by the state of the input.

NOTE:
For the two digital inputs, in the terminal blocks area, the user can move jumper to define pull-up or pull-down state.
Pull-up resistors are resistors which are used to ensure that a wire is pulled to a high logical level in the absence of an input signal.
Pull-down resistors work in the same manner as pull-up resistors, except that they pull the pin to a logical low value. They are connected between ground and the appropriate pin on a device.

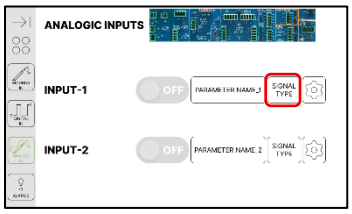
6.2.3 Configuring the analog inputs.

The analog input menu can be accessed directly from the sidebar.
This menu is used to:

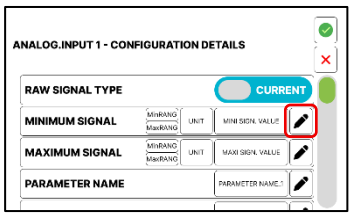
- activate the input using ON/OFF toggle button,
- configurate signal conversion and define parameter (name; unit) using gear button.



In addition, the raw signal type (current or voltage) of the analog input is displayed in a field.
NOTE: The raw signal type, voltage or current, is physically defined on the board, in the analog inputs' connection area, selecting the right position of a female jumper on a 3 pins socket.



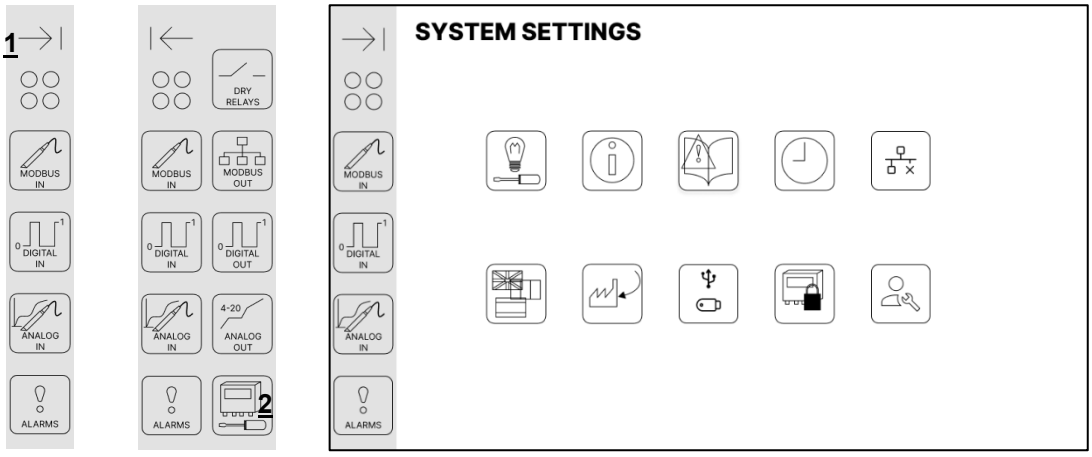
On each line of input, a gear button permits access to configuration details.
In each line of configuration list, an edition button gives access to keypad to determine name, unit, values. The user must adjust all lines values.



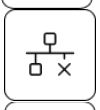
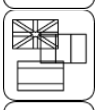
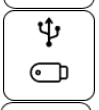
Set-up line	Functionality
Input 1 (or2)	Description and programming of Analog Input No.1(or No.2): *Current*: if a sensor is connected which generates a signal of 0/4-20 mA *Voltage*: if a sensor is connected which operates within a 0-10 V range
Minimum signal	For a *Current* input: can be set to a value between 0 and 20 mA For a *Voltage* input: can be set to a value between 0 and 10V
Maximum signal	For a *Current* input: can be set to a value between the minimum value set up in the "Signal min" line and 20 mA. For a *Voltage* input: can be set to a value between the minimum value set up in the "Signal min" line and 10 V.
Parameter name	The user defined name will be displayed in the tile of dashboard. (example: water level)
Parameter unit	User defined text of parameter unit. (example: m, meter)
Parameter minimum range	This line lets the operator set the minimum value of the parameter delivered by the analog sensor. (example: 0 meter of water level)
Parameter maximum range	This line lets the operator set the maximum value of the parameter delivered by the analog sensor. (example: 1.5 meters of water level)
Parameter stability	Value in parameter unit to define a criterion of stability arrow in the associated tile. (example: 0.5 meter)

Averaging	Used to set the number of measurements, from 1 (instantaneous value) to 50, from which the moving average is calculated.
Refresh rate	This line lets the operator select the interval between each measurement. The possible values are: 1 to 120 seconds.
Out of range reporting	OFF: no error reporting ON: if the measurement falls outside of the range programmed by the minimum signal and maximum signal lines, an information is displayed in the information window joined to an active tile.

6.2.4 Configuring the ACTEON 6000.

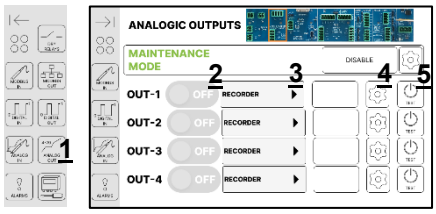


From the main menu, in the second column, select the SYSTEM icon to open the ACTEON 6000 settings window.

Icon	Functionality
	Display settings: A menu used: to set how long the backlight stays on for (from 1 to 30 minutes); to set the brightness level (from 0 to 7).
	System information: an information menu which displays the system serial number and system firmware version, electronic board hardware version, as well as the display hardware version and firmware version. A firmware update can be initiated after plugging in a USB stick.
	Events log: an information-only menu which lists all the events together with their timestamping and with the option to transfer this data to a USB stick. Events are stored in 4 different categories, SYSTEM, CONFIG, ALARMS and ACTUATORS, to find easily the information.
	Date/time settings: a menu used to set the date and time.
	**Network settings:** a menu used to set mode (manual or DHCP), IP address, subnet mask, gateway IP.
	**Language**: used to select the display language.
	Return to factory settings: used to reset main elements of the ACTEON 6000's settings to the defaults set during factory process.
	**Data export:** Measurements stored for TRENDLINE could also be exported using USB key.
	Password: Used to activate and define the password for two access levels. At OPERATOR level, there is no password, the user cannot go in menus. TECHNICIAN level gives access to every menu except calibration. METROLOGY level is free access. A 4-digit code, between 0 and 9999 is mandatory for TECHNICIAN and METROLOGY.
	Service menu: Specific modbus communication actions (read/write of register).

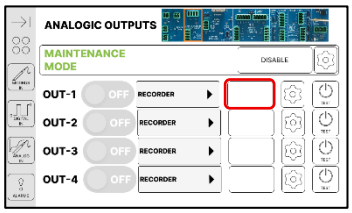
6.2.5 Configuring the Analog outputs.

The analog outputs menu can be accessed directly from the sidebar.

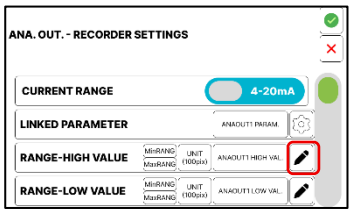


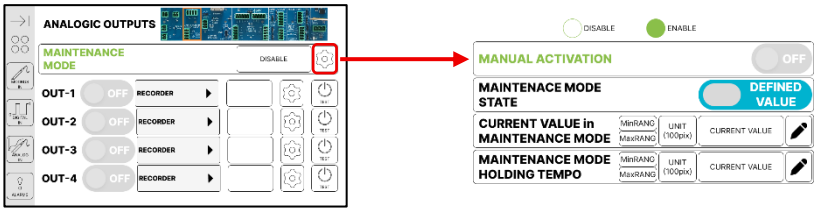
1	Selected ANALOG output in the sidebar.
2	activate one of the 4 outputs using ON/OFF toogle button,
3	configurate the selected output function (RECORDER or PID),
4	define linked parameter (name; unit) using gear button
5	test the current loop applying 10mA default value. Active in green state.

