



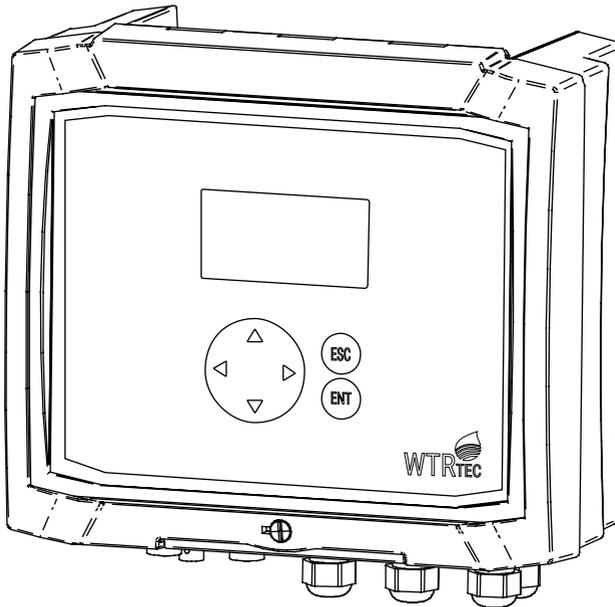
Management System
ISO 9001:2015



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ITC

DOSING PUMPS



WTRTEC

GREEN

ENGLISH

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SAFETY INSTRUCTIONS

To avoid personal injury risks and damage to the environment, and to ensure proper equipment operation, personnel responsible for installing, commissioning and maintaining the equipment must follow the instructions in this manual, with special attention to the detailed recommendations and warnings. The specific instructions for the use of the chemicals to be dosed must also be followed.

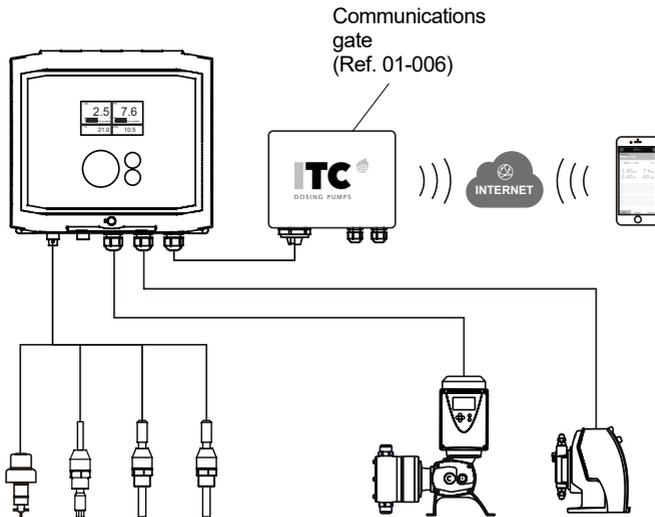
1. GENERAL DESCRIPTION

WTRTEC Green is a high-precision pH, conductivity and proportional dosing controller that at the same time is simple to install and operate. It is specially designed for processes such as fertigation, where correction of pH and EC is needed.

The **WTRTEC** controller enables monitoring of flow, pH and EC, as well as their adjustment through analogue and digital control outputs for dosing pumps. The analogue output (4-20 mA) control is specially designed to provide in-line control adapted to flow rate changes (PIQ).

The **WTRTEC** enables remote monitoring and management by means of a mobile/web application. A communications Gate (Ref. 01-006) is needed for this, which can be connected to the internet by Ethernet or 3G/4G.

INSTALLATION DIAGRAM



2. TRANSPORT AND HANDLING

The original packaging is designed to allow the equipment to be transported and stored without damage, provided this takes place in dry, ventilated spaces away from heat sources.

Included in the packaging are:

- **WTRTEC**
- Instruction manual

3. TECHNICAL SPECIFICATIONS

Power supply: 100-240 V 50-60 Hz. 10.8-14.4 VDC

Power: 6 W

IP65 protection

Housing material: ABS

Working temperature: 0 - 45 °C / 32 - 113 °F

Maximum relative humidity: 95% without condensation

Inputs

Flow meter	0.00-9999 m ³ /h / gph	NPN isolated
Flow meter (power supply)		12 VDC (100 mA)
EC sensor	0.00-10.00 mS	Isolated
EC temperature sensor	0.0 - 100°C / 32.0 - 212 F	NTC
pH sensor	0.00 - 14.00	Isolated
pH/EC temperature sensor	0.0 - 100°C / 32.0 - 212 F	PT100
Remote input	ON/OFF	12-24 V AC/DC
Flow detector	ON/OFF	NPN isolated

