USER MANUAL

S6001

Pump controller



SENECA®

CE

ORIGINAL INSTRUCTIONS

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1 INTRODUCTION

1.1 IDENTIFICATION DATA OF THE MANUAL

The identification data of the manual can be found in the footer of this manual.

1.2 PURPOSE AND USE OF THE MANUAL

This Manual is an integral part of the product and is intended for all people who work on the product or interact with the users of the product itself. It aims to provide all the information necessary to:

- quickly identify all parts of the product;
- define the tasks, capabilities and intervention limits of the various users;
- perform all the expected operations during the phases preceding the use, utilization, maintenance and disposal of the product;
- guarantee the safety and protection of the health of personnel who work on the product in various ways;
- ensure the efficient operation of the product.

This manual must be read carefully in its entirety before carrying out any operation on the product. In case of doubts on the correct interpretation of the instructions contained therein, contact SENECA s.r.l. to obtain the necessary clarifications.

This Manual must be kept with care throughout the life of the product and must accompany the product itself in all its transfers, for any reason, to other users. It must be placed near the product, in a place protected from atmospheric agents, heat, humidity and corrosive agents, easily accessible and known to all users; it must be consulted taking care not to damage it, not to remove pages, not to modify its contents in any way.

If, as a result of constructive changes that entail a change in the operation of the product, an update of the manual should be necessary, SENECA s.r.l. will provide the Customer with a revision of the Manual itself that will replace the previous one in all respects.

1.3 CONSULTATION OF THE MANUAL

Inside the manual the information is organized in:

- chapters,
- subchapters,
- paragraphs,
- subparagraphs

and they are easily traceable by consulting the Summary at the beginning of the Manual itself.

To draw users' attention to the correct and safe use of the product, the following graphic symbols are used in this manual:

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	The symbol is used to indicate dangerous situations for people or situations that may cause damage to the product or compromise its efficiency.
	The symbol is used to indicate prohibited operations.
	The symbol is used to call attention to particularly important information.

1.4 GLOSSARY

ROUTER

Network device that sends data packets between computer networks, for example through a LAN or a WAN (Internet).

SWITCH

Network device that connects different devices in a computer network, using a form of packet switching to send data to the destination device.

HMI (Human Machine Interface)

The man-machine interface is a component of the devices that are able to manage the interactions between man and machine. The interface consists of hardware and software that allow you to translate user inputs and turn them into signals for the machines, which in turn provide the result requested by the user as output.

VPN (Virtual Private Network)

Virtual private networks (VPNs) are point-to-point connections on a public or private network, such as the Internet. A VPN client uses special TCP / IP-based protocols, called tunnelling protocols, to make a virtual call to a virtual port on a VPN server. In a standard VPN deployment, a client initiates a point-to-point virtual connection to a remote access server over the Internet. The remote access server responds to the virtual call, authenticates the caller, and transfers data between the VPN client and the organization's private network.

WIZARD

It is a computer procedure, generally incorporated in a more complex application, which allows the user to perform certain (usually complex) operations through a series of successive steps.

PROVIDER

Service company that has computers constantly connected to the Internet through special lines. Through a normal telephone line and a modem, it is possible to connect subscriber users, thus having access to the network.

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AI (Analogue Input)

Analogue input acronym.

AO (Analogue Output)

Analogue output acronym.

DI (Digital Input)

Digital input acronym.

DO (Digital Output)

Digital output acronym.

CPU (Central Processing Unit)

Central processing unit. Housed on the microprocessor, it manages and controls every computer activity, coordinates the memory and peripheral unit activities and performs all arithmetic and logical operations.

PLC (Programmable Logic Controller)

It is a programmable electronic device capable of interpreting and executing the instructions of the programs stored in it, interacting with a control circuit through input and output devices.

SYSTEM

Set of pumps, data acquisition sensors, actuators, drives, etc., for the regulation of a hydraulic quantity.

STATION

System set (as defined in **"1.6 General Description" on page 11**) and plant.

1.5 FORMULATION OF INTELLECTUAL PROPERTY RIGHTS

All information, drawings, diagrams and anything else contained in this Manual and in the accompanying documentation are confidential in nature. None of this information may be reproduced or communicated to third parties without the prior written consent of SENECA s.r.l., which is its exclusive owner.

The only one authorized to use the documentation in question is the Customer to whom the Manual is supplied as an integral part of the product, for the sole exclusive purpose of correctly carrying out all the operations related to the various phases of the life cycle of the product itself.

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2 PRODUCT DESCRIPTION

1.6 GENERAL DESCRIPTION

The product, called S6001 Pump controller, is a configurable system for the control and adjustment of a pump group, consisting of a number of pumps ranging from a minimum of 2 to a maximum of 6.

	In the remainder of the manual, the S6001 Pump Controller will be referred to as the “system”.

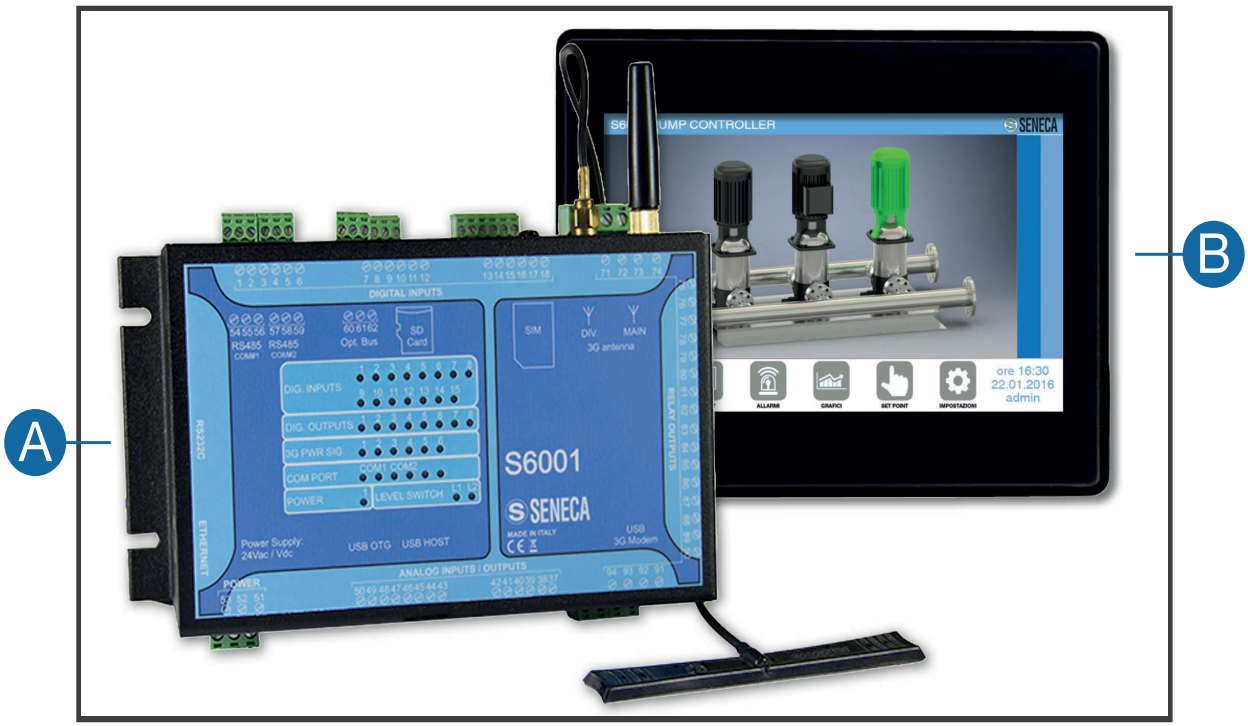


Fig. 1 S6001 Pump Controller

The system **(Fig. 1 on page 11)** consists of:

- S6001 RTU **(A)**, configurable pump supply control CPU module;
- 7” HMI panel **(B)**, allowing the user’s interaction with the CPU module and the pump group connected to it.

	In the rest of the Manual: - the S6001 RTU will be called “RTU”; - the HMI panel will be called “HMI”.

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1.6.1 RTU

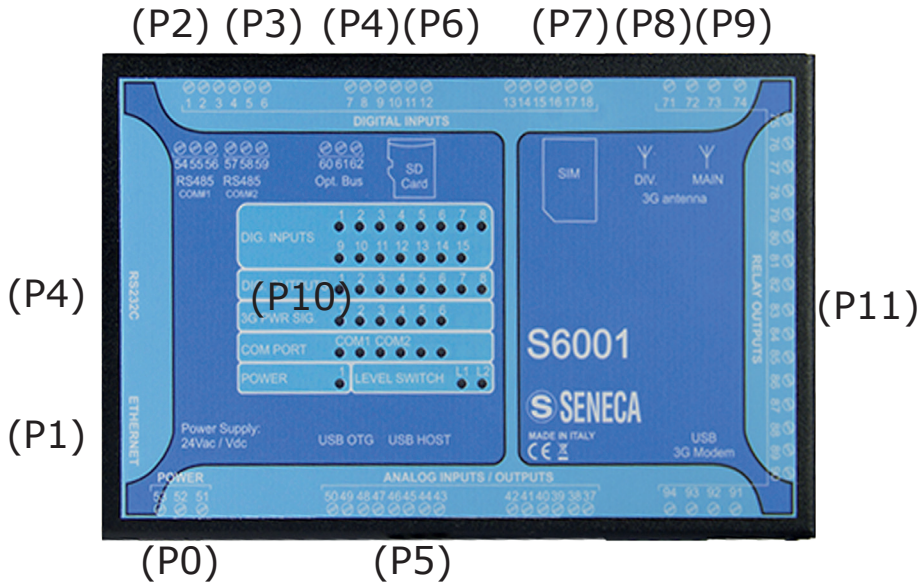


Fig. 2 RTU

The RTU **(Fig. 2 on page 12)** is equipped with:

- supply **(P11 - Fig. 2 on page 12)**,
- inputs/outputs **(P2 - Fig. 2 on page 12)**,
- communication ports **(P2, P3, P4 - Fig. 2 on page 12)**,
- signalling LEDs **(P10 - Fig. 2 on page 12)**,

on which more detailed information is provided in the following tables.

Reference/Terminal No.	Description
P0/51, 52, 53	RTU supply

Tab. 1 RTU supply

Terminal No.	Description
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18	Digital inputs
37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50	Analogue inputs/outputs
71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94	Relay digital outputs

Tab. 2 RTU inputs/outputs

Reference/Terminal No.	Description
P1	Ethernet Port
P2/54, 55, 56	RS485 port (COM 4)

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Reference/Terminal No.	Description
P3/57, 58, 59	RS485 port (COM 2)
P4	RS232 port (COM 1)
P5	USB port
P6	SD card port
P7	SIM card port
P8	Main antenna connector
P9	Diversity antenna connector

Tab. 3 RTU connector/port description

Port **(P6 - Fig. 2 on page 12)** is not used by the system.

For further information, please refer to **"1.9.2 Electrical technical characteristics" on page 17**.

Group	Number	Colour	Status	Meaning
DIGITAL INPUTS (digital inputs)	1,2,3,4,5,6,7,8,9, 10,11,12,13,14,15	Green	ON	High
			OFF	Low
DIGITAL OUTPUTS (digital outputs)	1,2,3,4,5,6,7,8	Red	ON	High
			OFF	Low
PWR SIG. (signal power)	1,2,3,4,5,6	Yellow	ON	Signal present (6 ON = Max)
			OFF	Signal absent (1 Flashing = Min)
COM PORT COM2 (common port COM 2)	RX,TX	Red	Flashing	RS485 active
		Red	ON	Connection check
COM PORT COM4 (common port COM 4)	RX,TX	Red	Flashing	RS485 active
		Red	ON	Connection check
RUN (operation)	1	Red	Flashing	Working
LEVEL SWITCH (level switch)	L1, L2	Green	OFF, OFF (value 0)	Below the minimum level
			ON, OFF (value 1)	Included between the minimum and maximum level
			ON, ON (value 2)	Above the maximum level

Tab. 4 RTU signalling LED - operation

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Find below further information on how the LEDs operate:

- At power-up, during the loading phase, all the LEDs, with the exception of the COM port LEDs, are ON; when the system is fully operational, the operation LED flashes.
- The signal power LED 1 flashes, in sync with the operation LED, in the following situations:
  - *the GSM network is not available (or the signal level is too low);*
  - *the SIM is not inserted;*
  - *the modem is not present.*

LED	Status	Meaning
PWR Green	ON	The modem is ON
STAT yellow	ON	Not recorded on the GSM network
	Slow flashing	Recorded on the GSM network
	Fast flashing	PPP connection active

Tab. 5 RTU signalling LED - Modem

1.6.2 HMI

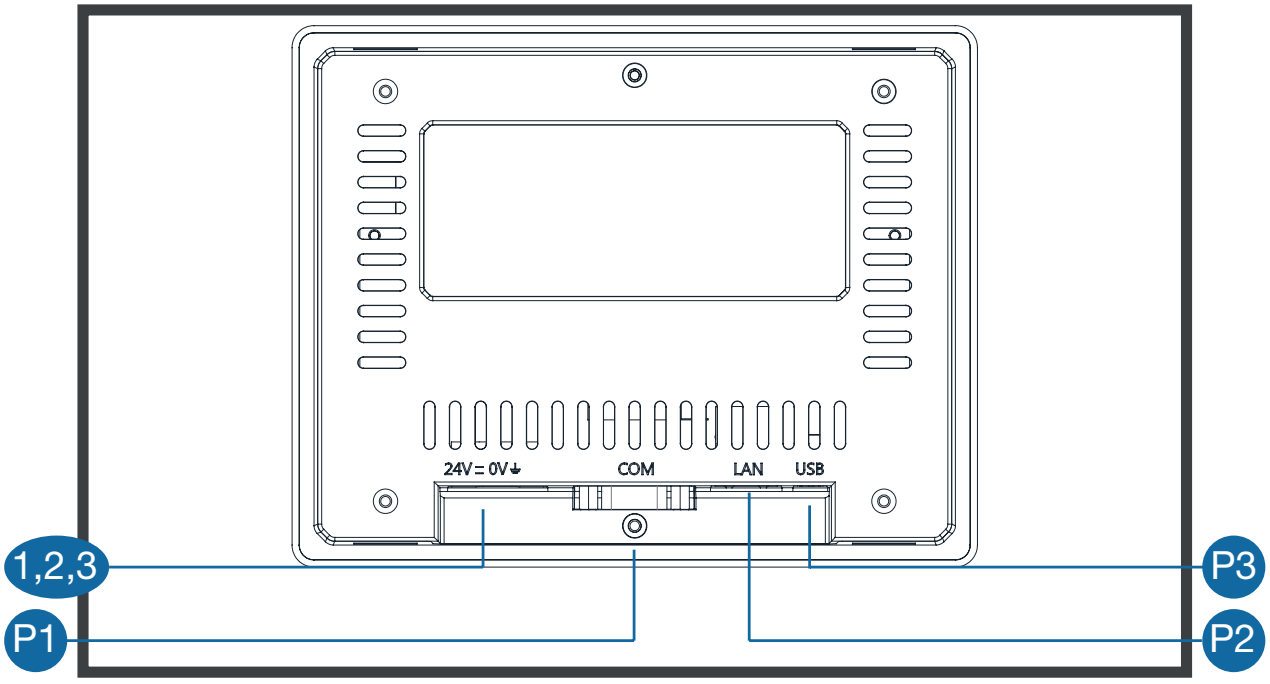


Fig. 3 HMI

The HMI **(Fig. 3 on page 14)** is equipped with:

- Power supply **(1,2,3 - Fig. 3 on page 14)**,
- communication ports **(P1 - Fig. 3 on page 14)**,,

on which more detailed information is provided in the following tables.

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Terminal No.	Description
1, 2, 3	HMI supply

Tab. 6 HMI supply

Port reference	Description
P1	RS232 port
P2	Ethernet Port
P3	USB port

Tab. 7 HMI port description

1.7 INTENDED USE

The system is intended for one of the following applications:

- pressure adjustment;
- flow adjustment;
- level adjustment;
  - *tank filling;*
  - *lifting from tank.*

Measuring the level can be carried out:

- with floats;
- with a level probe;
- with floats and a level probe.

1.8 REASONABLY FORESEEABLE INCORRECT USE

Any use of the system other than indicated in **“1.7 Intended use” on page 15** and compliant with the indications provided in this Manual is to be considered IMPROPER USE and the Manufacturer declines all responsibility in relation to any damage caused to persons or property and deems the warranty of the product null and void.

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1.9 TECHNICAL CHARACTERISTICS

1.9.1 Mechanical technical characteristics

1.9.1.1 RTU mechanical technical characteristics

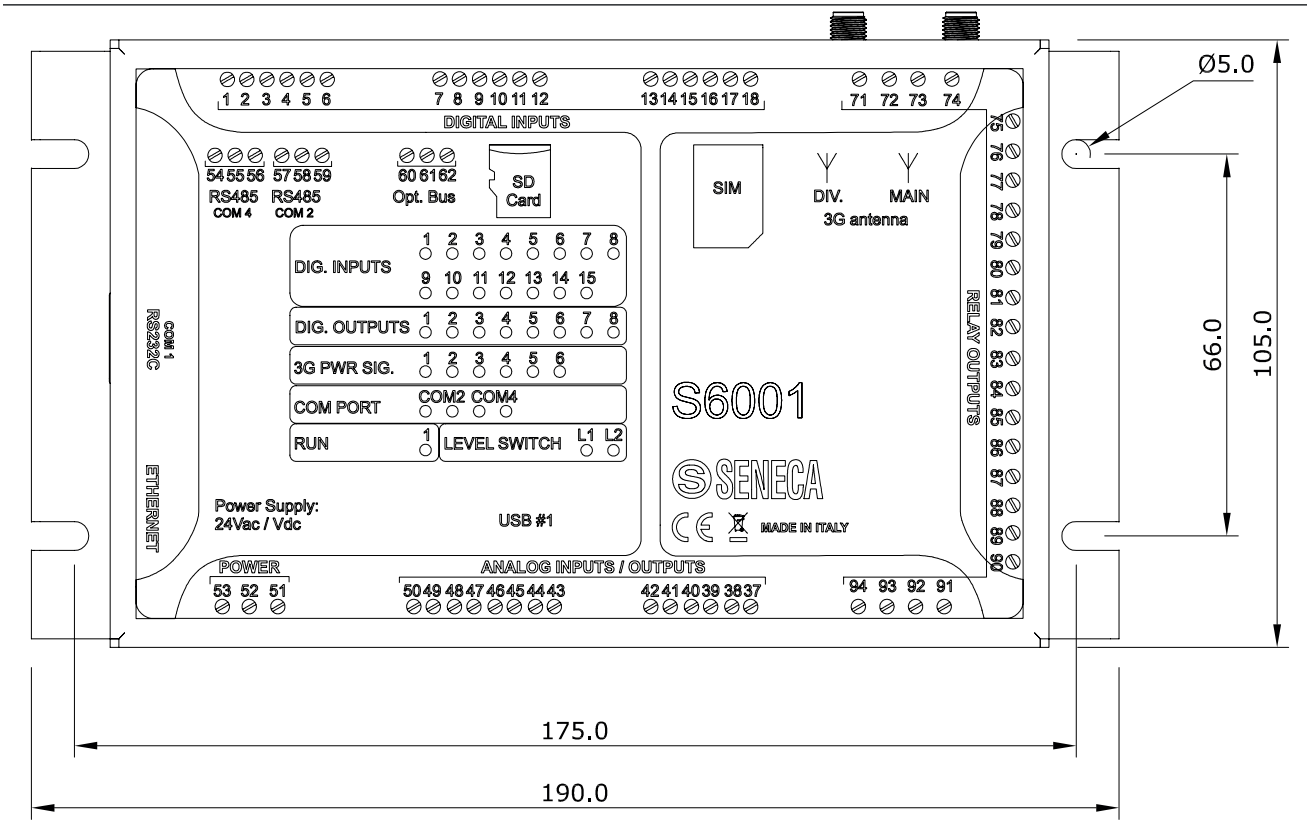


Fig. 4 RTU dimensions

Width	190 mm
Depth	60 mm
Height	105 mm
Weight	720 g

Tab. 8 RTU dimensions and weight

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1.9.1.2 HMI mechanical technical characteristics

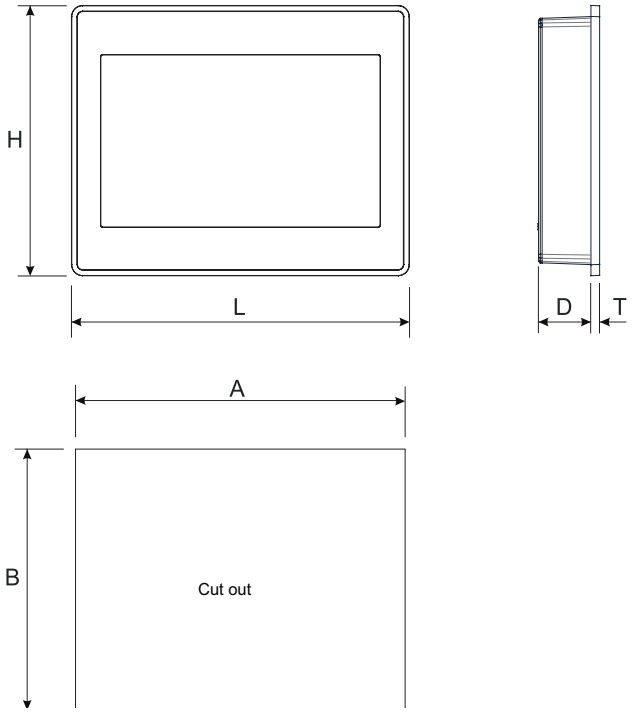


Fig. 5 HMI dimensions

A	176 mm
B	136 mm
L	187 mm
H	147 mm
D	29 mm
T	5 mm
Weight	600 g

Tab. 9 HMI dimensions and weight

1.9.2 Electrical technical characteristics

1.9.2.1 RTU electrical technical characteristics

Voltage	24 Vac/dc± 15%@ 50/60 Hz
Absorption	10 VA max, 6 VA (typical)
Section of removable terminals	0.2 ÷ 2.5 mm2 (AWG 24-12)
Insulation	1,500 Vac

Tab. 10 RTU supply characteristics

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CPU	32 bits, 400 MHz
CPU I/O	8 bits, 24 MHz
Flash 1GB	1 GB
RAM	64 MB
FeRAM	8 KB, divided into two (4 KB) partitions for redundancy

Tab. 11 CPU and RTU memory

Number of channels	4	All in 0 ÷ 20 mA current
Resolution		12 bit
Precision		± 0.3% compared to full scale
Input impedance		50 Ω

Tab. 12 RTU analogue inputs

Type	PNP
Number of channels	15
Connections	Removable terminals from 1 to 18
Opto-isolation	yes
Current ON	> 4 mA
Current OFF	< 3 mA

Tab. 13 RTU digital inputs

Number of channels	1	0 ÷ 10 V dc
	1	0 ÷ 20 mA
Resolution		12 bit
Precision		± 0.3% compared to full scale
Output impedance	Voltage	≥ 1 kΩ
	Current	≤ 500 Ω

Tab. 14 RTU analogue outputs

Type	SPDT free contact relay
Number of channels	8
Maximum current	3 A
Maximum voltage	250 V ac
Minimum load	0.5 W

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Insulation	3 kVac

Tab. 15 RTU digital outputs

Type	Conductive level control
Number of channels	2
Sensitivity	Adjustable

Tab. 16 Inputs for RTU liquid level control

Ethernet	10/100 Mbit Base Tx with RJ45 connector
RS485 (COM 2)	Isolated serial port from 110 to 115.200 bit/s
RS485 (COM 4)	Isolated serial port from 110 to 115.200 bit/s
RS232 (COM 1)	Serial port complete with DB9 male connector
USB	1 host USB A maximum current 300 mA
SD card	MicroSD max 32 GB
SIM card	Mini SIM type @ 3V with pressure slot

Tab. 17 RTU communication ports and storage devices

Frequency	GSM/GPRS/EDGE Quad-band: GSM 850 GSM 900 DCS 1800, PCS 1900
	UMTS/HSPA+Dual-Band: WCDMA 2100/900 2100/850, 1900/850

Tab. 18 RTU modem

1.9.2.2 HMI electrical technical characteristics

Display	TFT Color/LED
Monitor technology	Resistive
Colours	64K
Resolution	800X480
Diagonal	7”
Dimming	Yes
User memory	30 MB Flash
RAM	512 MB DDR
Serial port	RS232
Ethernet port	10/100 Mbit

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USB port	Host interface V2.0 max. 500 mA
Hardware clock	Clock/calendar with buffer battery
Time zone	Automatic
Clock precision	<100 ppm
Voltage	18-32 Vdc
Rated current (at 24 Vdc)	0.30 A

Tab. 19 HMI hardware characteristics

Radiated disturbance test	Class A
Electrostatic discharge immunity tests	8 kV (electrostatic discharge in air) EN 61000-4-2 4 kV (electrostatic discharge from contact)
Radiated radio frequency electromagnetic immunity tests	80 MHz ÷ 1 GHz, 10 V/m 1.4 GHz ÷ 2 GHz, 3 V/m 2 GHz ÷ 2.7 GHz, 1 V/m
Tests of immunity to fast network transistors	± 2 kV dc power port EN 61000-4-4 ± 1 kV signal line
Tests of immunity to power surges	± 0.5 kV dc power port (from ground to line) ± 0.5 kV dc power port (from line to line) ± 1 kV signal line (from line to ground)
Immunity to conducted interferences, induced by radiofrequency fields	0.15 ÷ 80 MHz, 10 V
Immunity tests to voltage dips, short interruptions and voltage variations	Port: Network AC: Level: 100% life: 1 cycle and 250 cycles (50Hz); 40% life: 10 cycles (50-Hz); 70% life: 25 cycles (50-Hz); Phase: 0°-180°

Tab. 20 HMI electromagnetic compatibility

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Backlight life (LED type)	20,000 hours or longer
Front foil (without exposure to sunlight or UV rays)	10 years with an air temperature of 25°C
UV resistance	Indoor applications: after 300 hours' tests of aging accelerated by humidity, some yellowing and brittleness may appear

Tab. 21 HMI durability information

1.9.3 Environmental characteristics

It is forbidden to install and use the system in environments with a risk of explosion.

It is forbidden to mount the system in environments in contact with corrosive chemical compounds.

The system must be adequately protected from water and dust.

