FLS M9.08
DUAL-PARAMETER pH/ORP AND FLOW MONITOR & TRANSMITTER

SAFETY INSTRUCTIONS

General Statements

• Do not install and service the product without following the Instruction Manual.
• This item is designed to be connected to other instruments which can be hazardous if used improperly. Read and follow all associated instrument manuals before using with it.
• Product installation and wiring connections should only be performed by qualified staff.
• Do not modify product construction.

Installation and Commissioning Statements

• Remove power to the instrument before wiring input and output connections.
• Do not exceed maximum specifications using the instrument.
• To clean the unit, use only chemical compatible products.

PACKING LIST

Please verify that the product is complete and without any damage.
The following items must be included:
• M9.08 Dual-Parameter pH/ORP and Flow Monitor & Transmitter
• Instruction Manual for M9.08 Dual-Parameter pH/ORP
and Flow Monitor & Transmitter

DESCRIPTION

The new FLS M9.08 is a dual monitor which combines pH/ORP and flow measurements. A 4" wide full graphic display shows measured values clearly together with many other useful information. Moreover, due to a multicolor display plus a powerful backlight, measurement status can be determined easily from afar also. A tutorial software guarantees a mistake-proof and fast set up of every parameters. Different type of calibrations can be performed to fit user needs for both measurements. A 4-20mA output dedicated to each measurement grants to remote values to a external device. A proper combination of digital outputs allows customized setups for any process to be controlled.

CONNECTIONS TO INSTRUMENTS

	F3.00	F3.20	F6.30	F3.10	F3.05	F6.60	F6.61	F111
M9.08	X	X	-	X	-	X	X	X

	ULF	F3.80	pH/ ORP200	pH/ ORP400	pH/ ORP600	pH/ ORP800	C150/ 200	C100/ C300	C6.30
M9.08	X	X	X	X	X	X	-	-	-

TECHNICAL DATA

General
• Associated sensors: FLS pH/ORP sensors & FLS hall effect flow sensors or FLS F6.60 flow magmeters
• Materials:
- case: ABS
- display window: PC
- panel & wall gasket: silicone rubber
- keypad: 5-button silicone rubber
• Display:
- LC full graphic display
- backlight version: 3-colours
- backlight activation: user adjustable with 5 levels of timing
- update rate: 1 second
- enclosure: IP65 front
• pH input range: -2÷16 pH
• pH measurement resolution: ± 0.01 pH
• ORP input range: -2000÷ +2000mV
• ORP measurement resolution: ± 1 mV

- Temperature input range: -50÷150°C (-58÷302°F) (with Pt100-Pt1000)
- Temperature measurement resolution: 0,1°C/°F (Pt1000); 0,5°C/°F (Pt100)
- Flow input range (frequency): 0÷1500Hz
- Flow input accuracy (frequency): 0,5%

Electrical

- Supply Voltage: 12 to 24 VDC ± 10% regulated
- Maximum current consumption: 300 mA
- FLS hall effect flow Sensor power:
- 5 VDC @ < 20 mA
- optically isolated from current loop
- short circuit protected
- 2 x Current output:
- 4-20 mA, isolated, fully adjustable and reversible
- max loop impedance: 800 Ω @ 24 VDC - 250 Ω @ 12 VDC
- 2 x Solid State Relay output:
- (Flow) user selectable as MIN alarm, MAX alarm, Pulse Out, Window alarm, Off
- (pH/ORP) user selectable as ON-OFF, Proportional frequency output, Timed Pulse, MIN alarm, MAX alarm, Off
- optically isolated, 50 mA MAX sink, 24 VDC MAX pull-up voltage
- max pulse/min: 300
- hysteresis: User selectable
- 2 x Relay output:
- (Flow) user selectable as MIN alarm, MAX alarm, Pulse Out, Window alarm, Off
- (pH/ORP) user selectable as ON-OFF, Proportional frequency output, Timed Pulse, Off
- mechanical SPDT contact
- expected mechanical life (min. operations): 10^7
- expected electrical life (min. operations): 10^5 N.O./N.C.switching capacity 5A/240 VAC
- max pulse/min: 60
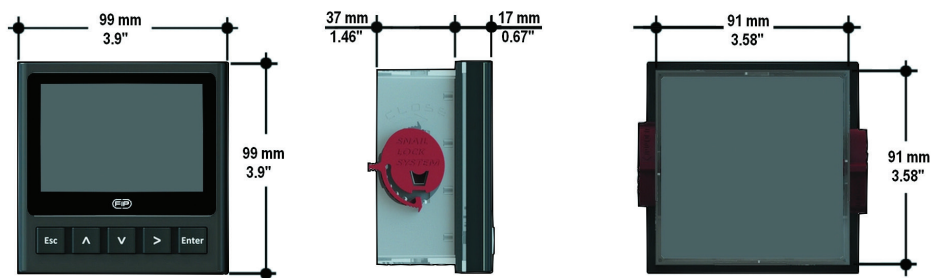- hysteresis: user selectable

