ETORB Series

Instruction **Manual**

- **ETORB2**
- **ETORB3**
- **ETORB4**

TURBIDITY PROBES FOR EMEC TCS-100, TCS-400 & TCS-1000

(for use with the EMEC LDTORBM Turbidity Controller)

IMPORTANT: Refer to separate instruction manual for EMEC LDTORBM controller

Supplied by:

Convergent Water Controls Pty Ltd
2/4 Huntley St.
Alexandria NSW 2015
Tel: (02) 9698 3131
Fax: (02) 9698 3210
www.cwc.com.au
info@cwc.com.au

Note: On-going product development at Convergent Water Controls may lead to changes in the specifications of this product.

Warranty: This product is guaranteed for a period of 12 months from installation date. The warranty applies to manufacturing or component defects which may cause the unit to malfunction under specified conditions. The guarantee does not cover damage due to abuse, tampering or improper installation.

Disclaimer: Convergent Water Controls will not be held liable for any consequential damage or loss arising resulting from product malfunction.

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1. INTRODUCTION

Thank you for purchasing an ETORB series turbidity probe. It will give you years of service if you install and maintain it according to guidelines set out in these instructions.

Your ETORB turbidity probe is designed to work with the EMEC LDTORBM turbidity controller.

Designed for 0-100 NTU (ETORB2), 0-400 NTU (ETORB3) & 0-1000 NTU (ETORB4) applications, the probe is ideal where bio-fouling or sedimentation buildup is likely. The probe may be submerged to a depth of 100 meters (approx. 330 feet).

The probes use 90° optics and employ infrared light in accordance with ISO7027. All probes use a unique modulation technique that ensures almost total rejection of ambient light conditions as well as a unique microprocessor controlled differential sample and hold circuit for enhanced performance particularly at low turbidity levels.

1.1 Applications

- Industrial process monitoring.
- Waste water clarification processes e.g. DAF or floatation cells.
- Monitoring of streams and rivers.
- Intermediate and final effluent treatment monitoring.
- Drinking water filtration efficiency.
- Monitoring of water storage bodies

The ETORB2, ETORB3 & ETORB4 turbidity probes are not suitable in situations where they may be abraded by large particles such as sand and under these circumstances the reading may become erratic due to the large particles passing the optic sensor. Measuring turbidity under these circumstances will require a stilling well to allow the sand particles to settle away from the optic sensor in the probe tip.

2. INSTALLATION

There are three aspects to consider when preparing to install the ETORB2, ETORB3 & ETORB4 probes in the field.

1. Installation of the probe proper into the environment where measurements are to take place.
2. Cabling considerations.
3. Connection of the probe into the EMEC LDTORBM controller

2.1 Probe Installation

The probe is normally installed with the optics pointing downwards or in a horizontal alignment. In a simple application the probe is simply immersed into the water to the desired depth, but within the depth rating of the probe. Please note the depth rating is based on static water. Allowances must be made for the effect of flowing water to ensure the static depth rating is not exceeded. If the probe is to be installed downwards then it is recommended to install it a few degrees away from the vertical to allow bubbles to escape easily.

It is important that the optic end of the probe is kept clear of obstruction such as a river bed. The minimum distance between the optic head and any object should be 50mm (2”).

The casing of the ETORB2, ETORB3 & ETORB4 series probes are made of 316 stainless steel but the optic face is made of plastic materials and so should be protected from accidental scratching or abrasion. The optic face is partially protected from damage by the protruding castellations in the probe casing.

If the probe body is to be installed in a glanded fitting (for insertion into a pipe etc.) then care must be taken to ensure the sealing surface pressures exerted by the gland fitting are not excessive so as to not cause distortion of the probe casing and force leakage. The ETORB2, ETORB3 & ETORB4 probes are thin wall devices and so glanding pressure must be minimal and spread over the largest possible area. Do not cut or damage the outer sheath of the cable. Water may enter the probe through holes or cuts in the cable sheath.

Where damage may occur due to river rocks striking or rolling over the probe body, a protective shroud should be used which can be made of simple PVC piping or stainless steel whichever the situation warrants.

2.2 Cabling Considerations

The ETORB2, ETORB3 & ETORB4 probe cable is a specially selected PUR sheathed cable selected for strength, chemical and exceptional resistance to cuts, nicks and abrasion.

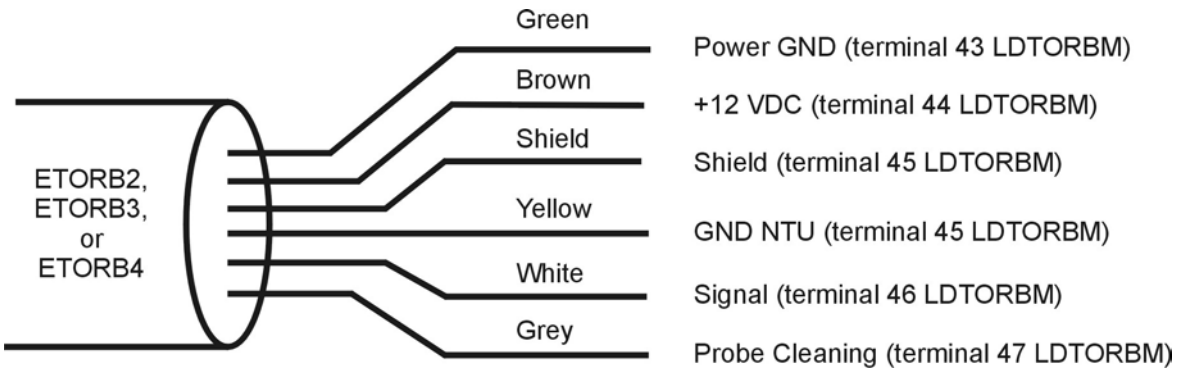
Nevertheless, care should be taken during the installation process of the probe and its cabling to ensure that the cable is not subjected to persistent pulling, snagging or abrasion. As the cable is fixed to the probe, this is particularly important, as any water penetration through the cable sheath may find its way into the probe proper affecting the accuracy of the readings and possibly causing irreparable damage.

The standard cable length is 10 metres. However, longer lengths are available on request.