1.9.3.1 RTU environmental characteristics

Protection rating	IP20
Operating temperature	-10 ÷ +65°C
Storage temperature	-40 ÷ +85°C
Humidity	10 ÷ 90% non condensing
Altitude	Up to 2,000 m above sea level

Tab. 22 RTU environmental characteristics

1.9.3.2 HMI environmental characteristics

Protection rating	IP66
Operating temperature (temperature of surrounding air)	0 ÷ +50°C
Storage temperature	-20 ÷ +70 °C
Operating and storage relative humidity	5 ÷ 85% non condensing
Vibrations	5 ÷ 9 Hz, 7 mm 9 ÷ 150 Hz, 1 g
Shock	± 50 g, 11 ms, 3 pulses per axis
Environmental pollution rating	2

Tab. 23 HMI environmental characteristics

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1.10 CONFIGURATIONS

The system is configured according to:

- type of adjustment;
- number of pumps.

The following table shows the configurations envisaged for the system.

Possible configurations	Adjustment	Number of pumps
Configuration 1	Pressure	From 2 to 6
Configuration 2	Capacity	
Configuration 3	Level with floats (lift from tank)	
Configuration 4	Level with floats (tank filling)	
Configuration 5	Level with probe (lift from tank)	
Configuration 6	Level with probe (tank filling)	
Configuration 7	Level with probe and floats (lift from tank)	
Configuration 8	Level with probe and floats (tank filling)	

Tab. 24 System configuration

Each system configuration includes:

- electrical connections, for the hardware part;
- HMI configuration, for the software part;

For the hardware configuration, please refer to **“1.1.2 Instructions for electrical connections” on page 26**.

For the software configuration, please refer to **“1.3 HMI Configuration” on page 47**.

1.11 RESIDUAL RISKS

SENECA s.r.l. is not liable for any damages deriving from:

- installation/use other than those envisaged and, in particular, other than the safety prescriptions provided for by the regulations in force in the country where the product is installed and/or indicated in this Manual;
- tampering and/or alteration of the product;
- product configuration incorrect or not compatible with the type of application for which it is intended.

	SENECA s.r.l. declines all responsibility for damage to persons and/or property deriving from the incorrect configuration of the product.

An incorrect configuration of the product might cause risks for people and damage to the product itself. It is **mandatory** to always perform a product test after completing the configuration.

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3 INSTALLATION

The installation operations must be carried out EXCLUSIVELY by qualified personnel, in possession of the necessary technical requirements.

Install all protection devices required by the regulations in force in the country where the product is used.

Install the product in an environment with the environmental conditions stated in **“1.9.3 Environmental characteristics” on page 21**

	**It is mandatory to use adequate Personal Protective Equipment (PPE) to perform the installation operations, in particular insulating shoes.** **The installation operations must be carried out with the power supply cut-off.**

	**It is forbidden** to dismantle or modify the product.

1.12 ASSEMBLY

1.12.1 Assembly warnings

	**Be careful not to drop the system so as not to damage it.**

1.12.2 Assembly instructions

1.12.2.1 RTU assembly instructions

	To guarantee optimal duration, **it is forbidden** to mount the RTU on appliances that generate heat.

The installation of the RTU can be performed:

- on omega bar IEC EN 60715;
- onto the wall;

MOUNTING ON OMEGA BAR IEC EN 60715

To mount the RTU on omega bar IEC EN 60715 **(Fig. 6 on page 24)** carry out the following in the given order:

1. fix omega bar IEC EN 60715 (1) su to a smooth surface, using dowels;
1. position the 2 supports **(2)** as shown;
2. fix the 2 supports using the 4 star screws **(3)** as shown;

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	To fix each support, ONLY use the 2 holes (of the 4 holes provided) indicated in **Fig. 6 on page 24**.

3. hook the RTU to omega bar IEC EN 60715.

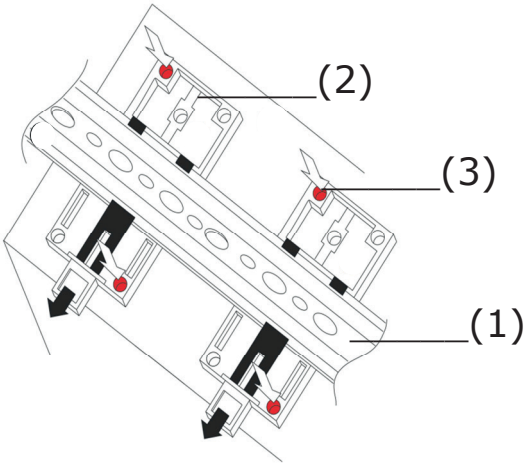


Fig. 6 RTU mounting on bar

WALL MOUNTING

To mount the RTU onto the wall **(Fig. 7 on page 24)** carry out the following in the given order:

1. position the RTU on the fixing wall;
4. mark the wall at the 4 housings **(1)** on the RTU;
5. make 4 holes **(2)** on the fixing wall, where the previously made marks are;

	The maximum diameter of the holes must be 5 mm.

6. position the RTU on the fixing wall;
7. fix the RTU with suitable fastening elements (screws or rivets).

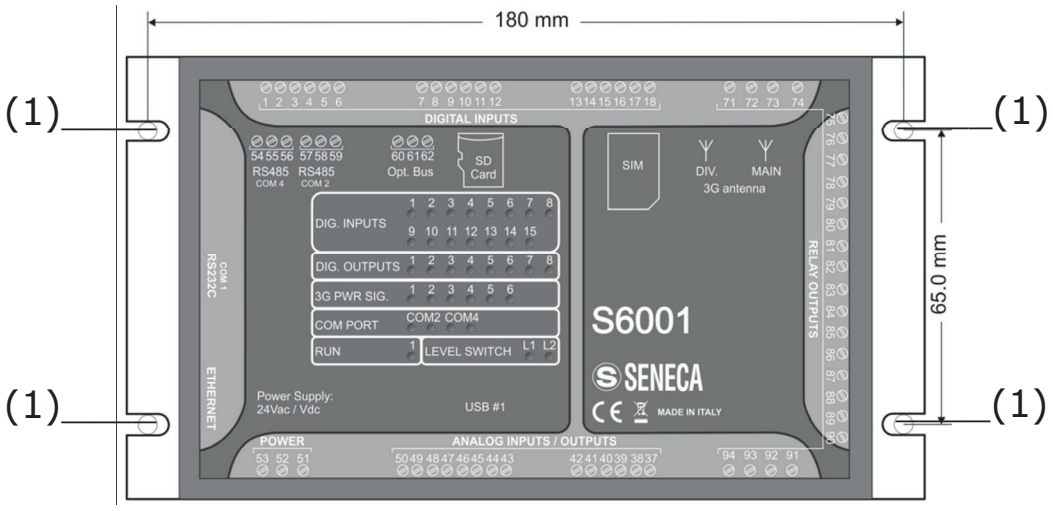


Fig. 7 RTU wall mounting

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1.12.2.1 HMI assembly instructions

	It is forbidden to mount the HMI in environments exposed to direct sunlight in order not to accelerate the ageing process of the frontal film.

To mount the HMI, carry out the following operations in the given order:

1. prepare a cut-out hole of the dimensions indicated in **"1.9.1.2 HMI mechanical technical characteristics" on page 17**;
8. insert the HMI in the cut-out hole;

	The maximum deviation between the surface of the cut-out hole and the HMI must be 0.5 mm.

9. insert the 4 fixing screws in the appropriate seats as indicated in **Fig. 8 on page 25**;
10. tighten the screws.

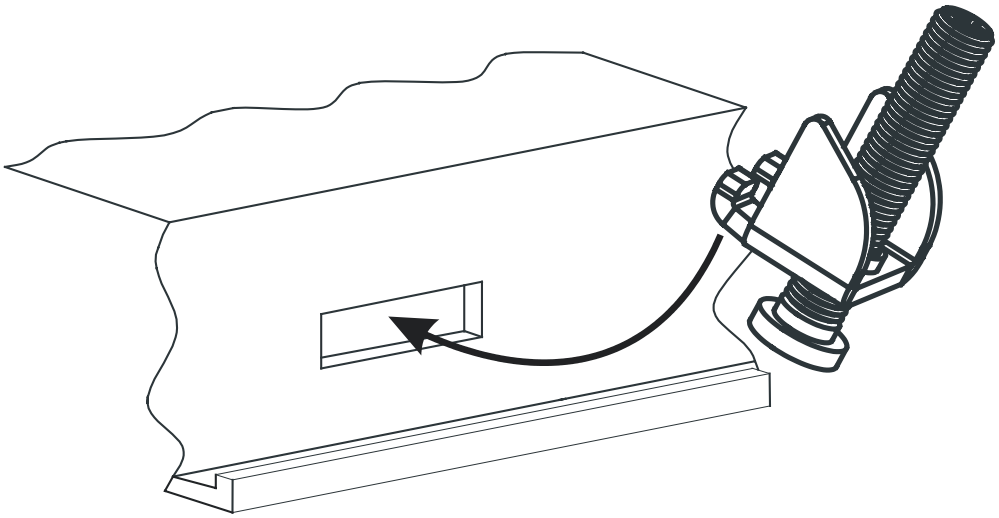


Fig. 8 HMI assembly

1.1 ELECTRICAL CONNECTIONS

1.1.1 Warnings on electrical connections

	Verify that all electrical connections are properly made and that there is a ground connection before powering the product. **It is compulsory to use appropriate voltage detection devices to confirm the absence of power and insulated tools, before making any electrical connections.**

For electrical connections follow the following instructions:

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- wire the power supply lines and I/O lines as required by the regulations in force in the country where the product is used;
- for power supply lines and I/O lines, use cables with a section suited to the technical characteristics listed in **“1.9.2.1 RTU electrical technical characteristics” on page 17;**
- the electrical connections must be as short as possible, without wrapping them around other electrically connected parts;
- pay attention not to twist the electric cables;
- wire the power cables separately from the I/O and communications cables.

1.1.2 Instructions for electrical connections

The electrical connections must be made according to the desired configuration.



For the contemplated configurations, please refer to **“1.10 Configurations” on page 22**.

The I/O integrated in the RTU allows you to manage a maximum of 3 pumps. For the management of additional pumps, up to a maximum of 3, the use of the Z-D-IO expansion modules is envisaged: each expansion module allows you to manage 1 additional pump.



For more information on Z-D-IO expansion modules, refer to the relevant manual at www.seneca.it/prodotti/z-d-io .

For the different configurations, we provide the connection diagram to:

- RTU;
- possible expansion modules Z-D-IO, if a number of pumps greater than 3 is expected.

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1.1.2.1 Configuration 1 and Configuration 2

RTU SETTINGS FOR "CONFIGURATION 1" AND "CONFIGURATION 2"

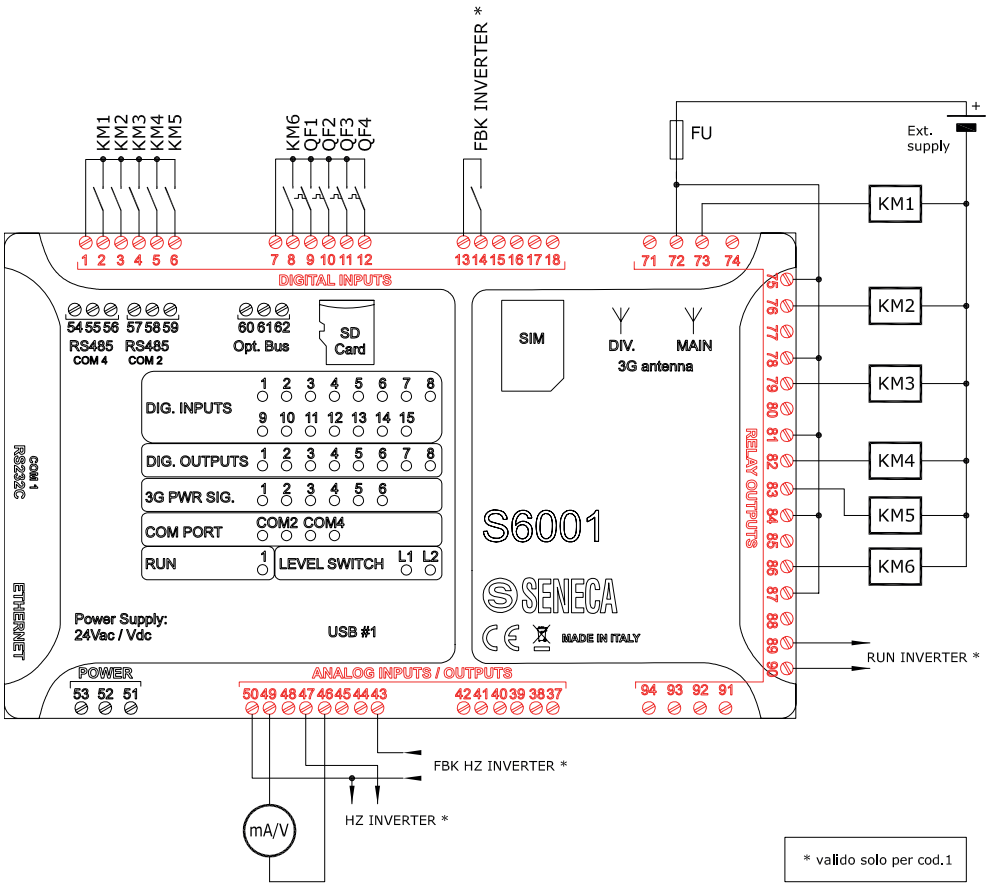


Fig. 9 RTU settings for Configurations 1 and 2: Electrical connections

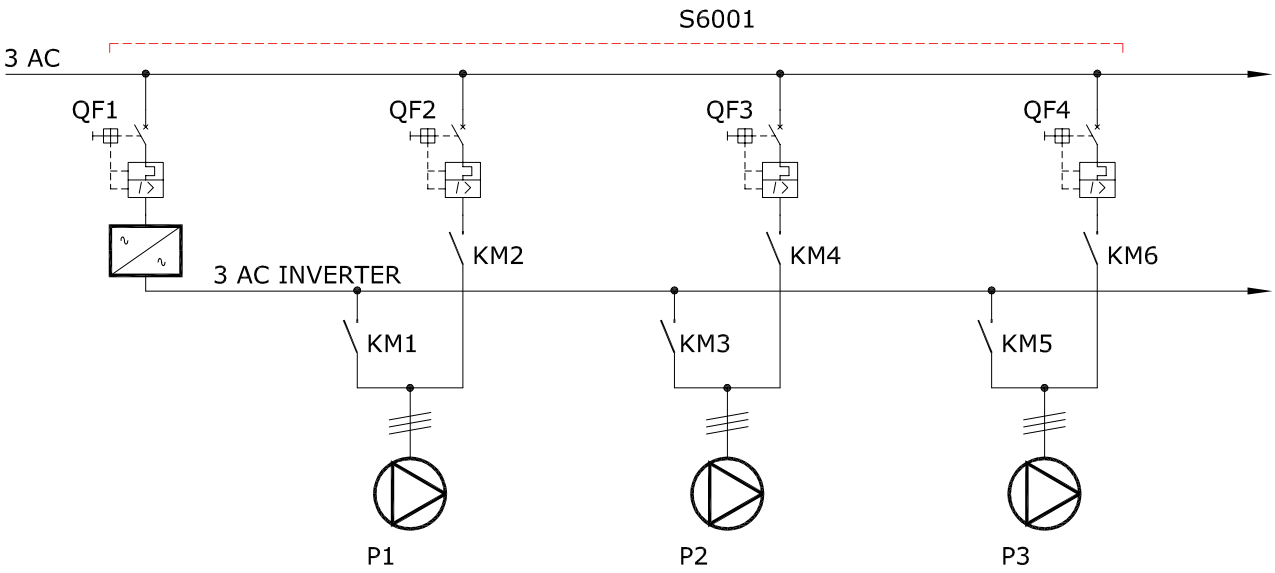


Fig. 10 RTU settings for Configurations 1 and 2: Pump drive diagram

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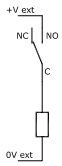
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DIGITAL INPUTS			
No. 1 inverter, No. 3 pumps			
	1	+13 V	COMMON INPUTS IN1..5
	2	IN1	PUMP 1 INVERTER CONTACTOR FEEDBACK
	3	IN2	PUMP 1 DIRECT CONTACTOR FEEDBACK
	4	IN3	PUMP 2 INVERTER CONTACTOR FEEDBACK
	5	IN4	PUMP 2 DIRECT CONTACTOR FEEDBACK
	6	IN5	PUMP 3 INVERTER CONTACTOR FEEDBACK
	7	+13 V	COMMON INPUTS IN6..10
	8	IN6	PUMP 3 DIRECT CONTACTOR FEEDBACK
	9	IN7	INVERTER CIRCUIT BREAKER
	10	IN8	PUMP 1 CIRCUIT BREAKER
	11	IN9	PUMP 2 CIRCUIT BREAKER
	12	IN10	PUMP 3 CIRCUIT BREAKER
	13	+13 V	COMMON INPUTS IN11..15
	14	IN11	INVERTER RUN FEEDBACK
	15	IN12	CONFIGURABLE
	16	IN13	CONFIGURABLE
	17	IN14	CONFIGURABLE
	18	IN15	CONFIGURABLE

Tab. 25 RTU settings for Configurations 1 and 2: digital inputs

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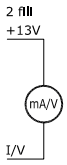
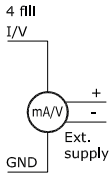
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RELAY DIGITAL OUTPUTS			
No. 1 inverter, No. 3 pumps			
	71 72 73	01-NC 01-C 01-NO	PUMP 1 INVERTER CONTACTOR CONTROL
	74 75 76	02-NC 02-C 02-NO	PUMP 1 DIRECT CONTROL
	77 78 79	03-NC 03-C 03-NO	PUMP 2 INVERTER CONTACTOR CONTROL
	80 81 82	04-NC 04-C 04-NO	PUMP 2 DIRECT CONTROL
	83 84 85	05-NC 05-C 05-NO	PUMP 3 INVERTER DIRECT CONTROL
	86 87 88	06-NC 06-C 06-NO	PUMP 3 DIRECT CONTROL
	89 90 91	07-NC 07-C 07-NO	RUN A INVERTER
	92 93 94	08-NC 08-C 08-NO	CONFIGURABLE

Tab. 26 RTU settings for Configurations 1 and 2: digital outputs with relay

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ANALOGUE INPUTS/OUTPUTS			
No. 1 inverter, No. 3 pumps			
	37	GND	ALARM SIGNAL GND
	38	ALARM OUT	ALARM SIGNAL
	39	-	-
	40	LEVEL 2	CONFIGURABLE
	41	LEVEL 1	CONFIGURABLE
	42	COM. LEVEL	LEVEL COMMON
	43	I IN1	FEEDBACK Hz INVERTER (option)
	44	I IN2	CONFIGURABLE
	45	I IN3	CONFIGURABLE
	46	I IN4	ADJUSTMENT PROBE (FT-PT-LT)
	47	I OUT	INVERTER Hz REFERENCE (*)
	48	V OUT	INVERTER Hz REFERENCE (*)
	49	+13V	+V ANALOG I/O
	50	GND	I/O ANALOG GND
(*) Signal not bound to the configuration but it is **mandatory** to select at least one “I OUT” or “V OUT” output for the correct operation of the system. Selection to be operated according to the type of input the inverter requires.			

Tab. 27 RTU settings for Configurations 1 and 2: Analogue inputs/outputs

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Z- D-IO SETTINGS FOR CONFIGURATION 1 AND CONFIGURATION 2

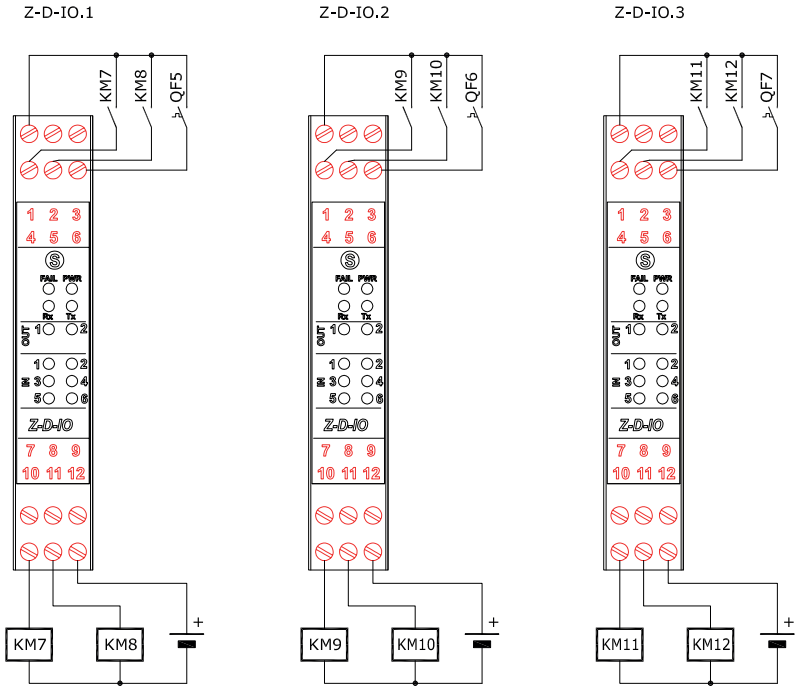
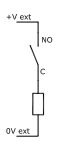


Fig. 11 Z-D-IO settings for Configurations 1 and 2

DIGITAL INPUTS			
EXPANSION MODULE 1-2-3			
	1	+V	COMMON INPUTS IN1..6
	4	IN1	PUMP 4 -5 -6 INVERTER CONTACTOR FEEDBACK
	5	IN2	PUMP 4 -5 -6 DIRECT CONTACTOR FEEDBACK
	6	IN3	PUMP 4 -5 -6 CIRCUIT BREAKER
	7	IN4	-
	8	IN5	-
	9	IN6	-

Tab. 28 Z-D-IO settings for Configurations 1 and 2: Digital inputs

DIGITAL OUTPUTS			
EXPANSION MODULE 1-2-3			
	10	Dout1-NO	PUMP 4 -5 -6 INVERTER CONTACTOR CONTROL
	11	Dout2-NO	PUMP 4 -5 -6 DIRECT CONTACTOR CONTROL
	12	C	COMMON DIGITAL OUTPUTS

Tab. 29 Z-D-IO settings for Configurations 1 and 2: Digital outputs

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1.1.2.2 Configuration 3 and Configuration 4

RTU SETTINGS FOR "CONFIGURATION 3" AND "CONFIGURATION 4"

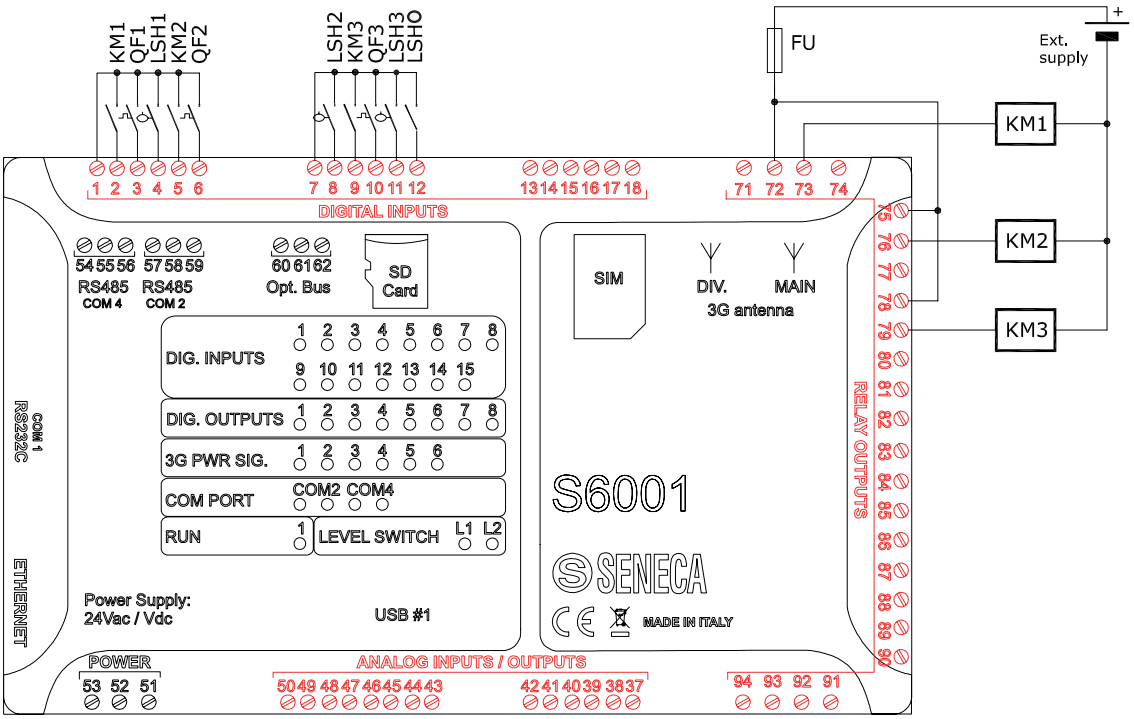


Fig. 12 RTU settings for Configurations 3 and 4: Electrical connections

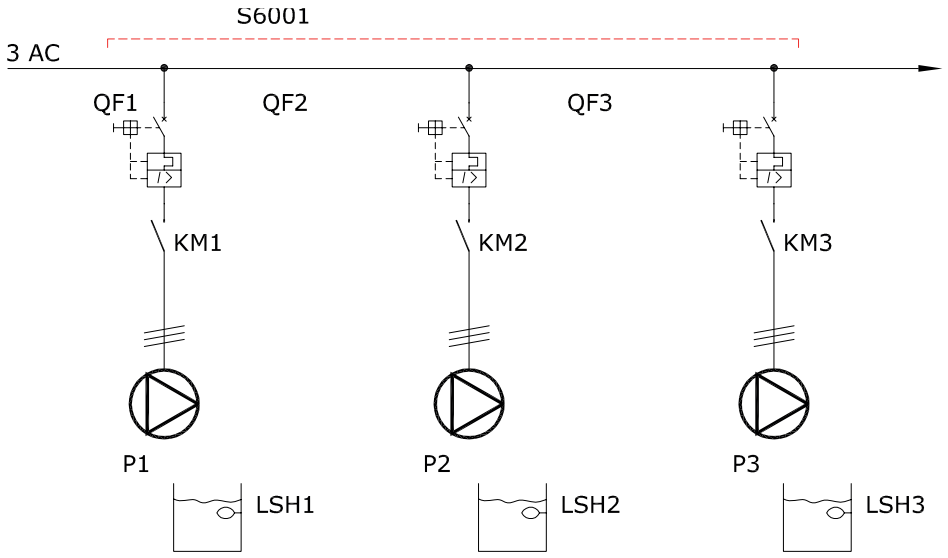


Fig. 13 RTU settings for Configurations 3 and 4: Pump drive diagram

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DIGITAL INPUTS			
No. 3 pumps, No. 2 floats			
	1	+13 V	COMMON INPUTS IN1..5
	2	IN1	PUMP 1 DIRECT CONTACTOR FEEDBACK
	3	IN2	PUMP 1 CIRCUIT BREAKER
	4	IN3	PUMP 1 START FLOAT
	5	IN4	PUMP 2 DIRECT CONTACTOR FEEDBACK
	6	IN5	PUMP 2 CIRCUIT BREAKER
	7	+13 V	COMMON INPUTS IN6..10
	8	IN6	PUMP 2 START FLOAT
	9	IN7	PUMP 3 DIRECT CONTACTOR FEEDBACK/ CONFIGURABLE (*)
	10	IN8	PUMP 3 CIRCUIT BREAKER/CONFIGURABLE (**)
	11	IN9	PUMP 3 START FLOAT/CONFIGURABLE(**)
	12	IN10	CONFIGURABLE
	13	+13 V	COMMON INPUTS IN11..15
	14	IN11	CONFIGURABLE
	15	IN12	CONFIGURABLE
	16	IN13	CONFIGURABLE
	17	IN14	CONFIGURABLE
	18	IN15	CONFIGURABLE