Environmental

- Operating temperature: -20 to +70°C (-4 to 158°F)
- Storage temperature: -30 to +80°C (-22 to 176°F)
- Relative humidity: 0 to 95% not condensing
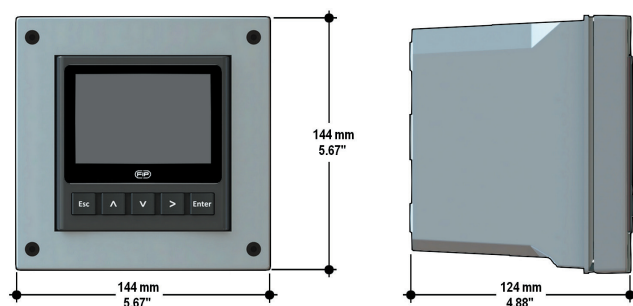
Standards & Approvals

- Manufactured under ISO 9001
- Manufactured under ISO 14001
- CE
- RoHS Compliant
- EAC

DIMENSIONS

PANEL MOUNTING

99 mm
3.9"

99 mm
3.9"

37 mm
1.46"

17 mm
0.67"

91 mm
3.58"

91 mm
3.58"

WALL MOUNTING

144 mm
5.67"

144 mm
5.67"

124 mm
4.88"

INSTALLATION

Mechanical installation

The M9.08 Dual-Parameter pH/ORP and Flow Monitor & Transmitter is available just in one packaging for panel or wall installation. The panel version is installed using the panel mounting kit (M9.SN1), while the wall mounting version is got fixing the panel mounting version on the wall mounting kit (M9.KW1).
The mounting kits can be ordered directly connected to the monitor or separately and then simply installed on it.
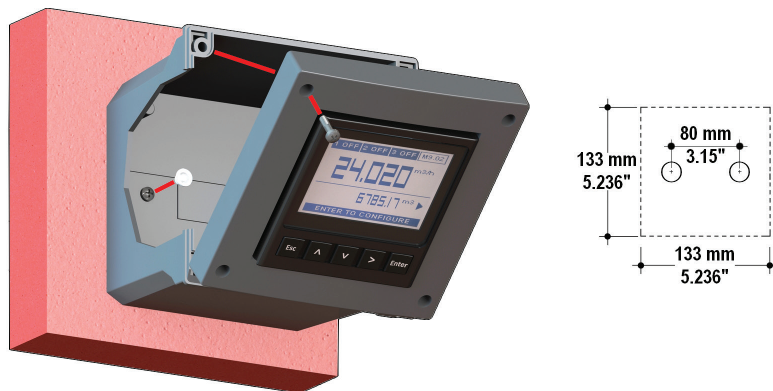
Panel installation
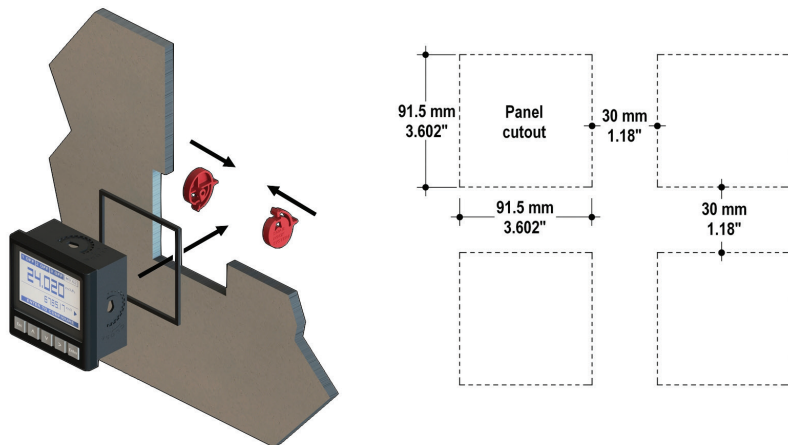
Fix instrument on the panel rotating by hand the fixing snails (M9.SN1).