Outputs

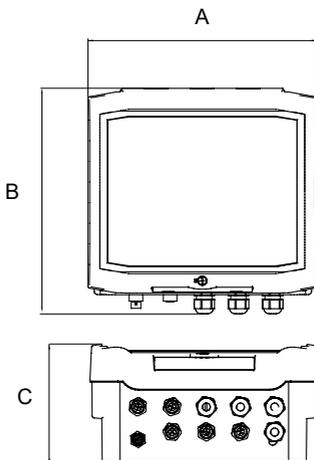
Relay 1	Alarm	N.A. 230 V AC 1 A
Relay 2	Alarm	N.A. 230 V AC 1 A
Relay 3	Alarm	N.A. 230 V AC 1 A
Relay 4	Control	N.A. 230 V AC 1 A
Relay 5	Control	N.A. 230 V AC 1 A
4-20 mA 1	Control or record	max. 520 Ohms
4-20 mA 2	Control or record	max. 520 Ohms

Communications

RS485 port ModBus

Dimensions

	mm	inch
A	229	9.02
B	225	8.86
C	119	4.69



4. OPERATION

4.1 Main screen and navigation

Control parameter 1
EC (or flow rate)

Regulation output

Temperature

Control parameter 2
pH

Flow rate (or EC) reading

- Confirm
- Exit without confirming
- Increase / decrease value, and move up /down
- Decrease / increase value, and move down/up
- Move left / right
- Move right / left

Warnings on the main screen:

- Flashing reading: parameter alarm
- Flashing regulation output: no device detected on the 4-20 mA output
- Flashing regulation outputs (both): remote control deactivated, or no device connected to the 4-20 mA outputs

Cursor

EC setpoint value

pH regulation output

Access to the Configuration menu

Move the cursor to select the following menu: mS, pH, m3h or CONFIG, and enter with ENTER

ENT

Press ENTER to edit the setpoint or move the cursor to enter the following menu:
 CAL: Calibration
 CONTROL: control output
 ALARM: alarms
 REGISTER: output for register

Calibration menu

Control menu

Alarm menu

Register menu

4.2 Setpoint configuration

Configuration of the desired EC, pH or % values for the two channels for control through values or setpoints.

Choose the control parameter for channel 1 between dosing by EC setpoint (mS) or by proportionality value (%) of the product to be dosed with the irrigation water. Parameter selection is performed by activating the control through the selected parameter's Control menu. The parameter not selected for control will remain as additional information and will be displayed in the lower right quadrant of the main screen.

The second control channel is for pH.

To enter the setpoint:

<table border="1"> <tr><td>mS</td><td>2.50</td><td>SP</td><td>2.00</td></tr> <tr><td></td><td></td><td></td><td>032%</td></tr> <tr><td>pH</td><td>7.60</td><td>SP</td><td>7.00</td></tr> <tr><td></td><td></td><td></td><td>021%</td></tr> <tr><td>m3h</td><td>10.5</td><td></td><td></td></tr> <tr><td>CONFIG</td><td></td><td></td><td>21.3°C</td></tr> </table>	mS	2.50	SP	2.00				032%	pH	7.60	SP	7.00				021%	m3h	10.5			CONFIG			21.3°C		<table border="1"> <tr><td>mS</td><td>SP</td><td>02.00</td></tr> <tr><td>CAL</td><td></td><td></td></tr> <tr><td>CONTROL</td><td></td><td></td></tr> <tr><td>ALARM</td><td></td><td></td></tr> <tr><td>REGISTER</td><td></td><td></td></tr> </table>	mS	SP	02.00	CAL			CONTROL			ALARM			REGISTER				<p>change the value with the up/down arrows and confirm with ENT</p>		
mS	2.50	SP	2.00																																										
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4.3 Calibration

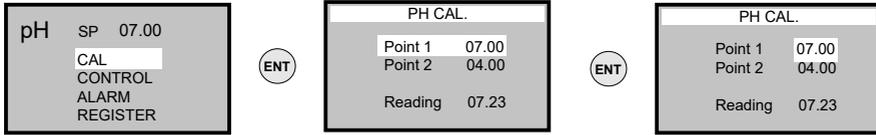
Calibration of the sensors used for EC, pH and flow. The calibration menu is in each parameter menu.

4.3.1 EC calibration

<table border="1"> <tr><td>mS</td><td>SP</td><td>02.00</td></tr> <tr><td>CAL</td><td></td><td></td></tr> <tr><td>CONTROL</td><td></td><td></td></tr> <tr><td>ALARM</td><td></td><td></td></tr> <tr><td>REGISTER</td><td></td><td></td></tr> </table>	mS	SP	02.00	CAL			CONTROL			ALARM			REGISTER				<table border="1"> <tr><td colspan="2">EC CAL.</td></tr> <tr><td>Point 1</td><td>01.41 mS</td></tr> <tr><td>Reading</td><td>01.37 mS</td></tr> </table>	EC CAL.		Point 1	01.41 mS	Reading	01.37 mS		<table border="1"> <tr><td>Point 1</td><td>01.41 mS</td></tr> <tr><td>Reading</td><td>01.37 mS</td></tr> </table>	Point 1	01.41 mS	Reading	01.37 mS
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Point 1	01.41 mS																												
Reading	01.37 mS																												

If necessary, modify the value for the EC calibration standard using the up/down arrows. Insert the sensor into the standard solution, wait until the sensor reading is stable and confirm with ENTER. If you are not sure of the calibration, you can exit without confirming by pressing ESCAPE. The zero point is factory calibrated.