In addition, after analog output configuration, the name of the linked parameter, for example, temperature, is displayed in a field.



On each line of analog output, a gear button permits access to configuration details.
In each line of configuration list, an edition button gives access to keypad to determine name, unit, values. The user must adjust all lines values.





The functionality offered for the setting up of the four analog outputs is described in the table below:

Set-up line	Functionality
Maintenance mode	Used to set the Maintenance Mode to one of the following modes: Disable (the default option) Enable, with definition of all analog output state when maintenance mode is activated, for example when the calibration menu is used.

	Manual activation, ON/OFF toggle button gives the possibility to switch in maintenance mode if the operator needs, for example when maintenance operation or other work is performed on the sensors delivering the associated parameters.
Maintenance mode state	In Maintenance Mode, the analog output may return to a value corresponding to: - the last value measured, - a fixed (unchanged) value which shall be defined in the dedicated line (range 0-20mA).
Maintenance mode Holding tempo	Used to set a time delay (in seconds) which shall begin when the Maintenance is completed, to allow a period for the measurement to stabilize.

Active Function : Recorder

Function	Used to set the selected output to **Data logger** mode (for when the output is connected to a controller/data logger).
Current range	Used to set output to operate within a range of 0-20 mA or 4-20 mA.
Linked parameter	Used to select the parameter whose value shall be output via analog output. An active parameter list is displayed based on parameters available in tiles, displayed in the dashboard.
Range high value	Used to set the maximum value of the selected parameter, in its unit, corresponding to 20mA current.
Range low value	Used to set the minimum value of the selected parameter, in its unit, corresponding to 0 or 4mA current.
Reactivity	Used to set the "responsiveness" of the 4-20 mA output. Possible value: 0 to 40 mA/s

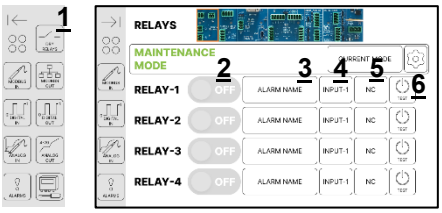
Active Function: PID Controller

PID range	Used to set output to operate within a range of 0-20 mA or 4-20 mA
Linked parameter	Used to select the parameter whose value shall be output via analog output. An active parameter list is displayed based on parameters available in tiles, displayed in the dashboard.
PID Set-point	Used to set the value in the parameter unit.
PID Dead Band %	Proportional to the set-point value.
PID Integral	Choice with toggle button between active and Inactive.
PID Integral coeff	Line with an edition button to define the coefficient value.
PID Derivative	Choice with toggle button between active and Inactive.
PID Derivative coeff	Line with an edition button to define the coefficient value.
PID Proportional coeff	Line with an edition button to define the coefficient value.
PID Direction	Used to selected DIRECT or REVERSE action.

Maintenance Mode is activated under the following conditions:
- When a calibration is being performed,
- If a digital input is active with EXTERNAL MAINTENANCE button also active (green state).

6.2.6 Configuring the relay outputs.

The relay outputs menu can be accessed directly from the sidebar.

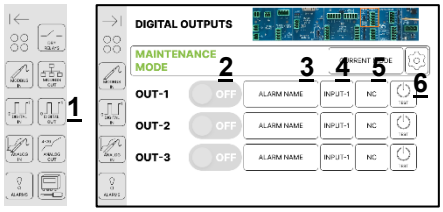


1	Selected DRY RELAY button in the sidebar.
2	Activate one of the 4 relays using ON/OFF toggle button,
3	This information field is a reminder of the alarm previously defined and using this relay for action.
4	This information field is a reminder of the parameter linked to the alarm previously defined and using this relay for action.
5	This information field is a reminder of normal state of the relay defined in the ACTUATOR line of ALARM configuration list. NC : Normally Closed NO : Normally Open
6	test the relay by changing state. Active in green state.

Set-up line	Functionality
Maintenance mode	Used to set the Maintenance Mode to one of the following modes: Disable (the default option) Enable, with definition of all dry relay state when maintenance mode is activated, for example when the calibration menu is used. Manual activation, ON/OFF toggle button gives the possibility to switch in maintenance mode if the operator needs, for example when maintenance operation or other work is performed on the sensors delivering the associated parameters.
Maintenance mode state	In Maintenance Mode, the dry relay may be in a defined state corresponding to: - the last state, - a user defined state.
Maintenance mode Holding tempo	Used to set a time delay (in seconds) which shall begin when the Maintenance is completed, to allow a period of time for the measurement to stabilize.

6.2.7 Configuring the digital outputs.

The digital outputs menu can be accessed directly from the sidebar.



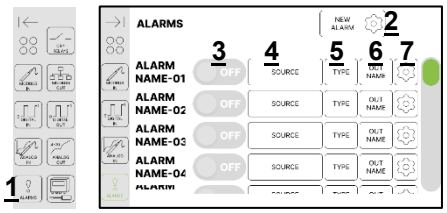
1	Selected DIGITAL OUT button in the sidebar.
2	Activate one of the 3 digital outputs using ON/OFF toggle button,
3	This information field is a reminder of the alarm previously defined and using this digital output for action.
4	This information field is a reminder of the parameter linked to the alarm previously defined and using this digital output for action.
5	This information field is a reminder of normal state of the digital output defined in the ACTUATOR line of ALARM configuration list. NC: set NO: unset
6	test the digital output by changing state. Active in green state.

Set-up line	Functionality
Maintenance mode	Used to set the Maintenance Mode to one of the following modes: Disable (the default option) Enable, with definition of all digital output state when maintenance mode is activated, for example when the calibration menu is used. Manual activation, ON/OFF toggle button gives the possibility to switch in maintenance mode if the operator needs, for example when maintenance operation or other work is performed on the sensors delivering the associated parameters.
Maintenance mode state	In Maintenance Mode, the digital output may be in a defined state corresponding to: - the last state, - a user defined state.
Maintenance mode Holding tempo	Used to set a time delay (in seconds) which shall begin when the Maintenance is completed, to allow a period of time for the measurement to stabilize.

6.2.8 Configuring the alarms

6.2.8.1 Alarms List:

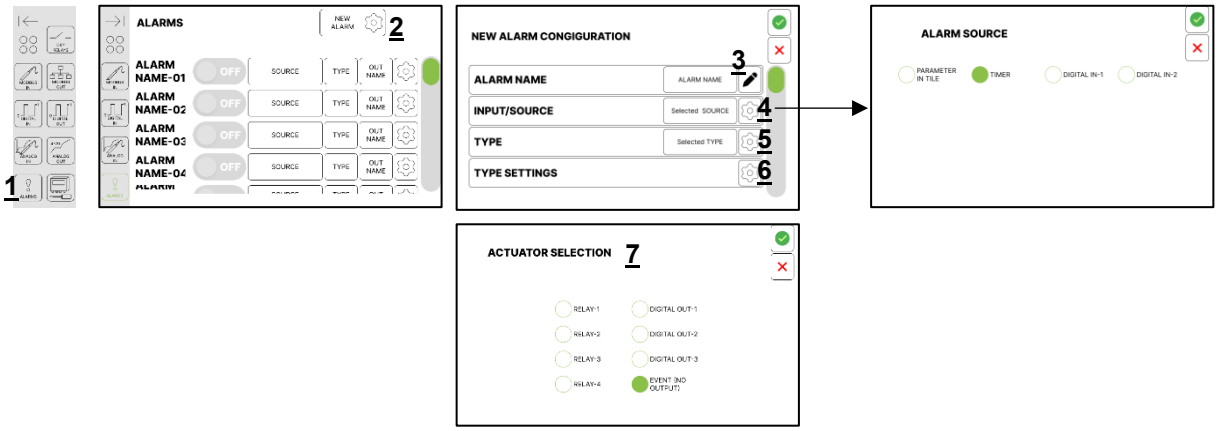
The ALARMS menu can be accessed directly from the sidebar.