Wall installation

Use the panel mounting kit (M9.SN1) to fix the M9.08 on the dedicated frontal cutout of the wall mounting kit (M9.KWX).

Tighten front screws of box and waterproof connectors of cables, internally mount caps on screw sites to get a IP65 watertight installation.

WIRING

CAUTION!

General recommendation

Always ensure the power supply is switched off before working on the device.
Make wiring connections according to wiring diagrams.
• Terminals accept 26 to 12 AWG (0.08 to 2.5 mm^2)
• Strip around 10 mm (0.4") of insulation from the wire tips and tin bare ends to avoid fraying.
• Ferrules are suggested when connecting more than one wire to a single terminal.
• Remove the upper part of the terminals for an easy cabling.
• Insert wire tip or ferrule completely into the terminal and fix with the screw until finger tight.
• Do not route the sensor, DC power, or 4-20mA cables in conduit containing AC power wiring. Electrical noise may interfere with sensor signal.
• Routing the sensor cable in grounded metal conduit can help prevent electrical noise and mechanical damage.

Wall Installation

Pull the electrical cables through liquid tight connectors.
Use electrical cables with the proper external diameter for the liquid tight connector.
PG11/PG9: external diameter between 2-7 mm (0.079-0.276")
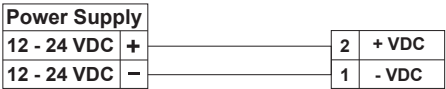
REAR TERMINAL VIEW
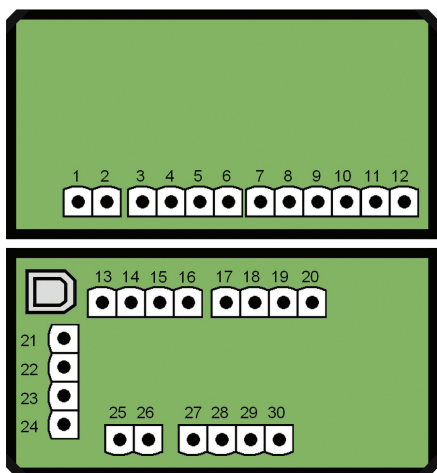
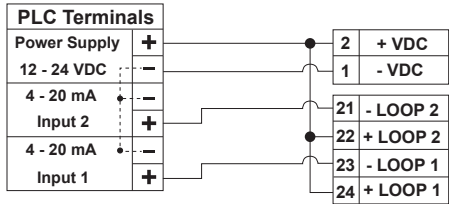| 1	-VDC	Power Supply
2	+VDC	
3	NO	SSR1
4	COM	
5	NO	SSR2
6	COM	
7	NO	RELAY1
8	COM	
9	NC	
10	NO	RELAY2
11	COM	
12	NC	
13	+V	Flow Sensor
14	FREQ IN	
15	DIR	
16	GND	
17	+HOLD	Digital Input
18	-HOLD	
19	+REED	
20	-REED	
21	-LOOP2	Analog Output
22	+LOOP2	
23	-LOOP1	
24	+LOOP1	
25	IN+	pH/ORP Input
26		
27	REF	PT100 - PT1000
28		
29		
30		

Refer to dedicated sensor manual for its wiring.
In case a temperature sensor (Pt100-Pt1000) is not available, place a brigde connection between 28 - 29 and between 29 - 30.
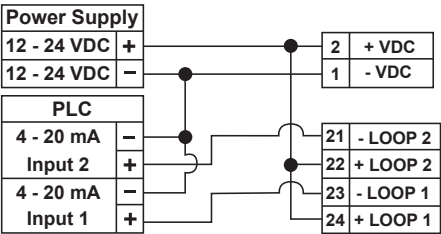
POWER/LOOP WIRING DIAGRAM
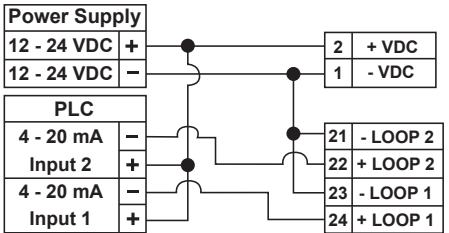
Stand-alone application,
no current loop used

