

# FLS M9.05

## CONDUCTIVITY 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:

- M9.05 conductivity Monitor & Transmitter
- Instruction Manual for M9.05 conductivity Monitor & Transmitter

## DESCRIPTION

The new FLS M9.05 is a powerful conductivity monitor studied to fit a broad range of applications included ultrapure water process. A 4" wide full graphic display shows measured values clearly together with many other useful information. Moreover, due to the multicolor bright backlight, measurement status can be determined easily also from very long distance. A tutorial software guarantees a mistake-proof and fast set up of every parameter. Measured values can be showed as resistivity or TDS in according with customer needs. A cell constant freely fixable allows to use all types of 2-cell conductivity probe. Two 4-20mA output grants to remote values of conductivity and temperature to external devices. 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
M9.05	-	-	-	-	-	-	-	-

	ULF	F3.80	pH/ ORP200	pH/ ORP400	pH/ ORP600	C150/ 200	C100/ C300	C6.30
M9.05	-	-	-	-	-	X	X	-

## TECHNICAL DATA

### General

- Associated sensors: FLS conductivity sensors and FLS temperature sensors
- 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
- Conductivity input range: 0,055÷200000µS (Cell Costant : 0.01 - 10.0)
- Conductivity measurement accuracy: ± 2.0 % of reading value
- Temperature input range: -50÷150°C (-58÷302°F) (with Pt100-Pt1000)
- Temperature measurement resolution: 0,5°C/°F (Pt100-Pt1000)

## Electrical

- Supply Voltage: 12 to 24 VDC  $\pm$  10% regulated
- 2 x Current output:
  - 4-20 mA, isolated, fully adjustable and reversible
  - max loop impedance: 800  $\Omega$  @ 24 VDC - 250  $\Omega$  @ 12 VDC
- 2 x Solid State Relay output:
  - user selectable as ON-OFF, Proportional frequency, Proportional Pulse, Timed Pulse, Off
  - optically isolated, 50 mA MAX sink, 24 VDC MAX pull-up voltage
  - max pulse/min: 300
  - hysteresis: User selectable
- 2 x Relay output:
  - user selectable as ON-OFF, Proportional frequency, Proportional Pulse, 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/240VAC
  - max pulse/min: 60t
  - hysteresis: User selectable

## Environmental

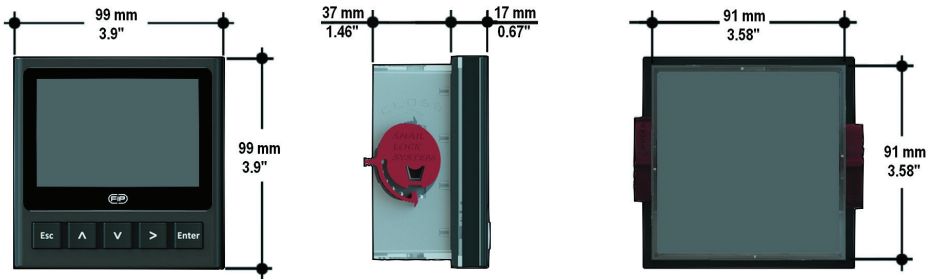
- Operating temperature: -20 to +70°C (-4 to 158°F)
- Storage temperature: -30 to +80°C (-22 to 176°F)
- Relative humidity: 0 to 95% not condensing

## Standards & Approvals

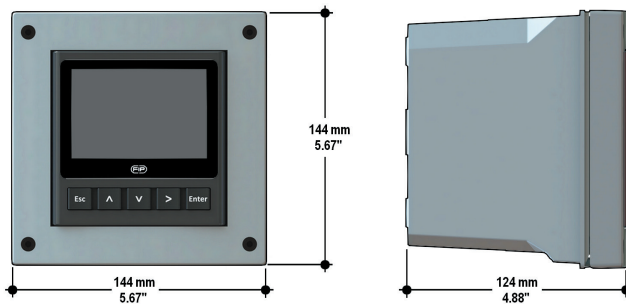
- Manufactured under ISO 9001
- Manufactured under ISO 14001
- CE
- RoHS Compliant
- GOST R