1	Select ALARMS button in the sidebar.
2	NEW ALARM button to configurate alarm (name, source, type, settings, actuator)
3	Existing alarms list : Activate one of the already defined alarm using ON/OFF toogle button,
4	This information field is a reminder of the source previously defined for this alarm.
5	This information field is a reminder of the type of alarm previously defined.
6	This information field is a reminder of the actuator previously defined.
7	This gear button gives access to configuration to adjust type settings and used actuator.

6.2.8.2 New alarm configuration:

Creating an alarm, the operator defines the rule between a source (measurement value, time, input state) and an actuator (dry relay or digital output).



1	Selection of ALARMS button in the sidebar.
2	NEW ALARM button to configurate alarm (name, source, type, settings, actuator)
3	This edition button gives access to an alphanumeric keypad to create the name of this new alarm.
4	Gear button to configurate the source of this new alarm. Four sources available: - A parameter currently displayed in one of the 12 tiles,

	- Timer, - Digital input 1, - Digital input 2.
5	Gear button to configurate the type of this new alarm. Type is related to source (see table below).
6	When type is defined, the list in type settings is dynamically adjusted (see table below)..
7	At the end of an alarm configuration process, at the bottom line of the list, the user must select actuator.

SOURCE	TYPE	TYPE SETTINGS	Description
PARAMETER in tile	UL Overflow	Upper limit value[a] Upper limit hysteresis[b] Upper limit delay[e] Upper limit holding tempo[f]	[a]The limit value corresponds to the threshold expressed in the unit of the selected parameter. The alarm is active when the value of the selected parameter increases over the limit. [b]The hysteresis, in % of the limit value, defines an inactive band below the threshold. The purpose of hysteresis is to prevent rapid oscillations (chattering) of the control output when the measured value fluctuates around a single threshold. [c]The limit value corresponds to the threshold expressed in the unit of the selected parameter. The alarm is active when the value of the selected parameter decreases below the limit. [d]The hysteresis, in % of the limit value, defines an inactive band over the threshold. [e]The delay represents the waiting time before the configured action is carried out. [f]The holding tempo defines duration without output change whereas the measure value comes back in normal band.
	LL Undercut	Lower limit value[c] Lower limit hysteresis[d] Lower limit delay[e] Lower limit holding tempo[f]	
	SPAN LL&UL	Upper limit value[a] Upper limit hysteresis[b] Upper limit delay[e] Upper limit holding tempo[f] Lower limit value[c] Lower limit hysteresis[d] Lower limit delay[e] Lower limit holding tempo[f]	
TIMER	TIMER	Period[g] with reference time[h] Duration[i]	[g]Period is the interval between two activations of the related output (relay or digital output) [h]The reference time is the starting point, HH:MM, at which the periodic activation process for the associated output begins. [i]The duration refers to how long the output remains active each time.
DIGITAL Input	STATE	Delay[e] Holding tempo[j]	[j]The holding tempo defines duration without output change whereas the digital input comes back to normal state.
	PULSE	Pulse quantity Pulse duration Holding tempo[j]	

NOTE:

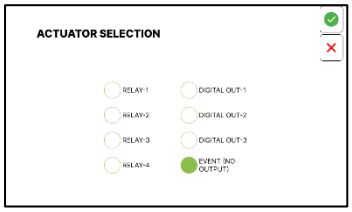
If the user acknowledges an alarm without having completed all the required fields, a message correctly indicates that some information is missing. However, the data previously entered is not saved and the process must be restarted from the beginning.

NOTE:

When configuring a TIMER, if the reference time has passed, the periodic sequence will start the following day.

6.2.8.3 Actuator list:

In the alarm configuration process, the last step is the actuator selection. In this screen, the user could associate output, dry relay or digital, not already used by another alarm to the currently defined alarm.



The eighth option, called EVENT (no output), will simply change the color of the measured value in the tile from black to orange when the alarm is active. This is a visual alarm.

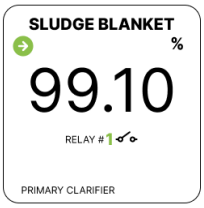
6.2.8.4 Actuator associated to Alarms:

When an alarm, using parameter in tile as source, is fully configured then, in the dashboard, the tile displaying this parameter contains a new icon about output.

This new icon visually confirms the link between measurement value and output.

This icon gives 3 information:

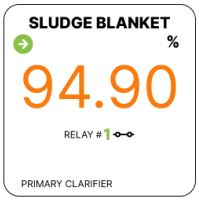
- output type: RELAY or OUT (digital),
- Output number,
- output state,



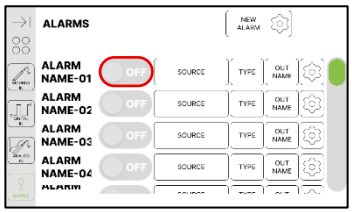
This output icon is displayed only when the output is ON (toggle button in ON position into output screen).

When the alarm is active and the threshold is reached:

a) the output icon state changes (for example, open to closed or unset to set),
b) The measurement value in this tile changes from black to orange.

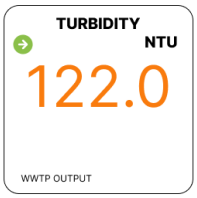


An existing alarm could be frozen switching toggle button to OFF in the alarms list.



This output icon is displayed only when the output is ON (toggle button in ON position into output screen).

EVENT (no output) choice in actuator list, will simply change the color of the measured value in the tile from black to orange when the alarm is active. This is a visual alarm.



NOTE:

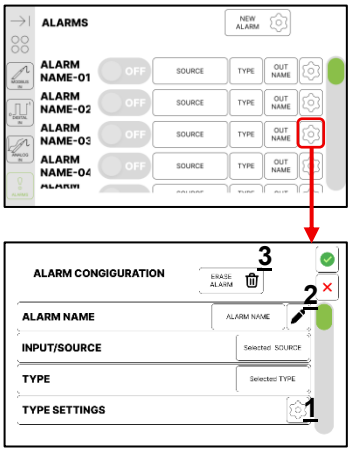
If the user only wants a visual alarm, without a relay or digital output, they must still open the actuator selection and explicitly choose EVENT. Without this selection, the alarm is considered incomplete.

6.2.8.5 Alarms list and erase:

In the ALARMS screen, the list of existing alarms is displayed. It gives the status of each alarm (ON or OFF) and also a reminder about configuration:

- Source (associated parameter),
- Type,
- Associated actuator.

A gear button on each line of the alarms list allows you to adapt configuration



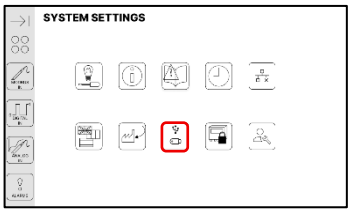
1	The Gear button in the TYPE SETTINGS allows you to change the settings of the existing alarm. A similar button on ACTUATOR line allows you to change the actuator, if it is not used with another alarm.
2	The “Edit” button allows you to change the name of the alarm.
3	The “ERASE ALARM” button allows you to destroy this alarm.

6.2.9 Data logging and export process

The measurement values displayed in the tiles of the dashboard are also recorded. This process allows trendline view, accessible from the information screen joined at each tile.