Connection to a PLC with built-in power supply

Power Supply				2	+ VDC
12 - 24 VDC	+			1	- VDC
12 - 24 VDC	−				

PLC Terminals				2	+ VDC
Power Supply	+			1	- VDC
12 - 24 VDC	−			21	- LOOP 2
4 - 20 mA				22	+ LOOP 2
Input 2	+			23	- LOOP 1
4 - 20 mA	−			24	+ LOOP 1
Input 1	+				

Connection to a PLC/Instrument with a separate power supply

Power Supply				2	+ VDC
12 - 24 VDC	+			1	- VDC
12 - 24 VDC	−				

PLC				21	- LOOP 2
4 - 20 mA	−			22	+ LOOP 2
Input 2	+			23	- LOOP 1
4 - 20 mA	−			24	+ LOOP 1
Input 1	+				

or

Power Supply				2	+ VDC
12 - 24 VDC	+			1	- VDC
12 - 24 VDC	−				

PLC				21	- LOOP 2
4 - 20 mA	−			22	+ LOOP 2
Input 2	+			23	- LOOP 1
4 - 20 mA	−			24	+ LOOP 1
Input 1	+				

PROBE WIRING DIAGRAM

pH/ORP probe connection

	SIGNAL	25	+IN
		26	
	SHIELD	27	REF pH
		28	PT100/1000
		29	
		30	
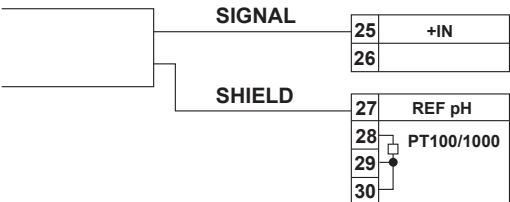
Pt100 - Pt1000
two wires connection

	27	
	28	PT100/1000
	29	
	30	
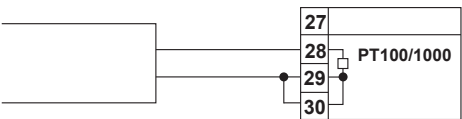
Pt100 - Pt1000
three wires connection

	27	
	28	PT100/1000
	29	
	30	
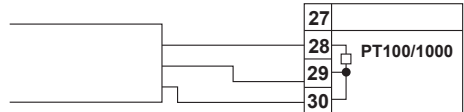
Pt100 - Pt1000
no connection

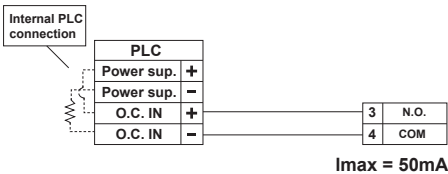| 27	
28	PT100/1000
29	
30	
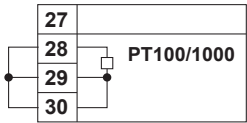
USB PORT

A USB port (type B) is available on the M9.08 PCB.
The USB connection allows the updating of device software. To update the software you need: USB cable (M9.KUSB), the interface software "FLS Calibration System" and the new updating software for M9.08 which are both downloadable from www.flsnet.it freely on product page.

# SOLID-STATE RELAY WIRING DIAGRAM (FOR SSR1 AND SSR2)
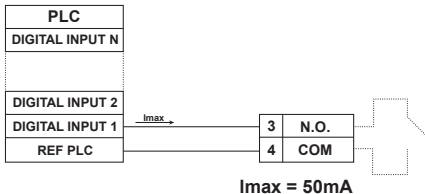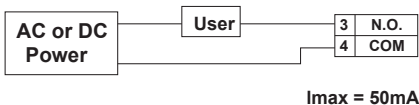
Connection to a PLC with NPN input