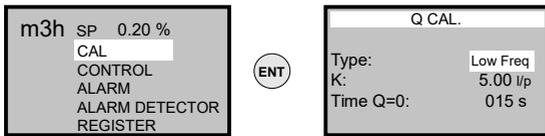
4.3.2 pH calibration



If necessary for pH calibration point 1, modify the buffer value using the up/down arrows. Insert the sensor into the point 1 buffer, wait until the sensor reading is stable and confirm with ENTER.

Repeat the operation with the point 2 buffer. Before putting the sensor in the point 2 buffer, clean the sensor with distilled water and dry it well (with tissue paper) to avoid contamination of the buffer. If at any time during the calibration process you are not sure of the calibration, you can exit without confirming by pressing ESCAPE.

4.3.3 Flow rate calibration



Select the type of flow meter:

- Low Freq:

Low frequency flow meter. Flow meters with pulse frequencies of between a minimum of 1 pulse every 200 seconds and a maximum of 30 pulses per second (30 Hz).

- K (l/p):

This type of flow meter requires entry of the configuration value the manufacturer indicates in litres/pulse.

- Time Q=0:

In these flow meters, which calculate the flow rate from the time between two consecutive pulses, a wait time from which the flow rate is considered to be zero needs to be defined.

- High Freq:

High frequency flow meter for Hall effect or electromagnetic insertion flow meters with a maximum of 300 Hz (300 pulses per second).

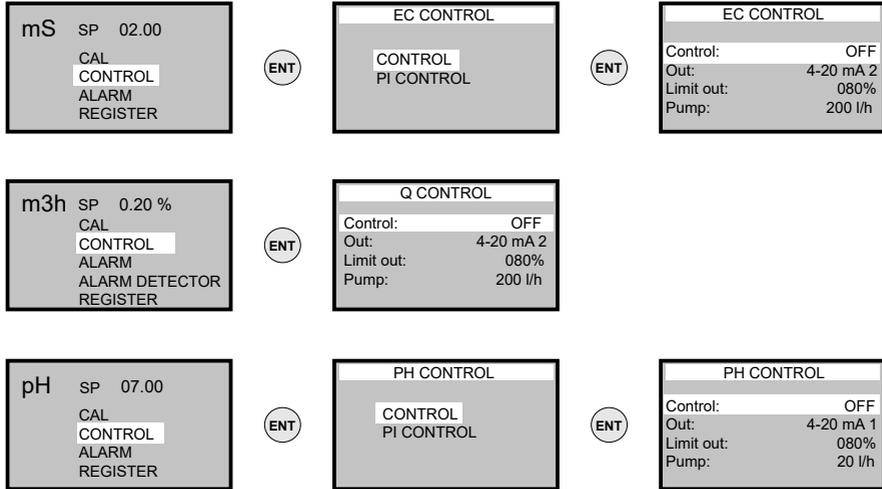
- K-factor (p/l):

This type of flow meter requires entry of the K-factor (pulses/litre), corresponding to the diameter where it is installed. This value is supplied by the manufacturer.

4.4 Control configuration

4.4.1. Activation of the control

Activate control in the two parameters chosen for the regulation.



For fertiliser dosing, choose between the options:

- Flow Rate control (proportionality):

Dosing will be regulated depending on the % value entered as the setpoint value, representing the percentage of product flow rate dosed with respect to the main water pipe flow rate.

- EC control:

Dosing will be regulated automatically to adjust the conductivity reading to the value entered as the EC setpoint.

- EC control with flow rate adjustment:

Activate the EC control and set the PEC value (%) in the PI Control menu to set an initial proportionality value that the controller will regulate automatically to adjust to the EC setpoint.

For acid or base dosing for pH regulation:

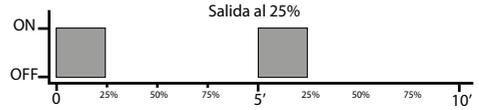
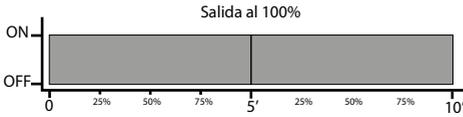
- Control in pH:

Dosing will be regulated automatically to adjust the pH reading to the value entered as the pH setpoint.

The regulating output will need to be selected for each control channel:

- Out:

Choose between the two 4-20 mA channels for analogue regulation or between the relay outputs for ON/OFF regulation.



Out = 4-20mA. For in-line process control. This is more precise regulation, which requires a pump with a 4-20 mA analogue input, such as a Dositec mA, Dostec AC or Dostec with variable frequency drive.