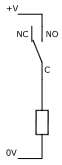
Tab. 30 RTU settings for Configurations 3 and 4: Digital inputs

(*) If the configuration provides for 2 pumps “IN7” becomes PUMP STOP FLOAT

(**) If two pumps are configured , “IN8” and “IN9” become freely configurable

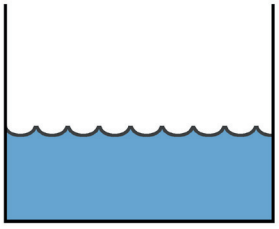
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RELAY DIGITAL OUTPUTS			
No. 3 pumps, No. 2 floats			
	71 72 73	01-NC 01-C 01-NO	PUMP 1 DIRECT CONTACTOR CONTROL
	74 75 76	02-NC 02-C 02-NO	PUMP 2 DIRECT CONTACTOR CONTROL
	77 78 79	03-NC 03-C 03-NO	PUMP 3 DIRECT CONTACTOR CONTROL/ CONFIGURABLE
	80 81 82	04-NC 04-C 04-NO	CONFIGURABLE
	83 84 85	05-NC 05-C 05-NO	CONFIGURABLE
	86 87 88	06-NC 06-C 06-NO	CONFIGURABLE
	89 90 91	07-NC 07-C 07-NO	CONFIGURABLE
	92 93 94	08-NC 08-C 08-NO	CONFIGURABLE

Tab. 31 RTU settings for Configurations 3 and 4: Relay digital outputs

LIFTING



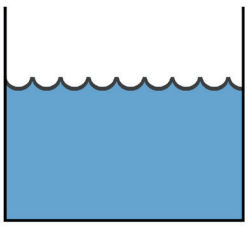
or LSH3 "start Pump3"

or LSH2 "start Pump2"

or LSH1 "start Pump1"

or LSH0 (STOP)

FILLING



or LSH0 (STOP)

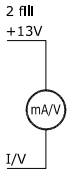
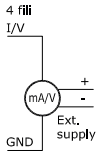
or LSH1 "start Pump1"

or LSH2 "start Pump2"

or LSH3 "start Pump3"

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ANALOGUE INPUTS/OUTPUTS			
No. 3 pumps, No. 2 floats			
	37	GND	ALARM SIGNAL GND
	38	ALARM OUT	ALARM SIGNAL
	39	-	-
	40	LEVEL 2	CONFIGURABLE
	41	LEVEL 1	CONFIGURABLE
	42	COM. LEVEL	COMMON LEVEL
	43	I IN1	CONFIGURABLE
	44	I IN2	CONFIGURABLE
	45	I IN3	CONFIGURABLE
	46	I IN4	CONFIGURABLE
	47	I OUT	CONFIGURABLE
	48	V OUT	CONFIGURABLE
	49	+13V	+V ANALOG I/O
	50	GND	I/O ANALOG GND

Tab. 32 RTU settings for Configurations 3 and 4: Analogue inputs/outputs

Z-D-IO SETTINGS FOR CONFIGURATIONS 3 AND 4

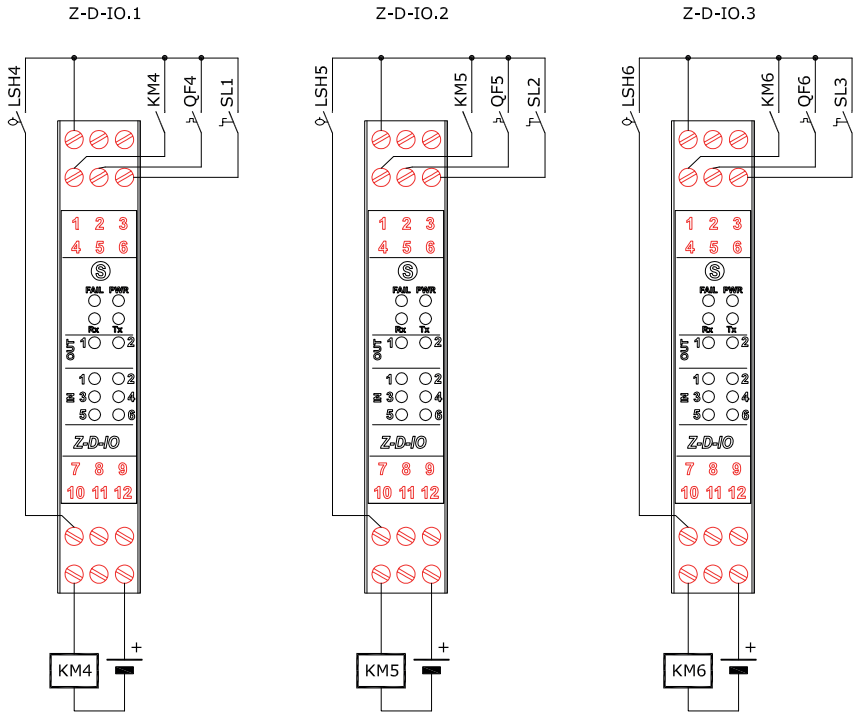


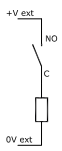
Fig. 14 Z-D-IO settings for Configurations 3 and 4

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DIGITAL INPUTS			
EXPANSION MODULE 1-2-3			
	1	+V	COMMON INPUTS IN1..6
	4	IN1	PUMP 4-5-6 DIRECT CONTACTOR FEEDBACK
	5	IN2	PUMP 4-5-6 CIRCUIT BREAKER
	6	IN3	PUMP 4-5-6- MAN/AUT SELECTOR (CLOSED=AUTO)
	7	IN4	PUMP 4-5-6 START FLOAT
	8	IN5	-
	9	IN6	-

Tab. 33 Z-D-IO settings for Configurations 3 and 4: Digital inputs

DIGITAL OUTPUTS			
EXPANSION MODULE 1-2-3			
	10	Dout1-NO	PUMP 4-5-6 DIRECT CONTACTOR CONTROL
	11	Dout2-NO	-
	12	C	COMMON DIGITAL OUTPUTS

Tab. 34 Z-D-IO settings for Configurations 3 and 4: Digital outputs

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1.1.2.3 Configuration 5 and Configuration 6

RTU SETTINGS FOR "CONFIGURATION 5" AND "CONFIGURATION 6"

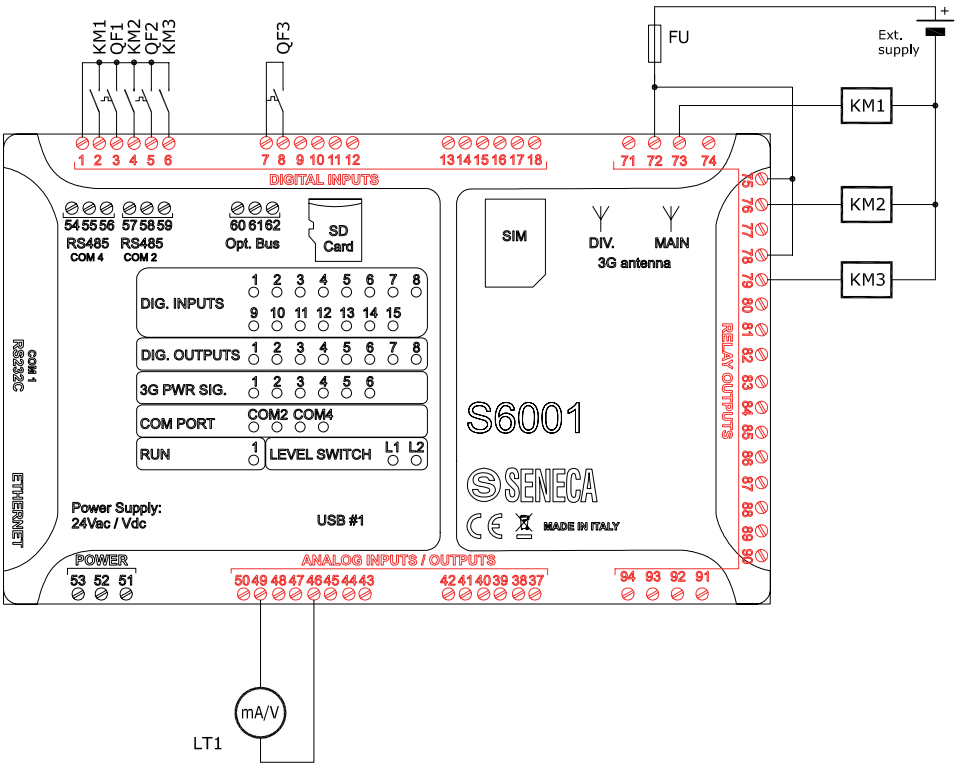


Fig. 15 RTU settings for Configurations 5 and 6: Electrical connections

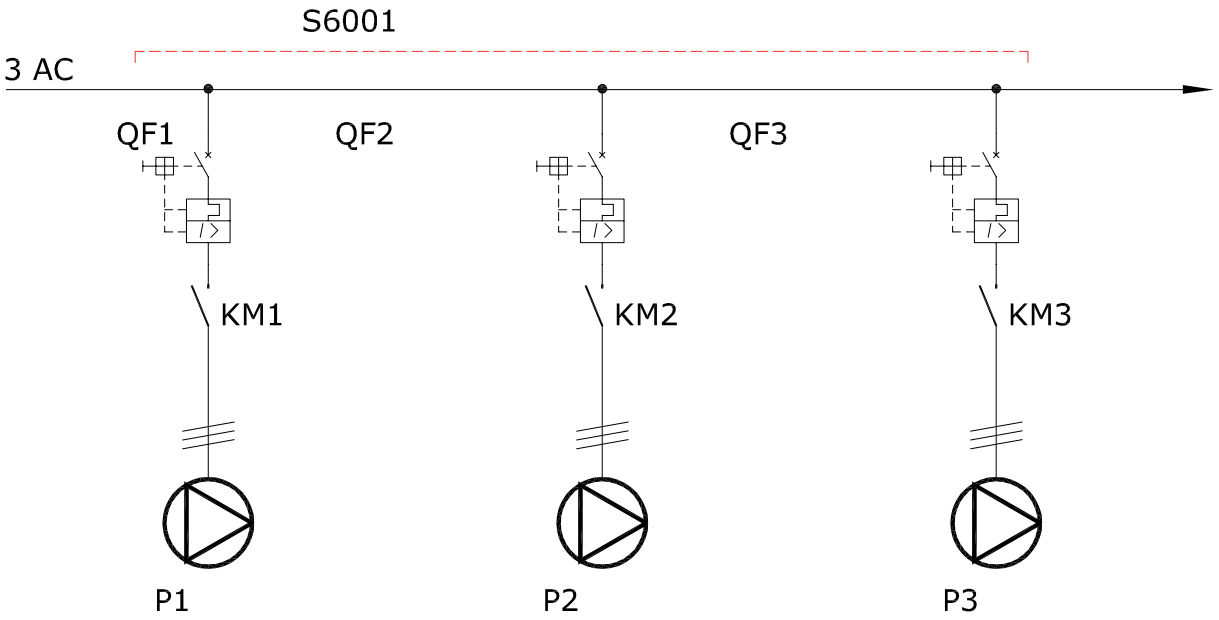


Fig. 16 RTU settings for Configurations 5 and 6: Pump drive diagram

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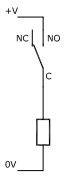
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DIGITAL INPUTS			
No. 3 pumps, No. 1 level probe			
	1	+13 V	COMMON INPUTS IN1..5
	2	IN1	PUMP 1 DIRECT CONTACTOR FEEDBACK
	3	IN2	PUMP 1 CIRCUIT BREAKER
	4	IN3	PUMP 2 DIRECT CONTACTOR FEEDBACK
	5	IN4	PUMP 2 CIRCUIT BREAKER
	6	IN5	PUMP 3 DIRECT CONTACTOR FEEDBACK/ CONFIGURABLE
	7	+13 V	COMMON INPUTS IN6..10
	8	IN6	PUMP 3 CIRCUIT BREAKER/CONFIGURABLE
	9	IN7	CONFIGURABLE
	10	IN8	CONFIGURABLE
	11	IN9	CONFIGURABLE
	12	IN10	CONFIGURABLE
	13	+13 V	COMMON INPUTS IN11..15
	14	IN11	CONFIGURABLE
	15	IN12	CONFIGURABLE
	16	IN13	CONFIGURABLE
	17	IN14	CONFIGURABLE
	18	IN15	CONFIGURABLE

Tab. 35 RTU settings for Configurations 5 and 6: Digital inputs

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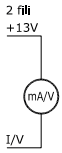
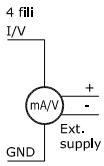
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RELAY DIGITAL OUTPUTS			
No. 3 pumps, No. 1 level probe			
	71 72 73	01-NC 01-C 01-NO	PUMP 1 DIRECT CONTACTOR CONTROL
	74 75 76	02-NC 02-C 02-NO	PUMP 2 DIRECT CONTACTOR CONTROL
	77 78 79	03-NC 03-C 03-NO	PUMP 3 DIRECT CONTACTOR CONTROL/ CONFIGURABLE
	80 81 82	04-NC 04-C 04-NO	CONFIGURABLE
	83 84 85	05-NC 05-C 05-NO	CONFIGURABLE
	86 87 88	06-NC 06-C 06-NO	CONFIGURABLE
	89 90 91	07-NC 07-C 07-NO	CONFIGURABLE
	92 93 94	08-NC 08-C 08-NO	CONFIGURABLE

Tab. 36 RTU settings for Configurations 5 and 6: Relay digital outputs

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ANALOGUE INPUTS/OUTPUTS			
No. 3 pumps, No. 2 floats			
	37	GND	ALARM SIGNAL GND
	38	ALARM OUT	ALARM SIGNAL
	39	-	-
	40	LEVEL 2	CONFIGURABLE
	41	LEVEL 1	CONFIGURABLE
	42	COM. LEVEL	COMMON LEVEL
	43	I IN1	CONFIGURABLE
	44	I IN2	CONFIGURABLE
	45	I IN3	CONFIGURABLE
	46	I IN4	ADJUSTMENT PROBE (LT)
	47	I OUT	CONFIGURABLE
	48	V OUT	CONFIGURABLE
	49	+13V	+V ANALOG I/O
	50	GND	I/O ANALOG GND

Tab. 37 RTU settings for Configurations 5 and 6: Analogue inputs/outputs

Z-D-IO SETTINGS FOR CONFIGURATIONS 5 AND 6

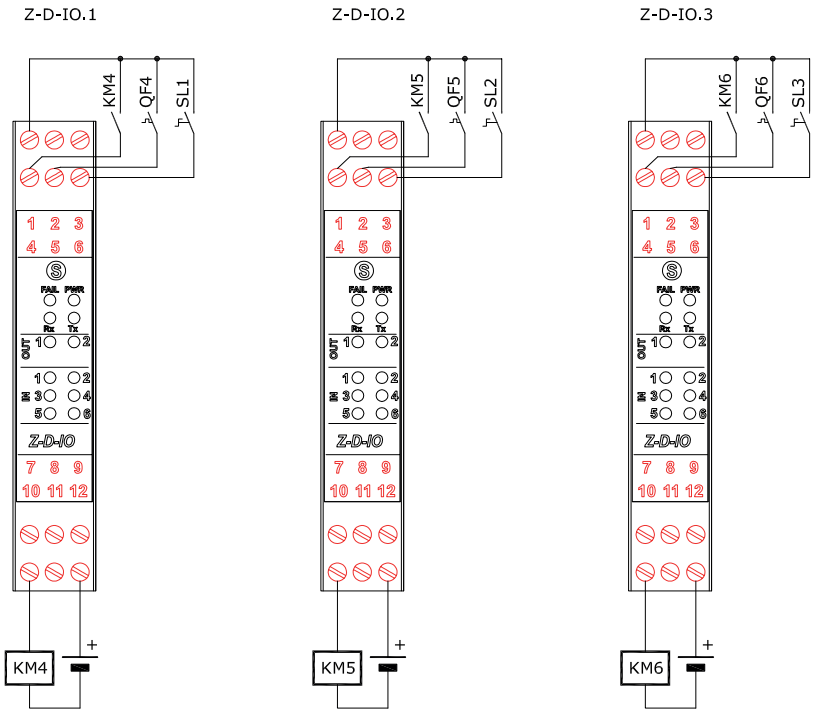


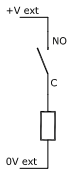
Fig. 17 Z-D-IO settings for Configurations 5 and 6

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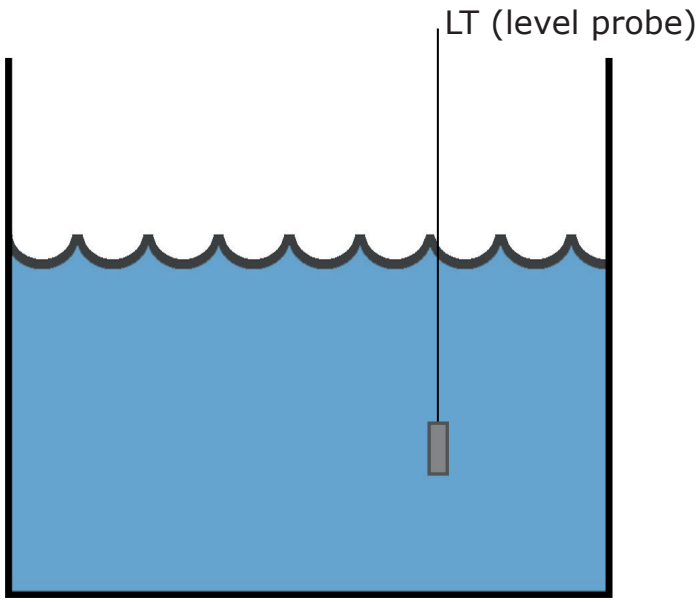
DIGITAL INPUTS			
EXPANSION MODULE 1-2-3			
	1	+V	COMMON INPUTS IN1..6
	4	IN1	PUMP 4-5-6 DIRECT CONTACTOR FEEDBACK
	5	IN2	PUMP 4-5-6 CIRCUIT BREAKER
	6	IN3	PUMP 4-5-6- MAN/AUT SELECTOR (CLOSED=AUTO)
	7	IN4	-
	8	IN5	-
	9	IN6	-

Tab. 38 Z-D-IO settings for Configurations 5 and 6: Digital inputs

DIGITAL OUTPUTS			
EXPANSION MODULE 1-2-3			
	10	Dout1-NO	PUMP 4-5-6 DIRECT CONTACTOR CONTROL
	11	Dout2-NO	-
	12	C	COMMON DIGITAL OUTPUTS

Tab. 39 Z-D-IO settings for Configurations 5 and 6: Digital outputs

LIFTING / FILLING



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1.1.2.4 Configuration 7 and Configuration 8

RTU SETTINGS FOR "CONFIGURATION 7" AND "CONFIGURATION 8"

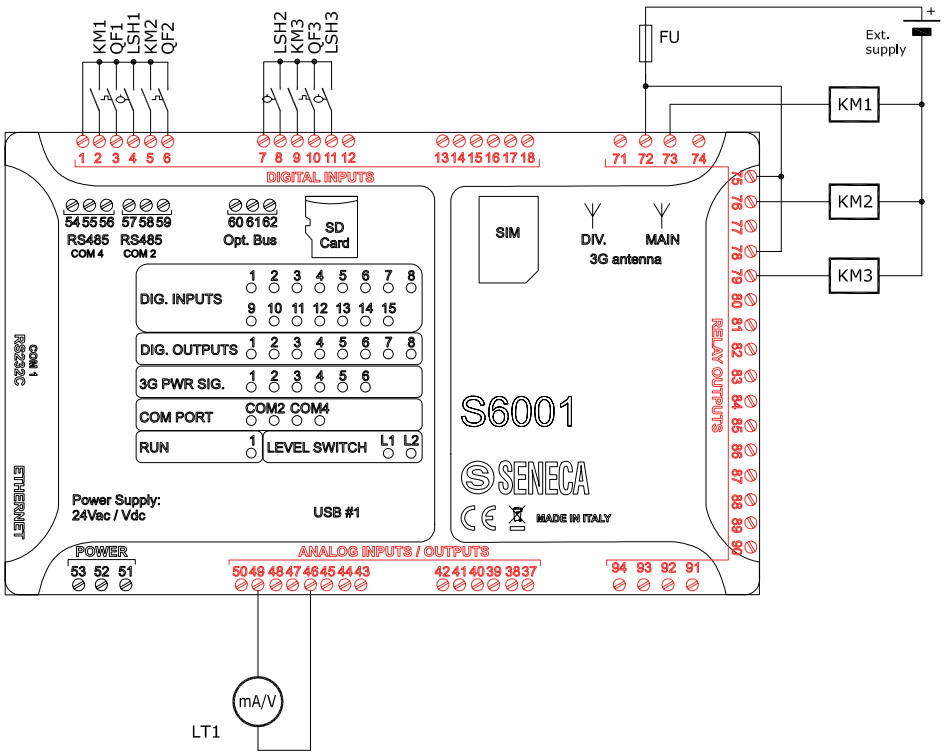


Fig. 17 RTU settings for Configurations 7 and 8: Electrical connections

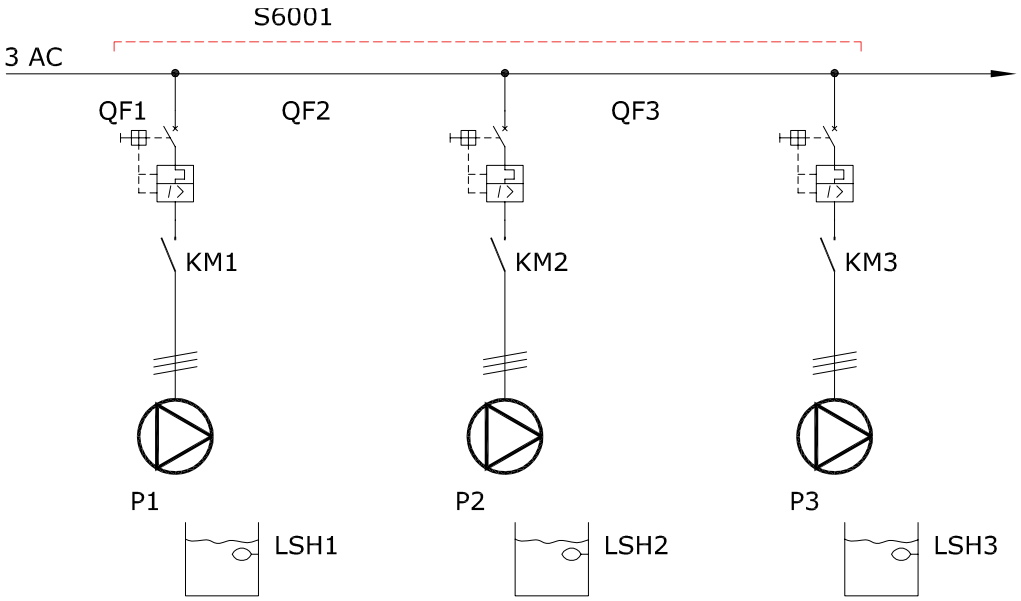


Fig. 18 RTU settings for Configurations 7 and 8: Pump drive diagram

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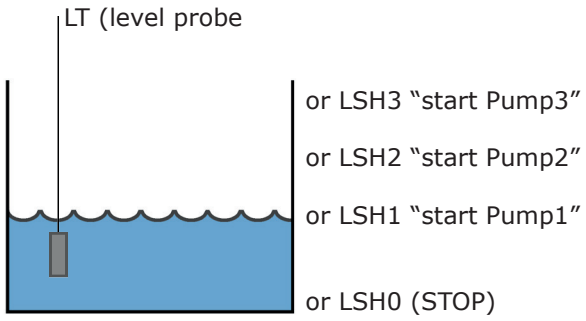
DIGITAL INPUTS			
No. 3 pumps, No. 2 floats, No. 1 level probe			
	1	+13 V	COMMON INPUTS IN1..5
	2	IN1	PUMP 1 DIRECT CONTACTOR FEEDBACK
	3	IN2	PUMP 1 CIRCUIT BREAKER
	4	IN3	PUMP 1 START FLOAT
	5	IN4	PUMP 2 DIRECT CONTACTOR FEEDBACK
	6	IN5	PUMP 2 CIRCUIT BREAKER
	7	+13 V	COMMON INPUTS IN6..10
	8	IN6	PUMP 2 START FLOAT
	9	IN7	PUMP 3 DIRECT CONTACTOR FEEDBACK/ CONFIGURABLE (*)
	10	IN8	PUMP 3 CIRCUIT BREAKER/CONFIGURABLE (**)
	11	IN9	PUMP 3 START FLOAT/cONFIGURABLE(**)
	12	IN10	CONFIGURABLE
	13	+13 V	COMMON INPUTS IN11..15
	14	IN11	CONFIGURABLE
	15	IN12	CONFIGURABLE
	16	IN13	CONFIGURABLE
	17	IN14	CONFIGURABLE
	18	IN15	CONFIGURABLE

Tab. 40 RTU settings for Configurations 7 and 8: digital inputs

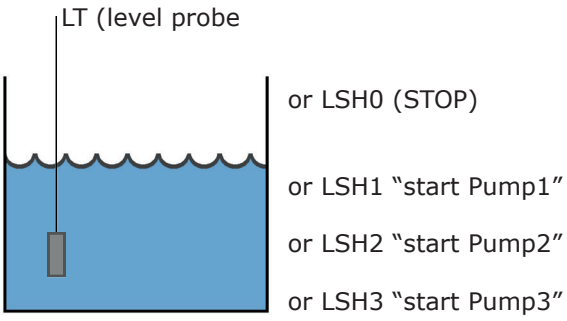
(*) If the configuration provides for 2 pumps "**IN7**" becomes PUMP STOP FLOAT