Internal PLC connection

PLC	
Power sup.	+
Power sup.	−
O.C. IN	+
O.C. IN	−

3	N.O.
4	COM

Imax = 50mA
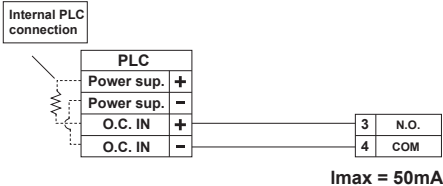
Connection to a PLC with PNP input

Internal PLC connection

PLC	
Power sup.	+
Power sup.	−
O.C. IN	+
O.C. IN	−

3	N.O.
4	COM

Imax = 50mA

Connection to a PLC / Instrument digital input with separate Power Supply

Power Supply	
12 - 24 VDC	+
12 - 24 VDC	−
PLC / Instrument	
Digital INPUT	−
Digital INPUT	+

3	N.O.
4	COM
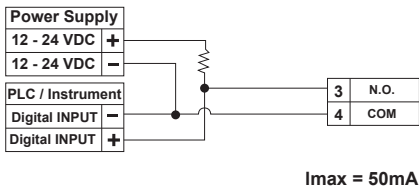
Imax = 50mA

Connection to a PLC / Instrument digital input for Voltage Free Contacts (REED)

PLC	
DIGITAL INPUT N	
DIGITAL INPUT 2	
DIGITAL INPUT 1	Imax →
REF PLC	

3	N.O.
4	COM

Imax = 50mA

Connection to an User

AC or DC Power	User

3	N.O.
4	COM

Imax = 50mA

| AC or DC Power	User

3	N.O.
4	COM

Imax = 50mA

The alarm is off during normal operation and goes ON according to Relay setting.
If Imax > 50 mA use external Relay

+V

Imax

External Relay

N.C.
COM
N.O.

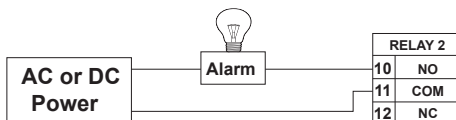| N.O. | 3 |
| COM | 4 |

Imax

V= 12-24 VAC/VDC

-V **Imax = 50mA**
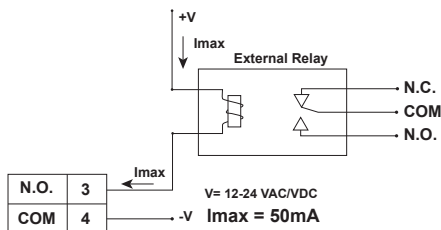
RELAY WIRING DIAGRAM (FOR RELAY 1 & RELAY 2)

The alarm is OFF during normal operation and goes ON according to Relay settings

AC or DC Power

Alarm

RELAY 2	
10	NO
11	COM
12	NC
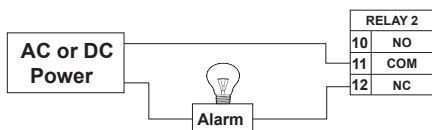
The alarm is ON during normal operation and goes OFF according to Relay settings

AC or DC Power

Alarm

RELAY 2	
10	NO
11	COM
12	NC

HOLD AND REED CONNECTION

12-24 VDC

17	+ HOLD
18	- HOLD
19	+ REED
20	- REED
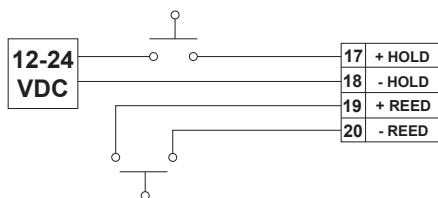
OPERATIONAL OVERVIEW

The M9.08 Dual-Parameter pH/ORP and Flow Monitor & Transmitter features a full graphic display and a five-button keypad for system set-up, calibration and operation. Full graphic display has a white backlight during standard conditions, a green backlight in case a external device control is activated (ON/OFF, PROPORTIONAL FREQUENCY, PROPORTIONAL PULSE and TIMED PULSE), a red backlight in case a set alarm is activated (O.V.A., O.T.A, MIN, MAX, related to pH/ORP measurement and MIN, MAX WINDOW related to flow measurement, always with priority).
The five push buttons of the keypad are used to navigate display levels and modify settings.
The function of each button may change according to display level; please refer to following table:

VIEW LEVEL ****	MENU DIRECTORY

VIEW LEVEL **

pH/ORP - temperature

Output Settings ***

pH/ORP - flow

pH/ORP - temperature - flow

item code -
software release

pH/ORP or temperature or flow -
analog output 1

pH/ORP or temperature or flow -
analog output 2

pH/ORP direct access to calibration*

pH/ORP - last calibration

flow - infinte totalizer -
resettable totalizer

flow - infinte totalizer -
resettable totalizer**

∨
∧

Enter

Esc

MENU DIRECTORY

Settings

∨
∧

Flow settings

∨
∧

Calibration

∨
∧

Flow Calibration

∨
∧

Outputs

∨
∧

Options

∨
∧

View data

*"pH/ORP direct access to calibration" includes the
"in-line adjustment" option to align on site the measurement
with a instant reference value.
** Only in case bidirectional option has been activated
*** Use **>** for more info about Outputs

**** VIEW LEVEL LEGENDA
AT: automatic temperature (a Pt100-1000 is connected)
MT: manual temperature (no temperature sensor connected)
NTC: not temperature compensation
ATC: automatic temperature compensation

MENU LEVEL

Settings

- Probe Unit
- Temperature Unit
- Manual Temperature

Flow Settings

- K Factor
- Flow Unit
- Volume Unit

Calibration

- pH/ORP Probe Calibration
- Temperature Probe Calibration

Flow Calibration

- Correction Factor
- Auto Calibration
- Signal Intensity BLE

Enter

Esc

Outputs

- 1 SSR
- 2 SSR
- 3 RELAY
- 4 RELAY
- Output Test
- 4-20mA1
- 4-20mA2

Options

- Language
- Flow Filter
- Filter
- Backlight
- Password
- Default Data
- Output Activation
- Hold
- Reed
- Contrast
- Decimal Point Measurement
- Bi-directional
- Decimal Point Flow
- Upgrade Firmware
- F3.00.W

View Data

- Output Statistic
- Settings Data
- Statistic Reset
- Frequency/Direction input
- Hold - Reed Statistic
- Probe Signal

EDIT LEVEL

PUSH BUTTON

| ∨ | ∧ |

to modify an item

Enter →

>

to scroll right

Esc ←

Esc

to return to Menu without saving

Enter

to save new settings
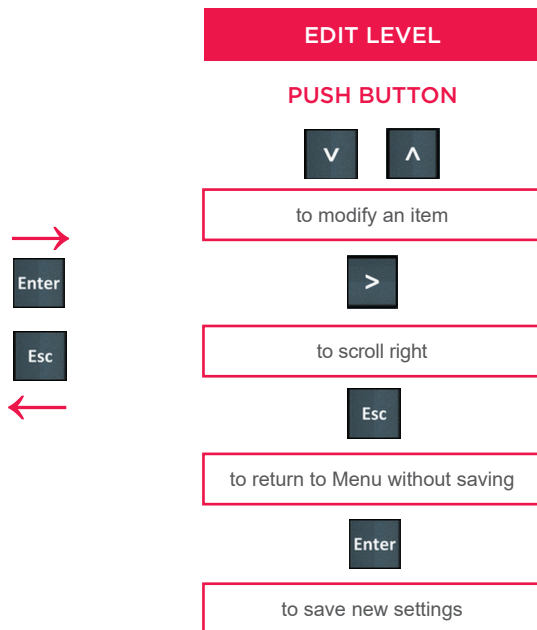
OUTPUT MODE

The M9.08 Dual-Parameter pH/ORP and Flow Monitor & Transmitter features 2 solid state relays and 2 mechanical relays in addition to 2 analog output 4-20mA freely.Only the second mechanical relay can be set as a pH/ORP alarm (icon is 4ALR) related to the feedback of external device managing. Icon will turn to 4OTA (Over Time Alarm) in case the pH/ORP setpoint has not been reached within set maximum timing. Icon will turn to 4OVA (Over Values Alarm) in case pH/ORP values overstep the set value band. In addition to the type of failure, a reference number correlated to the involved digital output is reported by the output number.