The timestamped measurement values can be exported to a USB key through the USB-C socket located near the RJ 45 ethernet socket in the terminal blocks area.

The export process is launched from SYSTEM SETTINGS screen using USB icon.
A progress bar is displayed during the export process.



Given the frequency of updates to the measurements taken by the Modbus sensors, the number of tiles and the time scale, the database may be quite large. Consequently, the export process may take longer than 5 minutes. The user can therefore choose between two different data export processes: a quick process, which generates a CSV file containing the last 20,000 records, or an export of the entire database.

A message reading ‘LAST MEASUREMENTS ONLY (FASTER)’ accompanied by two options appears when the user clicks the USB button on the SYSTEM SETTINGS screen.

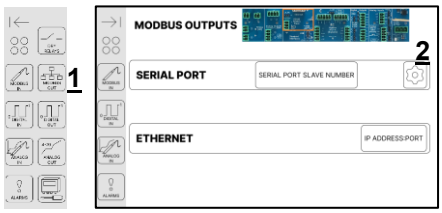
- The green CONFIRM button starts the export of the CSV file.
- The red cross-shaped button starts the export of the entire database.

NOTE: The DB Browser for SQLite software is useful for viewing the complete exported database.

6.2.10 Configuration of modbus outputs: Ethernet or RS485 MODBUS slave series.

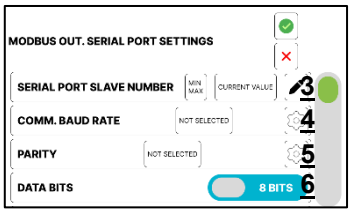
From the sidebar, the user can access MODBUS OUTPUT. This configuration page provides access to two types of modbus output:
• Ethernet (TCP/IP modbus) on the client/server model,
• Serial (modbus RTU), Master/Slave.

The serial digital output is wired to the 3 dedicated contacts terminal block (ground, A and B).
The Ethernet output uses a standard RJ45 socket.



6.2.10.1 Serial output (Modbus RTU) :

1	Modbus output is available directly from the sidebar.
2	The gear button allows you to access configuration page of Modbus RTU.
3	The “Edit” button allows you to define the serial port slave number.
4	The gear button allows you to define in a list the suitable communication baud. Example: 115200
5	The gear button allows you to define the parity : none, odd or even.
6	A toggle button allows you to select data bits format: 7 or 8 bits. A second toogle button allows you to select one or two stop bits.



6.2.10.2 Ethernet output (TCP/IP Modbus):

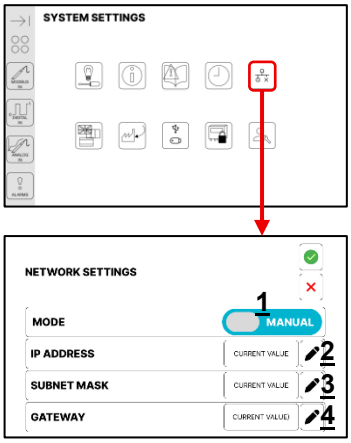
Port 502 is defined by default.

See Network settings paragraph for IP address, subnet mask and gateway configuration.

6.2.10.3 Network settings

In the SYSTEM SETTINGS screen, a NETWORK icon gives access to NETWORK SETTINGS.

1	A toggle button on MODE line permits DHCP or MANUAL configuration of the device in the network.
2	In manual mode, the “Edit” button allows you to define IP address of this device. Example: 192.168.40.40
3	In manual mode, the “Edit” button allows you to define the subnet mask. Example: 255.255.255.0
4	In manual mode, the “Edit” button allows you to define the gateway. Example: 198.168.40.1



NOTE: In a test phase if you connect your ACTEON with a live PC (RJ45 cable connecting the PC directly to the transmitter) make sure to assign an IP as well as a mask, to your PC, cohesive with the ACTEON. (see example below)

	ACTEON	PC
Network mask	255.255.255.0	255.255.255.0
IP (fixed)	192.168.40.40	192.168.40.1 (≠192.168.40.40)

6.2.10.4 Table of data registers

The values measured by the analog or modbus sensors connected to the ACTEON inputs are accessible remotely via the modbus outputs.
Regardless of the connected sensor, the data is classified into fixed register ranges considering a maximum of 12 tiles displayed in the dashboard.

Data format: floating IEEE754 (byteorder=Endian.Big, wordorder=Endian.Little)

The data is refreshed at the same rate as the one displayed on the screen.

For each tile, a 6-information block describes:

- Tile-1 sensor name
- Tile-1 parameter name
- Tile-1 parameter unit
- Tile-1 alarm name (if an alarm has been created using this parameter as the source),
- Tile-1 actuator name (if an alarm has been created using this parameter as the source and an actuator as output),
- Tile-1 analog output name (if an analog output has been asscoiated with this parameter),

Another registers block contains the measurement results values (float format) for the 12 tiles.
A similar block contains the measurement status values for the 12 tiles.

See in annex, the table -ACTEON6000 MODBUS REGISTER'S IMPLEMENTATION-

6.2.10.5 Table of modbus sensors parameters

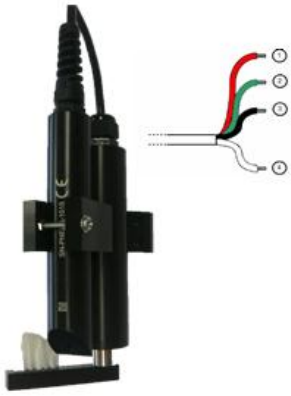
Sensors	Measured parameter
Sensor OPTOD	temperature
Parameter 1	Oxygen (%sat)
Parameter 2	Oxygen (mg/L)
Parameter 3	Oxygen (ppm)
Parameter 4	/
Sensor STACSENSE	temperature
Parameter 1	SAC254
Parameter 2	CODeq
Parameter 3	BOCeq
Parameter 4	TOCeq
Parameter 5	Absorbance UV
Parameter 6	Absorbance Green light
Parameter 7	Turbidity eq
Parameter 8	Transmittance UV
Parameter 9	Transmittance Green
Sensor Turbidity NTU	Temperature
Parameter 1	Turbidity NTU
Parameter 2	Turbidity FNU
Parameter 3	Turbidity mg/l
Parameter 4	/
Sensor pH-ORP	Temperature
Parameter 1	pH
Parameter 2	Redox (mV)
Parameter 3	pH (mV)
Parameter 4	/
Sensor ORP	Temperature
Parameter 1	/
Parameter 2	Redox (mV)
Parameter 3	/
Parameter 4	/
Sensor C4E	Temperature
Parameter 1	Conductivity µS/cm
Parameter 2	Salinity ppt
Parameter 3	TDS-KCl ppm
Parameter 4	/
Sensor CTZN	Temperature
Parameter 1	Conductivity mS/cm
Parameter 2	Salinity g/Kg
Parameter 3	Conduc not compensated mS/cm
Parameter 4	/
Sensor MES_VB	Temperature
Parameter 1	Sludge Blanket %
Parameter 2	TSS g/l
Parameter 3	Turbidity FAU
Parameter 4	/
Sensor LowTuS	Temperature
Parameter 1	Turbidity NTU
Parameter 2	Turbidity adjusted NTU
Parameter 3	TSS mg/l
Parameter 4	/
Sensor free chlorine	Free chlorine mg/L
Parameter 1	Cell current nA
Parameter 2	Temperature °C

7. Using the Motorized Cleaning Accessory HYDROCLEAN-P

DIGISENS Modbus sensors OPTOD or nephelometric turbidity, can be equipped with a motorized cleaning accessory, external to the sensor.
The temporal control of this HYDROCLEAN-P accessory can be configured on an ACTEON 6000. For this purpose, the HYDROCLEAN-P is connected to a digital output of the terminal block. In parallel, an alarm based on timer and using a digital output must be created and configurated (see step by step process below).