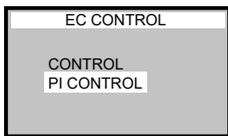
Out = Relay. For control in a recirculating tank. The regulating output establishes 5-minute cycles in which the output will be ON for the proportional part of the time corresponding to PI adjustment.

- Limit out:

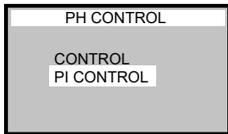
If a 4-20 mA output is used, this parameter allows you to limit the output value so as to limit the maximum dosing pump flow rate.

- Pump:

Enter the rated dosing pump flow rate to record the dosed flow rate in the data logger.



EC PI CONTROL	
PIQ (PEC):	1.50
Kp:	20
Ki:	30
T delay (s):	015
Q test:	00.00 m3h



PH PI CONTROL	
PIQ (PpH)	030
Kp:	20
Ki:	30
T delay:	020 s
Q test:	00.00 m3h

4.4.2. Advanced control configuration. PI control

For adjustment of EC and pH, the control system operates using a PI algorithm. The setting parameters for this control are in the PI CONTROL menu

- PIQ (PEC):

The PIQ control mode to adjust EC is a PI algorithm conditioned on the flow rate of water to be treated. Initial dosing proportional to the water rate in % is set using the PEC parameter, and is subsequently corrected by means of a PI approximation curve. This system combines the benefits of proportional dosing and EC setpoint dosing, ensuring stability

of the EC reading, even with highly variable flow rates.

PEC=0 PI control. PIQ control disabled.

PEC= 0.01 - 2% Dosing will be proportional to the water flow at the % rate entered and with adjustment to setpoint through a PI algorithm.

- PIQ (PpH):

The PIQ control mode to adjust pH is a PI algorithm conditioned on the flow rate of water to be treated. Initial dosing proportional to the water rate is set using the PpH parameter, and is subsequently corrected by means of a PI approximation curve. This system, which can only be activated with independent pumps (type mA outlets for acid/alkaline dosing), ensures pH stability even with highly variable flow rates and provides greater agility in reaching and maintaining the setpoint.

PpH=0 PI control. PIQ control disabled.

PpH= 1 - 200 Acid dosing will be proportional to the water flow rate with setpoint adjustment by means of a PI algorithm. The proportion is indicated by the PpH parameter and is referenced to 100,000 units of water flow.

Example: For a flow rate of 200,000 l/h of water and a PpH = 1, proportional dosing of acid will be: (1 / 100,000) x 200,000 l/h = 2 l/h

The proportion needed to achieve a specific pH will depend not only on its nature and concentration, but also on the nature of the water to be treated and the rest of the dosed products that can influence this parameter. The range PpH recommended to rapidly reach a pH and maintain it stable are detailed below. The following tables for different acids are an approximation to the PpH value for these acids, depending on the pH correction required (1 or 2 points of pH).

Table for nitric acid

A	1 point	2 points
60%	4-10	10-20
40%	8-15	15-30
10%	30-60	60-120
5%	60-110	120-200

Table for phosphoric acid

A	1 point	2 points
80%	3-8	8-15
50%	6-15	15-25
10%	30-60	60-120
5%	60-110	120-200

Table for sulphuric acid

A	1 point	2 points
90%	1-13	2-5
50%	2-5	4-10
10%	10-25	20-50
5%	20-50	40-100

Note: Column "A" corresponds to the acid concentration

- Kp:

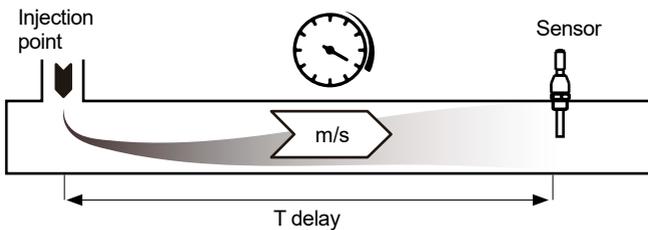
Proportional constant for PI adjustment. This parameter enables adjustment of the amount of device response based on the difference between the reading and the setpoint (Error). The default value is normally correct for the majority of in-line controls. A value that is too high will produce reading oscillations around the setpoint value. A value that is too low will produce a slow approach to the setpoint.

- Ki:

Integral PI adjustment. This parameter acts on the accumulated error and enables reading stabilisation once the setpoint value has been achieved. It is only valid for in-line controls. For recirculating controls it must be $K_i=0$.

- T delay (seconds):

T delay is the time between two consecutive controller orders to position the regulating output. For a proper regulation, this time has to be greater than it takes for a drop of dosed product to travel from the injection point to the point where the pH or EC sensor is located.



- Q test:

Reference flow rate for T delay that allows for automatic adjustment of T delay with changes in water flow rate, so that T delay is always at an optimal value. To keep T delay fixed, leave $Q_{test} = 0$.

Example: In a 8" pipe through which water passes at 100 m³/h, the water speed is approximately 1 m/s. If the distance between the injection point and the sensor is 10 metres, the installation delay time is 10 seconds.