PROCEDURE FOR OUTPUTS SETTING
- go to the "Options" menu
- enter into the "Outputs activation" sub menu
- enable output(s)
- go to the "Outputs" menu
- set the operating mode for each enabled output

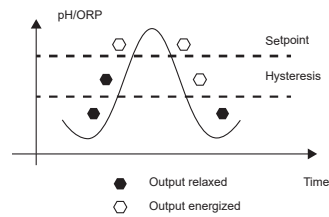|			
Monitor without digital output activated	In case a digital output is enabled, a icon will appear	In case a digital output is set, icon reports the operating mode	In case set digital output is activated, the icon will turn to black

Digital outputs can be set in the following way:

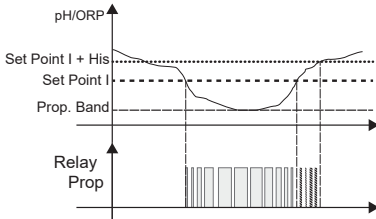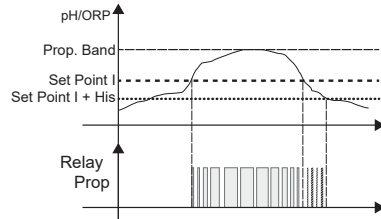# pH/ORP

ON-OFF MODE (icon reports O-F) LOW LEVEL
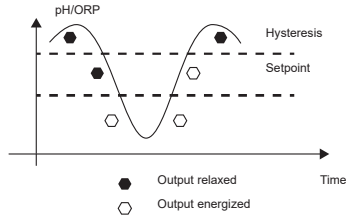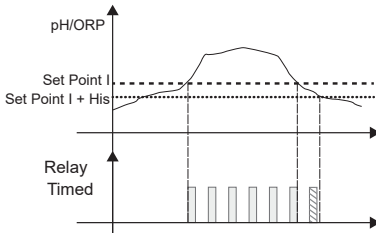

ON-OFF MODE (icon reports O-F) HIGH LEVEL

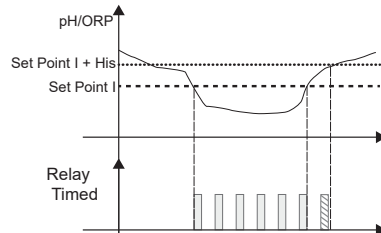## PROPORTIONAL MODE (icon reports PRP) LOW LEVEL

PROPORTIONAL MODE (icon reports PRP) HIGH LEVEL
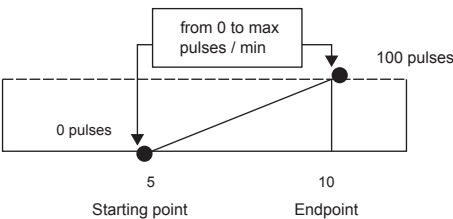

TIMED MODE (icon reports TMD) HIGH LEVEL
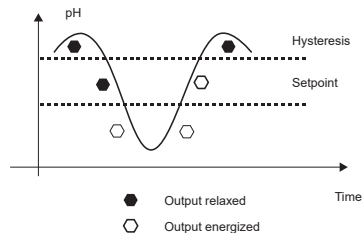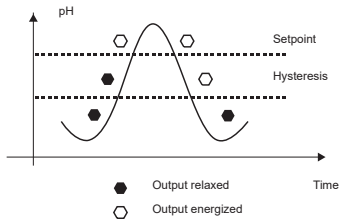

TIMED MODE (icon reports TMD) LOW LEVEL

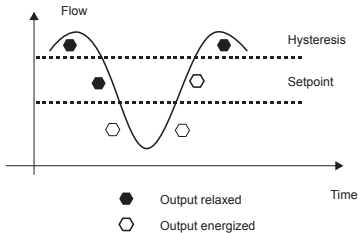## FREQUENCY MODE (icon reports FRQ)

MIN MODE (icon reports MIN)

MAX MODE (icon reports MAX)

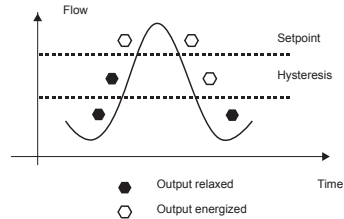pH

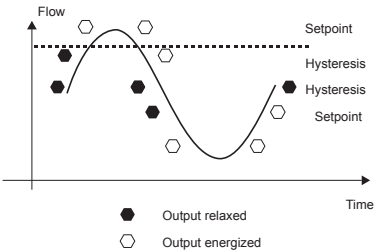Setpoint
Hysteresis

● Output relaxed   Time
○ Output energized

FLOW

MIN MODE (icon reports MIN)