Surge and lightning protection may also have to be considered if the probe is used outdoors. It is important to note that the ETORB2, ETORB3 & ETORB4 probes have the stainless steel casing terminated to the cable shield. There is no electrical contact between the casing and the probe electronics.

2.3 Probe Connections

The cable conductor assignment is as shown below:



Note that the Signal Ground (yellow) and Power Common (green) conductors and the probe's stainless steel case are electrically connected together within the probe.

The probe is designed to connect directly to the EMEC LDTORBM turbidity controller. The ETORB2, ETORB3 & ETORB4 probes are factory calibrated, but the controller should be calibrated with the probe in standard solutions.

3. WIPER REPLACEMENT

The effectiveness of the wiper in maintaining a clean optical surface will eventually be compromised, the time being dependent on the water under investigation and the number of wiping cycles carried out. We recommend periodic inspection of the wiper pad to determine if the material is deteriorating or is impregnated with material from bio-fouling. In addition, as a precaution we recommend changing the wiper prior to each long-term deployment. The wiper is a wear item and a spare is provided with each probe along with a hex key to loosen the wiper set screw. Wiper packs are available as a standard accessory (Part Number EMEC ETWK).

To change the wiper:

1. Loosen the grub screw in the wiper arm until the wiper assembly can be removed from the wiper shaft.
2. Place a new wiper assembly on the shaft with the grub screw aligned with the flat edge on the wiper shaft.
3. Gently press the wiper arm down until the wiper arm hits the stop on the shaft.
4. The wiper pad should now be compressed to roughly one half its original thickness.
5. Tighten the grub screw.
6. It is important that the wiper arm body does not make contact with the probe face - only the pad should be in contact. A gap of 0.5mm between the wiper arm and the optic face is typical when a new pad has been properly installed.

CAUTION: Do not over tighten the grub screw or manually attempt to rotate the wiper arm once set onto the shaft. Any attempt to manually rotate the wiper may cause gearbox damage and void the warranty.

4. CALIBRATION CONFIRMATION & TURBIDITY STANDARDS

The ETORB2, ETORB3 & ETORB4 probes are factory calibrated using neutral-density polymer-based turbidity standards.

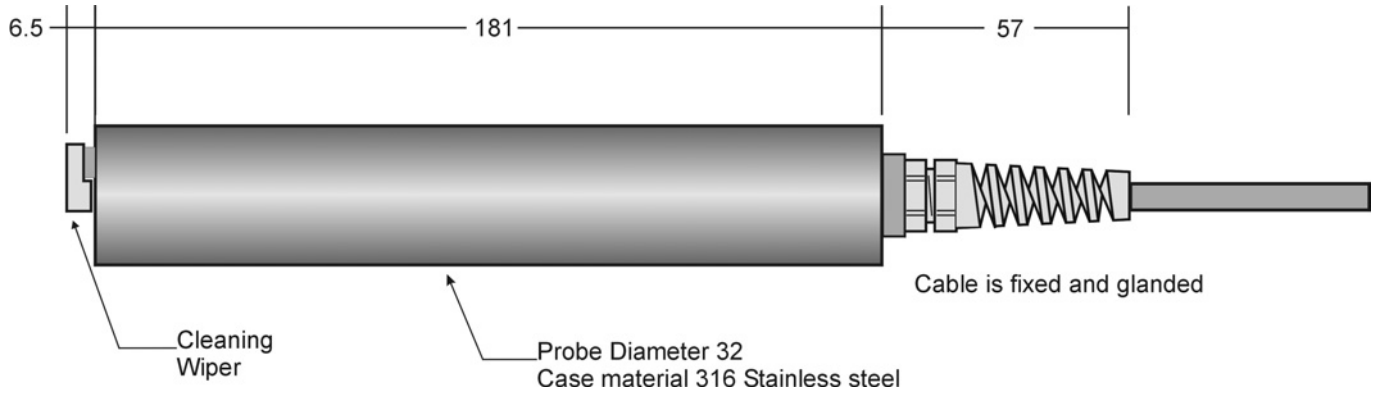
100 NTU, 400 NTU & 1000 NTU neutral-density polymer-based turbidity standards and clear water (ie distilled de-ionized water) are recommended for a calibration confirmation. These standards should not be diluted, as this will reduce the effect of the anti-fungal agent contained in the solutions.

Because a turbidity probe is inherently an optical device, care must be taken during a calibration confirmation to ensure that external effects are kept to a minimum. This is best implemented by placing calibration solutions in dark, leak proof bottles with a non-reflective finish such as Nalgene® 2106 bottles in amber. These are available with wide necks and a nominal capacity of 1,000ml.

Another important factor is cleanliness. Any debris or water that makes its way into the calibration solutions will affect its value. It is therefore good practice to have an ample supply of distilled de-ionized water and a means of properly drying the probe end (Clean compressed air is ideal). Probes should be flushed in two containers of distilled water with thorough drying in between and before insertion into a calibration solution. Also wherever possible, a calibration confirmation should commence at a lower value (usually zero) and work up in value to further minimize the effects of cross contamination.

When inserting the ETORB2, ETORB3 or ETORB4 probe into a calibration solution ensure that the optic face of the probe is at least 50mm from the base and all sides of the bottle. This is particularly important for low turbidity solutions below 200NTU. Hold the probe a few degrees from the vertical and gently tap it on the bottle rim so as to dislodge any air bubbles on the optic face. If the probe is properly placed, the measurement value will not vary if the probe is gently moved a few millimeters in any direction.