# DIMENSIONS

## PANEL MOUNTING



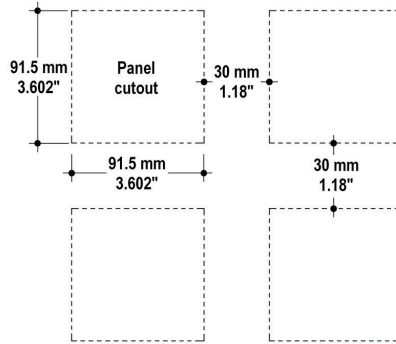
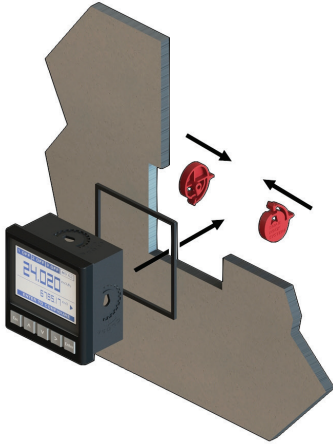
## WALL MOUNTING



## Mechanical installation

The conductivity monitor & transmitter M9.05 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 (F9.KWX). The mounting kits can be ordered directly connected to the monitor or separately and then simply installed on it.

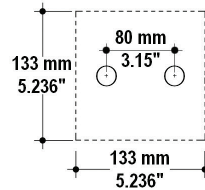
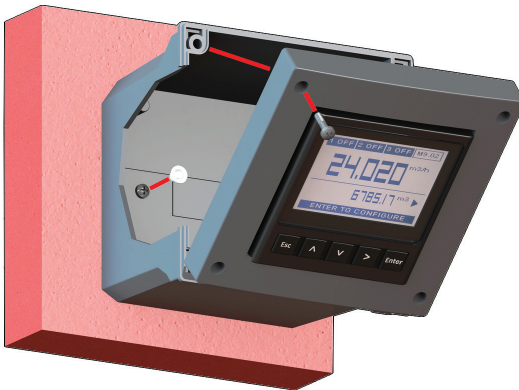
## Panel installation



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 M9.05 on the dedicated frontal cutout of the wall mounting kit (F9.KWX).



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

# WIRING



## General recommendation

Always ensure the power supply is switched off before working on the device.  
Make wiring connections according to wiring diagrams.

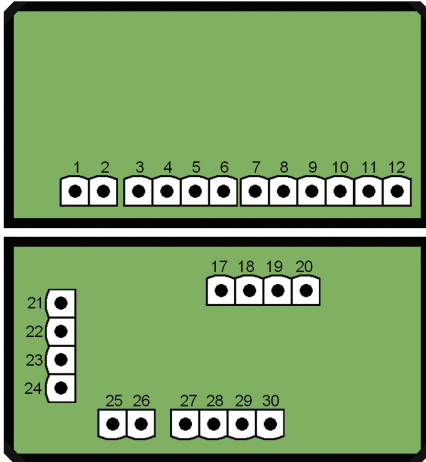
- Terminals accept 26 to 12 AWG (0.08 to 2.5 mm<sup>2</sup>)
- Strip around 10 mm (0.4") of insulation from the wire tips and tin bare ends to avoid fraying.
- Ferrules are suggested when connecting more than one wire to a single terminal.
- Remove the upper part of the terminals for an easy cabling.
- 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



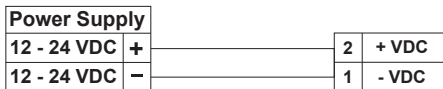
1	-VDC	Power Supply
2	+VDC	
3	NO	SSR1
4	COM	
5	NO	SSR2
6	COM	
7	NO	RELAY1
8	COM	
9	NC	RELAY2
10	NO	
11	COM	
12	NC	
17	+HOLD	Digital Input
18	-HOLD	
19	+REED	
20	-REED	
21	-LOOP2	Analog Output
22	+LOOP2	
23	-LOOP1	
24	+LOOP1	
25	+IN	Conductivity Sensor
26	REF	
27		PT100 - PT1000
28		
29		
30		

Refer to dedicated sensor manual for its wiring. In general conductivity sensor wires can be connected independently without caring about +IN/REF connectors.

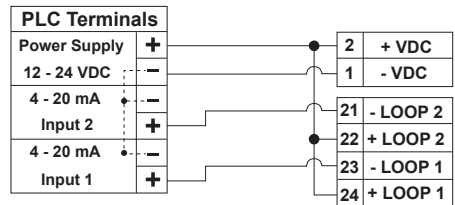
In case a temperature sensor (Pt100-Pt1000) is not available, place a bridge connection between 28 - 29 and between 29 - 30.