Flow

Hysteresis
Setpoint

● Output relaxed   Time
○ Output energized

MAX MODE (icon reports MAX)

Flow

Setpoint
Hysteresis

● Output relaxed   Time
○ Output energized

WINDOW MODE (icon reports WDW)

Flow

Setpoint
Hysteresis
Hysteresis
Setpoint

● Output relaxed   Time
○ Output energized

PULSE MODE (icon reports PLS)

Pulse duration   Pulse duration   Pulse duration

Volume   Volume   Volume

● Output relaxed
○ Output energized
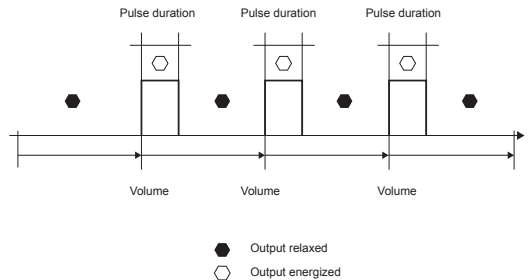
OUTPUT FOR F3.00.W

In case of combination with F3.00.W, LOW BATTERY status and NO SIGNAL condition can be remoted by two different digital outputs or by one for both indications.

SOFTWARE UPDATING

In order to update the Instrument Software with a New Firmware Release follow the suggested procedures:

TO UPDATE INSTALLED UNITS

- Download the interface software "FLS Calibration System"
and the Updated Software on www.flsnet.it
- Launch the software "FLS Calibration System" on the laptop
- Select OPTION and then UPGRADE FIRMWARE
- Confirm the "Firmware Upgrade" procedure by ENTER

- Connect M9.08 to the laptop by the USB cable
- Select the item (M9.08) which appears on the navigation area
on the "FLS Calibration System" software
- Confirm FW UPGRADE and select the Updated Software
NOTE: At the end of the procedure restart the instruments in order to refresh
M9.08 software (It takes 90 seconds to refresh the SW. Please do not interrupt
the restarting process).

TO UPDATE NEW UNITS
- Download the interface software "FLS Calibration System" and the updated
software on www.flsnet.it.
- Launch the software "FLS Calibration System" on the laptop
- Push together ENTER and ESC powering the monitor
- Connect M9.08 to the laptop by the USB cable
- Select the item (M9.08) which appears on the surfing area on the software
"FLS Calibration System"
- Confirm FW UPGRADE and select the Updated Software

NOTE: At the end of the procedure restart the instruments in order to refresh
M9.08 software (It takes 90 seconds to refresh the SW.
Please do not interrupt the restarting process).

ORDERING DATA

Part No.	Description / Name	Power supply	Wire power Technology	Sensor Input	Output
M9.08.P1	Panel mount pH/ORP & Flow monitor & transmitter	12 - 24 VDC	3/4 wire	pH/ORP, Temperature, Flow (Frequency)	2*(4-20mA), 2*(S.S.R.), 2*(mech. relay)
M9.08.W1	Wall mount pH/ORP & Flow monitor & transmitter	12 - 24 VDC	3/4 wire	pH/ORP, Temperature, Flow (Frequency)	2*(4-20mA), 2*(S.S.R.), 2*(mech. relay)
M9.08.W2	Wall mount pH/ORP & Flow monitor & transmitter	110 - 230 VAC	3/4 wire	pH/ORP, Temperature, Flow (Frequency)	2*(4-20mA), 2*(S.S.R.), 2*(mech. relay)

ACCESSORIES

Part No.	Name	Description
M9.KW1	Wall mounting kit	144x144mm plastic box for wall installation of all panel mount monitors
M9.KW2	Wall mounting kit with power supply	144x144mm plastic box and 110/230 VAC to 24 VDC power supply for wall installation of all panel mount monitors
M9.KUSB	USB cable for device interfacing	USB cable dedicated to FLS products, 1,5 meter long

SPARE PARTS

Part No.	Name	Description
M9.SN1	Fixing snails	2 fixing snails for panel installation of FLS monitors