5. PHYSICAL DIMENSIONS



Dimension: in mm

Cable length: 10m (other lengths available on request)

6.SPECIFICATIONS

6.1 Probe Specifications

System Part No:	**EMEC TCS-100**	**EMEC TCS-400**	**EMEC TCS-1000**
Probe Model	**ETORB2**	**ETORB3**	**ETORB4**
Measurement Technique	90° modulated infra-red (ISO7027)		
Depth Rating	Submersible to 100 metres		
Range (Resolution)	0-100 NTU (±0.2 NTU)	0-400 NTU (±1 NTU)	0-1000 NTU (±3 NTU)
Repeatability	±1% at 25°C		±2% at 25°C
Linearity	< 1%		< 5%
Temp Coefficient	< ± 0.05 % / °C		
Output	- 2.5V to + 2.5V, where 0V = 50 NTU	- 2.5V to + 2.5V, where 0V = 200 NTU	- 2.5V to + 2.5V, where 0V = 500 NTU
Zero offset	± 3mV (0 to 40°C)		
3 point Factory Calibration with APS AEPA polymer solutions	0, 20, 100 NTU	0, 100, 400 NTU	0, 400, 1000 NTU
Construction	Stainless Steel 316 casing with protruding castellations to protect the plastic fibre-optic face.		
Cable connection	10 metre (5 core + shield) probe PUR cable is glanded directly from the rear of the probe via an integrated plastic strain relief		
Temp rating	-20°C to +50°C (storage), -10°C to +40°C (operating)		
Probe Cleaning Wiper			
Wiper Arrangement	Disposable - Foam Pad on PVC or Acetal arm. Field replaceable. Mounted on central shaft, fixed by hex grub screw.		
Spare Wiper Kit	Ordering code: EMEC ETWK (includes 4 wipers & key)		
Actuation	When powered up, or when called for by the program in the controller		
Wiping Time	The probe wiper performs 1 revolution every cleaning cycle, regardless of the cleaning time programmed in the controller. Probe output held to approx 0NTU. (The controller's outputs are disabled during the clean and restore time)		

6.2 Controller Specifications

System Part No:	EMEC TCS-100	EMEC TCS-400	EMEC TCS-1000
Controller Model	**EMEC LDTORBM**		
Controller Function			
Variable Measured	Turbidity		
Range	0-100 NTU	0-400 NTU	0-1000NTU
Resolution	± 0.2 NTU	± 1 NTU	± 3 NTU
Control Function	Dosing coagulant or flocculant		
Device Controlled	Switches 240VAC to power 1 or 2 optional dosing pumps, or pulsed output for 1 or 2 optional dosing pumps with pulse inputs		
Control Algorithm	ON/OFF or digital proportional		
Cleaning Function	Activation of wiper on ETORB probes with programmable restore time and time between succesive cleans (the wiper performs 1 revolution every cleaning cycle)		
Re-transmission	Isolated 4-20mA		
Display	Dot matrix reverse backlit graphic LCD displays Turbidity		
Controller Alarms			
Activation	High or Low NTU with programmable delay		
Relay Contact	1 C/O (ie fail-safe), 5A/250VAC, resistive load, potential free		
Electrical			
Power Supply	90 – 240VAC, 50/60Hz		
Control Output/s	ON/OFF relay outputs: switched 240VAC, Pulsed outputs: Proportional		
Relay Rating	5A/250VAC, resistive load (fuse protected)		
Physical			
Protection	IP65 (weatherproof) ABS enclosure		
Environment	0-50°C, 0-95% (non condensing) relative humidity		
Dimensions	225 (h) x 215 (w) x 110 (d) mm		
Packaged dimensions	310 x 260 x 190 mm		
Packaged weight	2 Kg		

This manual contains important safety informations about installation and use of this equipment. Ignoring this informations could result in injuries or damages.

It is strictly forbidden to use this equipment with radioactive chemicals !

"LDTORBM" DIGITAL CONTROLLER
O P E R A T I N G M A N U A L

Read carefully!

ENGLISH Version

R3-02-05

“LDTORBM” series instruments comply with the following European regulations:

EN60335-1 : 1995, EN55014, EN50081-1/2, EN50082-1/2, EN6055-2, EN60555,3

Based on directive CEE 73/23 c 93/68 (DBT Low voltage directive) and directive 89/336/CEE (EMC Electromagnetic Compatibility)

GENERAL SAFETY GUIDELINES

Danger! In emergencies the instrument should be switched off immediately! Disconnect the power cable from the power supply!

When using instrument with aggressive chemicals observe the regulations concerning the transport and storage of aggressive fluids!

When installing outside European Community, always observe national regulations!

Manufacturer is not liable for any unauthorized use or misuse of this product that can cause injury or damage to persons or materials!

Caution! Instrument must be accessible at all times for both operating and servicing. Access must not be obstructed in any way!

Feeder should be interlocked with a no-flow protection device.

Instrument and accessories must be serviced and repaired by qualified and authorised personnel only!

Always read chemical safety datasheet!

Always wear protective clothing when handling hazardous or unknown chemicals!

Index

Introduction

GENERAL DESCRIPTION

The LDTORBM controller is a compact and user friendly wall mounted instrument to control and measure turbidity, providing reliable and accurate measurements. It features two ON/OFF set-point, two proportional set-points with digital outputs and a 0÷20 mA output proportional to the actual reading of the instrument that can be used for a chart recorder or remote control. The user interface is an intuitive keyboard and a baklit graphic display for a clear view even in dark environments. The controller is cased in a IP65 plastic box, dimensions are 225x215x125mm.

CONTROL PANEL

Display

The LCD display gives an high resolution of the reading value and shows actual operative status of the system.

Date and time

Keyboard

Range

ESC

Enter

Status of the controller

Temperature

Set-up menu

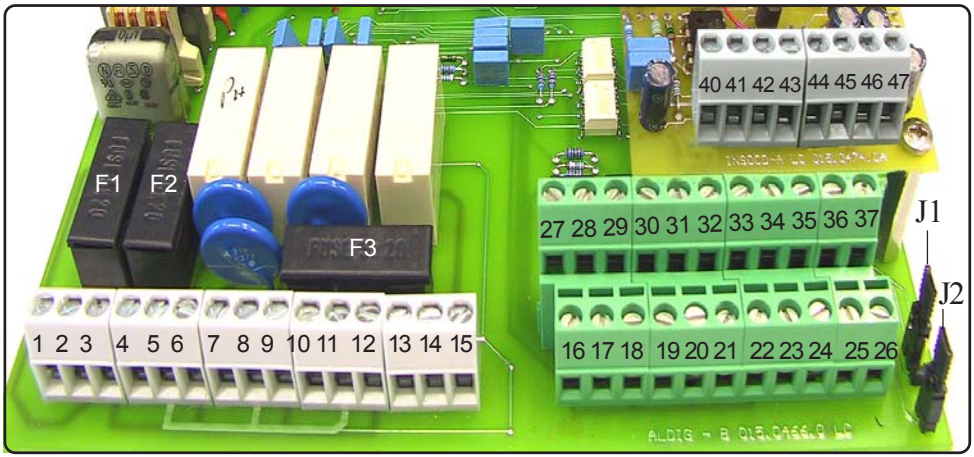
Probe selection

Use keyboard (up, down, left and right) to make a selection or change set values. The "Enter" key confirms your choose. Keep pressed "ESC" to cancel the selection and returns to previous menu.