(**) If two pumps are configured , "**IN8**" and "**IN9**" become freely configurable

LIFTING

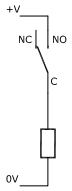


FILLING



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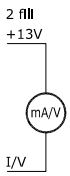
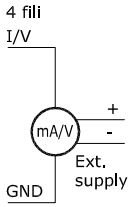
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RELAY DIGITAL OUTPUTS			
No. 3 pumps, No. 2 floats, No. 1 level probe			
	71 72 73	01-NC 01-C 01-NO	PUMP 1 DIRECT CONTACTOR CONTROL
	74 75 76	02-NC 02-C 02-NO	PUMP 2 DIRECT CONTACTOR CONTROL
	77 78 79	03-NC 03-C 03-NO	PUMP 3 DIRECT CONTACTOR CONTROL/ CONFIGURABLE
	80 81 82	04-NC 04-C 04-NO	CONFIGURABLE
	83 84 85	05-NC 05-C 05-NO	CONFIGURABLE
	86 87 88	06-NC 06-C 06-NO	CONFIGURABLE
	89 90 91	07-NC 07-C 07-NO	CONFIGURABLE
	92 93 94	08-NC 08-C 08-NO	CONFIGURABLE

Tab. 41 RTU settings for Configurations 7 and 8: Relay digital outputs

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ANALOGUE INPUTS/OUTPUTS			
No. 3 pumps, No. 2 floats			
	37	GND	ALARM SIGNAL GND
	38	ALARM OUT	ALARM SIGNAL
	39	-	-
	40	LEVEL 2	CONFIGURABLE
	41	LEVEL 1	CONFIGURABLE
	42	COM. LEVEL	COMMON LEVEL
	43	I IN1	CONFIGURABLE
	44	I IN2	CONFIGURABLE
	45	I IN3	CONFIGURABLE
	46	I IN4	ADJUSTMENT PROBE (LT)
	47	I OUT	CONFIGURABLE
	48	V OUT	CONFIGURABLE
	49	+13V	+V ANALOG I/O
	50	GND	I/O ANALOG GND

Tab. 42 RTU settings for Configurations 7 and 8: Analogue inputs/outputs

Z-D-IO, 7+8 CONFIGURATION

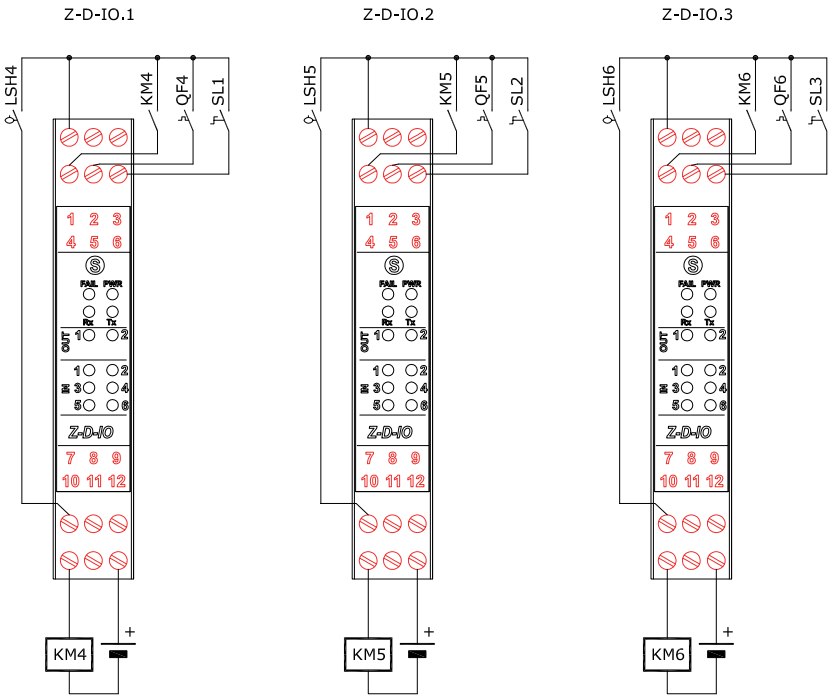


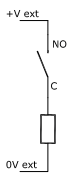
Fig. 19 Z-D-IO settings for Configurations 7 and 8

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DIGITAL INPUTS			
EXPANSION MODULE 1-2-3			
	1	+V	COMMON INPUTS IN1..6
	4	IN1	PUMP 4-5-6 DIRECT CONTACTOR FEEDBACK
	5	IN2	PUMP 4-5-6 CIRCUIT BREAKER
	6	IN3	PUMP 4-5-6- MAN/AUT SELECTOR (CLOSED=AUTO)
	7	IN4	PUMP 4-5-6 START FLOAT
	8	IN5	-
	9	IN6	-

Tab. 43 Z-D-IO settings for Configurations 7 and 8: Digital inputs

DIGITAL OUTPUTS			
EXPANSION MODULE 1-2-3			
	10	Dout1-NO	PUMP 4-5-6 DIRECT CONTACTOR CONTROL
	11	Dout2-NO	-
	12	C	COMMON DIGITAL OUTPUTS

Tab. 44 Z-D-IO settings for Configurations 7 and 8: Digital outputs

1.2 OTHER CONNECTIONS

The other connections include:

- connection between RTU and HMI;
- connection to serial ports.

1.2.1 Connection between RTU and HMI

Connect the RTU to the HMI via an Ethernet cable on the respective Ethernet ports:

- **(P1 - Fig. 2 on page 12)** of the RTU;
- **(P2 - Fig. 3 on page 14)** of the HMI.

1.2.2 Connection to serial ports

With reference to **Fig. 2 on page 12** and **Fig. 3 on page 14**, the following table shows the use of each serial port of the system.

If required, make the desired connection(s).

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Port	Reference	Use
RS485	**(P2 - Fig. 2 on page 12)**	Not used
RS485	**(P3 - Fig. 2 on page 12)**	- For Z-D-IO expansion modules (pumps 4, 5, 6 if provided) - For inverter (if connected in mod-bus)
RS232	**(P4 - Fig. 2 on page 12)**	Not used
RS232/RS485/RS422	**(P1 - Fig. 3 on page 14)**	Not used

Tab. 45 Serial port connections

1.3 HMI CONFIGURATION

When first switching on, the HMI configuration must be performed. A wizard for system software configuration is automatically started on the HMI.

Carry out the following operations in the given order:

1. turn on the system referring to **“1.2.1 System start” on page 93**;
11. run the HMI configuration as follows:
   - if the system is intended for the “pressure/flow regulation” application, refer to **“1.3.1 Pressure/flow configuration wizard” on page 47**;
   - if the system is intended for “level control” applications, refer to

     ““1.3.2 Level configuration wizard” on page 52.

	The software configuration of the system MUST be compatible with the electrical connections made. Refer to **“1.1 Electrical connections” on page 25**. In case of subsequent changes to the electrical connections or to the devices connected to the system (pumps, inverters, etc.), the software configuration must be executed again. Use the command in section **“4.1.8.1 Confirm system reset” on page 73**

	**It is forbidden** to use any type of tools (screwdrivers, etc.) to activate the HMI touch-screen.

1.3.1 Pressure/flow configuration wizard

Follow the wizard steps to configure the system. Find below the screens displayed sequentially by the wizard.

When the HMI is first switched on, user login is required. Refer to **“4.1.1 Login page” on page 56**

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- Press the or key corresponding to the type of adjustment required.

Fig. 20 Pressure/flow wizard - Type of application



- Select the number of pumps available using the and keys.
- If necessary, press the key to return to the previous screen.
- Press the key to confirm.

Fig. 21 Pressure/flow wizard - Number of pumps



- Press the key corresponding to the type of inverter present in the system.
- If necessary, press the key to return to the previous screen.

Fig. 22 Pressure/flow wizard - Type of inverter

If you selected “Schneider ALTIVAR31” as inverter, the following screen is displayed.

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- Select the inverter interface.
- If necessary, press the key to return to the previous screen.

Fig. 23 Pressure/flow wizard - Inverter interface



- Check the settings made are correct.
- If necessary, press the key to return to the previous screen.
- Press the key to confirm.

Fig. 24 Pressure/flow wizard - System with inverter summary



- Press on the **"IS"** Scale Start field to enter the corresponding value using the displayed keypad.
- Press on the **"FS"** Scale End field to enter the corresponding value using the displayed keypad.
- If necessary, press the key to return to the previous screen.
- Press the key to confirm.

Fig. 25 Pressure/flow wizard - Type of AI04 analogue input

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The type of AI04 analogue input is automatically set according to the type of control selected in the first step of the wizard and is intended for measuring the process variable.

When a numeric field is pressed, the **(F - Fig. 46 on page 60)** keypad for entering the data is displayed.



- Press the key corresponding to the variation mode of the desired set point.

- If necessary, press the ◀ key to return to the previous screen.

Fig. 26 Pressure/flow wizard - Set point variation mode

With “HOUR SCHEDULING” the variation of the set point takes place on a time basis, with “DIGITAL INPUT VARIATION” the variation of the set point is based on the variation of a settable digital input.

If “DIGITAL INPUT VARIATION” has been selected, the following screen is displayed.



- Press on the corresponding fields to enter the set point values using the displayed keypad.

- If necessary, press the ◀ key to return to the previous screen.

- Press the ▶ key to confirm.

Fig. 27 Pressure/flow wizard - Set point allocation

The base Set Point is the value that the system must reach through pressure/flow regulation.

The first and second regulation Set Points are the values that the system must reach when they are active.

For further information, please refer to **“1.1.7 “Set point” page” on page 71**.

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- Press the key corresponding to the desired pump rotation criterion.

- If necessary, press the key to return to the previous screen.

Fig. 28 Pressure/flow wizard - Pump rotation

With “NUMBER OF OPERATING HOURS” the pump rotation criterion provides for the start of the pump with fewer hours of operation, with “NUMBER OF START-UPS” the pump rotation criterion provides for the start of the pump with the lowest number of start-ups made.



- Press on the corresponding fields to enter the telephone numbers associated with the system using the displayed keypad.

- If necessary, press the key to delete the entered number.

- Press the key to configure the mobile network settings.

- If necessary, press the key to return to the previous screen.

- Press the key to confirm.

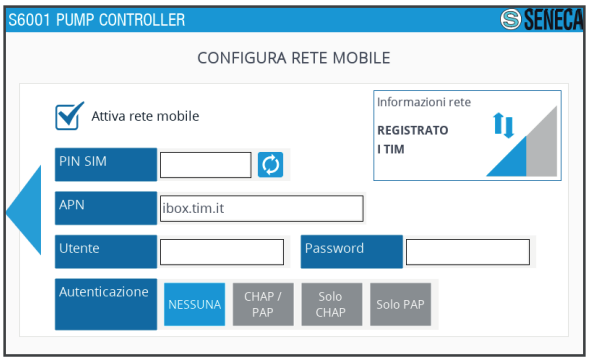
Fig. 29 Pressure/flow wizard - Telephone numbers

The telephone numbers associated with the system are enabled for remote connection via SMS. Refer to **“1.1.1 Remote connection via SMS” on page 105**.

If the key has been pressed, the following screen is displayed.

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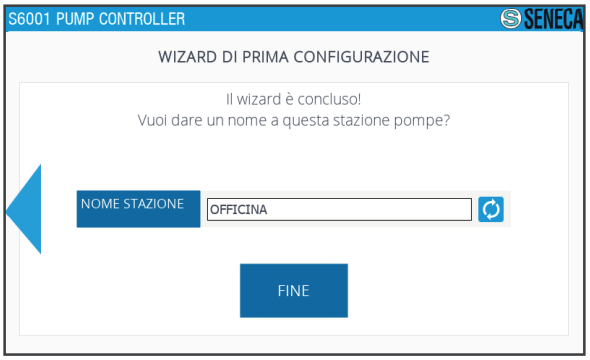
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- Press the ☑ key to enable/disable the mobile network.
- Press on the “PIN SIM” field to enter the SIM PIN using the displayed keypad.
- Press on the remaining fields to enter the network data using the displayed keypad.
- If necessary, press the ◀ key to return to the previous screen.

Fig. 30 Pressure/flow wizard - Mobile network

	The mobile network data is provided by the mobile service provider.



- Press on the “STATION NAME” field to enter the station name using the displayed keyboard.
- If necessary, press the ⟳ key to delete the entered name.
- Press the ◀ key to complete the configuration procedure.

Fig. 31 Pressure/flow wizard - Station name

	When an alphanumeric field is pressed, the **(G - Fig. 46 on page 60)** keypad for entering the data is displayed.

	By default, the logged-in user is admin. The admin user with the highest privileges will be disconnected automatically after 10 minutes of inactivity.

1.3.2 Level configuration wizard

Follow the wizard steps to configure the system. Find below the screens displayed sequentially by the wizard.

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Press the key.

Fig. 32 Level wizard - Type of application



- Press the key corresponding to the type of application for the desired level adjustment.
- If necessary, press the key to return to the previous screen.

Fig. 33 Level wizard - Level adjustment applications



- Press the key corresponding to the type of desired level measuring tool.
- If necessary, press the key to return to the previous screen.

Fig. 34 Level wizard - Level measurement tools

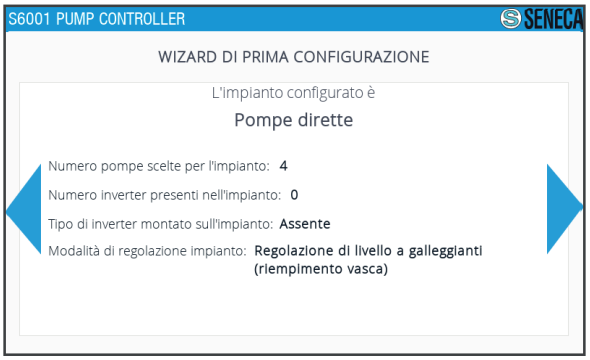
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- Select the number of pumps available using the ‹ and › keys.
- If necessary, press the ◀ key to return to the previous screen.
- Press the ▶ key to confirm.

Fig. 35 Level wizard - Number of pumps



- Check the settings made are correct.
- If necessary, press the ◀ key to return to the previous screen.
- Press the ▶ key to confirm.

Fig. 36 Level wizard - System summary



If the “probe” or “probe and floats” have been selected as adjustment tools, the following screen is displayed.



- Press on the **“IS”** Scale Start field to enter the corresponding value using the displayed keypad.
- Press on the “**FS**” Scale End field to enter the corresponding value using the displayed keypad.
- If necessary, press the ◀ key to return to the previous screen.
- Press the ▶ key to confirm.

Fig. 37 Level wizard - Type of AI04 analogue input

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The type of AI04 analogue input is automatically set according to the type of control selected in the first step of the wizard and is intended for measuring the process variable.

When a numeric field is pressed, the **(F - Fig. 46 on page 60)** keypad for entering the data is displayed.



- Press on the “START THRESHOLD” field to enter, for each pump, the corresponding value using the displayed keypad.

- Press on the “STOP THRESHOLD” field to enter, for each pump, the corresponding value using the displayed keypad.

- If necessary, press the key to return to the previous screen.

Fig. 38 Level wizard - Pump threshold



- Press the key corresponding to the desired pump rotation criterion.

- If necessary, press the key to return to the previous screen.

Fig. 39 Level wizard - Pump rotation

With “NUMBER OF OPERATING HOURS” the pump rotation criterion provides for the start of the pump with fewer hours of operation, with “NUMBER OF START-UPS” the pump rotation criterion provides for the start of the pump with the lowest number of start-ups made.

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Fig. 40 Level wizard - Telephone numbers

- Press on the corresponding fields to enter the telephone numbers associated with the system using the displayed keypad.

- If necessary, press the key to delete the entered number.

- Press the key to configure the mobile network settings.

- If necessary, press the key to return to the previous screen.

- Press the key to confirm.

The telephone numbers associated with the system are enabled for remote connection via SMS. Refer to **“1.1.1 Remote connection via SMS” on page 105**.

If the key has been pressed, the following screen is displayed.

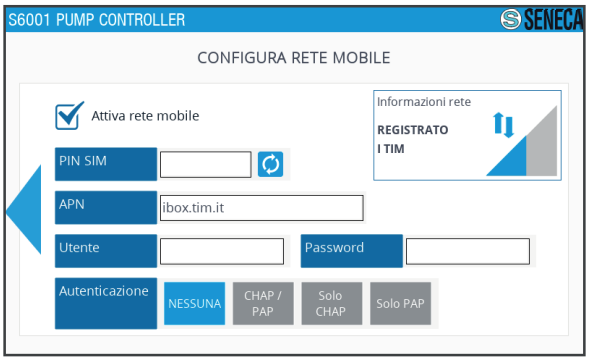


Fig. 41 Level wizard - Mobile network

- Press the key to enable/disable the mobile network.

- Press on the “PIN SIM” field to enter the SIM PIN using the displayed keypad.

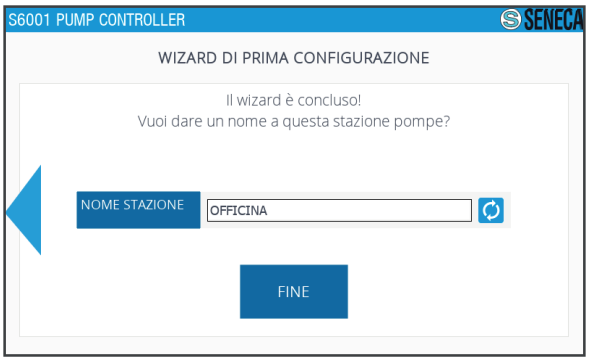
- Press on the remaining fields to enter the network data using the displayed keypad.

- If necessary, press the key to return to the previous screen.

The mobile network data is provided by the mobile service provider.

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- Press on the "STATION NAME" field to enter the station name using the displayed keyboard.

- If necessary, press the key to return to the previous screen.

- Press the FINE key to complete the configuration procedure.

Fig. 42 Level wizard - Station name

	When an alphanumeric field is pressed, the **(G - Fig. 46 on page 60)** keypad for entering the data is displayed.

	By default, the logged-in user is admin. The admin user with the highest privileges will be disconnected automatically after 10 minutes of inactivity.

1.1 TESTING

Before use, it is **mandatory** to carry out a test to verify the system installation is correct.

Carry out the following operations in the given order:

1. check that the RTU and HMI are assembled correctly;
12. check that the RTU and HMI are connected correctly;
13. check that the electrical connections are compatible with the type of desired system configuration (refer to **"1.1.2 Instructions for electrical connections" on page 26**);
14. check that the settings made in the configuration wizard are compatible with the type of desired system configuration;
15. log out referring to **"1.1 HMI description" on page 58**.

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4 USE

	Use the system in compliance with the conditions described in **"1.9.3 Environmental characteristics" on page 21**

1.1 HMI DESCRIPTION

On switching on the system on the HMI, the Login page is displayed **(Fig. 47 on page 61)**.

	When switching on for the first time, the configuration wizard starts automatically. Refer to **"1.3.1 Pressure/flow configuration wizard" on page 47**.

After logging in, the "Seneca" page is displayed **(Fig. 49 on page 62)**, from which you can access the main 6 pages:

- "Pumps" **(Fig. 50 on page 63)**;
- "Alarms" **(Fig. 52 on page 65)**;
- "Report" **(Fig. 54 on page 67)**;
- "Trend" **(Fig. 55 on page 68)**;
- "Set point" **(Fig. 57 on page 71)**;
- "Settings" **(Fig. 63 on page 77)**.

PAGE MENU

The main pages can be browsed using the page menu **(A - Fig. 43 on page 58)** at the bottom of each main page..



Fig. 43 Page menu

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POMPE	Key to access the “Pumps” page **(Fig. 50 on page 63)**.
ALLARMI	Key to access the “Alarms” page **(Fig. 52 on page 65)**.
REPORT	Key to access the “Report” page **(Fig. 54 on page 67)**.
TREND	Key to access the “Trend” page **(Fig. 55 on page 68)**.
SET POINT	Key to access the “Set Point” page **(Fig. 57 on page 71)**.
IMPOSTAZIONI	Key to access the “Settings” page **(Fig. 63 on page 77)**.

Tab. 46 Page menu

	The background of the page menu key corresponding to the displayed page changes from grey to blue. If access to a page is not allowed, the symbol appears on the top right hand corner of the relevant page menu button.

COMMON ELEMENTS



Fig. 44 Common elements

On each main page, there are the following common elements:

- upper display area **(B - Fig. 44 on page 59)**, which shows (from left to right) the system and the station names;
- key **(C - Fig. 44 on page 59)** to access the software version screen **(Fig. 45 on page 60)**;

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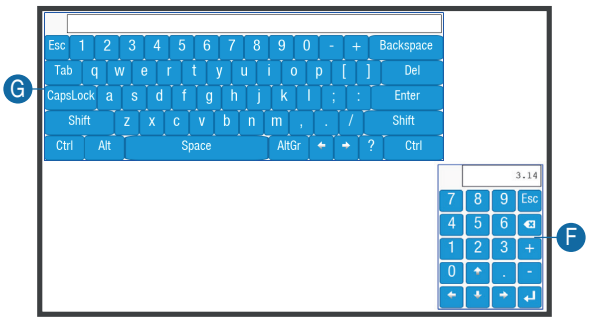
- logout **(D - Fig. 44 on page 59)** and login screen access key **(Fig. 47 on page 61)**;
- lower display area **(E - Fig. 44 on page 59)**, which shows the time, date and user currently logged in.

	The background of the upper display area changes colour if an alarm occurs. Refer to **"1.1.4 "Alarms" page" on page 65**. To change the date and/or time shown in the lower display area, refer to **""1.1.8 "Settings" page" on page 77**



Fig. 45 Software version screen

Data entry



For data entry, where provided, the following are available:

- numeric keypad **(F - Fig. 46 on page 60)**,
- alphanumeric keyboard **(G - Fig. 46 on page 60)**

which are displayed alternately, depending on the type of data to be entered, at the pressure of an input field.

Fig. 46 Keypad - keyboard

	Press and hold the upper left corner of the keypad/keyboard to move it in the screen.

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1.1.1 Login page

The Login page **(Fig. 47 on page 61)** allows logging into the system.

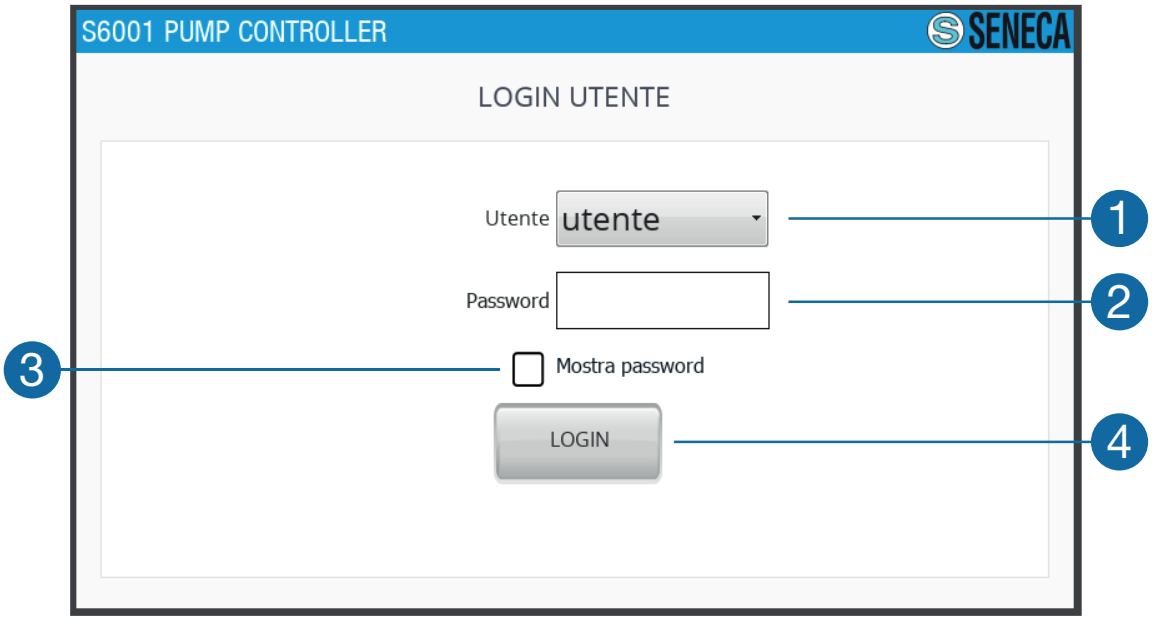


Fig. 47 Login page

1	Field to display and select the user. Select the desired user in the drop-down menu.
2	Field to display and enter the password. The field displays the password only if field **(3)** is ticked off.
3	Password display selection field. Select the field to display the password entered in **(2)**.
4	Login key. Press the key to authenticate with the selected user.

Tab. 47 Login page

1.1.1.1 User type

The following table describes the 3 types of users, listing the restrictions for each.

User	Restrictions	Password
admin	No restriction.	12345
tech	Access forbidden to “Set point” **(Fig. 57 on page 71)** and “Settings” **(Fig. 63 on page 77)** pages.	12345
guest	Access forbidden to “Set point” **(Fig. 57 on page 71)** and “Settings” **(Fig. 63 on page 77)** pages and data change disabled (only display is enabled).	12345

Tab. 48 User type

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The “admin” user can request the “tech” or “guest” user who will log in afterwards, to change the password; refer to the “User settings” sub-screen in **“1.1.8.4 “HMI properties” screen” on page 85**. In this case, the following screen is displayed at the next login **Fig. 48 on page 62**



Fig. 48 “Password change” screen

1.1.2 “SENECA” page

The “Seneca” page **(Fig. 49 on page 62)** is displayed after logging in and is the HMI welcome page.