The sensor will have a reaction time (approximately 10 seconds for the pH sensor), which must be added to the installation delay time. Therefore, a T delay = 20 seconds should be set.

Bear in mind that if there are any filters between the injection point and the sensor, the calculation of 10 metres x 1m/s = 10 seconds will no longer be valid.

4.5 Alarms

4.5.1 EC and pH alarms

To set the alarms, enter the upper and lower tolerance values with respect to the value entered as the setpoint and the time from which, with the reading outside tolerance range, the alarm must be activated. If the value = 0, the alarm is disabled. The alarms will activate only if the Control is ON.

mS	SP	02.00
	CAL	
	CONTROL	
	ALARM	
	REGISTER	

(ENT)

EC ALARM		
mS +	2.00	025 s
mS -	1.50	060 s
Reset: No		
Stop: EC		

mS+ 2.00: the alarm is activated when the reading is 2.00 mS above the setpoint value for 25 seconds
mS - 1.5: the alarm is activated when the reading is 1.50 mS below the setpoint for 60 seconds

pH	SP	07.00
	CAL	
	CONTROL	
	ALARM	
	REGISTER	

(ENT)

PH ALARM		
pH +	1.00	025 s
pH -	0.50	060 s
Reset: No		
Stop: pH		

pH + 1.00: the alarm is activated when the reading is 1.00 above the setpoint value for 25 seconds
pH - 0.5: the alarm is activated when the reading is 0.50 below the setpoint for 60 seconds

Reset: enables automatic alarm reset when the reading is back within the permissible values.

Stop: enables shutting down of the dosing control output for the alarmed control parameter, for all or none.

4.5.2 Zero flow alarm

An alarm can be set to warn that there is no flow in the main pipe.

If the value = 0, the alarm is disabled.

m3h	SP	0.20 %
	CAL	
	CONTROL	
	ALARM	
	ALARM DETECTOR	
	REGISTER	

(ENT)

Q ALARM	
Q = 0	200 s
Reset: No	
Stop: None	

Reset: enables automatic alarm reset when the reading is back within the permissible values.

Stop: enables the dosing control outputs to be shut down.

4.5.3 Flow detector alarm

When an external sensor holder is used through which a water sample is made to pass, and this has a flow detector, an alarm can be configured to warn in the event that no water sample reaches the external sensor holder.

If the value = 0, the alarm is disabled.

m3h	SP	0.20 %
	CAL	
	CONTROL	
	ALARM	
	ALARM DETECTOR	
	REGISTER	

ENT

Q ALARM DET	
Q = 0	200 s
Reset: No	
Stop: None	

Reset: enables automatic alarm reset when the reading is back within the permissible values.

Stop: enables the dosing control outputs to be shut down.

4.6 Configuration of the register outputs

If any of the 4-20 mA analogue control outputs is unused, these can be used to be configured as outputs for logging any sensor readings.

To do this, the output to be used needs to be selected and the 4 mA value related to the minimum sensor reading, and the 20 mA value with the maximum reading.

mS	SP	02.00
	CAL	
	CONTROL	
	ALARM	
	REGISTER	

ENT

EC REGISTER	
Out:	4-20 mA 2
4 mA:	00.00 mS
20 mA:	10.00 mS

pH	SP	07.00
	CAL	
	CONTROL	
	ALARM	
	REGISTER	

ENT

PH REGISTER	
Out:	4-20 mA 2
4 mA:	00.00
20 mA:	14.00

m3h	SP	0.20 %
	CAL	
	CONTROL	
	ALARM	
	ALARM DETECTOR	
	REGISTER	

ENT

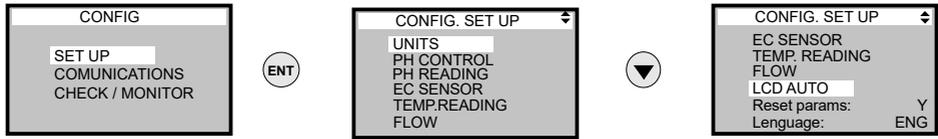
Q REGISTER	
Out:	4-20 mA 2
4 mA:	00.00
20 mA:	14.00

4.7 Configuration and monitor

mS	2.50	SP	2.00
			032%
pH	7.60	SP	7.00
			021%
m3h	10.5		
CONFIG			21.3°C

CONFIG	
SET UP	
COMMUNICATIONS	
CHECK / MONITOR	

4.7.1 Initial configuration (SET UP)



- Units:

Enables selection of the working units for the flow rate (litres or gallons) and temperature (Celsius or Fahrenheit)

- pH Control:

To select whether the pH control uses an acid or a base

- pH Reading:

To enable or disable the pH reading, or set the reading manually

- Temp. Reading:

To enable or disable the temperature reading, or fix a value manually. If using an ITC EC sensor, which includes an internal temperature sensor, the reading will be the measure by this sensor.