Password 1 and 2 are independent and can be set separately.

From main menu press "Up" key to show/hide temperature, date and probe value.

ELECTRICAL WIRINGS:



F1: General protection fuse (6.3A)
F2: Controller protection fuse (2A)
F3: Alarm protection fuse (2A)

1(Live) ; 2(Earth) ; 3(Neutral): Power Suppply (90÷240) VAC - 50/60Hz
4(Live) ; 5(Earth) ; 6(Neutral): Output (90÷240) D1 - Setpoint1
7(Live) ; 8(Earth) ; 9(Neutral): Output (90÷240) D2 - Setpoint2
10(Live) ; 11(Earth) ; 12(Neutral): Output (90÷240) Probe cleaning
13(N.O.) ; 14(common) ; 15(N.C.): Alarm output (Free of voltage contact)

16(Ground) ; 17: Stand-By contact (STANDBY)
18(Ground) ; 19: Level contact 1
20(Ground) ; 21: Level contact 2
22 ; 23 ; 24: Flow sensor: see page 22
25(-) ; 26(+): RS485 Output

27(-) ; 28(+): Output P1 proportional pump driven by pulses
29(-) ; 30(+): Output P2 proportional pump driven by pulses
31(-) ; 32(+): 4÷20mA output for Turbidity
33(-) ; 33(+): 4÷20mA output for Temperature
35(Ground) ; 36(Rx) ; 37(Tx): RS232 output
- for PC connection: 35 black - 36 green - 37 red
- for modem connection: 35 black - 36 green - 37 red
- for printer connection: 35 black - 37 red

40(Ground) ; 41(Input Signal) ; 42(Power supply): Temperature probe PT100
43(Green) ; 44(Red) ; 45(Yellow+Shield); 46(White) ; 47(Black): **"Etorb2 or Etorb3" probe**
J1 - J2: see page 22

“Function” Menu

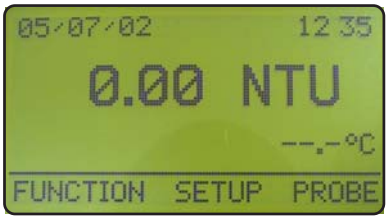


fig.1

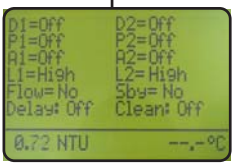
In the main screen showed in fig.1 press “>” key to highlight “FUNCTION”. Press then “Enter” to confirm selection. The controller will show the screen in fig.2. Press “ESC” at any time to get back in the normal operation screen (fig.1).

fig.2

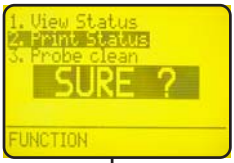
You can choose in this menu to view the controller status, print the events log or activate the probe cleaning procedure.

1

Highlight “View Status” and press “Enter” to get the controller status screen, see page 7 for more information.



2



Highlight “Print Status” and press “Enter”.

Display shows “Sure?”. Press again “Enter” to confirm printing or press “ESC” to cancel operation.*

**** It is needed a serial printer connected on the “RS232” connector of the terminal block. Protocol 9600-8-N-1.***

3

Highlight “Probe Clean” and press “Enter”.

*Display shows “Sure?”. Press again “Enter” to confirm probe cleaning** or press “ESC” to cancel operation*

***** Use this manual cleaning function when the probe gives unsatisfying results (readen value is not stable).***

fig.3

In the “View Status” screen in fig.3 there is a summary of the controller status, in particular the following information:

D1 = Relay status for SetPoint 1. *(Off ; On).*
D2 = Relay status for SetPoint 2. *(Off ; On).*

P1 = Pump 1 proportional output. *(Off ; Shows pump stroke per minute when On).*

P2 = Pump 2 proportional output. *(Off ; Shows pump stroke per minute when On).*

A1 = Programmable Alarm 1. *(Off ; On).*
A2 = Programmable Alarm 2. *(Off ; On).*

L1 = Chemical tank 1 Level *(Low ; High).*
L2 = Chemical tank 2 Level *(Low ; High).*

Flow = Probe holder’s water flow *(No if there’s no flow ; Yes).*

Sby = Standby *(No, controller in normal operations; Yes, controller in pause)*

Delay = Delay pump activation on start-up *(Off ; On)*

Clean = Automatic probe cleaning *(Off ; On during clean status)*

Note: To disable all alarms press “ENTER”.

“Setup” Menu

In the main screen showed in fig.1 press twice the “>” key to highlight “SETUP”. Press then “Enter” to confirm selection. The controller will show the screen in fig.4. Press “ESC” at any time to get back in the normal operation screen (fig.1).

fig.4

This screen protects the access to the programming menu of the controller to avoid alteration of set datas by unauthorized personnel. Default password is set to “0000”. Use arrow keys to enter password and then press “Enter” to confirm. See page 16 to know how to change password. Once entered the correct password the display shows the screen in fig. 5.

fig.5

Use arrow keys to choose the desired function and press then “Enter” to confirm. Press “ESC” at any time to cancel operation.

Highlight “1. Setpoint” and press “Enter” to confirm. The display will show the screen in fig. 6

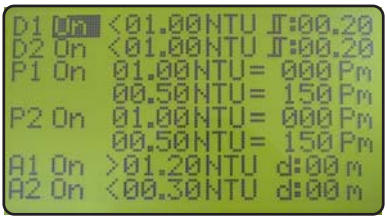


fig.6

In this menu you can set the set-point’s outputs, the pump response and the alarm ranges.

Data in fig. 6 are the default values (Everything is OFF). Use arrow keys to highlight the desired value in order to change it.

D1 Off < 01.00 NTU ⊓:00.20

“D1” is the digital output 1 of the controller.

“Off” means that the output is disabled. Must be switched to **“On”** to activate D1 output.

“<“ means that setpoint D1, when switched “On”, activate the output when the actual reading of the controller is less than set value (in the above line 01.00 NTU). It can be switched to **“>”**.

“01.00” is the setpoint value, it can be changed using arrow keys.