Table: Hydroclean connection to digital output

Wire #	HYDROCLEAN-P: Wire Color; function	Digital ouput terminal block
1	Red; V+ Power Supply	12V
2	Green; Feedback	Not used
3	Black; Ground	GND
4	White; Trigger	OUT-3 (example)



Extract the green 5 contacts plug from the Digital output connection area. Screw the wires red, black and white in the positions described in the table below. Connect this plug on the socket.

Check the position of power voltage jumper: 5V

In ALARMS screen, NEW ALARM button to access new alarm configuration list:

- ALARM NAME: edit button to define the name, for example “CLEAN”
- ALARM SOURCE: TIMER
- ALARM TYPE: TIMER
- TYPE SETTINGS:
  - Period = 5mn (minimum value ; cleaning period to be defined according to the conditions of use)
  - Reference time = 15:50 (set in the future)
  - Duration = 3 seconds
- ACTUATOR: Digital output – 3, default state = UNSET

After list validation, the ALARMS screen contains a new line called “CLEAN”.
In this line “CLEAN”, use the toggle button to ON.

Go to DIGITAL OUTPUTS screen and, using toggle button, turn ON the line OUT-3 / CLEAN /NO.

When installing the equipment – the Hydroclean and the attached sensor – please ensure there is sufficient clearance to allow the motorized brush to move back and forth.

8.Using AIR valve to periodically generate an AIR jet near measurement area of the sensor

DIGISENS Modbus sensors, especially optical sensors like StacSense, can be equipped with an air pipe using a fitting on the back side of the optical pathway.

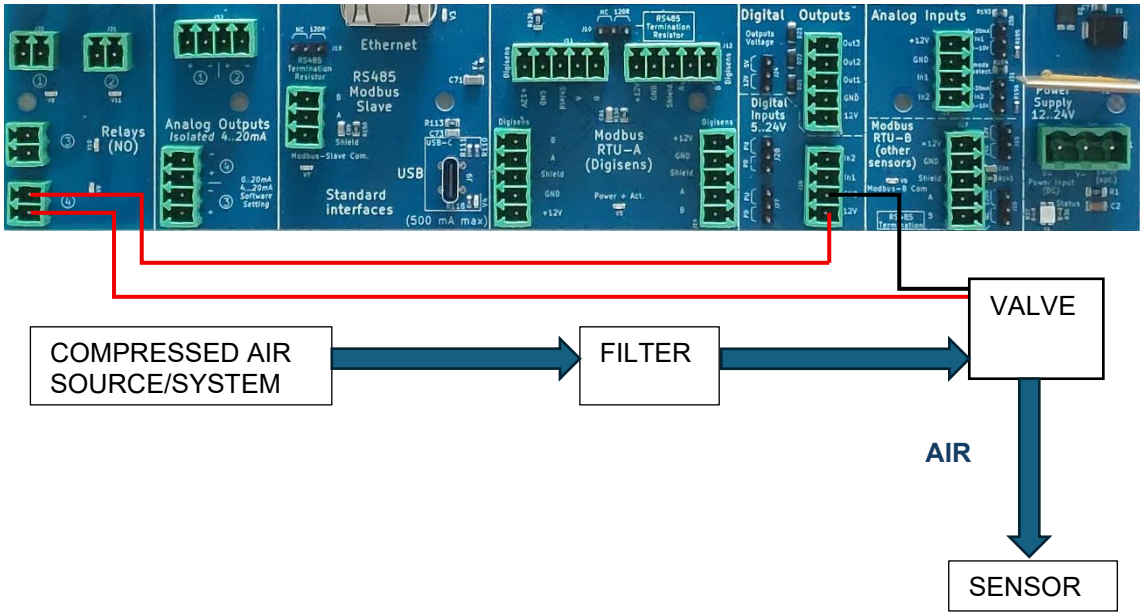
The temporal control of a valve in the air circuit can be configured on an ACTEON 6000.
For this purpose, the air valve power line is connected to a relay of the terminal block. In parallel, an alarm based on timer and using this relay must be created and configurated (see step by step process below).

Table : Valve connection to one RELAY and DIGITAL INPUT

Wire #	VALVE Wire Color ; function	DIGITAL Input terminal block 4 pins green plug	RELAY (#4 as example) 2 pins green plug
Additional red wire (18 AWG ; L = 20+/-1cm)		+12V	2d pin
1	Red ; V+ Power Supply		1st pin
2	White ; V+ Power Supply	GND	
3	Blue ; Ground	GND	
4	Black ; Ground	GND	
5	Shield	GND	

Main goal : A 12V power line runs from the DIGITAL INPUT socket through a RELAY to power the valve.

a) Extract the green 2 pins plug from one of the four relays connection area,
b) Screw Red and white joined wires from valve in the same pin of this RELAY plug,
c) Screw, one end of the additional red wire on the second pin of the RELAY plug,
d) Connect this plug on the RELAY socket.
e) Extract the green 4 pins plug from the Digital input connection area.
f) Screw the wires black, blue and shield in the same position described in the table.
g) Screw the additional red wire in the right position.
h) Connect this plug on the DIGITAL INPUT socket.



In ALARMS screen, NEW ALARM button to access new alarm configuration list:

- ALARM NAME: edit button to define the name, for example “AIR JET”
- ALARM SOURCE: TIMER
- ALARM TYPE: TIMER
- TYPE SETTINGS:
  - Period = 5mn (minimum value ; cleaning period to be defined according to the conditions of use)
  - Reference time = 15:50 (set in the future)
  - Duration = 3 seconds
- ACTUATOR: RELAY – 4, NORMALLY OPEN

After list validation, the ALARMS screen contains a new line called “AIR JET”.
In this line “AIR JET”, use the toggle button to ON.

Go to RELAYS screen and, using toggle button, turn ON the line OUT-4/ AIR JET /NO.

When installing the equipment – the valve in box, AIR tubes, filter, etc – please ensure all connection are safe.

9. Maintenance

9.1 Maintaining the transmitter:

9.1.1 General recommendations

Isolate the power to the measuring device when performing maintenance work.

	Maintenance work must exclusively be carried out by authorized personnel.
	Due to the risk of electrocution, disconnect the controller from the power supply systematically when performing maintenance work on the transmitter.

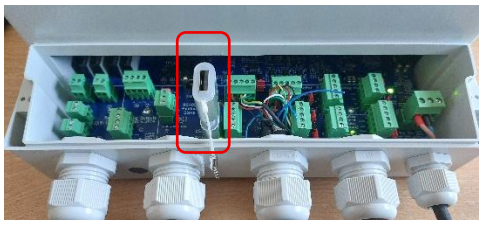
Do not use a corrosive or inflammable solvent to clean the transmitter. The use of this type of solvent could damage the device (its screen) and may invalidate the warranty.

After checking that the ACTEON 6000's protective covers are properly closed, wipe the outside of the transmitter with a soft cloth dampened with a mixture of water and non-corrosive detergent.

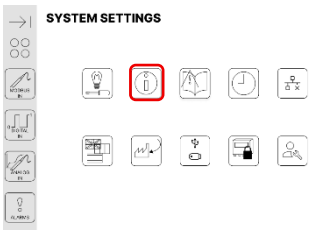
9.1.2 System firmware update process using USB key

The terminal block area contains a USB-C socket usable to connect a USB key for system firmware update process.

Firstly, place the new file (.RAUCB), alone, on the root of the USB key. Then plug this USB key on the USB-C socket.



Using the bottom button of the second column of side bar, the user can access to SYSTEM SETTINGS menu and select SYSTEM INFORMATIONS (button with i symbol).