## POWER/LOOP WIRING DIAGRAM

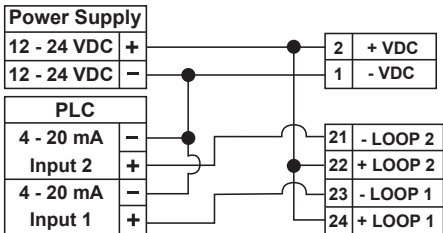
Stand-alone application,  
no current loop used



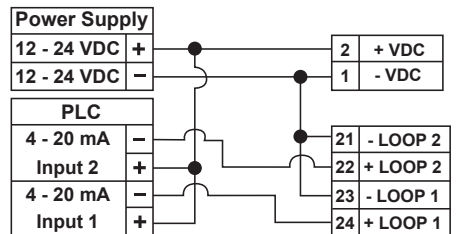
Connection to a PLC with built-in  
power supply



Connection to a PLC/Instrument with a separate power supply

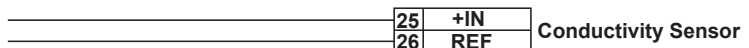


or



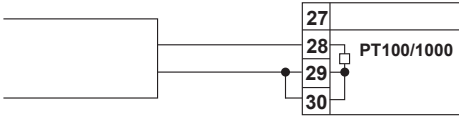
## PROBE WIRING DIAGRAM

Conductivity probe connection

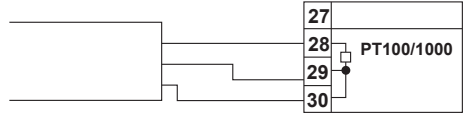


In general conductivity sensor wires can be connected independently without caring about +IN/REF connectors.

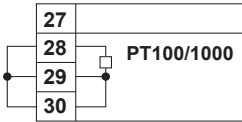
Pt100 - Pt1000  
two wires connection



Pt100 - Pt1000  
three wires connection

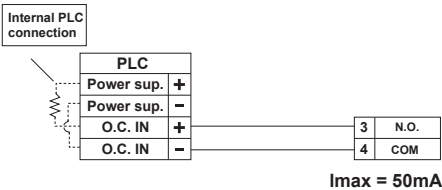


Pt100 - Pt1000  
no connection

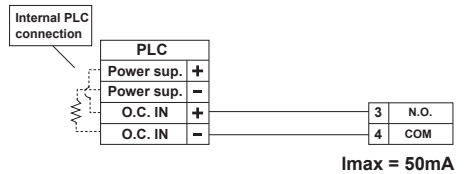


## SOLID-STATE RELAY WIRING DIAGRAM (FOR SSR1 AND SSR2)

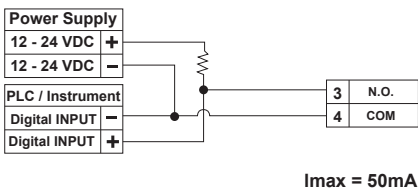
Connection to a PLC with NPN input



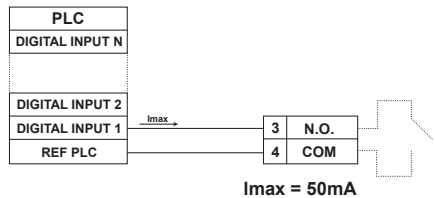
Connection to a PLC with PNP input



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

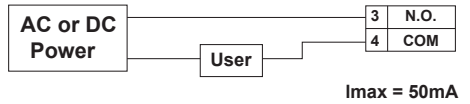
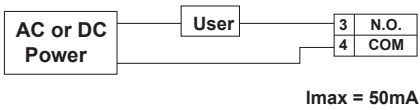


Connection to a PLC / Instrument  
digital input for Voltage Free Contacts  
(REED)

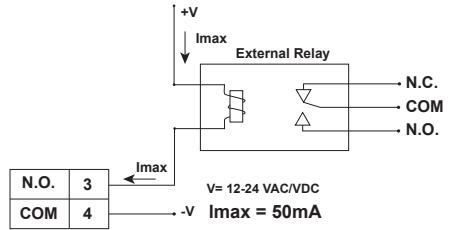




## Connection to an User

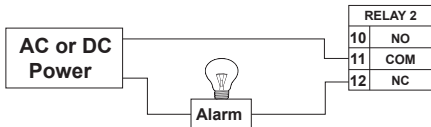


The alarm is off during normal operation and goes ON according to Relay setting.  
If  $I_{max} > 50\text{mA}$  use external Relay