“NTU” is the range of the set-point, it can be switched from 0 to 29,99 scale or from 0 to 299,9 scale (0÷2999).

“⊓:00.20” is the hysteresis value. It gives the working range of the relay, in our example above the relay switches on when the reading is lower than 00.80 NTU and it switches off when the reading goes over 01.20.NTU

D2 Off < 01.00 NTU ⊓:00.20

“D2” is the digital output 1 of the controller.

“Off” means that the output is disabled. Must be switched to **“On”** to activate D2 output.

“<“ means that setpoint D2, when switched “On”, activate the output when the actual reading of the controller is less than set value (in the above line 01.00 NTU). It can be switched to **“>”**.

“01.00” is the setpoint value, it can be changed using arrow keys.

“NTU” is the range of the set-point, it can be switched from 0 to 29,99 scale or from 0 to 299,9 scale(0÷2999).

“⊓:00.20” is the hysteresis value. It gives the working range of the relay, in our example above the relay switches on when the reading is lower than 00.80 NTU and it switches off when the reading goes over 01.20.NTU

“1.Setpoint”

P1 Off 01.00 NTU = 000 Pm
00.50 NTU = 150 Pm

“P1” Is the digital proportional output 1 of the controller.

“Off” means that this output is disabled. Must be switched to **“On”** to activate output P1.

“01.00” is the setpoint value, it can be changed using arrow keys.

“NTU” is the range of the set-point, it can be switched from 0 to 29,99 scale or from 0 to 299,9 scale.

“000 Pm” is the number of stroke per minute given to the pump for the corresponding value.

“00.50” is the setpoint value, it can be changed using arrow keys.

“NTU” is the range of the set-point, it can be switched from 0 to 29,99 scale or from 0 to 299,9 scale (0÷2999).

“150 Pm” is the number of stroke per minute given to the pump for the corresponding value.

Referring to the above shown data as an example and the setpoint activated (“On”), the output will be active and will drive the pump (if connected) at 150 strokes per minute when the readen value is lower or equal to 00.50 NTU. The output will drive the pump in the range between 00.50 and 01.00 NTU proportionally (i.e:when reading is 00.75 NTU the pump will be driven at 75 strokes per minute). When the reading is 01.00 NTU or higher the controller will keep the pump not working.

P2 Off 01.00 NTU = 000 Pm
00.50 NTU = 150 Pm

“P2” Is the digital proportional output 1 of the controller.

“Off” means that this output is disabled. Must be switched to **“On”** to activate output P2.

“01.00” is the setpoint value, it can be changed using arrow keys.

“NTU” is the range of the set-point, it can be switched from 0 to 29,99 scale or from 0 to 299,9 scale.

“000 Pm” is the number of stroke per minute given to the pump for the corresponding value.

“00.50” is the setpoint value, it can be changed using arrow keys.

“NTU” is the range of the set-point, it can be switched from 0 to 29,99 scale or from 0 to 299,9 scale (0÷2999).

“150 Pm” is the number of stroke per minute given to the pump for the corresponding value.

Referring to the above shown data as an example and the setpoint activated (“On”), the output will be active and will drive the pump (if connected) at 150 strokes per minute when the readen value is lower or equal to 00.50 NTU. The output will drive the pump in the range between 00.50 and 01.00 NTU proportionally (i.e:when reading is 00.75 NTU the pump will be driven at 75 strokes per minute). When the reading is 01.00 NTU or higher the controller will keep the pump not working.

A1 On > 01.20 NTU d:00 m

“A1” is the programmable alarm1 that activates the alarm output.

“Off” means that this output is disabled. Must be switched to **“On”** to activate output.

“>“ activates the output when the reading value is lower than indicated. It can be switched to “>“ in order to activate the output when the reading value is higher than indicated.

“01.20” is the alarm value, it can be changed using arrow keys.

“NTU” is the range of the set-point, it can be switched from0 to 29,99 scale or from 0 to 299,9 scale(0÷2999).

“d:00 m” is the output activation delay, the readen value must be lower (or higher) than the specified alarm value for this time to have the alarm output active, can be set between 0 and 99 minutes.

A2 Off < 00.30 NTU d:00 m

“A2” is the programmable alarm2 that activates the alarm output.

“Off” means that this output is disabled. Must be switched to **“On”** to activate output.

“<“ activates the output when the reading value is higher than indicated. It can be switched to “<“ in order to activate the output when the reading value is lower than indicated.

“00.30” is the alarm value, it can be changed using arrow keys.

“NTU” is the range of the set-point, it can be switched from0 to 29,99 scale or from 0 to 299,9 scale(0÷2999).

“d:00 m” is the output activation delay, the readen value must be lower (or higher) than the specified alarm value for this time to have the alarm output active, can be set between 0 and 99 minutes.

With both “A1” e “A2” switched to “On” and the above given datas the alarm will be active when the reading of the instrument will be lower than 00.30 NTU and higher than 01.20 NTU**.** In the above mentioned example there will not be any delay since “d:” is set to 0 for both the alarms.

“2.Option”

fig.5

Use arrow keys to choose the desired function and press then “Enter” to confirm. Press “ESC” at any time to cancel operation.

Highlight “2. Option” and press “Enter” to confirm. The display will show the screen in fig. 7.

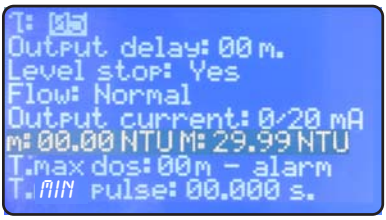


fig.7

T (Tau): it’s a factor that determines how quickly the reading on the display follows the reading of the probe. It’s set by default to 5 and it can be changed between 0 and 30. The more close to 0 this value is set and the more quickly the reading on the display will change, take in consideration that quickly changes on the display will result in unstable readings.

Output delay: it’s the pump output activation delay. Can be chosen between 0 and 99 minutes and it takes effect on start up of the controller, quitting from stand-by condition and after a “Flow Alarm”.

Flow stop: choose to stop the pumps when the “No Flow” is on (no flow in the probe holder) if it is set “Yes” the pumps connected to the controller will be stopped. If it is set “No” the signal will not affect the operations of the pumps.