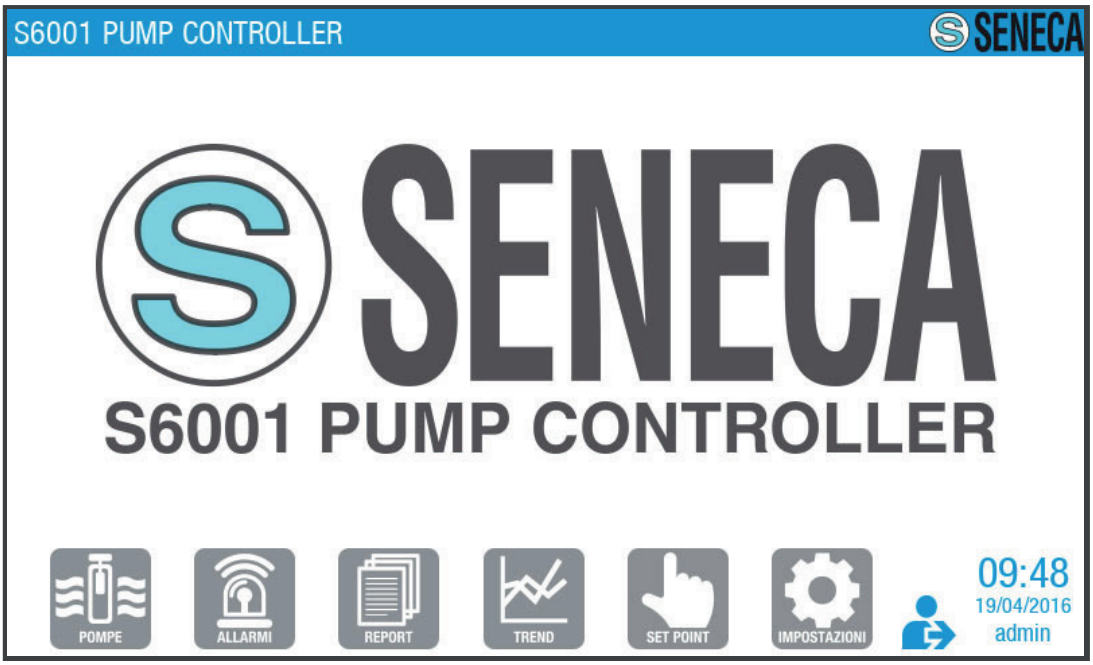


Fig. 49 “Seneca” page

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1.1.3 “Pumps” page

The “Pumps” page **(Fig. 50 on page 63)** allows managing the operating mode of the pump group and monitoring the correct operation of the system.



Fig. 50 “Pumps” page

5	System manual/automatic selector. In “AUTO” mode the pumps are managed autonomously by the RTU, in the “MAN” mode it is possible to manage the individual pumps manually. Press on the selector to set the pump group operating mode. The red indicator moves to the selected operating mode.
6	Pump display area. For each pump there is a box that shows the word “MAN” if set in manual mode, “AUTO” if set in automatic operating mode. The box is green if the corresponding pump is driven by the inverter, otherwise it is grey. The pumps can be one of the following colours: - red, if broken; - green, if active; - grey, if switched off. If selector **(5)** is set to MAN, it is possible to control the individual pump. Press on the desired pump to access the “Single pump” screen **(Fig. 51 on page 64)**.
7	Analogue indication of the value of the process variable (PV).
8	Indication of the full scale value of the process variable (PV).
9	Graphical indication of the process variable (PV) in real time (blue histogram).
10	Digital indication of the value of the process variable (PV).

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11	Digital indication of the Set Point (SP) value. The indication is positioned on the histogram corresponding to the value shown. The Set Point indication is not present for the “level control” application, as it is not required.

Tab. 49 “Pumps” page

1.1.3.1 “Individual pump” screen



Fig. 51 “Individual pump” screen

12	Pump information display area. “Pump status” (RUN, RUN WITH VARIABLE SPEED, STOP, FAULT), “Operating mode” (MANUAL ON, MANUAL OFF, AUTOMATIC) and pump image are displayed. The pump can be one of the following colours: - red, if broken; - green, if active; - grey, if switched off.
13	Operating mode selector. Drag the key to “AUTO” to set the automatic operating mode for the pump; drag the key to “MAN” to set the manual operating mode for the pump.
14	Pump manual start/stop button. Press the button to start/stop the pump; the blue indicator moves to “STOP” if the pump is stopped, to “START” if it is started. The key is enabled only if selector **(13)** is on “MAN”.

Tab. 50 “Individual pump” screen

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1.1.4 “Alarms” page

The “Alarms” page **(Fig. 52 on page 65)** allows managing alarms.

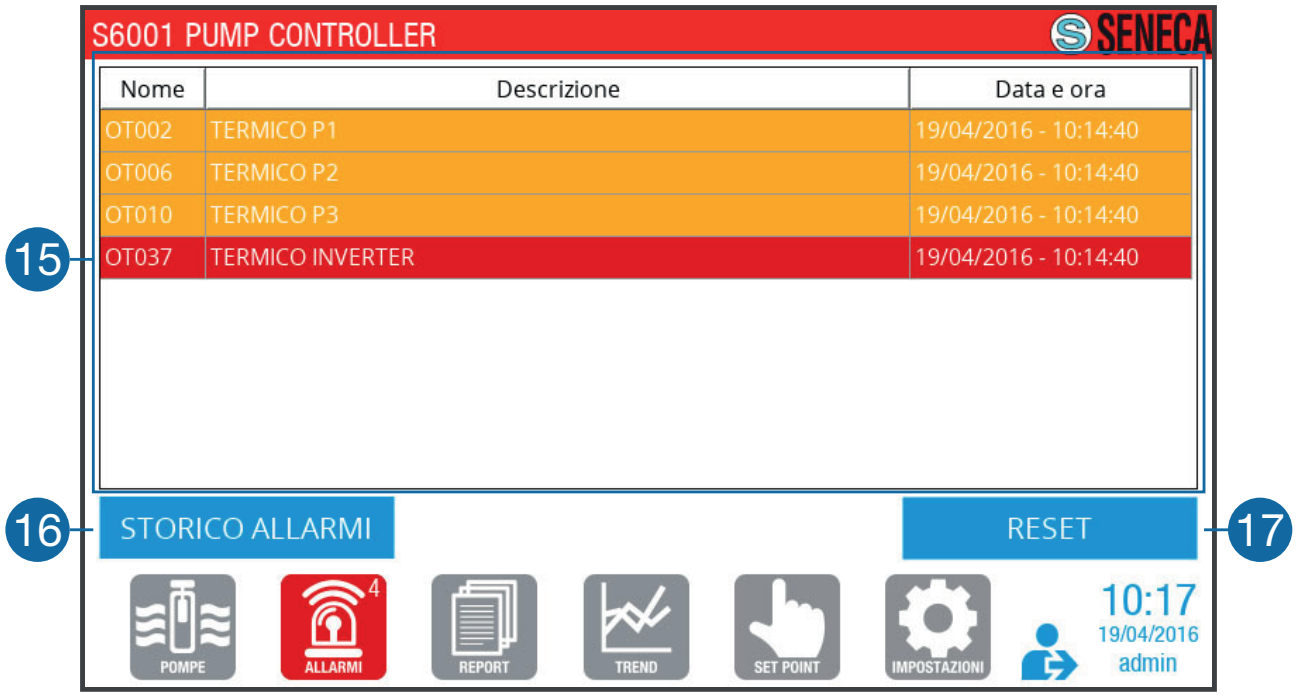


Fig. 52 “Alarms” page

15	Alarm display area present. For each alarm present, the “Name”, “Description”, “Date and time” are shown on a background coloured: - red if the alarm is blocking; - ochre if the alarm is non-blocking.
16	Key to access the “Alarm Log” page **(Fig. 53 on page 66)**.
17	Alarm reset button. The key allows to reset all resettable alarms, i.e. non-blocking alarms as well as blocking, solved alarms.

Tab. 51 “Alarms” page

	For the description of the blocking and non-blocking alarms refer to **“1.1.1 Alarm list” on page 96**. The background of the upper display area **(B - Fig. 44 on page 59)** is coloured: - red, if at least one blocking alarm is present; - ochre, if at least one non-blocking alarm is present; - blue, if no alarm is present. The alarm signals are sent, if enabled, to the telephone numbers associated with the system. Refer to the “Telecontrol” sub-screen in **“1.1.8.4 “HMI properties” screen” on page 85**

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1.1.4.1 “Alarm Log” screen

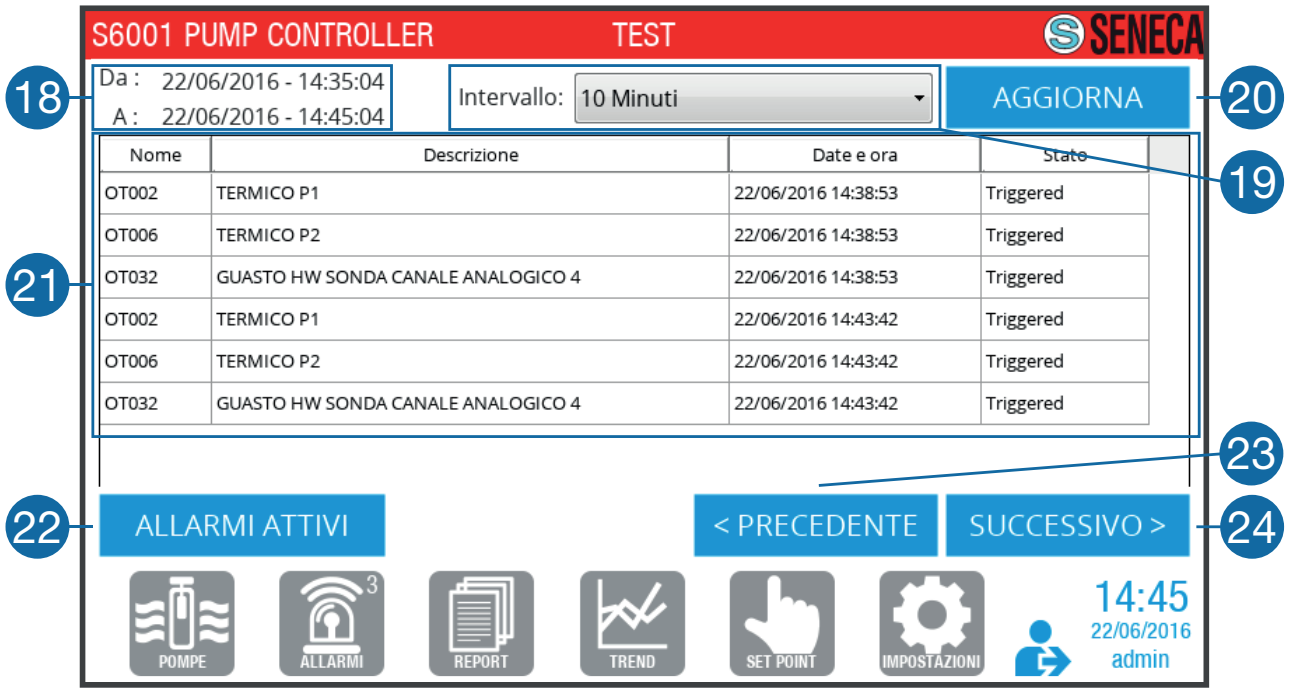


Fig. 53 “Alarm Log” screen

18	Range of display of the alarm log interval. The start and end date and time of the interval selected in the display and selection field **(19)** are displayed .
19	Display and selection field of the duration of the alarm log interval. Press and select the duration of the desired interval. In the display area **(21)** the alarms that have occurred in the selected interval are displayed.
20	Alarm log update button.
21	Display area of the alarms in the alarm log. The alarms that occurred in the interval shown in the display area **(18)** are displayed. For each alarm, the name, description, date, time and status (“triggered” if reset, “not triggered” if not reset) are given.
22	Key to return to the “Alarms” page **(Fig. 52 on page 65)**.
23	Key to scroll to the previous time interval. The time scroll is equal to the quantity selected in the display and selection field **(19)**.
24	Scroll key to the next time interval. The time scroll is equal to the quantity selected in the display and selection field **(19)**.

Tab. 52 “Alarm Log” screen

1.1.5 “Report” page

The “Report” page **(Fig. 54 on page 67)** allows viewing the reports on the pumps operation.

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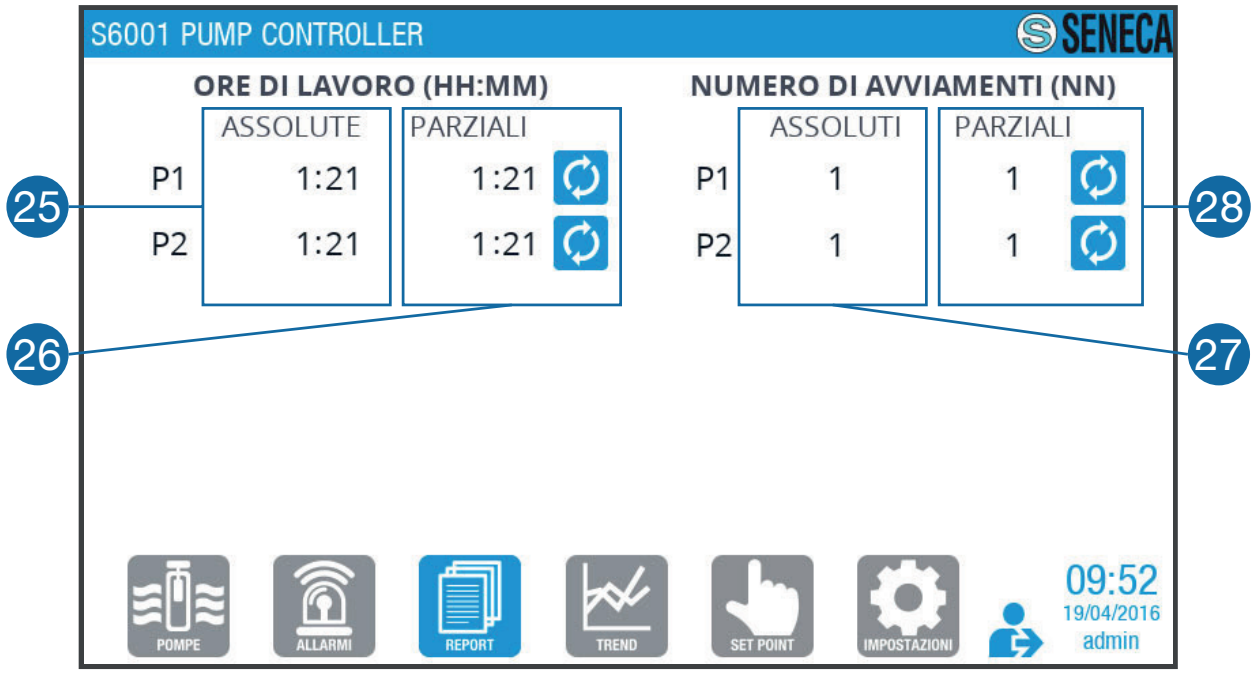


Fig. 54 “Report” page

25	Display area of the absolute working hours of the individual pumps, i.e. the total number of working hours from the first switching on of the station.
26	Display area of the partial work hours (since the last reset) of the individual pumps. To manually reset the partial total of one or more pumps, press the key corresponding to the pump for which the partial count is to be reset.
27	Display area of the number of absolute starts of the individual pumps, i.e. the total number of starts from the first start-up of the station.
28	Display area of the number of partial starts (since the last reset) of the individual pumps. To manually reset the partial total of one or more pumps, press the key corresponding to the pump for which the partial count is to be reset.

Tab. 53 “Report” page

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1.1.6 “Trend” page

The “Trend” page **(Fig. 55 on page 68)** allows viewing graphically the trend of the system variables.

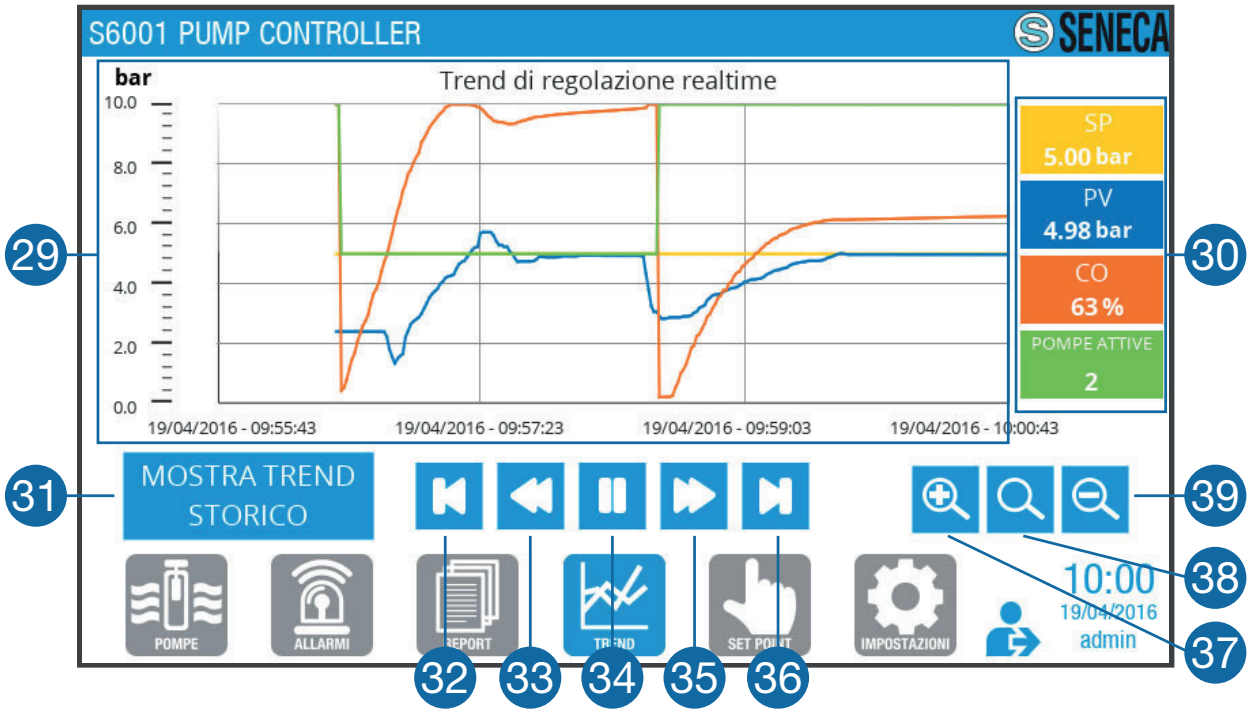


Fig. 55 “Trend” page

29	Display area of the trend graph of the plant trend variables in real time. The following values are listed in a default interval of 5 minutes: - Set Point (SP), in yellow; - process variable (PV), in blue; - control variable (CO), in orange; - number of active pumps, in green.
30	Numerical indications in real time of the values of: - Set Point (SP), on a yellow background; - process variable (PV), on a blue background; - control variable (CO), on an orange background; - number of active pumps, on a green background.
31	Key to access the “Historical trend” screen **(Fig. 56 on page 69)**.
32	Button to scroll back the time interval of a quantity equal to the interval displayed in the display area **(29)**.
33	Button to scroll back the time interval of a quantity equal to 1/10 of the interval displayed in the display area **(29)**.

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34	Pause button. Press once to pause the trend in real time; press a second time to return to the normal trend flow in real time.
35	Scroll forward the time interval of a quantity equal to 1/10 of the interval displayed in the display area **(29)**.
36	Button to scroll forward the time interval of a quantity equal to the interval displayed in the display area **(29)**.
37	Zoom+ key. Press the button to decrease the time interval displayed in the display area **(29)**. Each time the button is pressed, the time interval decreases progressively.
38	Default time interval reset button (5 minutes).
39	Zoom button - Press the button to increase the time interval displayed in the display area **(29)**. Each time the button is pressed, the time interval increases progressively.

Tab. 54 "Trend" page

The **(32)**, **(33)**, **(34)**, **(35)**, **(36)**, **(37)**, **(38)**, **(39)** keys have the same functions in the "Historical trend" screen **(Fig. 56 on page 69)**.

1.1.6.1 "Historical trend" screen

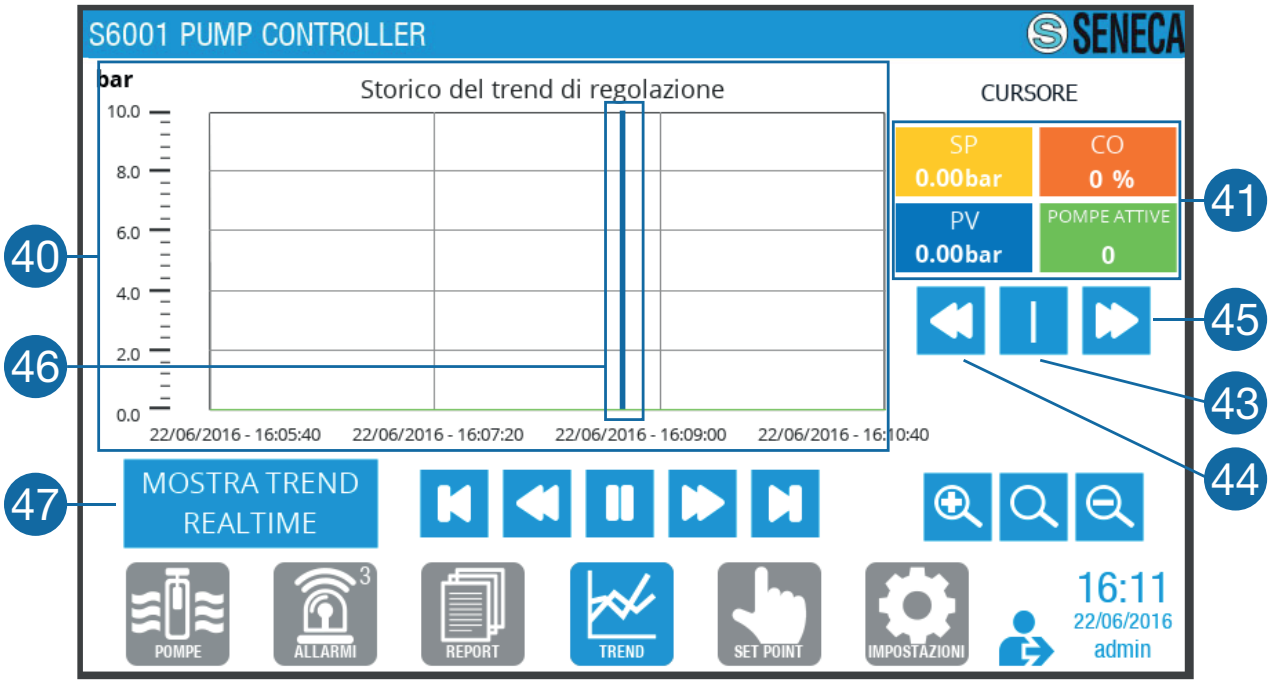


Fig. 56 "Historical trend" screen

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40	Graph display area of the historical trend of the plant variables. The following values are listed in a default interval of 5 minutes: - Set Point (SP), in yellow; - process variable (PV), in blue; - control variable (CO), in orange; - number of active pumps, in green.
41	Numerical indications of the values of: - Set Point (SP), on a yellow background; - control variable (CO), on an orange background; - process variable (PV), on a blue background; - number of active pumps, on a green background. When the cursor **(46)** is not active, N/D is shown under the numerical indications, when it is active, the numerical indications correspond to the values that the cursor is intersecting in the different graph curves.
43	Cursor activation key. Press the button to activate the cursor on the graph.
44	Cursor back key. When the key is pressed, the cursor scrolls back in time by a quantity equal to 1/100 of the interval displayed in the display area **(40)**. The key is initially disabled (grey), when the key is pressed **(43)** it is enabled (blue).
45	Cursor forward button. When the key is pressed, the cursor scrolls forward in time by a quantity equal to 1/100 of the interval displayed in the display area **(40)**. The key is initially disabled (grey), when the key is pressed **(43)** it is enabled (blue).
46	Cursor for the precise reading (at a certain time) in the graph of the historical trend of the plant variables. The read values are displayed in **(41)**.
47	Key to return to the “Trend” page **(Fig. 55 on page 68)**.

Tab. 55 “Historical trend” screen

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1.1.7 “Set point” page

The “Set Point” page **(Fig. 57 on page 71)** allows you to set the operating parameters of the system, based on what type of adjustment has been selected.



Fig. 57 “Set point” page

48	Screen display area. Press keys **(49)**, **(50)**, **(51)**, **(52)**, **(53)** to display the desired corresponding screen.
49	Key to access the “Set Point” screen **(Fig. 57 on page 71)**.
50	Key to access the “Pump thresholds” screen **(Fig. 59 on page 73)**.
51	Key to access the “Pump parameters” screen **(Fig. 60 on page 74)**.
52	Key to access the “Analogue thresholds” screen **(Fig. 61 on page 75)**.
53	Key to access the “PID parameters” screen **(Fig. 62 on page 76)**.

Tab. 56 “Set point” page

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1.1.7.1 “Set point” screen

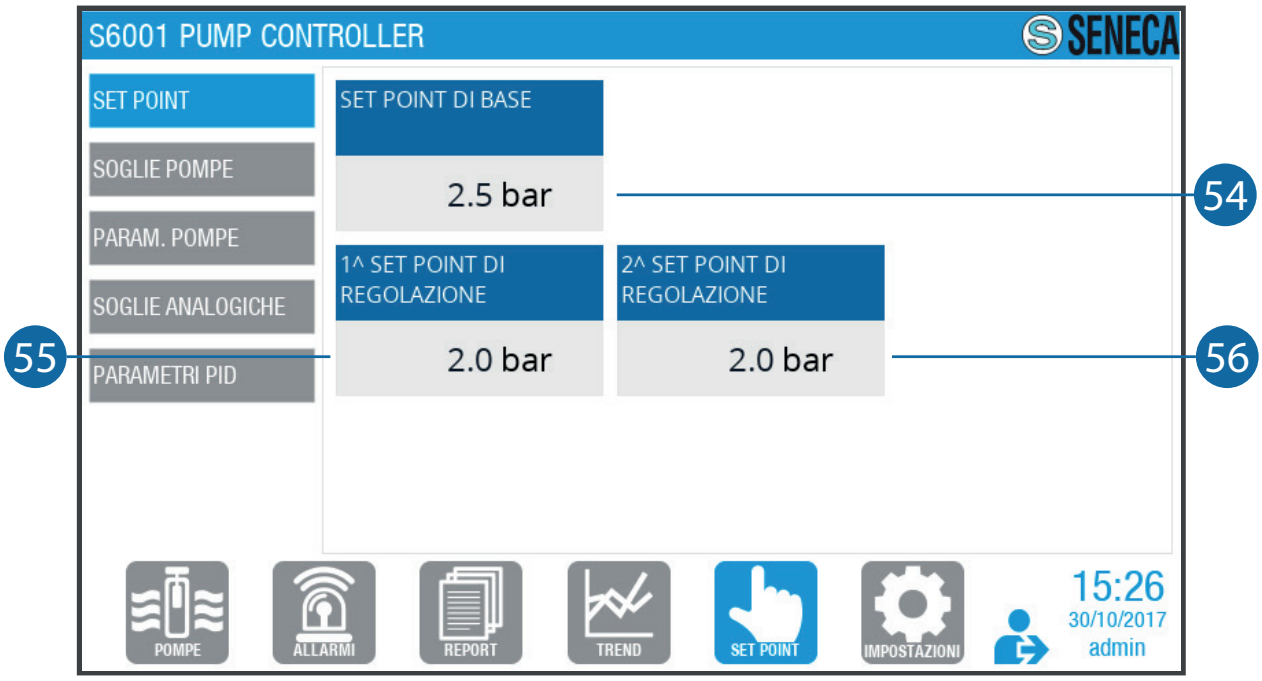


Fig. 58 “Set point” screen

54	Display and base Set Point entry field. Press on the field to enter, using the keypad, the value of the desired base Set Point.
55	Display and first adjustment Set Point entry field. Press on the field to enter, using the keypad, the desired first adjustment Set Point value.
56	Display and second adjustment Set Point entry field. Press on the field to enter, using the keypad, the value of the desired second adjustment Set Point.