In this SYSTEM INFORMATIONS screen, please, go to the last line of the list, called FIRMWARE UPDATE, and press VALIDATION button to initiate firmware update process.
A message will stay displayed during all the process (few minutes duration). At the end, the device will automatically restarts.

Before updating the system using a USB stick, the user must set the date and time on the device.

9.2 Maintenance of digital sensors:

9.2.1 OPTOD sensor.

General description	Oxygen: luminescent membrane sensitive to the oxygen level in the medium being analyzed. Gaseous exchange between the membrane's material and the medium. Temperature: NTC thermistor.
Materials	316L stainless steel version: polyamide, silicone and quartz; polyurethane sleeve around cable. Titanium version: polyamide, silicone and quartz; polyurethane sleeve around cable.
Precautions	The membrane is sensitive to: - chemicals (organic solvents, acids, hydrogen peroxide), - mechanical stresses (impacts, abrasion, tearing).
Measurement/Interference	When measuring, check that bubbles do not become trapped under the membrane. If chlorine is present, the quality of the measurement will be impaired (overestimate of the level of dissolved oxygen). When immersing the sensor in the medium to be measured, wait until the sensor's temperature has stabilized before taking the reading. To optimize the service life of the sensor, we recommend a measurement interval (refresh rate) of more than 5 seconds.
Operating temperature	0 °C to 50 °C Temperature compensation effective over the range 0-40 °C
Servicing	After each use, rinse the sensor and the membrane carefully in clean water. If deposits such as biofilm or sludge persist, wipe the membrane carefully with soft cloth or absorbent paper. ***Caution***: for the titanium version, clean the body of the sensor with acetone (do not use methylated spirits, ethanol or methanol). ***Caution***: only unscrew the sieve cap containing the DODISK when replacing the disk. If the sieve cap must be replaced, screw the new sieve cap on slowly to allow the air to escape slowly.
Storage	Keep the membrane hydrated using the protective bag and a dampened absorbent wad of material (e.g. cotton wool. After being stored in dry conditions, rehydrate the membrane for 12 hours by immersing the sensor in water.
Storage temperature	- 10 °C to + 60 °C
Oxygen calibration	Using a clean sensor, occasionally check the 0% Sat value by immersing the sensor in a sulfite solution in water (sulfite concentration <2%). If there is a zero error, perform a complete calibration of the sensor. *Caution: do not allow the sensor to remain in contact with the sulfite solution for more than 1 hour.* The 2-point calibration is performed using a sulfite solution (for the offset) then, after rinsing and drying, the sensor's gain is determined by exposing the sensor to moisture-saturated air (or to clean water saturated with air).

Temperature calibration	The calibration of the temperature sensor is a 2-step process: - step 1 (offset): the sensor is placed in a container containing a water bath and ice, - step 2 (gain): the sensor is placed in a medium (with an even temperature distribution in the medium) at a known temperature. This temperature may be measured using a certified thermometer.

9.2.2 NTU sensor: Turbidity.

General description	Turbidity: nephelometric measurement by IR diffusion (wavelength: 880 nm) at 90°. Temperature: NTC thermistor.
Materials	PVC, PMMA, Polyamide, POM-C, polyurethane sleeve on cable
Precautions	The optical windows are sensitive to: - chemicals (organic solvents, strong acids and bases, hydrogen peroxide, hydrocarbons), - mechanical stresses (impacts, abrasion). When in use, the sensor must not come into contact with the sides or bottom of a container. Maintain a minimum distance of 2 or 3 cm between the sides and the sensor (depending on the concentration of the medium).
Measurement/Interference	Bubbles on the optical components can interfere with the measurements. When immersing the sensor in the medium to be measured, wait until the sensor's temperature has stabilized before taking the reading. If measurements are being made in a range between 0 and 20 NTU, or if the sensor saturates (a value of 9999), it is advisable to use the protective sieve to avoid interference from edge effects, sunlight, etc.
Operating temperature	0 °C to 50 °C
Servicing	After each use, rinse the sensor carefully in clean water. If deposits such as biofilm or sludge persist, clean the sensor carefully with soapy water and wipe the head with a soft cloth or absorbent paper.
Storage	Place the protective bag over the head of the sensor to prevent the optical part from being scratched.
Storage temperature	- 10 °C to + 60 °C
Turbidity calibration (in NTU)	The NTU sensor is an optical sensor which requires very little calibration. Using a clean sensor, occasionally check the 0 NTU value by immersing the sensor in clean, bubble-free water. If there is a zero error, perform a complete calibration of the sensor (over 1 or 4 measurement ranges). **This procedure requires a formazine solution whose concentration lies at the mid-point of the measurement range being calibrated. This solution is prepared from a 4,000-NTU stock solution.** Use a 200 ml volumetric flask when preparing the solutions. Add the required volume of formazine (refer to the table below) and make up to 200 ml with distilled water. Formazine solutions with concentrations of less than 1,000 NTU degrade fairly quickly; do not keep the solution for more than a few days. The 2,000 NTU solution can be kept for 2 to 3 weeks in a fridge in an opaque bottle.

Measurement range	Concentration of formazine standard solution	Volume of formazine (mL)
0.0-50.0 NTU	25 NTU	1.25 mL
0.0-200.0 NTU	100 NTU	5 mL
0-1,000 NTU	500 NTU	25 mL

	0-4,000 NTU	2,000 NTU	100 mL

Turbidity calibration (in mg/L)

When a turbidity sensor is used to measure in a range whose units are mg/L, then the sensor must be calibrated using a field sample.

A 2-point calibration is performed:

- 1 offset using distilled water (0 mg/L),

- 1 gain using a sludge sample: immerse the sensor in the sample, with stirring, and log the theoretical value measured by the sensor. Using the same sample, analyze the dry weight in a laboratory in accordance with standard EN 872 within a range from 0-500 mg/L, and in accordance with standard NF T 90 105 2 if the concentration is > 500 mg/L.

Analysis the sample dry weight in the laboratory according to the NF standard T 90 105 2.
-Finalized the calibration, in a third step, selecting again the site, enter the DRY WEIGHT results to feed the sensor. It will use this dry weight value to calculate the useful gain.

NOTE : “&” symbol is used to show a pending dry weight. “&” appears in site list into TSS calibration settings.

Temperature calibration

Refer to the dedicated section

9.2.3 PHEHT sensor: pH/ORP/Temperature.

General description	pH/Redox: Potentiometric measurement; pH: a pair of electrodes; a reference (Ag/AgCl gel) and a glass bulb sensitive to H_3O^+ ions Redox: a pair of electrodes; a reference (Ag/AgCl gel) and a platinum disk Temperature: NTC thermistor.
Materials	Glass, platinum, PVC, POM-C, Polyamide, Stainless steel 316L (sleeving the temperature sensor); polyurethane sleeve on cable.
Precautions	The glass electrode is sensitive to: - chemicals (organic solvents, strong acids and bases, hydrogen peroxide, hydrocarbons), - mechanical stresses (impacts). The electrode that measures the Redox potential is sensitive to sulfides, which are adsorbed onto the platinum.
Measurement/Interference	When immersing the sensor in the medium to be measured, wait until the sensor's temperature has stabilized before taking the reading.
Operating temperature	0 °C to 50 °C
Servicing	After each use, rinse the sensor carefully in clean water. **pH**: If deposits such as biofilm or sludge persist, immerse the sensor in a cleaning solution (PF-CSO-C-00010) for a few hours and rinse with plenty of water before use. Do not use soft cloth or absorbent paper since the glass bulb is extremely sensitive to scratching. **ORP**: clean the platinum disk using fine, wet abrasive paper (such as P1200 or P220).
Storage	Keep the glass membrane hydrated by adding a few drops of storage solution (PF-CSO-C-00005) to the protective bag or using a solution at pH 4. Rinse the glass bulb with plenty of water before use. If the sensor is stored in dry conditions, soak the sensor in a pH4 buffer solution for 12 hours before use. The protective bag absorbs direct impacts on the head of the sensor. The platinum electrode is kept under dry conditions.
Storage temperature	0 °C to + 60 °C
pH calibration	Using a clean sensor, perform a 2-point calibration of the sensor (offset and gain, e.g. at pH7 and pH4).
ORP verification	Using a clean sensor, check the electronic 0 by exposing the sensor to air, and check a second point using a buffer solution at 240 mV (or 470 mV).
Temperature calibration	Refer to the dedicated section
Changing the cartridge	In order not to damage the electronic part of the sensor, **hold the cartridge in one hand** and unscrew the connecting ring using the other hand. Remove the used cartridge and insert the new cartridge before re-tightening the connecting ring.