Level stop: choose to stop the pumps when the “Level alarm” is on (no chemical in the drum) if it is set “Yes” the pumps connected to the controller will be stopped. If it is set “No” the signal will not affect the operations of the pumps.

Flow: choose the flow sensor input, set to “Normal” activates the standard flow sensor (“SEPR” proxy sensor). Set to “Reverse” the digital logic of the sensor is inverted. Set to “Disable” the flow sensor is not enabled. See pag. 22.

Flow “Normal”

Output current: changes the output current range, can be set to 0/20mA or 4/20mA.

“m” and “M”: defines the output current range according to the reading of the controller.
Basically the controller will give a current output of 0 or 4 mA when the **NTU** value readen will be equal to “m”. The controller will give a current output of 20 mA when the **NTU** value readen will be equal to “M”. Between the range defined by “m” and “M” the controller gives a current output proportional. See the chapter “Range selection” on page 18.

T.MAX DOS.: maximum time dosing alarm. This alarm prevents the pump to dose if a set time is reached. To activate the alarm move the cursor on “01M” and set the time (from 0 to 99 minutes). To setup the alarm move the cursor on “DOSING”. Use “UP” or “DOWN” keys to change this voice. On “STOP” mode the pump will stop the dosing procedure once the set time is reached. The pump’s display will show the alarm condition and requires to press ENTER key for 2 seconds to continue while into “View Status” menu. On “DOSING” mode the pump will NOT stop the dosing procedure once the set time is reached. Instrument will show the alarm condition only.

T.MIN PULSE: it sets up the proportionality between flow and the digital outputs (P1 and P2) for IS series pumps.
T.MIN PULSE represents the time, in second, that elapses between a pulse and the next one of a “pulse sender water meter”, at the maximum capacity. The time can be set from a minimum of 10mSec (100Hz) to a maximum of 29,99 Sec (0,033Hz).
For T.MIN PULSE = 00,000, there will not be variations on the data set up on setpoint P1 and P2 (“pulse sender water meter” disabled).

Ex. Set T.MIN PULSE=01,000 (time in second between a pulse and the next one, at the maximum capacity).
Set:

P1	**On**	**00.50 NTU =**	**150 Pm**
		01.00 NTU =	**000 Pm**

If the time that elapses between a pulse and the next one of a “pulse sender water meter” is lower or equal to 1 second, with the instrument that visualizes 00.50 NTU, the value (150 Pm) will not change (pulses to IS pump).
If the time that elapses between a pulse and the next one of a “pulse sender water meter” is higher to 1 second (es. 2 sec.), with the instrument that visualizes 00.50 NTU, the value (150 Pm) will halve (75 Pm - pulses to IS pump).

How To Calculate the T.MIN PULSE: example

Max Capacity: 5 m^3 (5000 lit)
Imp/lit: 4

$$\text{T.MIN PULSE} = \frac{3600 \text{ sec}}{5000 \text{ lit} \times 4 \text{ imp/lit}} = 0{,}180 \text{ sec}$$

“3.Clock”

fig.5

Use arrow keys to choose the desired function and press then “Enter” to confirm. Press “ESC” at any time to cancel operation.

Highlight “3. Clock” and press “Enter” to confirm. The display will show the screen in fig. 8.

fig.8

Use arrow keys to set date and time in the following format:

Week day DD/MM/YY
HH.MM.SS. (24h)

Press “Enter” to confirm. The controller will ask a confirmation like in fig. 9:

fig.9

Press “Enter” to save entered datas and return to menu in fig.5.

fig.5

Use arrow keys to choose the desired function and press then “Enter” to confirm. Press “ESC” at any time to cancel operation. Highlight “4. Print., Comm.” and press “Enter” to confirm. The display will show the screen in fig. 16.

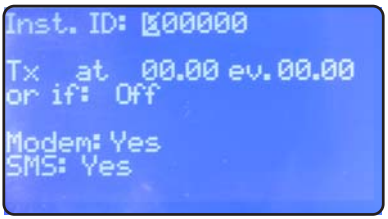


fig.16

“Inst. ID”: is the controller identity number. It’s needed to change it only when the controller is connected to a network that has more than one controller.

“Tx at 00.00 ev. 00.00”: set the sending of the status at a selectionable time (at) every hour/minute set (ev.). Use arrow keys to change time and interval.

“or if: Off”: disable sending when set to “Off”.

enable sending also whenever a generic alarm occurs when set to “alarm”.

enable sending also whenever there’s no flow in the probe holder when set to “flow”.

enable sending also whenever an alarm occurs and when there’s no flow in the probe holder when set to “alarm,flow”.

enable sending also whenever there’s no chemical in the drum when set to “level”.

enable sending also whenever an alarm occurs and when there’s no chemical in the drum when set to “alarm, level”.

enable sending also whenever there’s no flow in the probe holder and when there’s no chemical in the drum when set to “flow, level”.

enable sending also whenever an alarm occurs, when there’s no flow in the probe holder and when there’s no chemical in the drum if set to “alarm, flow, level”.

Once done press “Enter”. The controller will ask confirmation showing “SAVE?” on the display. Press again “Enter” to save entered data.

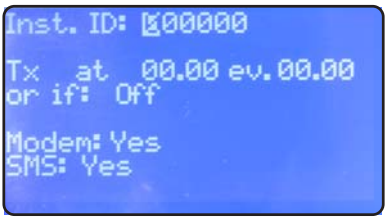


fig.16

“**Modem**”: no “**SMS**”: no	Printer, PC or LDCOMM setting.
“**Modem**”: yes “**SMS**”: no	PSTN (es.: 56K/V90) setting. The instrument can be remote controlled: setting and status.
“**Modem**”: yes “**SMS**”: yes	GSM modem setting. The instrument sends short messages (SMS) during alarm conditions or at selected interval (see “TX AT” function on page 15). The instrument can send short messages to a maximum of 9 phone numbers saved on the SIM CARD.

Press “Enter” at the end. The instrument will display “SAVE?”. Press “Enter” to confirm.

Press “Enter” to save the settings and go back to the menu (fig.5).

fig.5

Use arrow keys to choose the desired function and press then “Enter” to confirm. Press “ESC” at any time to cancel operation.