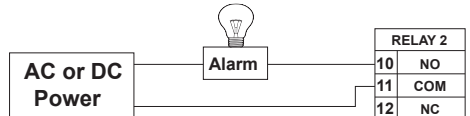


## RELAY WIRING DIAGRAM (FOR RELAY 1 & RELAY 2)

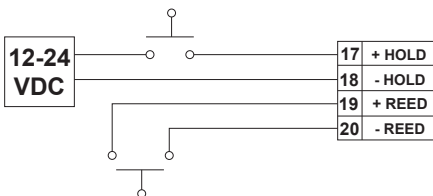
The alarm is OFF during normal operation and goes ON according to Relay settings



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

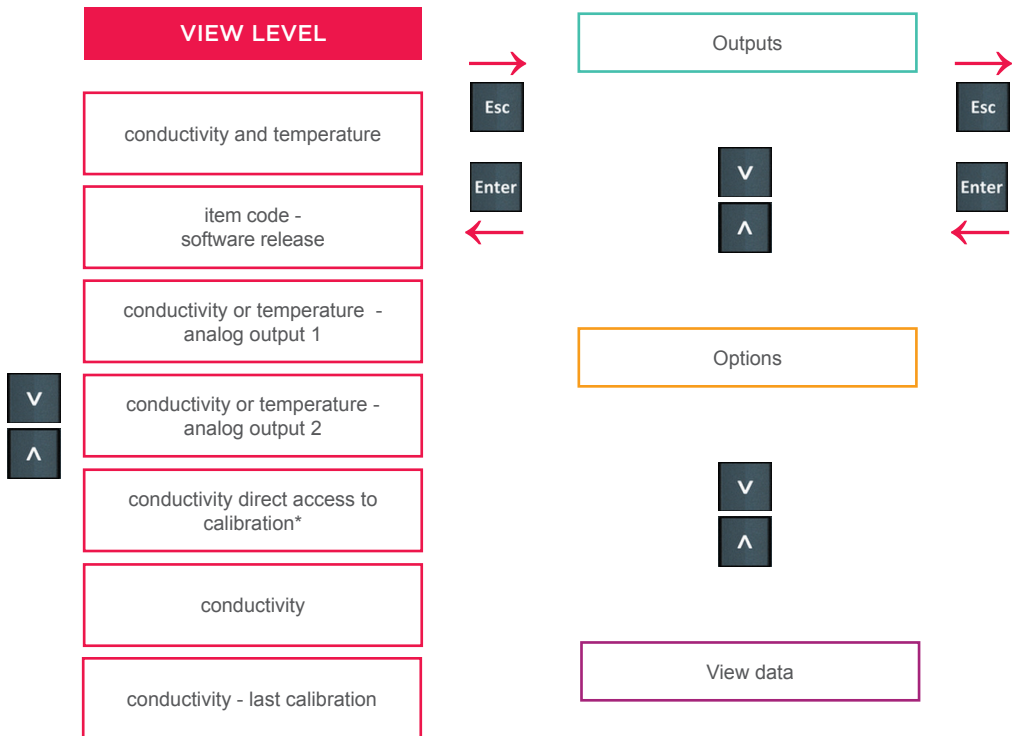


## HOLD AND REED CONNECTION



# OPERATIONAL OVERVIEW

The M9.05 conductivity monitor and 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. and O.T.A., 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:



\*"Conductivity direct access to calibration" includes the "in-line adjustment" option to align on site the measurement with a instant reference value.

## MENU LEVEL

Conductivity Unit

Cell Constant

TDS Factor

Temperature Unit

Temperature Compensation Mode

Reference Temperature

Temperature Compensation Factor

Manual Temperature

Conductivity Probe Calibration

Temperature Probe Calibration

1 SSR

2 SSR

3 RELAY

4 RELAY

Output Test

4-20mA1

4-20mA2

Language

Filter

Backlight

Password

Default Data

Output Assignment

Hold

Reed

Contrast

Decimal Point Measurement

Probe Signal

Hold - Reed Statistic

Output Statistic

Settings Data

Statistic Reset

## EDIT LEVEL

### PUSH BUTTON



to modify an item



to scroll right

Esc

to return to Menu without saving

Enter

to save new settings

# OUTPUT MODE


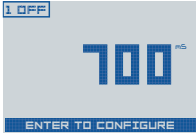

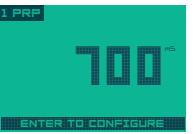
The M9.05 conductivity monitor and transmitter features 2 solid state relays and 2 mechanical relays in addition to 2 analog output 4-20mA.