9.2.4 ORP sensor: ORP/Temperature.

General Description	Redox: a pair of electrodes with a reference (Ag/AgCl gel) /platinum ring Temperature : NTC.
Materials	Glass, platinum, PVC, Polyamide, POM-C; polyurethane jacketed cable.
Safeway	The redox potential electrode is sensitive to sulphide adsorption on platinum.
Measurement/ Interference	During the introduction of sensor in the measurement environment, wait sensor's temperature stabilization before proceeding with measurement.
Operating temperature	0°C to 50°C
Maintenance	After each use, rinse the sensor with clear water. Clean the platinum ring with an abrasive moist paper (type P1200 or P220).
Storage	Maintain the head of the sensor **hydrated in the protection case with a few drops of preservation agent solution** (PF-CSO-C-00005) or, if it is not available, with the solution of KCl. Rinse profusely the sensor before use. After storage in dry environment, put the sensor in a KCl solution for 12 hours. The case protects against direct impact on the head of the sensor.
Storage temperature	0°C to + 60°C
ORP verification	Using a clean sensor, check the electronic 0 by putting the sensor in free air and a second point with standard solution at 240 mV (or 470 mV).
Temperature calibration	Refer to the dedicated section
Changing the cartridge	To avoid deteriorating the electronic part of the sensor, **take the cartridge in one hand** and unscrew the clamping ring with the other hand. Remove the used cartridge and put the new cartridge before to screw back the clamping ring.

9.2.5 C4E sensor: 4-electrode conductivity.

General description	Conductivity: Amperometric measurement with a 4-electrode system; Temperature: NTC thermistor.
Materials	Graphite, platinum, PVC, POM-C, Polyamide, Stainless steel 316L (sleeve protecting the temperature sensor); polyurethane sleeve on cable.
Precautions	The 4 electrodes are sensitive to deposits (greases, hydrocarbons, biofilm, sludges).
Measurement/Interference	When immersing the sensor in the medium to be measured, wait until the sensor's temperature has stabilized before taking the reading.
Operating temperature	0 °C to 50 °C
Servicing	After each use, rinse the sensor carefully in clean water. If deposits such as biofilm or sludge persist in the measurement slit or on the electrodes, use wet abrasive paper to remove a thin layer off the surface of the electrodes (type P1200 or P220).
Storage	The protective bag absorbs direct impacts on the head of the sensor. If storing for a short period between measurements, place a wad of cotton wool in the bottom of the storage bag, dampened with a few drops of buffer solution at 1,413 µS/cm.
Storage temperature	- 10 °C to + 60 °C
Conductivity calibration	Using a clean sensor, perform a 2-point calibration of the sensor (offset and gain using a standard solution whose conductivity is suited to the measurement range) for 1 or all 4 ranges:

Measurement range	Concentration of the standard conductivity solution
0.0-200.0 µS/cm	84 µS/cm
0-2,000 µS/cm	1,413 µS/cm
0.00-20.00 mS/cm	12.88 mS/cm
0.0-200.0 mS/cm	111.8 mS/cm

Temperature calibration	Refer to the dedicated section

9.2.6 CTZN sensor: Inductive conductivity.

General description	Conductivity: inductive measurement technology. Temperature: NTC thermistor.
Materials	EPDM, PVC, 316L stainless steel (sleeve protecting the temperature sensor); polyurethane sleeve on cable.
Precautions	This measuring technology is not sensitive to fouling. However, ensure that the loop is not obstructed.
Measurement/Interference	When immersing the sensor in the medium to be measured, wait until the sensor's temperature has stabilized before taking the reading. The sensor is not well suited to measuring in the weakest ranges (0-200 µS/cm).
Operating temperature	0° C to 50 °C
Servicing	After each use, rinse the sensor carefully in clean water.
Storage	The sensor should be dried before being stored.
Storage temperature	- 10 °C to + 60 °C
Conductivity calibration	Using a clean sensor, perform a 2-point calibration of the sensor (offset and gain using a standard solution whose conductivity is suited to the average value expected):

Measurement range	Concentration of the standard conductivity solution
0-2,000 µS/cm	1,413 µS/cm
0.00-20.00 mS/cm	12.88 mS/cm
0.-100.0 mS/cm	20.00 mS/cm

Temperature calibration	Refer to the dedicated section

9.2.7 VB5 – MES 5 sensor: Sludge blanket detection – Sludge blanket detection/Suspended Solid/Turbidity.

Description	Optical IR (870 nm) based on IR absorption. Temperature: NTC.
Materials	POM-C, Nickel-plated brass, EPDM; Polyurethane jacketed cable
Safeway	The optical windows are vulnerable to: chemicals (organic solvents, acids and strong bases, peroxide, hydrocarbons), Mechanical treatments (impact, abrasion).
Measure/ Interfering	Bubbles on optical parts can interfere with the measurement. On environment change, wait for sensor's temperature stabilization before proceeding with measurement.
Operating temperature	0°C to 50°C
Maintenance	After each use, rinse the sensor with clear water. If deposits like biofilm or mud persist, clean the sensor with soapy water and wipe the head with a soft cloth or absorbent paper.
Storage	Place the protection case on the head of the sensor with a bottom of water to maintain the hydrated optical windows.
Temperature of storage	- 10°C to + 60°C
Turbidity calibration in FAU	On a clean sensor, check occasionally the 0 NTU value by dipping sensor in bubble free clear water. If the 0 point is shifted, proceed with the complete sensor calibration (on 1 or 4 ranges). **For this procedure, a Formazin solution, with concentration matching the middle of the measurement range, will be necessary. This solution will be prepared from a 4000 NTU main solution.** For the preparation of solutions, take a flask of 200 mL. Introduce the necessary volume of Formazin (cf. table below) and fill up to 200 mL with distilled water. The formazin solutions of concentration solutions lower at 1000 NTU deteriorate quickly, so do not preserve a solution during several days. The solution at 2000 NTU can be preserved in the refrigerator for 2 or 3 weeks in a opaque flask.

Measurement range	Concentration Formazin solution	Volume of Formazin (mL)
0.0-50.0 FAU	25 NTU	1,25 mL
0.0-200.0 FAU	100 NTU	5 mL
0-1000 FAU	500 NTU	25 mL
0-4000 FAU	2000 NTU	100 mL

Suspended Solid calibration in g/L	Turbidity in g / L, it is necessary to calibrate the sensor on a real sample. The calibration is achieved in 2 initial steps: - Step 1 (offset): immerse the sensor in distilled water (0 g / L), - Step 2 (slope): immerse the sensor into a sample of sludge, maintained under agitation, and validate the theoretical value measured by the sensor. Analysis the sample dry weight in the laboratory according to the NF standard T 90 105 2. -Finalized the calibration, in a third step, selecting again the site, enter the DRY WEIGHT results (in g/L) to feed the sensor. It will use this dry weight value to calculate the useful gain. NOTE : "&" symbol is used to show a pending dry weight. "&" appears in site list into TSS calibration settings.