Highlight “5. Password” and press “Enter” to confirm. The display will show the screen in fig. 9.

fig.10

This password protects the “Setup” menu from unauthorized personnel, use arrow keys to set the new password between 0000 and 9999 then press “Enter” to save. ***Forgotten password can not be retrieved, in this case a reset of the controller is needed. To reset the controller shut down power supply and power on again and press “ESC” when the screen in fig.11 shows on the display . Wait re-set screen and then press “Enter” to confirm the reset.***

fig.11

“PROBE”

fig.1

In the main screen showed in fig.1 press “>” key to highlight “PROBE”. Press then “Enter” to confirm selection. The controller will show the screen in fig.12. Press “ESC” at any time to get back in the normal operation screen (fig.1).

fig.12

This screen protects the access to the programming menu of the controller to avoid alteration of set data by unauthorized personnel. Default password is set to “0000”. Use arrow keys to enter password and then press “Enter” to confirm. See page 20 to know how to change password. Once entered the correct password the display shows the screen in fig. 13.

fig.13

Calibrate: access this menu to calibrate the probe.
Self-Clean: access this menu to set automatic probe clean procedure.
Password: access this menu to change the password of the “PROBE” menu. Please note this is no the same password used to protect the “SETUP” menu.

“1.Calibrate” is the probe setting menu, once entered you have the display shows the screen in fig.14. To make the probe settings is needed two buffer solutions (0NTU and another value close to the probe’s maximum range) in order to perform the calibration.

fig.14

NOTE: RELIABLE RESULTS MAY BE OBTAINED ONLY USING COSTANT WATER FLOW.

First of all choose “full-scale” range to working on with probe’s range. Move cursor over NTU (P2 field) and using “UP” or “DOWN” keys choose required scale.

Range selection
To select the instrument range according to probe’s working range) from Fig. 14, press right key and move the cursor on NTU (on P2). Use up key to select the range (29.99 - 299.9 - 2999) and press SAVE.
After setting instrument range, set the current output range. From Fig. 14, press ESC till display Fig. 5. Select OPTION, set the instrument working range by selecting the current output minimum (“m”) and maximum (“M”): move the cursor on NTU and use up key to select the range (29.99 - 299.9 - 2999).
To calibrate the instrument (P1 Zero ; P2 Probe Calibration) proceed in one of the following ways:

The screen is divided in three areas. The first one indicated as **area “A”** in the picture above shows the actual reading of the turbidity and temperature, it also shows the last calibration date. Those datas are not editable.

“B” Area: it shows turbidity probe parameters. Editable datas are:

“P1”: set “zero”. Follow the “Injection Mode” or “Direct Mode” to setup “etorb” probe. Then use arrow keys to move the cursor in “Set-P1”, read the actual value in the “A” area and wait until it is stabilized. During the calibration process, the value in the “A” area could be different from the buffer solution value (in this case distilled water / 0 NTU). Wait a stable reading. Press “Enter”. Next to “P1: 00.00 NTU” will appear “OK”. Use the arrow keys to move the cursor on “SAVE” and press “Enter” to confirm in order to save entered data. If the calibration of “P2” is also needed use the arrow keys to move cursor in this field.

“P2”: probe calibration with a buffer solution. Insert probe’s tip into “probe’s maximum range” buffer solution. Then use the arrow keys to move the cursor on “P2”, enter buffer solution value using the keys as described on page 4. Use arrow keys to move the cursor in “Set-P2”, read the actual value in the “A” area and wait until it is stabilized. Press “Enter”. Next to “P2: 20.00NTU” will appear “OK”. Pressing again the “Enter” key number will be increased by one unit to confirm the data acquisition. *Instead of a buffer solution, calibration procedure may be realized disconnecting probe’s white wire (block 46 of LDTORBM) and then editing, into “P2” field, a value that is half the probe’s full range.*
Use the arrow keys to move the cursor on “SAVE” and press “Enter” to confirm in order to save entered data.

area “C” shows the temperature probe configuration parameters. The controller is already set when is delivered and usually it is not needed to make this configuration. To calibrate the temperature use the arrow keys to move cursor on the temperature and enter measured value. Use arrow keys to move the cursor in “Set-T” and press “Enter”. A blinking “!” followed by one number “1” will appear below “Set-T”. Pressing again the “Enter” key number will be increased by one unit to confirm the data acquisition.

NOTE: Above datas are intended only as an example!

“2.Self-Clean”

In the menu in fig.13 highlight “Self-Clean” and press “Enter”.

fig.13

The display will show the screen in fig.15.

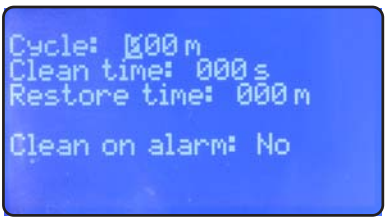


fig.15

This screen shows:

“Cycle”: the time between each cleaning. Can be set between 0 (disabled) and 999 minutes.

“Clean Time”: probe cleaning time. Can be set between 0 (disabled) and 999 seconds.

“Restore Time”: is the probe recovery time needed to come back in full operations after the cleaning. Can be set between 0 (disabled) and 999 minutes. Setting “0” as restore time the whole “Self-Clean” function will be disabled.

“**Clean on alarm**”: automatic probe cleaning when the alarm on the setpoints is active. The probe will not read till the end of the cleaning

Note: During “Clean Time”, “Restore Time” and “Clean on alarm” the controller’s outputs are DISABLED.

fig.5

Use arrow keys to choose the desired function and press then “Enter” to confirm. Press “ESC” at any time to cancel operation.

Highlight “3. Password” and press “Enter” to confirm. The display will show the screen in fig. 10.

fig.10

This password protects the “PROBE” menu from unauthorized personnel, use arrow keys to set the new password between 0000 and 9999 then press “Enter” to save. ***Forgotten password can not be retrieved, in this case a reset of the controller is needed. To reset the controller shut down power supply and power on again and press “ESC” when the screen in fig.11 shows on the display. Wait re-set screen and then press “Enter” to confirm the reset.***

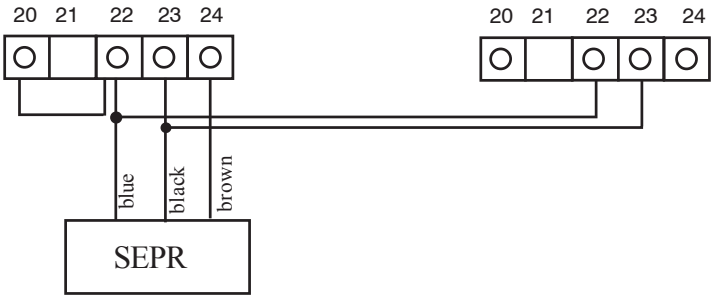
fig.11

“Flow Sensor” configuration

A proxy sensor model “SEPR” can be used to sense the flow inside the probe holder, make wirings as follows: blue wire to terminal n.22 ; black wire to terminal n.23 ; brown wire to terminal n.24 and set “Flow” to “normal” in menu “Option”.
Insert a connection between terminal blocks n. 20 and 22.