Only the second mechanical relay can be set as an alarm (icon is 4ALR) related to the feedback of external device managing. Icon will turn to 4OTA (Over Time Alarm) in case the setpoint has not been reached within set maximum timing.

Icon will turn to 4OVA (Over Values Alarm) in case measured 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 out put number.

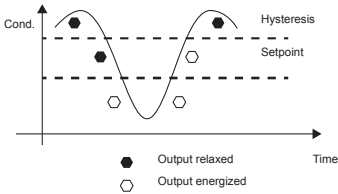
## PROCEDURE FOR OUTPUTS SETTING

- 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

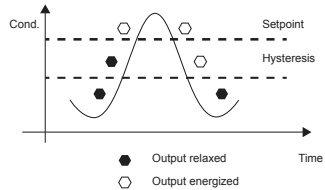
			
<p>Monitor without digital output activated</p>	<p>In case a digital output is enabled, a icon will appear</p>	<p>In case a digital output is set, icon reports the operating mode</p>	<p>In case set digital output is activated, the icon will turn to black</p>

Digital outputs can be set in the following way:

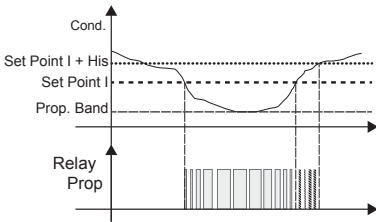
**ON-OFF MODE (icon reports O-F) alkaline dosing**



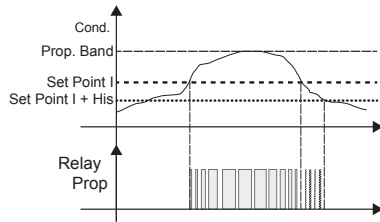
**ON-OFF MODE (icon reports O-F) acid dosing**



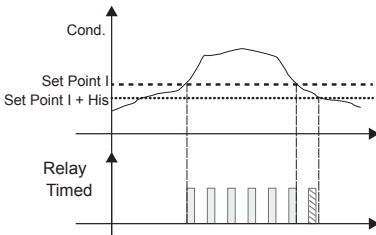
**PROPORTIONAL MODE (icon reports PRP) alkaline dosing**



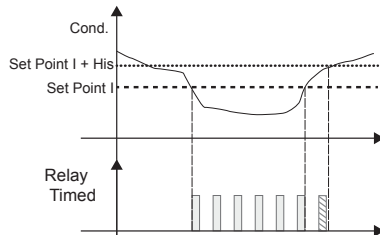
**PROPORTIONAL MODE (icon reports PRP) acid dosing**



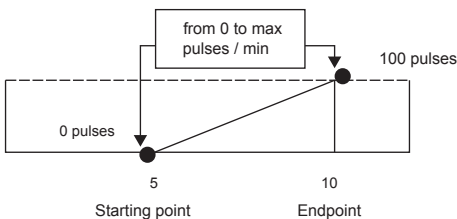
**TIMED MODE (icon reports TMD) acid dosing**



**TIMED MODE (icon reports TMD) alkaline dosing**



**FREQUENCY MODE (icon reports FRQ)**



## ORDERING DATA

Part No.	Description /Name	Power supply	Wire power Technology	Sensor Input	Output
M9.05.P1	Panel mount conductivity monitor	12 - 24 VDC	3/4 wire	conductivity	2*(4-20mA), 2*(S.S.R.), 2*(mech. relay)
M9.05.P1	Wall mount conductivity monitor	12 - 24 VDC	3/4 wire	conductivity	2*(4-20mA), 2*(S.S.R.), 2*(mech. relay)
M9.05.P1	Wall mount conductivity monitor	110 - 230 VAC	3/4 wire	conductivity	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 110/230VAC to 24 VDC power supply for wall installation of all panel mount monitors

## SPARE PARTS

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





**FIP - Formatura Iniezione Polimeri S.p.A.**

Loc. Pian di Parata  
16015 Casella  
Genova - Italy  
*Tel. +39 010 96211*  
*Fax +39 010 9621209*  
[www.flsnet.it](http://www.flsnet.it)