Tab. 57 “Set point” screen

	The base Set Point is the value that the process variable must reach and maintain over time. The Set Point is not used for the “level control” application, since the operation of the pumps is controlled by threshold exceeding levels. The first adjustment Set Point has the same meaning as the base Set Point and intervenes only if it has been enabled by the user. If it was set via “Digital input variation”, set the corresponding digital input (refer to **“1.1.8.2 “IO digital type” screen” on page 78**). The second adjustment Set Point has the same meaning as the base Set Point and intervenes only if it has been enabled by the user. If it was set via “Digital input variation”, set the corresponding digital input (refer to **“1.1.8.2 “IO digital type” screen” on page 78**).

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1.1.7.2 "Pump thresholds" screen

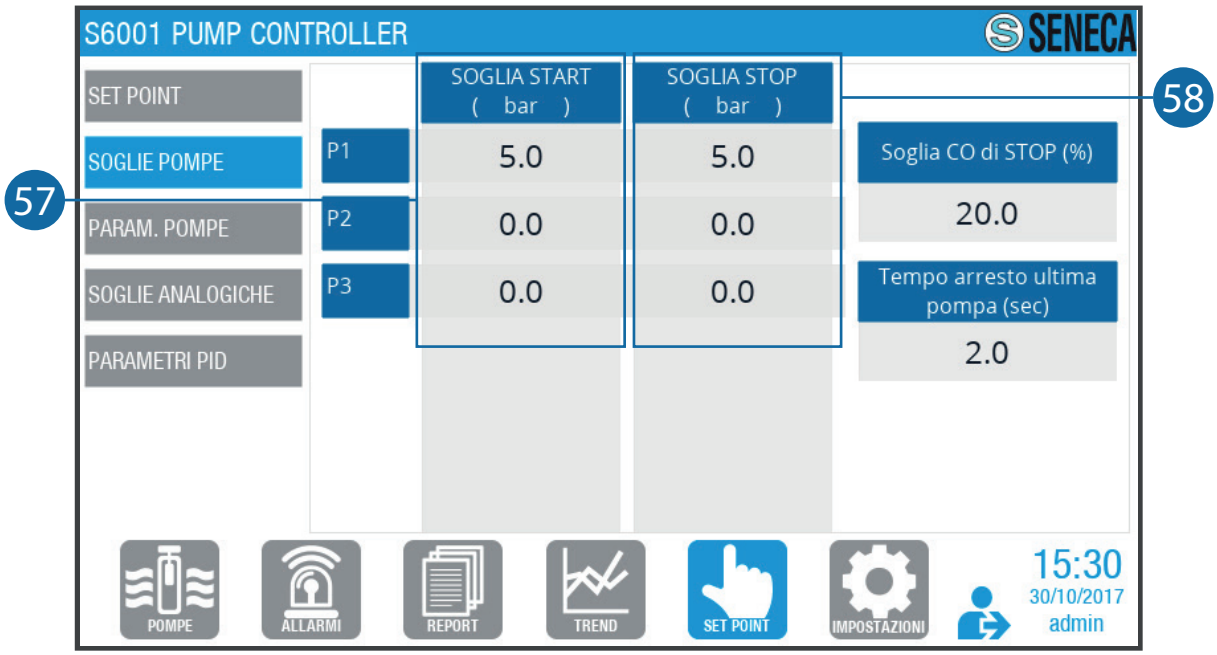


Fig. 59 "Pump thresholds" screen

57	Field to display and enter the start threshold of the individual pumps. Press on the field to enter, using the keypad, the desired "start threshold" value for the individual pumps.
58	Field to display and enter the stop threshold of the individual pumps. Press on the field to enter, using the keypad, the value of the desired stop threshold for the individual pumps.

Tab. 58 "Pump thresholds" screen

	The "start threshold" and "stop threshold" values are only used for level adjustments with an analogue probe. They indicate the analogue threshold value at which the individual pumps must start and stop, respectively.

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1.1.7.3 “Pump parameters” screen

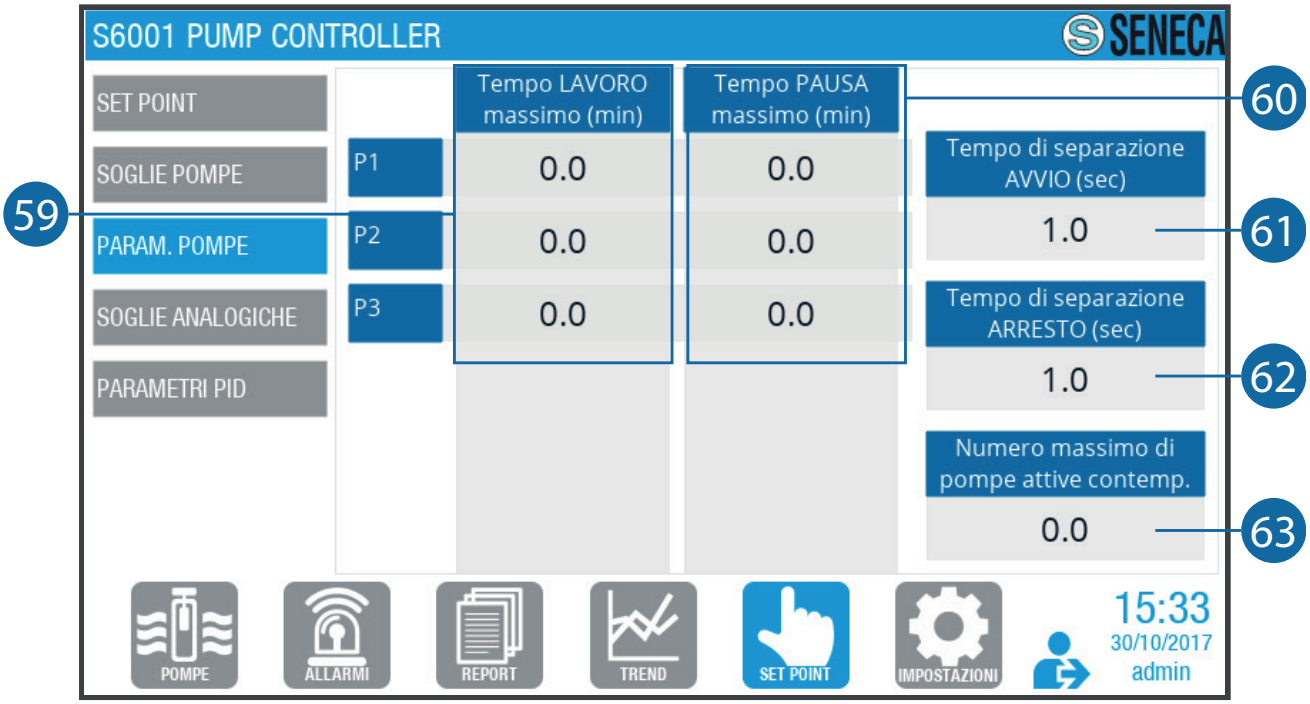


Fig. 60 “Pump parameters” screen

59	Field to display and enter the maximum work time of the individual pumps. Press on the field to enter, using the keypad, the value of the desired maximum work time for the individual pumps.
60	Field to display and enter the maximum pause time of the individual pumps. Press on the field to enter, using the keypad, the value of the desired maximum pause time for the individual pumps.
61	Field to display and enter the separation time between the start-ups of the individual pumps. Press on the field to enter, using the keypad, the minimum time that must elapse between one pump starting and the next one.
62	Field to display and enter the separation time between the individual pumps stopping. Press on the field to enter, using the keypad, the minimum time that must elapse between one pumps stopping and the next one.
63	Field to display and enter the maximum number of active pumps. Press on the field to enter, using the keypad, the maximum number of active pumps.

Tab. 59 “Pump parameters” screen

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1.1.7.4 “Analogue thresholds” screen

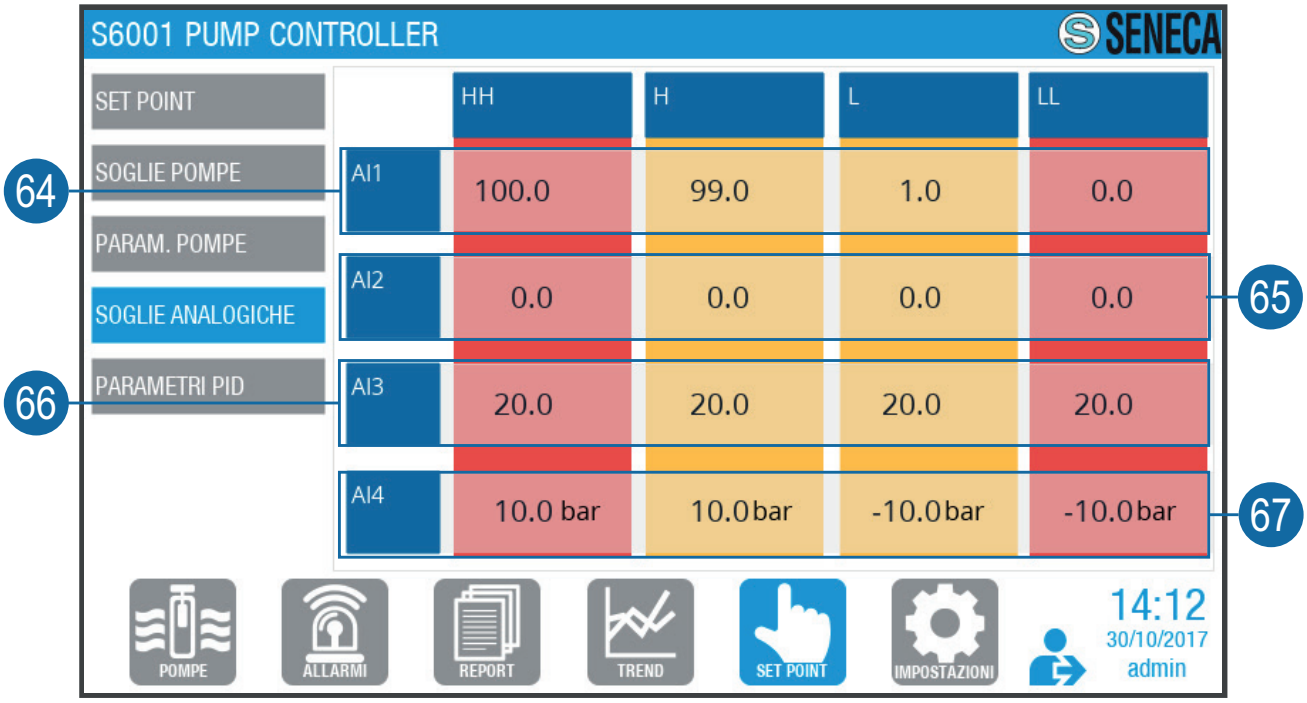


Fig. 61 “Analogue thresholds” screen

64	Field to display and enter the analogue threshold value “HH”, for the single analogue inputs. Press on the field to enter, using the numeric keypad, the value of the desired analogue threshold “HH”, for each analogue input.
65	Field to display and enter the analogue “H” threshold value for the individual analogue inputs. Press on the field to enter, using the numeric keypad, the value of the desired analogue threshold “H”, for each analogue input.
66	Field to display and enter the analogue “L” threshold value, for the individual analogue inputs. Press on the field to enter, using a numeric keypad, the value of the desired analogue threshold “L”, for each analogue input.
67	Field to display and enter the analogue threshold value “LL”, for the single analogue inputs. Press on the field to enter, using the numeric keypad, the value of the desired analogue threshold “LL”, for each analogue input.

Tab. 60 “Analogue thresholds” screen



It is possible to set these 4 thresholds so that alarms are triggered when they are exceeded. The values monitored by these 4 thresholds are associated with analogue inputs AI01, AI02, AI03 and AI04, in particular:

- Threshold HH is the threshold with maximum value; the alarm is triggered when AI > HH;
- Threshold h is the threshold with medium-high value; the alarm is triggered when AI > H;
- Threshold L is the threshold with medium-low value; the alarm is triggered when AI < L;
- Threshold LL is the threshold with minimum value; the alarm is triggered when AI < LL.

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1.1.7.5 "PID parameters" screen

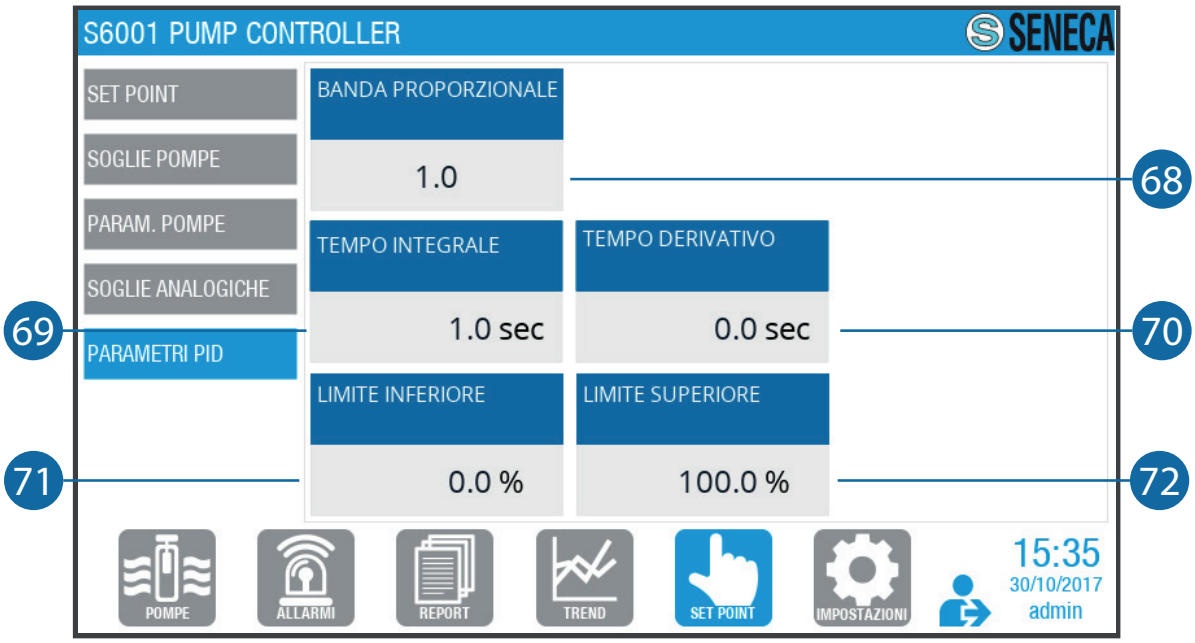


Fig. 62 "PID parameters" screen

68	Field to display and enter the proportional band value. Press on the field to enter the value of the proportional band using the numeric keypad.
69	Field to display and enter the integral time value. Press on the field to enter, using the keypad, the integral time value.
70	Field to display and enter the derivative time value. Press on the field to enter the derivative time value using the keypad.
71	Field to display and enter the lower limit value. Press on the field to enter, using the keypad, the lower limit value.
72	Field to display and enter the upper limit value. Press on the field to enter the upper limit value using the keypad.

Tab. 61 "PID parameters" screen

	An incorrect entry of values can lead to the incorrect operation of the system. Modify the parameters **only** if they are based on their meaning. We recommend that you use the preset values if you do not know their meaning.

	There is no unique optimal setting of these parameters; they must be calibrated empirically according to the type of application for which the system is intended.

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1.1.8 “Settings” page

The “Settings” page **(Fig. 63 on page 77)** allows setting parameters and advanced options.

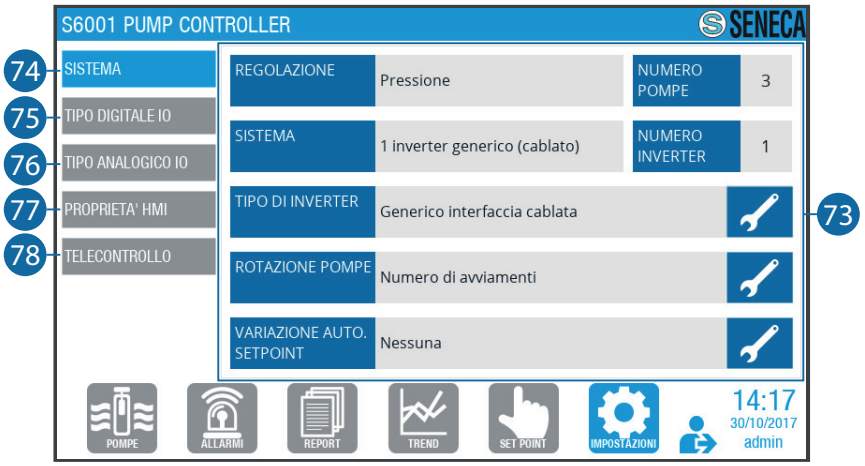


Fig. 63 “Settings” page

73	Screen display area. Press keys **(73)**, **(74)**, **(75)**, **(76)**, **(77)** to display the desired corresponding screen.
74	Key to access the “System” screen **(Fig. 64 on page 77)**.
75	Key to access the “IO digital type” screen **(Fig. 66 on page 78)**.
76	Key to access the “IO analogue type” screen **(Fig. 68 on page 83)**.
77	Key to access the “HMI properties” screen **(Fig. 70 on page 85)** and **(Fig. 71 on page 86)**
78	Key to access the “Telecontrol” screen **(Fig. 78 on page 91)**.

Tab. 62 “Settings” page

1.1.8.1 “System” screen



Fig. 64 “System” screen

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79	Area for displaying system summary information, which can not be configured.
80	Area for displaying system summary information, which can be configured. When the key is pressed, the relative selected configuration can be changed.

Tab. 63 "System" screen

"SYSTEM RESET CONFIRMATION" SUB-SCREEN



Fig. 65 "System reset confirmation" sub-screen

Press SI to confirm or NO to delete the system reset.

1.1.8.2 "IO digital type" screen

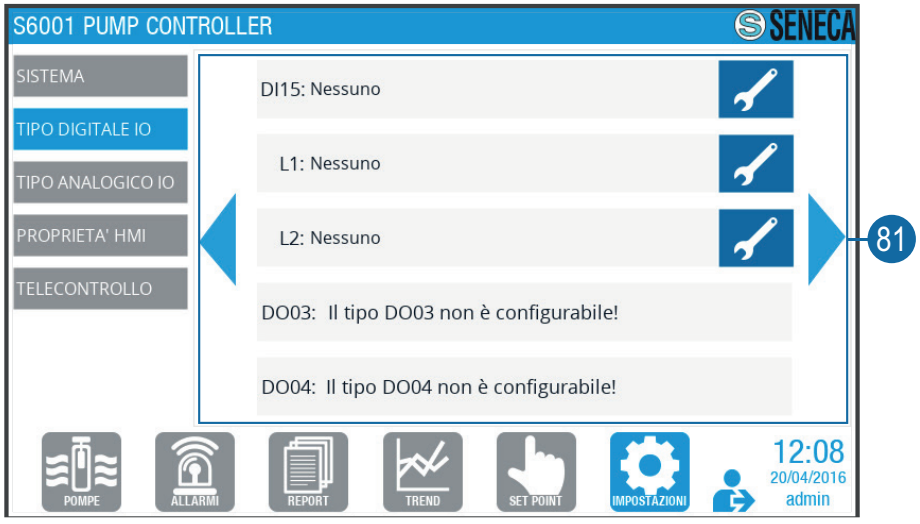


Fig. 66 "IO digital type" screen

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81	Display area of digital I/Os. To scroll through the list of I/Os, press the or key. When the corresponding key is pressed, present only for configurable I/Os, the “Configurations” sub-screen **(Fig. 67 on page 79)** is displayed, with the configurations provided for the I/O.

Tab. 64 “IO digital type” screen

“Digital configurations” sub-screen

(Fig. 67 on page 79) shows an example of “Digital configurations” sub-screen.



Fig. 67 Example of “Digital configurations” sub-screen

Press key or , if present, to scroll through the list of possible configurations; press the key corresponding to the desired configuration to select it.

Find below a table with all the possible configurations for each configurable digital I/O.

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I/O	Possible configuration	Configuration description
DI05÷DI17	None	The input is free, non configured.
	Reserved	In the system configuration currently in use, the input is non-configurable.
	External alarm	Alarm signal from electromechanics external to the system. The system will treat it as a non-blocking alarm.
	Feedback hw RUN from generic inverter	Signal of inverter running coming directly from the inverter. To be used if the type of inverter is set to wired.
	Cumulative alarm from generic inverter	Alarm signal from the inverter.
	Selection of adjustment Set Point 1	Use Set Point 1 instead of the basic adjustment Set Point.
	Selection of adjustment Set Point 2	Use Set Point 2 instead of the basic adjustment Set Point.
	AUT station	Signal used to set pump management by the system, in “automatic” or “manual” mode. The possible input states are: ON = automatic, OFF = total stop
	AUT P1	Signal used to set pump 1 in “automatic” or “manual” mode The possible input states are: ON = automatic, OFF = manual
	AUT P2	Signal used to set pump 2 in “automatic” or “manual” mode The possible input states are: ON = automatic, OFF = manual
	AUT P3	Signal used to set pump 3 in “automatic” or “manual” mode The input possible states are: ON = automatic, OFF = manual
	AUT P4	Signal used to set pump 4 in “automatic” or “manual” mode The input possible states are: ON = automatic, OFF = manual

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I/O	Possible configuration	Configuration description
DI05÷DI17	AUT P5	Signal used to set pump 5 in “automatic” or “manual” mode The possible input states are: ON = automatic, OFF = manual
	AUT P6	Signal used to set pump 6 in “automatic” or “manual” mode The possible input states are: ON = automatic, OFF = manual
	External Emergency Control	Alarm signal from electromechanics external to the system. The system will treat it as a non-blocking alarm. The possible input states are: ON = normal, OFF = emergency control active
	Supply voltage present	Voltage presence signal of the panel where the system is installed. The system will treat it as a blocking alarm. The possible states are: ON = absent, OFF = present
	Time programmer enabling presence	Time programmer enabling signal. With the time programmer active, the adjustment works according to the Set Points and the times defined in the device configuration. On the other hand, the current mode is used: “automatic” or “manual”. The possible input states are: ON = active, OFF = inactive
	UPS Network OK	Status signal of network presence UPS OK.
	UPS Low battery	Signal of UPS flat battery status.
	Pump stop float	Signal of the pump stop float. It can be used in all the applications provided for the system to stop the pumps in normal conditions or in all cases where the level of the fluid in the adjustment is such that it no longer requires the operation of the pumps.
	Alarm level float	Signal of the pump stop float. It can be used in all the applications provided for the system if you want to signal an alarm if the fluid level in the adjustment reaches a critical or anomalous condition.
	Alarm reset	The reset alarm signal can be used to reset system anomalies from the outside, for instance from a button on the electrical panel.

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I/O	Possible configuration		Configuration description
DO03÷DO08	None		The input is free, non configured.
	Reserved		In the system configuration currently in use, the input is non-configurable.
	Cumulative signal	Telecontrol modem ON	The system modem is ON.
		Telecontrol modem registered	The system modem is OFF.
		Blocking alarms present	Blocking alarms present..
		Non-blocking alarms present	Non-blocking alarms present.
		Alarm siren	Alarm siren active.
		AUT station	Station automatic signal enabled.
		UPS Network OK	Supply signal from UPS network OK.
		UPS Low battery	Low UPS battery signal.
		Pump stop float	Pump stop float signal.
		Alarm level float	Alarm float signal.
	Single signal	Telecontrol modem ON	The system modem is ON.
		Telecontrol modem registered	The system modem is OFF.
		Level Switch L1 / L2 signal	Repetition of the pump stop level float.
		Alarms present	Alarms present (blocking or non-blocking).
		Alarm siren	Signal for optical/acoustic signal of presence of unacknowledged alarms. When the alarms on the HMI are reset, the siren is silenced.
		Run inverter	Inverter order to run

Tab. 65 Digital !/O configurations

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1.1.8.3 "IO analogue type" screen



Fig. 68 "IO analogue type" screen

82	Display area of analogue I/Os. To scroll through the list of I/Os, press the ▶ or ◀ key. When the corresponding key is pressed, present only for configurable I/Os, the "Configurations" sub-screen **(Fig. 69 on page 83)** is displayed, with the configurations provided for the I/O.

Tab. 66 "IO analogue type" screen

"ANALOGUE CONFIGURATIONS" SUB-SCREEN

(Fig. 69 on page 83) shows an example of "Analogue configurations" sub-screen.



Fig. 69 Example of "Analogue configurations" sub-screen

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Press key ◀ or ▶, if present, to scroll through the list of possible configurations; press the key corresponding to the desired configuration to select it.

Find below a table with all the possible configurations for each configurable analogue I/O.

I/O	Possible configuration	Configuration description
AI01÷AI04	None	The input is free, non configured.
	Reserved	In the system configuration currently in use, the input is non-configurable.
	Feedback from inverter frequency (Hz)	Analogue frequency feedback signal from the inverter. To be used if the type of inverter is set to wired.
	Level analogue probe (m)	Input from level and measurement probe expressed in engineering units m (meters).
	Pressure analogue probe (bar)	Input from pressure and measurement probe expressed in engineering units (bar).
	Flow analogue probe (m3/h)	Input from flow and measurement probe expressed in engineering units (m3/h).
	Pump 1 absorption (A)	Input from transducer measuring current absorption of pump 1 in A.
	Pump 2 absorption (A)	Input from transducer measuring current absorption of pump 2 in A.
	Pump 3 absorption (A)	Input from transducer measuring current absorption of pump 3 in A.
	Pump 4 absorption (A)	Input from transducer measuring current absorption of pump 4 in A.