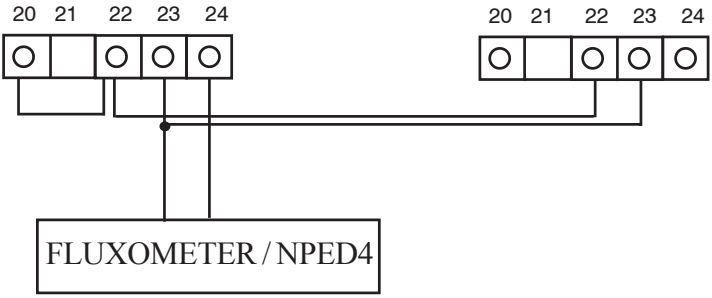
SEPR “Flow Sensor” configuration for two instruments

It is possible to control two digital instrument using a “SEPR” or a voltage free contact.
Connect the main instrument (master) as descrived in the previous paragraph.
Connect the second instrument (slave) making a wiring between terminals n.22 and n.23 of the two instruments.



Configuration of a fluxometer (NPED4) with a voltage free contact Normally Closed contact when there is flow for two instruments

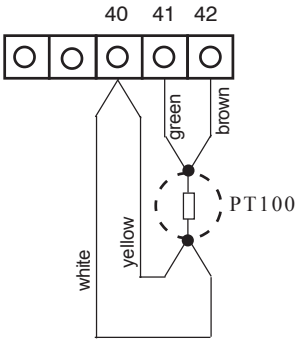
To install a proxy sensor different from “SEPR”, use a fluxometer with voltage free contact Normally Closed contact when there is flow.
Insert a connection between terminal blocks n. 20 and 22.
Connect the two fluxometer wires on terminal blocks n.23 and n.24 and set “Flow” on “normal” in the “Option” menu.



If the flow sensor with free of voltage contact Normally Open when there is flow, set “Flow” on “reverse” in the “Option” menu.

“Temperature Probe”

“LDTORBM” controller is designed to work with temperature probes type “PT100” (platinum sensor, 100Ohm at 0°C). To reduce the reading error typical connection of this sensor is made of four wires, the controller anyway accepts three wire connections too. Make wirings as follows: ground (yellow and white wires) to terminal n.40, signal (gree wire) to terminal n.41, power supply (brown wire) to terminal n.42.

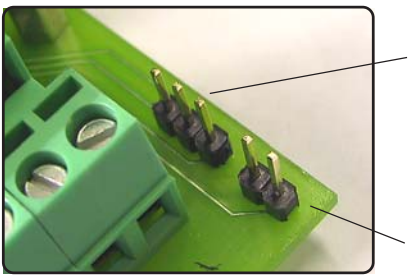


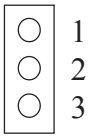
“Printer Port”

Use a shielded cable not longer than 50 meters to connect a printer to the controller, wire the shield to terminal n.35 and the signal wire to terminal n.37 (Data Transmission). Set-up printer as follows: Communication speed: 9600baud, control bit: 8, parity: none and 1 bit stop.

“Communication Ports”

The instrument has two communication ports built in (RS232 - RS485). User may select a port using J1 and J2 configuration jumpers. Use RS232 port for a local printer or PC connection (Rx-Tx 9600-8-N-1). Use RS485 port for remote control.

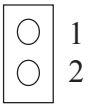




J1

1-2 Closed: RS232 On

2-3 Closed: RS485 On



J2

1-2 Closed: Termination resistance for RS485

Functions	LDTORBM
Range	0 ÷ 29.99 NTU 0 ÷ 299.90 NTU 0 ÷ 2999 NTU
Display	LCD Backlight Graphic Display
Controls	Digital Keyboard
Calibration	Manual
Environment Working Temperature	0°C to 50°C - 0% to 95% (non condensing) relative humidity
Set Points	Two On/Off SetPoints, two digital proportional
Control Inputs	Chemical Tank Level Control, Stand-by*
Relay Output (On-Off)	2 Voltage Output
Alarm	Voltage Free Contact Relay (Fuse Protected)
Delay**	Programmable "Power-on" Delay
Max Resistive Load	5A - 220 VAC
Power Supply	Universal 90÷240 VAC ; 50/60 Hz
Power Consumption	Average 10W
Fuse	Output, instrument and alarm fuse protections
Back up Data	YES
Galvanic Isolation	YES (current output/temperature measurement) 0/4 ÷ 20 mA
Probe Cleaning Output	YES
Casing Material	ABS - IP65 box
Mounting	WALL
Dimensions	225 x 215 x 110 mm
Net Weight	1,2 kg
Serial port for printer	RS232

"HIGH WARNING"

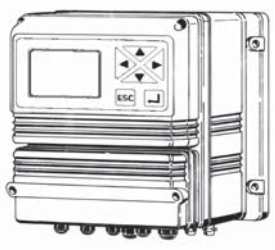
This message pop-up on the display when the readen value is above the meter's range. (See technical features table in page 24).

"LOW WARNING"

This message pop-up on the display when the readen value is below the meter's range. (See technical features table in page 24).

"WARNING"

This message pop-up on the display when the status of the controller is in alarm, it can be caused by: no flow in the probe holder, set-point alarm, no chemical in the drum. Alarm is specified in the menu "Function" -> "View Status" (pag.6).



Bottom-right side view.

Pulse emitter water meter input.

When dismantling an instrument please separate material types and send them according to local recycling disposal requirements. We appreciate your efforts in supporting your local Recycle Environmental Program. Working together we'll form an active union to assure the world's invaluable resources are conserved.