- LCD auto:

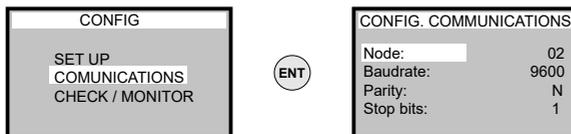
Energy saving option that allowing for switching off of the screen if no action has taken place through the menu in one minute

- EC Sensor:

Allows for selection of EC sensor type between the ITC sensor and a generic sensor with a cell constant k=1

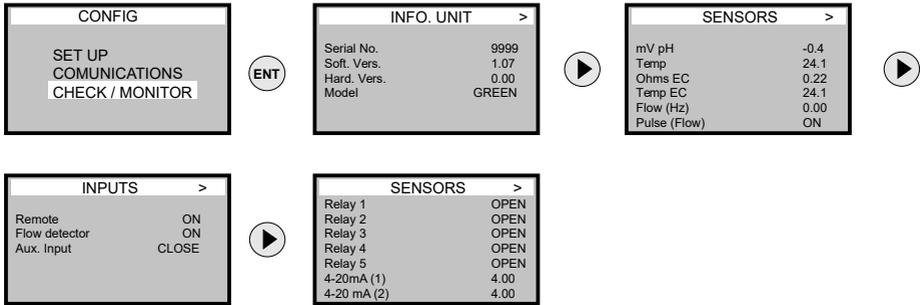
4.7.2 Communications settings

Setting the communications parameters via the RS485 port. Node, Baud Rate, Parity, and stop bit.



4.7.3 Information on the unit and monitor

This screen displays information on the equipment and the raw value sensor, input and output readings.

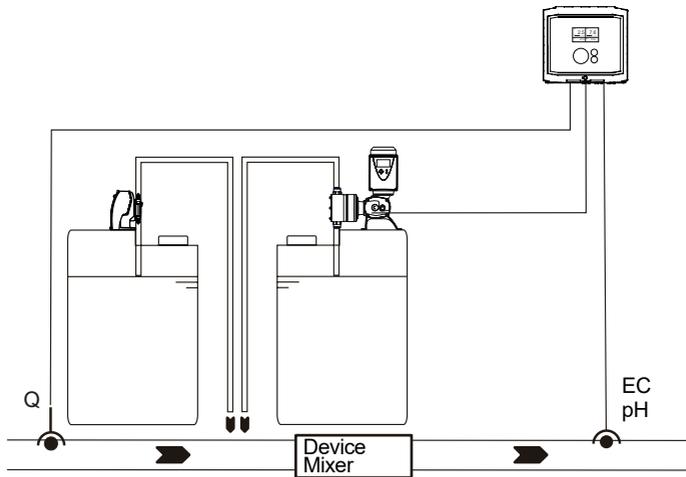


5. INSTALLATION

A place protected from water, away from heat and direct sunlight must be chosen for installation.

5.1. Installation diagram

In-line dosing



Alternative system for obtaining a homogeneous mixture

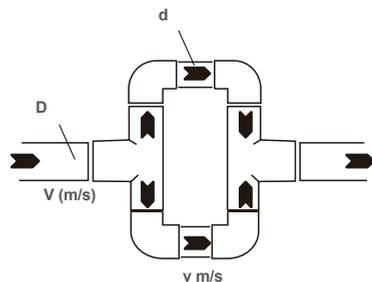
It must be ensured that the velocity in the branch of diameter d is the same or somewhat higher than that in the main pipe of diameter D . For this it needs to comply with the following:

To maintain the velocity, $v = V$:

$$d = 0.7D$$

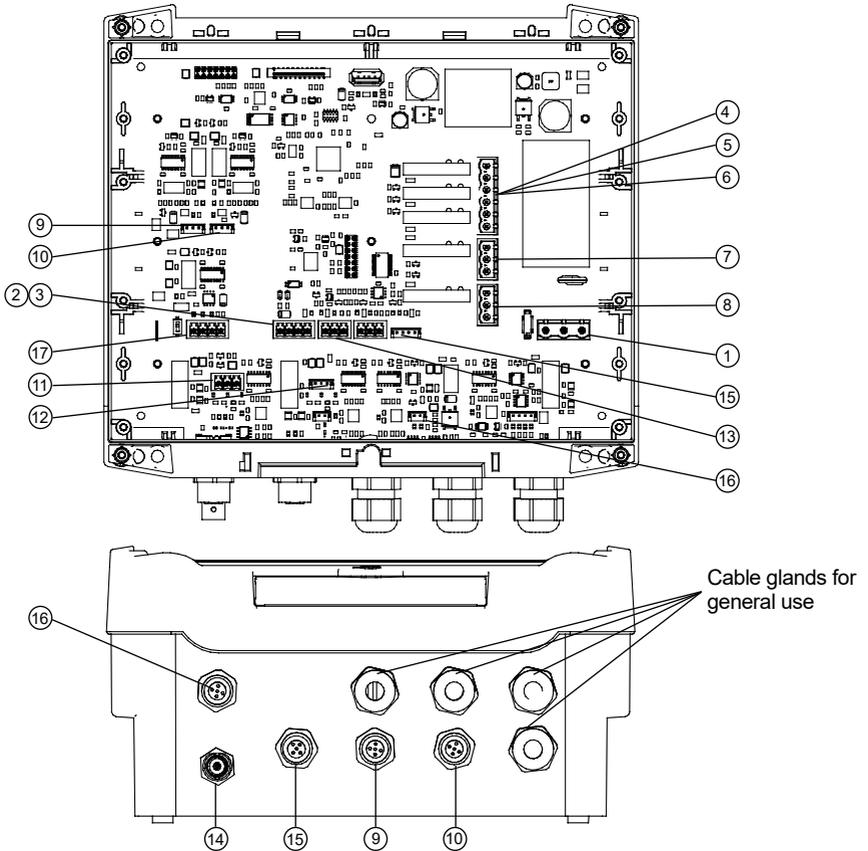
For $v = 1.4 V$

$$d = 0.6D$$



5.2. Wiring

- ① 110-240 V_{AC} power supply
- ② 12 V_{DC} power supply
- ③ Remote ON/OFF input (can be activated with 12-24 V_{AC/DC})
- ④ pH alarm output. Relay
- ⑤ EC alarm output. Relay
- ⑥ Flow rate alarm output. Relay
- ⑦ Control relay output. Relay 3.
- ⑧ Control relay output. Relay 5.
- ⑨ 4-20 mA output. Output 1.
- ⑩ 4-20 mA output. Output 2.
- ⑪ Temperature sensor input PT100.
- ⑫ Temperature sensor input NTC (ITC EC sensor).
- ⑬ Flow detector input.
- ⑭ Input for pH sensor (BNC connector)
- ⑮ Entry for Q flow rate sensor
- ⑯ Input for EC sensor
- ⑰ RS-485



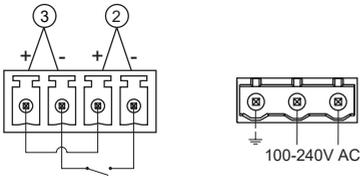


The probe cables must run through separate channelling.
 Must be fitted with a power supply circuit-breaking device according to the EN-60204-1 standard.
 A device for disconnection in case of emergency must be installed.
 The equipment must be protected to prevent abrupt starts

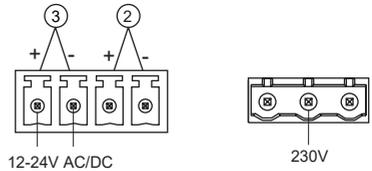
5.3. Remote start/stop activation

100-240 VAC power supply

- External voltage-free signal

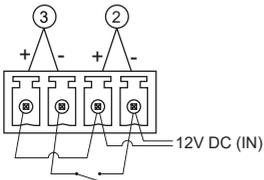


- External 12-24 VAC/DC signal

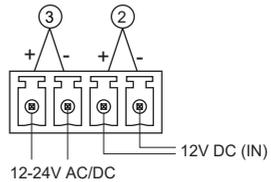


12-24 VDC power supply

- External voltage-free signal



- External 12-24 VAC/DC signal



6. START UP AND ADJUSTMENT

1. Installation:

Install the equipment and connect the pumps (see Installing and Wiring)

2. Equipment calibration and configuration:

Calibrate the sensors (pH, flow meter, etc.) (see Calibration)

Configure the equipment:

- Setpoint
- Type of control
- Installation and equipment configurations

3. Check readings

Start up the installation and check that the sensor reading are correct

4. Check operation of the dosing pumps:

Use "Manual" activation if available

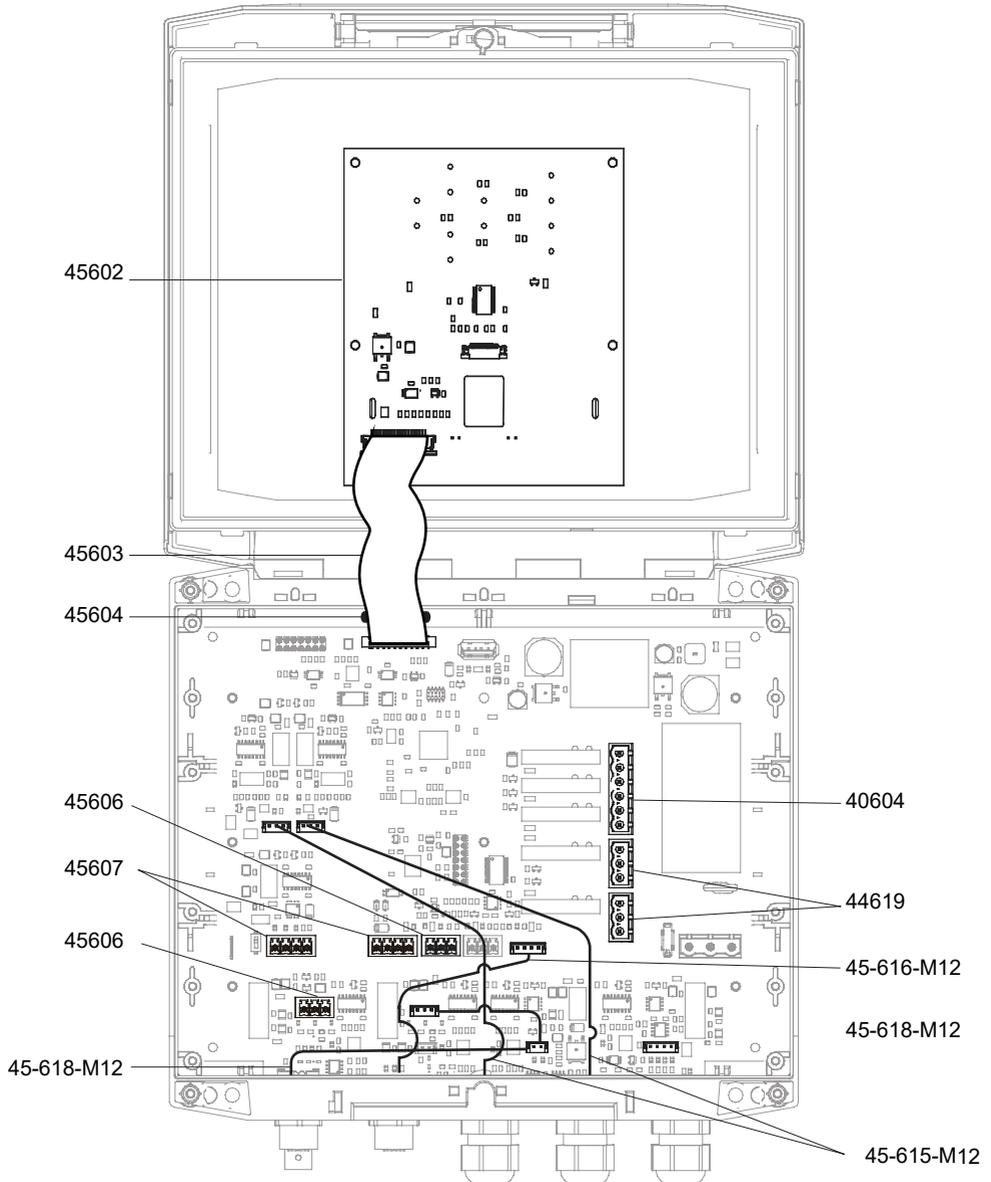
5. Determine "T delay" (time delay), according to the installation

6. Alarms:

Once proper operation of the installation has been confirmed, configure the alarms

See section 4.5

7. MAINTENANCE



SPARE PARTS

CODE	DESCRIPTION	QUANTITY
40604	Female angled terminal strip, 6 pins RDC06x	1
44604	Female angled terminal strip, 3 pins RDC03x	1
45602	WTRTec display	1
45603	Display cable	1
45604	Ferrite	1
45606	Female angled terminal strip, 3 pins, 3.81 pitch, black	3
45607	Female angled terminal strip, 4 pins, 3.81 pitch, black	2
44619	Female angled terminal strip, 3 pins, 5 pitch	2
40604	Female angled terminal strip, 6 pins, 5 pitch	1
45605	Female angled terminal strip, 3 pins, 7.5 pitch	1
45-615-M12	Hose cable, M12 female panel connector (mA)	2
45-616-M12	Hose cable, M12 female panel connector (flow rate)	1
45-618-M12	Hose cable, M12 female panel connector (EC)	1
45625	WTRTEC GREEN electronic board	1
ASSEMBLY		
45-601	WTRTEC display board and front panel	1

CE DECLARATION OF CONFORMITY



I.T.C. S.L.
 Vallès, 26
 Polígono Industrial Can Bernades-Subirà
 08130 Santa Perpètua de Mogoda

Declares that the **WTRtec** products identified by serial number and year of manufacture meet the requirements of the Low Voltage Directive 2014/35/EU and the Electromagnetic Compatibility Directive 2014/30/EU, provided that installation, use and maintenance are carried out in accordance with current regulations and according to the instructions in the instruction manual.

Antón Planas
 Manager



I.T.C. S.L. guarantees the product specified in this document, for a period of 1 year from the date of purchase, against all manufacturing or material defects, provided that installation, use and maintenance of the equipment are correct.

The equipment must be sent, free of charge, to our workshop or I.T.C. S.L.-accredited technical service and it will be returned cash on delivery.

The equipment must be accompanied by the warranty document, with the purchase date and stamp of the establishment where purchased, or a photocopy of the purchase invoice.

MODEL

SERIAL No.

Date of purchase and stamp of the establishment where purchased

DATE: _____