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I/O	Possible configuration	Configuration description
AO01-AO02	None	The input is free, non configured.
	Reserved	In the system configuration currently in use, the input is non-configurable.
	Control from internal PID	Inverter control output (comes directly from the PID system controller).
	Repetition of analogue Input 1	Repetition of analogue Input 1.
	Repetition of analogue Input 2	Repetition of analogue Input 2.
	Repetition of analogue Input 3	Repetition of analogue Input 3.
	Repetition of analogue Input 4	Repetition of analogue Input 4.
	Generic inverter set reference repetition (Hz)	Repetition of the inverter control output signal.
	Inverter frequency feedback repetition (Hz)	Repetition of the frequency feedback signal input from the inverter.

Tab. 67 Analogue I/O configurations

1.1.8.4 "HMI properties" screen

There are 2 "HMI properties" screens. To toggle from one screen to the other, press the ◀ or ▶ key.



Fig. 70 "HMI 1 properties" screen

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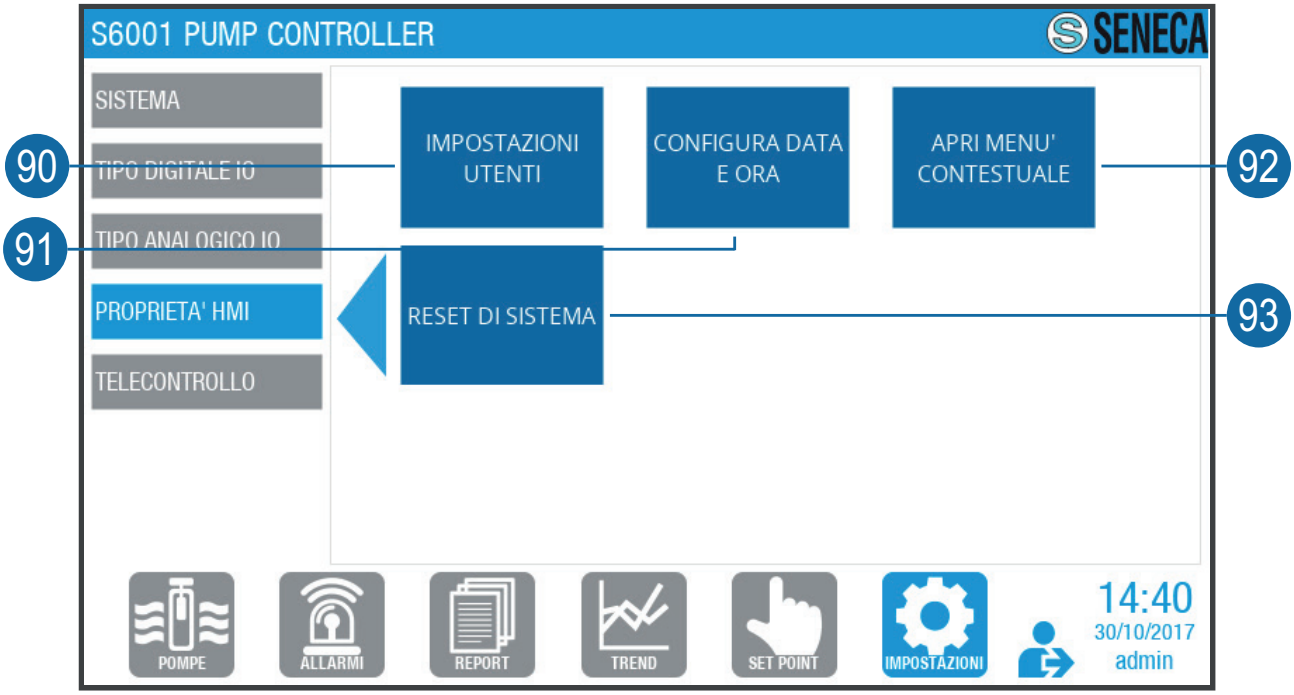


Fig. 71 “HMI 2 properties” screen

83	Field to display and enter the station name. Click and enter, using the keyboard, the name of the desired station.
84	Field to display and select the screen brightness. Press the ‹ or › key to adjust the screen brightness.
85	Field to display and select the screen timeout. Press the ‹ or › key to adjust the time of inactivity before the screen goes OFF.
86	Language selection field. To change language, press on the flag corresponding to the desired language.
87	Update procedure start key. Refer to **“1.1 HMI software update” on page 113**.
88	Key to access the “Panel restart” sub-screen **(Fig. 72 on page 87)**.
89	Key to access the “Network parameters” sub-screen **(Fig. 73 on page 87)**.
90	Key to access the “User settings” sub-screen **(Fig. 75 on page 88)**.
91	Key to access the “Date and time configuration” sub-screen **(Fig. 76 on page 89)**.
92	Access key to the HMI context menu to manage the advanced settings of the HMI operating system itself.
93	Key to access the “System reset confirmation” sub-screen **(Fig. 65 on page 78)**.

Tab. 68 “HMI” screens

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"Panel restart" sub-screen



Fig. 72 "Panel restart" sub-screen

Press SI to confirm or NO to cancel the HMI restart.

"Network parameters" sub-screen

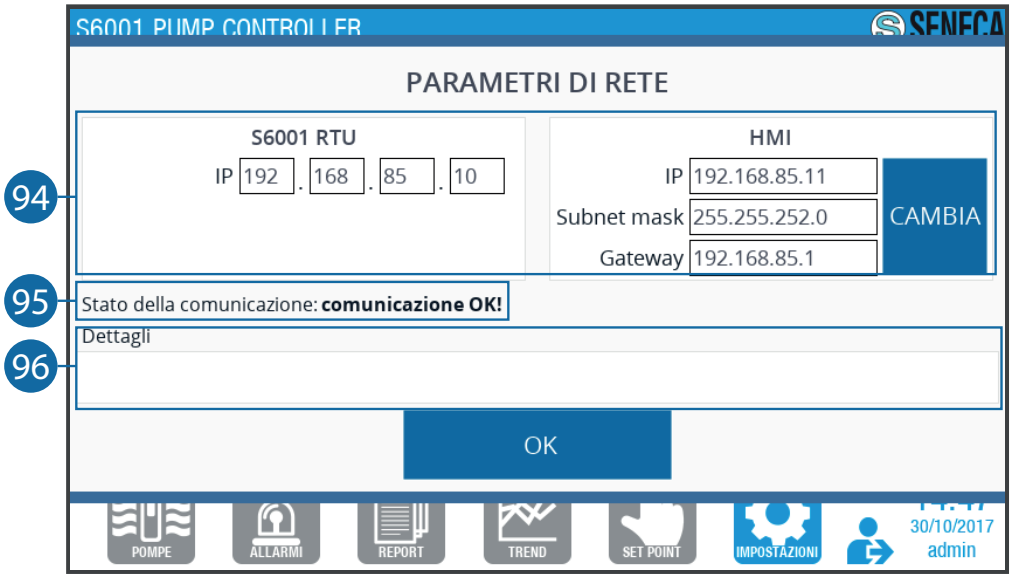


Fig. 73 "Network parameters" sub-screen

94	Field to display and enter the network parameters. Press to enter the network parameters using the keypad.
95	Display area of the communication status between RTU and HMI. The following is displayed: "communication OK" if communication is active, "communication error" if communication is inactive.

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96	Detail display area. In case a “communication error”, the errors are displayed in detail.

Tab. 69 “Network parameters” sub-screen

If the communication between RTU and HMI is not active The communication error message **(Fig. 74 on page 88)** is displayed.



Fig. 74 Communication error message

“User settings” sub-screen



Fig. 75 “User settings” sub-screen

97	Display field and user selection. Press to select the desired user type.
98	Display field and Password. Press to enter the password using the keypad.
99	Password display selection field. Select the field to display the password entered in **(98)**.

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100	Password change selection field. Tick the field to request the selected user in the **(97)** field to change the password on the next login.
101	Field to display and enter the inactivity Logout time. Using the keypad, press to enter the inactivity time for automatic logout.
102	Apply key. Press the key to apply the displayed settings.
103	Cancel key. Press the key to exit the sub-screen.

Tab. 70 "User settings" sub-screen

If the field **(100)** has been ticked off at the next login, the "Change password" screen will be displayed for the selected user **(Fig. 48 on page 62)**.

"Date and time configuration" sub-screen

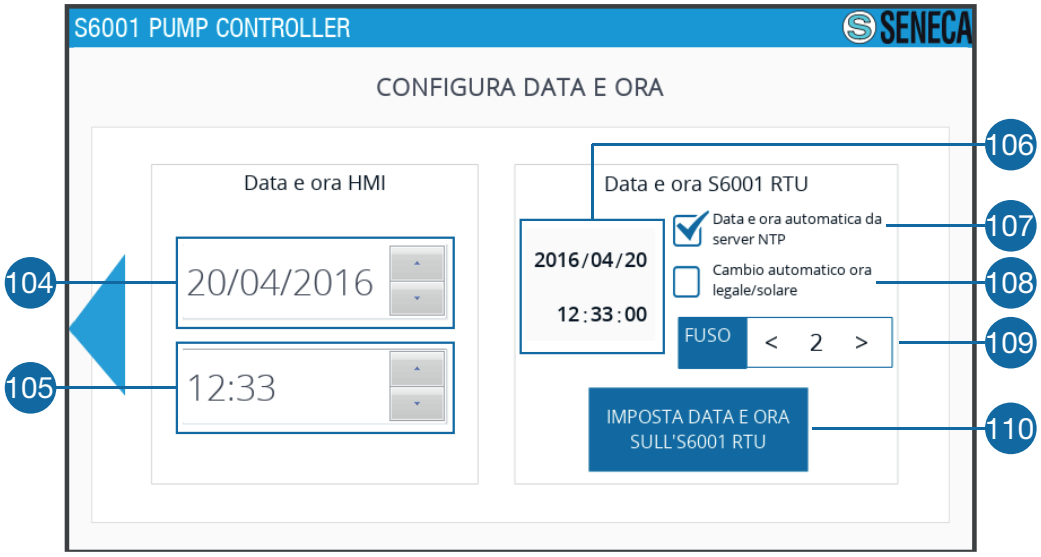


Fig. 76 "Configure date and time" sub-screen

104	Field to display and select the HMI date. Press the or key to change the date.
105	Field to display and select the HMI time. Press the or key to change the time.
106	Display area of the RTU date and time.
107	Automatic date and time selection field. Tick off the field to get date and time automatically via the server.
108	Automatic summer/winter time selection field. Tick off the field to get the change of the summer/winter time automatically.

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109	Field to display and select the time zone. Press the ‹ or › key to change the reference time zone manually.
110	Key to access the RTU “Date and time configuration” sub-screen **(Fig. 77 on page 90)**.

Tab. 71 “Configure date and time” sub-screen

“RTU DATE AND TIME CONFIGURATION” SUB-SCREEN

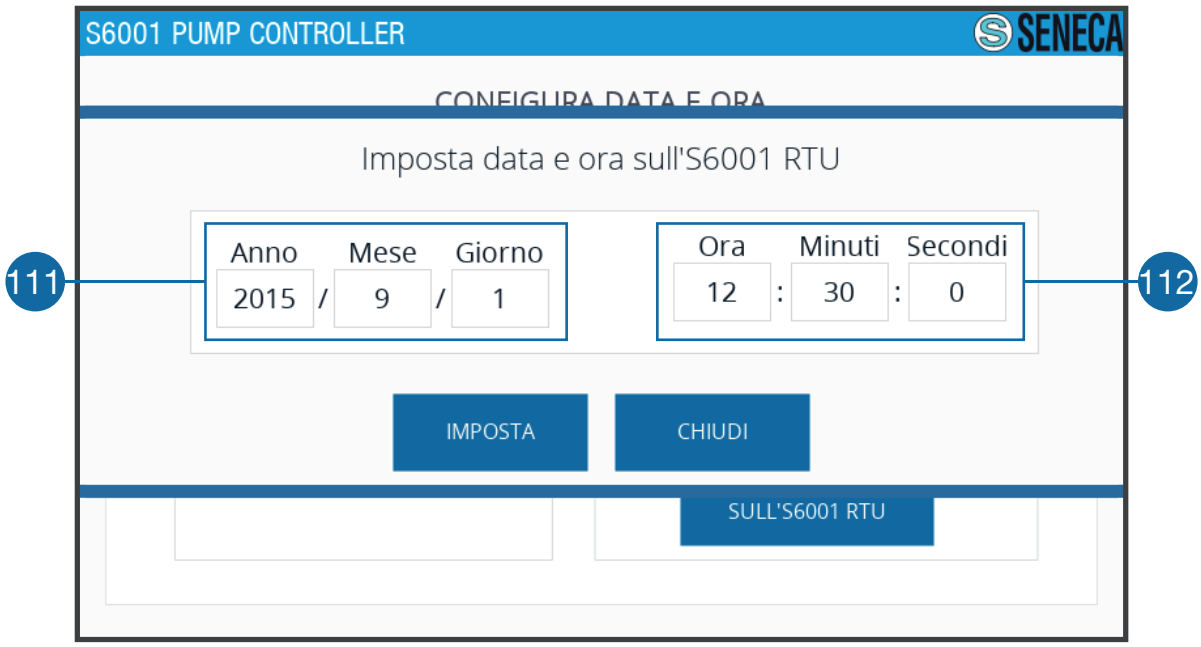


Fig. 77 “RTU date and time configuration” sub-screen

111	Field to display and enter the RTU date. Press on the field to enter the desired date using the keypad. Press the IMPOSTA key to confirm the date or the CHIUDI key to close the sub-screen.
112	Field to display and enter the RTU time. Press on the field to enter the desired time using the keypad. Press the IMPOSTA key to confirm the time or the CHIUDI key to close the sub-screen.

Tab. 72 “RTU date and time configuration” sub-screen

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1.1.8.5 "Telecontrol" screen

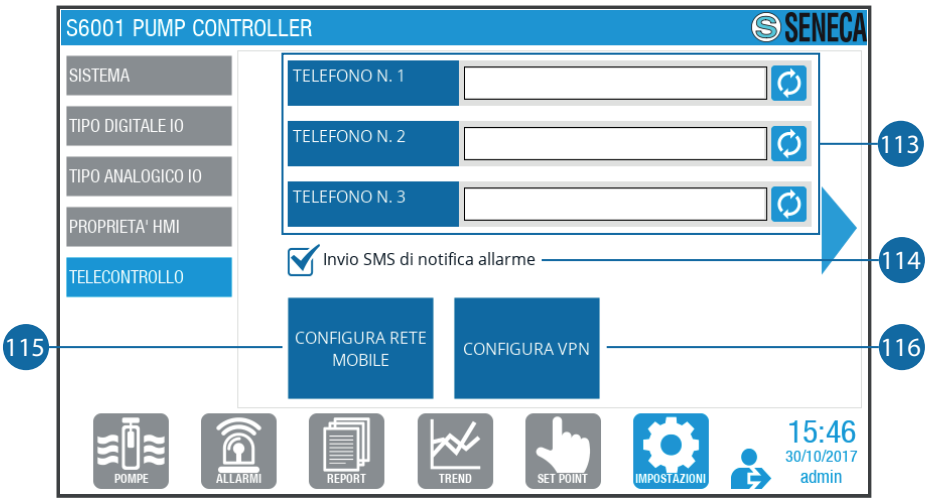


Fig. 78 "Telecontrol" screen

113	Field to enter telephone numbers. Press to enter the telephone numbers using the keypad. Press the key to access the "Confirm telephone number reset" sub-screen **(Fig. 79 on page 91)**.
114	Field to select the notification SMS. Tick the field to send the alarm notifications to the numbers entered in **(113)**.
115	Key to access the "Mobile network configuration" sub-screen **(Fig. 80 on page 92)**.

Tab. 73 "Telecontrol" screen

"TELEPHONE NUMBER RESET CONFIRMATION" SUB-SCREEN



Fig. 79 "Telephone number reset confirmation" sub-screen

Press SI to confirm the cancellation of the telephone number corresponding to the key pressed or NO to cancel the operation.

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"Mobile network configuration" sub-screen

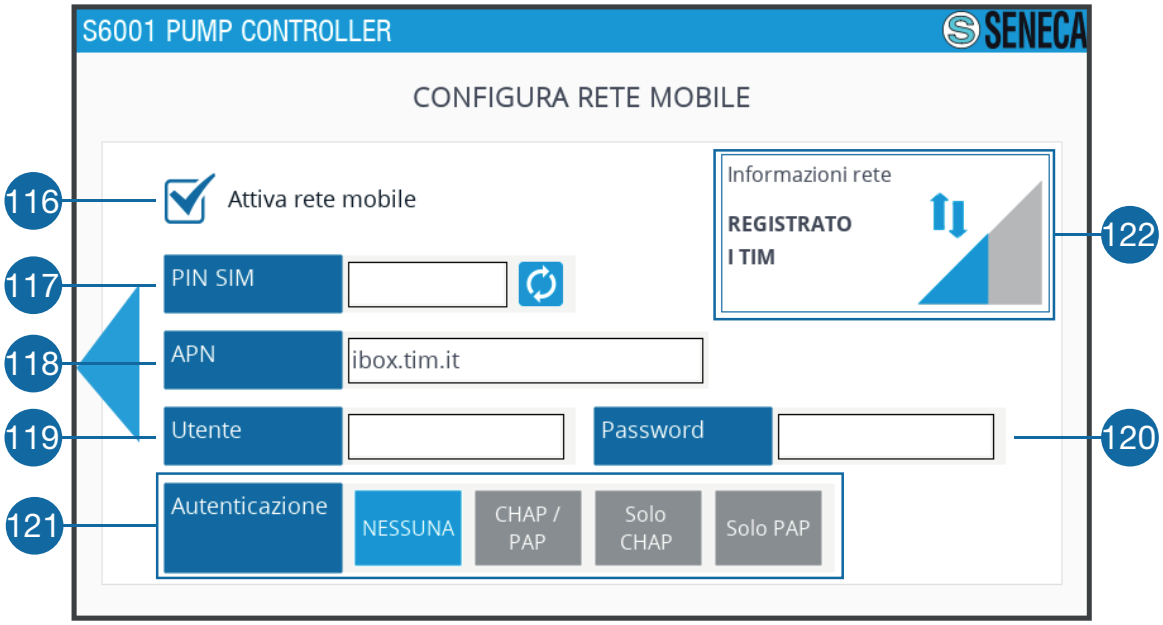


Fig. 80 "Mobile network configuration" sub-screen

116	Mobile network selection field. Tick the field to activate the mobile network.
117	Field to display and enter the PIN. Press on the field to enter, using the keypad, the PIN of the SIM card in the RTU. Press the key to delete the entered PIN.
118	Field to display and enter the APN. Press to enter the desired APN using the keypad. Press the key to delete the entered APN.
119	Field to display and enter the user. Press to enter the desired user using the keypad. Press the key to delete the entered user.
120	Field to display and enter the password. Press to enter the desired password using the keypad. Press the key to delete the entered Password.
121	Field to display and select authentication. Press on the desired authentication type. The selected authentication is blue in colour.
122	Network information display area, consisting of: - Provider name; - Signal status icon: blue if there is a signal, grey if there is not. - Graphic indication of the signal intensity, blue in colour.

Tab. 74 "Mobile network configuration" sub-screen

APN **(118)**, user **(119)**, password **(120)** and authentication **(121)** are supplied by the telephone service provider.

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1.2 USE INSTRUCTIONS

	The parts of the system subjected to hazardous voltages must not be accessible during the normal use of the system.

1.2.1 System start

To start the system, carry out the following operations in the given order:

1. apply the voltage stated in **"1.9.2 Electrical technical characteristics" on page 17** to start the system;
16. wait for the "Login" page to load **(Fig. 47 on page 61)**;
17. log in referring to **"1.1.1 Login page" on page 61**.

1.2.1 System management

	**It is forbidden** to use any type of tools (screwdrivers, etc.) to activate the HMI touch-screen.

Through the "Pumps" page **(Fig. 50 on page 63)** it is possible to manage the system operation, in particular:

- display all system pumps and detect any faults and/or malfunctions;
- select the pump operation mode;
- read information such as the instantaneous value of the process and Set Point variables;
- change the operating mode of the individual pumps;
- start or stop the individual pumps manually.

Through the "Trend" page **(Fig. 55 on page 68)** it is possible to obtain a graphical indication of the system operation in real time; any malfunctions can be detected by observing anomalous trends in the graphs. For an example refer to **"1.2.1.1 Trend example" on page 93**.

If it is necessary to leave the system, it is **mandatory** to:

- log out, in order to prevent unauthorized personnel from accessing the system;
- alternatively set the automatic logout after a certain period of inactivity (refer to the "User settings" sub-screen in **"1.1.8.4 "HMI properties" screen" on page 85)**.

1.2.1.1 Trend example

In **Fig. 81 on page 94** a graphic example of the trend of the system variables in real time is displayed. Find below an explanation of the 3 characteristic time intervals of the graph.

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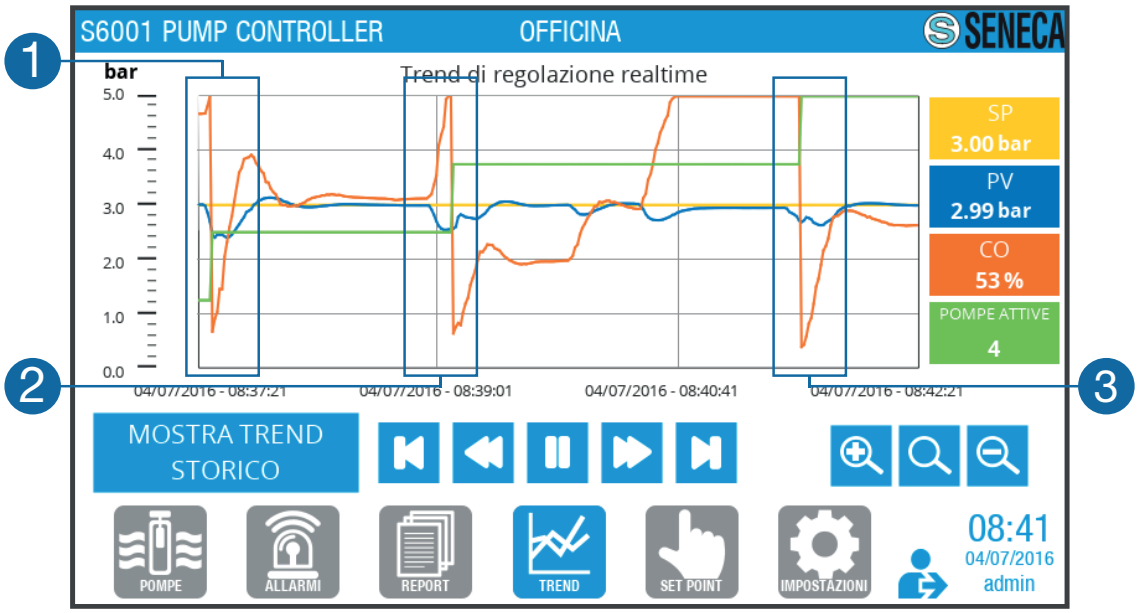


Fig. 81 Trend example

Interval "1"

In this interval the system starts from the initial condition where a pump is already operating, pump 1 in this case. When the second pump is required, represented by the step variation of the PUMP ACTIVE signal, the CO speed command signal of variable speed pump 1 is immediately brought to the technical minimum to try to minimize the system disruption due to the addition of the new pump.

Interval "2"

In this interval the PV pressure measurement signal is lowered due to the variation in the load connected to the pump unit. The system reacts by increasing the CO speed control signal of the variable speed pump up to the maximum value of 100% (= 50 Hz).

In this condition:

- PV < SP;
- CO = 100%;
- the start separation time **(Fig. 61 on page 74)** set in the "Pump parameters" screen in **"Pump parameters" screen on page 74"** has elapsed.

The system controls the switching on of the next pump and the reduction in the CO signal to the technical minimum is similar to that which occurs in interval 1.

Interval "3"

In this interval the behaviour is similar to interval 2, which involves switching on the last available pump, pump 4. The PUMP ACTIVE signal reaches the maximum value possible in the upper part of the trend graph and the CO signal settles around 53%, bringing the pumps in balance with the load at the set operating pressure as SP = 3.00 bar.

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	In case of a pressure increase PV > SP, or the dual case in which the pumps must be switched off in sequence, the behaviour is the same as described in 1, 2, 3 but the pump switch-off conditions are as follows: - PV > SP; - CO = 0%; the start separation time **(62 - Fig. 60 on page 74)** set in the “Pump parameters” screen in **“1.1.7.3 “Pump parameters” screen” on page 74** has elapsed. The above behaviour is also applicable to flow control but not to level control.

1.2.2 System stop

To stop the system, cut off the supply to the system.

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5 DIAGNOSTICS

1.1 ALARM MANAGEMENT

The system integrates management of malfunctions and faults, signalled by specific alarms through:

- HMI, directly on the system;
- SMS, to the phone numbers connected to the system;
- browser, with remote connection (via VPN protocol).

Alarm management is only possible:

- directly from the HMI,
- with remote connection, with “Seneca JMobile Client”

through the “Alarms” page **(Fig. 52 on page 65)**.

When an alarm is triggered, perform the following operations in the given order:

1. access the “Alarms” page on the HMI;
18. check the alarm;
19. to solve the alarm, refer to **“1.1.1 Alarm list” on page 96**;
20. reset the alarm.

1.1.1 Alarm list

Alarms are divided into 2 categories:

- blocking alarms;
- non-blocking alarms.

The following table shows the code, description, cause and solution of each blocking alarm.

Code Alarm	Description	Cause	Solution
OT025	EMERGENCY (MUSHROOM)	An “EXTERNAL EMERGENCY CONTROL” signal has been configured among the configurable digital inputs and the contact connected to this input is open.	- Check the correct configuration of the digital inputs in the SETTINGS> IO DIGITAL TYPE section of the HMI panel. - Check the correct wiring of the auxiliary contacts of the “EXTERNAL EMERGENCY CONTROL” signal, usually it is an emergency button. Check that the emergency button has been released.