Sludge blanket detection in %	For the use of the sensor in mode Sludge Blanket detection the sensor is tested on 1 point: - 1 offset with some distilled water (100 %)
Temperature calibration	Refer to the dedicated section

9.2.8 StacSense probe.

Description	Measurement by UV absorptiometry (wavelength 245+/-5 nm). Turbidity correction, green radiation absorptiometry 530+/-5nm Temperature: NTC.
Material	Body: stainless steel 316L (1.4401); optical windows Quartz (Corning 7980)POM-C, cable sheathed Polyurethane, seals: fluoro-elastomer (FPM/FKM) Optical windows are sensitive to aggression: - chemicals (organic solvents, acids and strong bases, hydrogen peroxide, hydrocarbons), - mechanical (shock, abrasion).
Safeway	- Body: stainless steel 316L (1.4401); optical windows Quartz (Corning 7980)POM-C, cable sheathed Polyurethane, seals: fluoro-elastomer (FPM/FKM) Optical windows are sensitive to aggression: - chemicals (organic solvents, acids and strong bases, hydrogen peroxide, hydrocarbons), - mechanical (shock, abrasion). The presence of bubbles on the optical parts may interfere with the measurement.
Measure/ Interfering	When introducing the sensor into a measuring medium, wait for the sensor to stabilize at temperature before taking the measurement into account.
Operating temperature	0°C to 40 °C
Maintenance	After each use, rinse the sensor thoroughly with clean water. If biofilm or mud deposits persist, clean the sensor with soapy water and wipe the optical windows with a soft cloth or absorbent paper.
Storage	The sensor is kept dry after complete cleaning.
Temperature of storage	- 10°C to + 50°C
CAS calibration in 1/m	For use of the Stacsense sensor in SAC 254 (spectral absorption coefficient) in 1/m, it is necessary to calibrate the sensor in clear water, without bubble, stabilized in temperature. Calibration is performed in 2 steps in the same sample: - step 1, clear water, active UV light source, - step 2, clear water, active green light source.
Equivalent Turbidity parameter	The sensor provides equivalent turbidity information in FAU. This parameter is not calibratable (factory determined slope coefficient). However, the clear water sequence of SAC 254 with active green light source allows an adjustment of the base signal.
Parameters CODeq, BODeq and TOCeq	The equivalence parameters COD, BOD and TOC are calculated from the main parameter SAC254 according to a refined law. The user accesses the independent coefficients (offset and slope) for each of these three parameters. The Stacsense sensor stores the factory coefficients below. These basic coefficients are accessible at any time by means of the return function to the factory coefficients.

Parameter	offset FACTORY	Slope FACTORY[(a)]
CODeq	0,0	1,81
BODeq	0,0	0,48
TOCeq	0,0	0,72

(a) Slope values obtained in KHP (potassium hydrogen phthalate) solution in the laboratory.

In CALIBRATION menu, the user can access the CODeq, BODeq or TOCeq parameter. For these 3 parameters a specific calibration process exists. The user can directly defined values of offset and gain.

	For example, the user determines these own coefficients of the CODeq refining law from representative samples, measured both with the StacSense sensor (active factory coefficients) and in the laboratory (standardized method).
Temperature calibration	Refer to the dedicated section

9.2.9 LowTuS sensor.

General description	Turbidity: nephelometric measurement by IR diffusion (wavelength: 850 nm) at 90°. Temperature: NTC thermistor.
Materials	Body: Polycarbonate, POM-C, PE, polyamide Optical windows: Fused silica Cable: Bare wire with polyurethane sheath Seals: Nitrile Wiper unit: Silicon, Stainless steel
Interference	The presence of bubbles on the optical parts may interfere with the measurement.
Operating temperature	0 °C to 40 °C
Maintenance	After stopping the wiper cleaning cycle, stopping the fluid supply to the cell, closing the inlet valve and opening the drain valve, it's possible to remove the device's lid to clean the cell. If biofilm or mud deposits persist, clean the windows with soapy water and wipe the optical windows with a soft cloth or absorbent paper
Storage temperature	0 °C to + 50 °C
Turbidity calibration (in NTU)	Complete calibration is performed with a static solution of formazine. 1. Close the taps to isolate the cell from the fluid circuit 2. Open the lid 3. Open drain valve to empty the flow cell and close the drain valve. 4. Four 80ml to 100ml of clear water into the flowcell and open drain valve. Repeat 2 times step 3.and 4. 5. Clean the measuring cell with a clean cloth before calibrating to zero with demineralized water (Turbidity<0.1 NTU for range 0-10NTU) 6. After measurements and user validation of the first step of calibration process, open drain valve to change fluid. 7. Dry internal surfaces of measuring cell before addition of formazine standard. and or formazine solution into the cell. **Description** / **Sensor conditions** / **Reference Input Value** Offset (NTU) / Demineralized water / < 0,5NTU (range 1 : 0-10 NTU) < 5 NTU (range 2 : 0-100 NTU) Slope (%) / Formazine solution / 8 NTU (range 1) 80 NTU (range 2) Generally, suitable formazine standard solutions are obtained by dilution of a mother formazine solution (known turbidity level near to 4000 NTU).
Adjusted turbidity parameter	Taken from the main parameter given a user-defined offset. This offset could be defined using an externally measured sample (e.g. laboratory turbidimeter). This sample will be easily collected using the drain valve. **TURBIDITY micro-offset adjusted = TURBIDITY main parameter + Micro-offset value** The micro-offset value could be positive or negative.
Custom TSS value (in mg/L)	Turbidity in mg/L parameter provides the user with information on the concentration of suspended solids dependent on the main parameter. The conversion law between Nephelometric turbidity and total suspended solid is user free. Based on samplings and TSS laboratory analysis, the user can then find and adjust a custom affine relationship, with offset and gradient coefficients, between nephelometric turbidity in NTU and particles concentration in mg/L for its installation. **TSS custom = GainTSS. TURBIDITY main parameter + OffsetTSS** Coefficients could be positive or negative.
Temperature calibration	Refer to the dedicated section

10. Troubleshooting

Fault	Resolution
Sensor not recognized, Short lines displayed instead of the measurement	- Make sure that the modbus or analog sensor has been connected up correctly. - If it is DIGISENS, run a SCAN of the modbus network-A, - Disconnect the sensor and connect it to the other similar input, - check the dedicated screen. If it is an analog sensor, check the toggle button position in ON, - Contact the technical services department.
Unstable measurements	- Check that the sensor has been installed under the correct conditions. - Clean the sensor and check the measuring elements (active disk for the OPTOD sensor, cartridge/glass bulb for the PHEHT sensor, etc.) - Run a calibration of the DIGISENS sensor. - Contact the technical services department.
Measurement displayed as 9999, 9991…	Out-of-range measurement: - Check that the sensor has been installed under the correct conditions. - Check that the active range is consistent with the current values of the measured parameter. Select the AUTO range if the measurements have a wide range. - Clean the sensor. - Run a calibration of the sensor. - Contact the technical services department.
Current analog output not working, or value incorrect	- Check the settings for the current output (toggle button position). - Check that the wiring is correct. - Check that the device is not in Maintenance Mode. - Disconnect the faulty analog output and connect it to the other analog output. - Use test button to create a 10mA current value. - Contact the technical services department.
No relay activation	- Check the settings for the relay output (toggle button position). - Check the settings of the associated alarm, (toggle button position, settings like threshold value). - Check that the wiring is correct. - Check that the device is not in Maintenance Mode. - Disconnect the faulty relay output and connect it to the other relay output. - Contact the technical services department.
Frozen screen	Restart the device by unplugging the 3 contacts power supply plug on the right corner of terminal block area.

After-Sales Service

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