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Code Alarm	Description	Cause	Solution
OT026	ELETRICITY SUPPLY KO	A “SUPPLY VOLTAGE PRESENT” signal has been configured among the configurable digital inputs and the contact connected to this input is open.	- Check the correct configuration of the digital inputs in the SETTINGS> IO DIGITAL TYPE section of the HMI panel. - Check the correct wiring of the auxiliary contacts of the “SUPPLY VOLTAGE PRESENT” signal, usually it is a voltage presence relay.
OT027	VERY LOW ADJUSTMENT PROBE	The adjustment probe connected to analogue input AI4 measures a level lower than the value set for parameter LL in the SETPOINT> ANALOGUE THRESHOLDS section of the HMI panel	- Check the correct configuration of the digital inputs in the SETPOINT > ANALOGUE THRESHOLDS section of the HMI panel. Check the wiring of the adjustment probe is correct.
OT032	ADJUSTMENT PROBE FAULT	The control probe connected to analogue input AI4 is not connected	- Check the wiring of the adjustment probe is correct.
OT033	MINIMUM FLOAT	A “PUMP STOP FLOAT” signal has been configured among the configurable digital inputs, the contact connected to this input is open and the pumps are running.	- Check the correct configuration of the digital inputs in the SETTINGS > IO DIGITAL TYPE section of the HMI panel. Check the wiring of the auxiliary contacts of the “PUMP STOP FLOAT” signal is correct. Check the installation of the float in the tank is correct.
OT035	LOW ADJUSTMENT PROBE	The adjustment probe connected to analogue input AI4 measures a level lower than the value set for parameter L in the SETPOINT> ANALOGUE THRESHOLDS section of the HMI panel	- Check the correct configuration of the digital inputs in the SETPOINT > ANALOGUE THRESHOLDS section of the HMI panel. Check the wiring of the adjustment probe is correct.

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Code Alarm	Description	Cause	Solution
OT037	INVERTER THERMAL SWITCH	The automatic switch protecting the inverter is not ON or has been triggered.	- Check the wiring in the terminal board of the automatic protection circuit breaker of the inverter. Check that the auxiliary contacts of the automatic switch are normally open. ATTENTION: The wiring depends on the type of system (ref. S6001 System Type Limits_v1.5.xls).
OT038	INVERTER M/A INCONSISTENCY	The pump controller is sending the inverter start command, but the run status contact signals the inverter has stopped	- Check the wiring in the terminal board of the inputs/outputs relative to the feedback and to the inverter control. - Check that the inverter run contact behaves as follows: INVERTER RUNNING = CONTACT CLOSED INVERTER STOPPED = CONTACT OPEN.
OT064	INVERTER COMMUNICATION ALARM	An inverter with MODBUS communication has been configured and communication is not active	- Check the RS485 data connection cable for correct connection and polarity of the A/B signals. - Check that the parameters of the RS485 serial set in the inverter correspond to those configured in the pump controller. Check whether any abnormal detections have appeared in the local inverter interface. - Consult the inverter supplier's manual.

Tab. 75 Blocking alarms

The following table shows the code, description, cause and solution of each non-blocking alarm.

	P1, P2, etc. stand for pump 1, pump 2, etc.

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Code Alarm	Description	Cause	Solution
OT001	P1 M/A INCONSISTENCY	The pump controller is sending the pump start command, but the contactor status contact signals the pump is switched off	- Check the wiring in the terminal box of the inputs/outputs related to the feedback and pump control. - Check that the pump power supply contactor is working correctly - Check that the auxiliary contacts of the pump supplying contactor are of the normally open type with contactor coil resting - Check the wiring of the auxiliary contacts of the pump supply contactor is correct WARNING: The wiring depends on the type of system (ref. S6001 System Type Limits_v1.5.xls).
OT002	P1 THERMAL SWITCH	The pump automatic circuit breaker is switched off and the pump is not powered	- Check the wiring in the terminal block for the status of the pump automatic circuit breaker. - Check that the auxiliary contacts of the automatic circuit breaker are normally open. ATTENTION: The wiring depends on the type of system (ref. S6001 System Type Limits_v1.5.xls).
OT003	P1 ANOMALY	The inverter connected to the pump is faulty	- If wired inverter: check the wiring of the fault signal from the inverter is correct. - If ModBUS inverter: check the RS485 data connection cable for correct connection and polarity of the A/B signals. Check whether any abnormal detections have appeared in the local inverter interface. Consult the inverter supplier's manual.
OT005	P2 M/A INCONSISTENCY	See CAUSE and SOLUTION of ALARMS OT001, OT002, OT003	
OT006	P2 THERMAL SWITCH		

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Code Alarm	Description	Cause	Solution
OT007	P2 ANOMALY		
OT009	P3 M/A INCONSISTENCY	See CAUSE and SOLUTION of ALARMS OT001, OT002, OT003	
OT010	P3 THERMAL SWITCH		
OT011	P3 ANOMALY		
OT013	P4 M/A INCONSISTENCY	See CAUSE and SOLUTION of ALARMS OT001, OT002, OT003	
OT014	P4 THERMAL SWITCH		
OT015	P4 ANOMALY		
OT017	P5 M/A INCONSISTENCY	See CAUSE and SOLUTION of ALARMS OT001, OT002, OT003	
OT018	P5 THERMAL SWITCH		
OT019	P5 ANOMALY		
OT021	P6 M/A INCONSISTENCY	See CAUSE and SOLUTION of ALARMS OT001, OT002, OT003	
OT022	P6 THERMAL SWITCH		
OT023	P6 ANOMALY		
OT028	VERY HIGH ADJUSTMENT PROBE	The adjustment probe connected to analogue input AI4 measures a level lower than the value set for parameter HH in the SETPOINT> ANALOGUE THRESHOLDS section of the HMI panel	- Check the correct configuration of the digital inputs in the SETPOINT > ANALOGUE THRESHOLDS section of the HMI panel. Check the wiring of the adjustment probe is correct.

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Code Alarm	Description	Cause	Solution
OT034	MAXIMUM FLOAT	An “ALARM LEVEL FLOAT” signal has been configured among the configurable digital inputs, the contact connected to this input is closed and the pumps are running.	- Check the configuration of the digital inputs in the SETTINGS > IO DIGITAL TYPE section of the HMI panel is correct. Check the wiring of the auxiliary contacts of the “ALARM LEVEL FLOAT” signal is correct. Check the installation of the float in the tank is correct.
OT036	HIGH ADJUSTMENT PROBE	The adjustment probe connected to analogue input AI4 measures a level lower than the value set for parameter H in the SETPOINT> ANALOGUE THRESHOLDS section of the HMI panel	- Check the correct configuration of the digital inputs in the SETPOINT > ANALOGUE THRESHOLDS section of the HMI panel. Check the wiring of the adjustment probe is correct.
OT039	EXTERNAL ALARM	An “EXTERNAL ALARM” signal has been configured among the configurable digital inputs and the contact connected to this input is closed.	- Check the configuration of the digital inputs in the SETTINGS> IO DIGITAL TYPE section of the HMI panel is correct. - Check the wiring of the auxiliary contacts of the “EXTERNAL ALARM” signal is correct.
OT040	UPS ALARM IN BATTERY OPERATION	A “UPS NETWORK OK” signal has been configured among the configurable digital inputs and the contact connected to this input is open.	- Check the configuration of the digital inputs in the SETTINGS > IO DIGITAL TYPE section of the HMI panel is correct. Check the wiring of the auxiliary contacts of the “UPS NETWORK OK” signal is correct.

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Code Alarm	Description	Cause	Solution
OT041	UPS FLAT BATTERY ALARM	A “UPS FLAT BATTERY” signal has been configured among the configurable digital inputs and the contact connected to this input is closed.	- Check the configuration of the digital inputs in the SETTINGS > IO DIGITAL TYPE section of the HMI panel is correct. Check the wiring of the auxiliary contacts of the “UPS FLAT BATTERY” signal is correct.
OT043	PUMP 1 ANALOGUE PROBE FAULT (A)	A “PUMP 1 ABSORPTION” signal has been configured among the configurable analogue inputs, but the probe is not connected or is not working properly.	- Check the configuration of the digital inputs in the SETTINGS > IO ANALOGUE TYPE section of the HMI panel is correct. Check the wiring of the probe is correct - Check the polarity of the probe signal.
OT044	PUMP 2 ANALOGUE PROBE FAULT (A)	A “PUMP 2 ABSORPTION” signal has been configured among the configurable analogue inputs, but the probe is not connected or is not working properly.	- Check the configuration of the digital inputs in the SETTINGS > IO ANALOGUE TYPE section of the HMI panel is correct. Check the wiring of the probe is correct - Check the polarity of the probe signal.
OT045	PUMP 3 ANALOGUE PROBE FAULT (A)	A “PUMP 3 ABSORPTION” signal has been configured among the configurable analogue inputs, but the probe is not connected or is not working properly.	- Check the configuration of the digital inputs in the SETTINGS > IO ANALOGUE TYPE section of the HMI panel is correct. Check the wiring of the probe is correct - Check the polarity of the probe signal.
OT046	PUMP 4 ANALOGUE PROBE FAULT (A)	A “PUMP 4 ABSORPTION” signal has been configured among the configurable analogue inputs, but the probe is not connected or is not working properly.	- Check the configuration of the digital inputs in the SETTINGS > IO ANALOGUE TYPE section of the HMI panel is correct. Check the wiring of the probe is correct - Check the polarity of the probe signal.

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Code Alarm	Description	Cause	Solution
OT047	PUMP 1 ABSORPTION (A) - LL	A “PUMP ABSORPTION 1” signal has been configured among the configurable analogue inputs and the probe measures a value lower than the value set in the LL parameter in the SETPOINT> ANALOGUE THRESHOLDS section of the HMI panel	- Check the correct configuration of the digital inputs in the SETPOINT > ANALOGUE THRESHOLDS section of the HMI panel. Check the wiring of the adjustment probe is correct.
OT048	PUMP 1 ABSORPTION (A) - L	A “PUMP ABSORPTION 1” signal has been configured among the configurable analogue inputs and the probe measures a value lower than the value set in the L parameter in the SETPOINT> ANALOGUE THRESHOLDS section of the HMI panel	- Check the correct configuration of the digital inputs in the SETPOINT > ANALOGUE THRESHOLDS section of the HMI panel. Check the wiring of the adjustment probe is correct.
OT049	PUMP 1 ABSORPTION (A) - H	A “PUMP ABSORPTION 1” signal has been configured among the configurable analogue inputs and the probe measures a value higher than the value set in the H parameter in the SETPOINT> ANALOGUE THRESHOLDS section of the HMI panel	- Check the correct configuration of the digital inputs in the SETPOINT > ANALOGUE THRESHOLDS section of the HMI panel. Check the wiring of the adjustment probe is correct.
OT050	PUMP 1 ABSORPTION (A) - HH	A “PUMP ABSORPTION 1” signal has been configured among the configurable analogue inputs and the probe measures a value higher than the value set in the HH parameter in the SETPOINT> ANALOGUE THRESHOLDS section of the HMI panel	- Check the correct configuration of the digital inputs in the SETPOINT > ANALOGUE THRESHOLDS section of the HMI panel. Check the wiring of the adjustment probe is correct.
OT051	PUMP 2 ABSORPTION (A) - LL	See CAUSE and SOLUTION of ALARMS OT047, OT048, OT049, OT050 for the “PUMP 2 ABSORPTION” signal	
OT052	PUMP 2 ABSORPTION (A) - L		

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Code Alarm	Description	Cause	Solution
OT053	PUMP 2 ABSORPTION (A) - H		
OT054	PUMP 2 ABSORPTION (A) - HH		
OT055	PUMP 3 ABSORPTION (A) - LL	See CAUSE and SOLUTION of ALARMS OT047, OT048, OT049, OT050 for the “PUMP 3 ABSORPTION” signal	
OT056	PUMP 3 ABSORPTION (A) - L		
OT057	PUMP 3 ABSORPTION (A) - H		
OT058	PUMP 3 ABSORPTION (A) - HH		
OT059	PUMP 4 ABSORPTION (A) - LL	See CAUSE and SOLUTION of ALARMS OT047, OT048, OT049, OT050 for the “PUMP 4 ABSORPTION” signal	
OT060	PUMP 4 ABSORPTION (A) - L		
OT061	PUMP 4 ABSORPTION (A) - H		
OT062	PUMP 4 ABSORPTION (A) - HH		
OT063	INVERTER FREQUENCY ANALOGUE PROBE FAULT (HZ)	An “INVERTER FREQUENCY FEEDBACK” signal has been configured among the configurable analogue inputs, but the probe is not connected or is not working properly.	- Check the configuration of the digital inputs in the SETTINGS > IO ANALOGUE TYPE section of the HMI panel is correct. Check the wiring of the probe is correct - Check the polarity of the probe signal.
OT065	EXPANSION MODULE 1 COMMUNICATION ALARM	At least 4 pumps have been configured, which requires the installation of an expansion module for the P4 pump, Z-D-IO type, connected to the RS485 that does not respond to MODBUS queries	- Check the RS485 data connection cable for correct connection and polarity of the A/B signals between the pump controller and the Z-D-IO expansion module. Verify that the parameters of the RS485 serial set in the dip switches of the Z-D-IO expansion module correspond to those configured in the pump controller.

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Code Alarm	Description	Cause	Solution
OT066	EXPANSION MODULE 2 COMMUNICATION ALARM	At least 5 pumps have been configured, which requires the installation of an expansion module for the P5 pump, Z-D-IO type, connected to the RS485 that does not respond to MODBUS queries	- Check the RS485 data connection cable for correct connection and polarity of the A/B signals between the pump controller and the Z-D-IO expansion module. Verify that the parameters of the RS485 serial set in the dip switches of the Z-D-IO expansion module correspond to those configured in the pump controller.
OT067	EXPANSION MODULE 3 COMMUNICATION ALARM	At least 6 pumps have been configured, which requires the installation of an expansion module for the P6 pump, Z-D-IO type, connected to the RS485 that does not respond to MODBUS queries	- Check the RS485 data connection cable for correct connection and polarity of the A/B signals between the pump controller and the Z-D-IO expansion module. Verify that the parameters of the RS485 serial set in the dip switches of the Z-D-IO expansion module correspond to those configured in the pump controller.

Tab. 76 Non-blocking alarms

1.1 REMOTE CONNECTIONS

Remote connections can be through:

- SMS;
- VPN protocol.

1.1.1 Remote connection via SMS

If the remote connection is provided by SMS, carry out the following operations in the given order:

1. connect the main antenna to the port **(P8 - Fig. 2 on page 12)**;
21. if necessary, connect the diversity antenna to the port **(P9 - Fig. 2 on page 12)**;
22. insert the SIM into the slot **(P7 - Fig. 2 on page 12)**;
23. configure the SIM parameters as instructed in the “Mobile network configuration” sub-screen in **“1.1.8.5 “Telecontrol” screen” on page 91**, if not already configured using the wizard.

The following tables show all the possible commands that can be managed via SMS.

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	The system accepts commands **only** from the 3 numbers associated to the system in the "Telecontrol" screen in **"1.1.8.5 "Telecontrol" screen" on page 91**. P1, P2, etc. stand for pump 1, pump 2, etc. respectively. The following acronyms are used in the following table: - COM = command the system must execute; - TX = SMS text to send to the system; - RX = system answering SMS text; - ES = example.

COM	Change the system operating mode setting it to AUTOMATIC or MANUAL.
TX	SET MODE <AUTO/MAN>
RX	SET MODE <AUTO/MAN> OK
ES	Set the system to automatic mode. TX: SET MODE AUTO RX: SET MODE AUTO OK

Tab. 77 SMS 1 command

COM	Changing the operating mode of the pump to AUTOMATIC/MANUAL and forcing it to start or stop if it is set to MANUAL. If the command is sent to set a pump to automatic mode, the next parameter <ON/OFF> is not necessary and, if present, is ignored. The command is executed only if the pump you want to control is present in the system, otherwise it gives an error (ERR). If the pump is in the fault state, any command given causes an alarm (ALR).
TX	SET <P1/P2/P3/P4/P5/P6> <AUTO/MAN> <ON/OFF>
RX	SET <P1/P2/P3/P4/P5/P6> <AUTO/MAN> <ON/OFF> <OK/ERR/ALR>
ES	P2 is in the system and in manual mode. Force the pump to switch off. TX: SET P2 MAN OFF RX: SET P2 MAN OFF OK
	P1 is in the system and in automatic mode but is faulty. If the pump is forced to switch off, the alarm is triggered. TX: SET P1 MAN OFF RX: SET P1 MAN OFF ALR
	P6 is not in the system. If a command is sent, an error is returned. TX: SET P6 AUTO ON RX: SET P6 AUTO ERR

Tab. 78 SMS 2 command

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COM	Changing the system adjustment Set Point. The command works only if the type of system application is pressure/flow. Il campo <valore del Set Point> deve contenere un numero; se è necessario indicare un numero decimale si deve utilizzare il punto '.' (per esempio "5,5" deve essere inserito come "5.5"). If you enter a lower number at the beginning of the system adjustment scale, the Set Point is set to the beginning of the scale. If you enter a number higher than the end of the system adjustment scale, the Set Point is set to the end of the scale.
TX	SET SP <Set Point value>
RX	SET SP <Set Point value> <Set Point unit of measurement> OK
ES	Set the Set Point to 5.5 TX: SET SP 5.5 RX: SET SP 5.5 bar OK
	If the end of scale is set to 10.0 bar and you try to set it to 11.0 bar, it is set to the end of scale value of 10.0 bar. TX: SET SP 11 RX: SET SP 10.0 bar OK

Tab. 79 SMS 3 command

COM	Requesting the system status. The system responds with a summarizing message containing the current operation of the pump group, the Set Point, the adjustment value measured, the number of non-blocking alarms (WARNINGS) and the number of blocking alarms (ALARMS).
TX	STATUS
RX	SET= <Set Point value> <Set Point unit of measurement> PV=<process variable value> <process variable unit of measurement> P1:<MAN/AUTO> <RUN/RUN_INV/STOP/ALR> P2<MAN/AUTO> <RUN/RUN_INV/STOP/ALR> P3:<MAN/AUTO> <RUN/RUN_INV/STOP/ALR> (if present) P4:<MAN/AUTO> <RUN/RUN_INV/STOP/ALR> (if present) P5:<MAN/AUTO> <RUN/RUN_INV/STOP/ALR> (if present) P6:<MAN/AUTO> <RUN/RUN_INV/STOP/ALR> (if present) WARNING:<number of non-blocking alarms> ALARMS:<numbers of blocking alarms>

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ES	Request the status of a 5-pump system TX: STATUS RX: SP=5.0 bar PV=5.1 bar P1:MAN RUN P2:MAN STOP P3:MAN ALR P4:AUTO RUN P5:AUTO STOP WARNING:2 ALARMS:3

Tab. 80 SMS 4 command

COM	Enabling or disabling the sending of SMS on alarm to the user who sends the command. The command does not exclude the calculation of alarms by the system
TX	SET ALARM <ON/OFF>
RX	SET ALARM <ON/OFF> OK
ES	TX: SET ALARM ON RX: SET ALARM ON OK

Tab. 81 SMS 5 command

COM	System alarm resetting. The command resets the alarms as if a user were to press the RESET key on the “Alarms” page **(Fig. 52 on page 65)** of the system. The response to the reset command is the same as the STATUS message.
TX	RESET ALARM
RX	SP=<Set Point value> <Set Point unit of measurement> PV=<process variable value> <process variable unit of measurement> P1:<MAN/AUTO> <RUN/RUN_INV/STOP/ALR> P2<MAN/AUTO> <RUN/RUN_INV/STOP/ALR> P3:<MAN/AUTO> <RUN/RUN_INV/STOP/ALR> (if present) P4:<MAN/AUTO> <RUN/RUN_INV/STOP/ALR> (if present) P5:<MAN/AUTO> <RUN/RUN_INV/STOP/ALR> (if present) P6:<MAN/AUTO> <RUN/RUN_INV/STOP/ALR> (if present) WARNING:<number of non-blocking alarms> ALARMS:<numbers of blocking alarms>

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ES	TX: RESET ALARM RX: SP=5.0 bar PV=5.1 bar P1:AUTO RUN P2: AUTO STOP P3:MAN STOP WARNING:1 ALARMS:0

Tab. 82 SMS 6 command

COM	Enter the version numbers of the RTU and HMI applications.
TX	GET VERSION
RX	RTU:<RTU application version> HMI: <HMI application version>
ES	TX: GET VERSION RX: RTU:AP00210-01.00.482 (Example) HMI:AP00220-01.00.4

Tab. 83 SMS 7 command

COM	Returning the operating statistics of the pump group split into partials (PARTIAL) and totals (TOTAL), as if you were viewing the “Report” page **(Fig. 54 on page 67)** of the operator’s panel. The operating time (hours and minutes) and the number of start-ups are indicated for each pump The partial statistics section contains the statistics since the last reset made by the user on the HMI.
TX	REPORT

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RX	PARTIAL P1:<number of hours>h <number of minutes>m n:<number of start-ups> P2:<number of hours>h <number of minutes>m n:<number of start-ups> P3:<number of hours>h <number of minutes>m n:<number of start-ups>(if present) P4:<number of hours>h <number of minutes>m n:<number of start-ups>(if present) P5:<number of hours>h <number of minutes>m n:<number of start-ups>(if present) P6:<number of hours>h <number of minutes>m n:<number of start-ups>(if present) TOTAL P1:<number of hours>h <number of minutes>m n:<number of start-ups> P2:<number of hours>h <number of minutes>m n:<number of start-ups> P3:<number of hours>h <number of minutes>m n:<number of start-ups>(if present) P4:<number of hours>h <number of minutes>m n:<number of start-ups>(if present) P5:<number of hours>h <number of minutes>m n:<number of start-ups>(if present) P6:<number of hours>h <number of minutes>m n:<number of start-ups>(if present)
ES	In the system there are only 2 pumps TX: REPORT RX: PARTIAL P1:0h 21m n:2 P2:1h 12m n:4 TOTAL P1:1h 21m n:10 P2:2h 20m n:11

Tab. 84 SMS 8 command

COM	Getting the list of numbers associated to the system and enabled to SMS telecontrol
TX	GET NUM LIST
RX	NUM1:<telephone number> NUM2:<telephone number> NUM3:<telephone number>
ES	Ask for the list of numbers; there are only two in the system. TX: GET NUM LIST RX: NUM:+39123411111

Tab. 85 SMS 9 command

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COM	Entering or deleting the mobile numbers enabled to send/receive commands via SMS. The telephone number must include the international area code. To enter a new number, if it is not in the list, the INS parameter must be used. The new number is entered in the first free space; if there are no spaces or if the number is already present, an error is returned. To delete a number from the list, use the DEL parameter; if the number is not present in the list, an error is returned. The number corresponding to TEL. No.1 has the privilege of not being able to be deleted by SMS commands, not even by itself. The numbers corresponding to TEL. No.2 e TEL. No.3 can delete themselves and the other one, but not TEL. No.1.
TX	SET NUM <INS/DEL> <telephone number>
RX	SET NUM <INS/DEL> <telephone number> <OK/ERR>
ES	Entering a new number TX: SET NUM INS +39123411113 RX: SET NUM INS +39123411113 OK Deleting number +3912341111 associated to TEL. No.1. TX: SET NUM DEL +39123411111 RX: SET NUM DEL +39123411111 ERR Deleting number +3912341116 not in the list TX: SET NUM INS +39123411116 RX: SET NUM INS +39123411116 ERR

Tab. 86 SMS 10 command

1.1.1 VPN Connection

The system supports the OpenVPN standard protocol. The main advantages of using a VPN network are:

- secure connections, as the transported data are encrypted;
- the ability to establish connections without interfering with the company LAN;
- it is not necessary to have a static/public IP address on the WAN side;
- remote configurability from an embedded web server.

Two “VPN modes” are available:

- “OpenVPN Client”;
- “VPN Box”.

The “OpenVPN Client” mode can be used when the device must be installed in an existing VPN. In this case, an OpenVPN server, the certificate and the key file for the system client must be available, provided by the VPN administrator. The files can be uploaded to the device through the “VPN configuration”, present in the RTU Web Server (refer to the S6001-RTU manual available at http://www.seneca.it/prodotti/s6001-rtu/).

The “VPN Box” mode, developed by SENECA, is recommended if the VPN infrastructure does not exist. The “VPN Box” is a hardware device (or virtual machine) that allows the user to easily configure two alternative types of VPN:

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- VPN “Single LAN”;
- VPN “Point-to-Point”.

In “Single LAN” VPN mode, all devices and PCs (and associated local sub-networks) configured in VPN are always connected in the same network. In this scenario every PC client can connect to any device and to other machines that are in the LAN, but also any other device/machine can connect to any other device/machine belonging to the same VPN network. This VPN architecture places some constraints on the definition of the subnets of the devices, in fact all VPN clients must have a different IP address and a different local LAN network to avoid conflicts. The “VPN BOX Manager” software, supplied free of charge with “VPN Box”, allows the configuration of the SENECA VPN server and helps to avoid the errors defined by local sub-networks.

In “Point-to-Point” VPN mode a PC client can perform a single connection, on request, to a single device (and to the machines that are in the LAN network of the device at that time). Furthermore, the devices cannot communicate with each other, even if they belong to the same VPN. The advantage of this architecture is that the same sub-net can be used anywhere. The “Point-to-Point” mode allows defining groups of users and managing them. This VPN mode must be configured on a “VPN Box” via the “VPN BOX Manager” software.

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6 SYSTEM UPDATE

The system update requires the software update of:

- RTU,
- HMI

via USB stick, on which the update file must be saved.

	The update is available from http://www.seneca.it/prodotti/s6001-pump-controller

1.1 RTU SOFTWARE UPDATE

To Update the RTU software, carry out the following operations in the given order:

1. cut off the supply to the system;

24. insert the USB stick, containing the update, into the port **(P5 - Fig. 2 on page 12)**;
25. apply the voltage stated in **“1.9.2.1 RTU electrical technical characteristics” on page 17** to access the system;
26. at the end of the start-up (identified by the flashing “RUN” LED), wait for at least one minute;
27. remove the USB stick;
28. cut off the supply to the system.

1.1 HMI SOFTWARE UPDATE

To update the HMI software, carry out the following operations in the given order:

1. access the “HMI 1 properties” screen in **“1.1.8.4 “HMI properties” screen” on page 85**;
29. press key **(88 - Fig. 70 on page 85)** to start the update procedure;
30. when the “USB 1 update” sub-screen is displayed **(Fig. 82 on page 114)**, insert the USB stick containing the update into port **(P3 - Fig. 3 on page 14)**;

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Fig. 82 “USB 1 update” sub-screen

31. when the “USB 2 update” sub-screen is displayed **(Fig. 83 on page 114)**, press the key CHIUDI;



Fig. 83 “USB 2 update” sub-screen

32. when the “USB 3 update” sub-screen is displayed **(Fig. 84 on page 115)**, wait for the update to be completed;

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Fig. 84 "USB 3 update" sub-screen

The system restarts automatically at the end of the update.

DISPOSAL

	The product must be disposed of separately according to the regulations in force in the country of installation regarding the disposal of electrical and electronic equipment.

	**It is forbidden** to dispose of the product or parts of it in the environment. Incorrect disposal of the product may cause damage to the environment and/or to people.

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