USER MANUAL

NEG POWER

NEG Pump Controller

SAES Getters S.p.A. – Italy

www.saesgroup.com

The **NEG POWER - NEG Pumps Controller** power supply serves for operating the **NEG** (Non Evaporable Getters) pumps. It is designed to be used indoor in laboratory conditions.

WARNING

After transportation, the device has to be left idle without mains voltage for at least 3 hours at the laboratory temperature.

WARNING

The use of the instrument for any other purpose than originally intended may damage the instrument, injure the user and void all warranties.

Security provisions

ATTENTION

High voltage is present inside the instrument and also in the connectors and cables, which may harmful to the user.

Manipulation of the cables and of the grounding wire is prohibited while the appliance is in operation.

Likewise, the operation of the instrument without its protective covers is prohibited.

Protect the device against humidity and against penetration of conductive objects and liquids into the ventilation slots.

Symbols on the Manual

These symbols appear on the product:

CAUTION
Pay specific attention
to the section

INDEX

1. APPLICATION

NEG POWER - NEG Pump Controller power supply is designed to operate the MK4 and MK5 NEG pumps series, namely GP SORB AC®, CapaciTorr®, CapaciTorr HV® and NEXTorr® families.

2. INTRODUCTION

2.1. General description

NEG POWER is an electronic unit specifically designed to control the heating and the activation process of the getter pumps whether they are or aren't equipped with a thermocouple.
There are two versions: NEG POWER for up to 4 controlled pumps, NEG POWER SMALL supporting up to 2 pumps only.

NEG POWER can control up to 4 different getter pumps at the same time, with an adjustable DC voltage output up to 110 V, current up to 10A, power up to 700W.
It has a touch screen display to control all the pumps together and in a very friendly way; it is also possible to control the NEG POWER by the SAES remote control software.

NEG POWER SMALL is the smaller version of NEG POWER that can control up to 2 different getter pumps.

Both versions can be equipped with standard 700 W modules or with low power 150 W modules. (see paragraph 2.4).

The most popular SAES NEG pumps are preset in the software (like the GP SORB AC®, the CapaciTorr®, CapaciTorr HV® and NEXTorr® families), so that in order to activate the NEG pump just the pump model must be selected and START button pressed.
Other pumps, not included in the list of presets, can be managed by "custom settings" by choosing suitable operating parameters.

2.2. MAIN FEATURES

The main features of the new NEG POWER are the following:

- contemporary activation/conditioning up to 4 NEG pumps
- automatic recognition of the cable length
- local control by user friendly touch screen controller
- remote control by RS232/RS485 interface with Modbus protocol (RTU)
- remote control by TCP/IP network interface
- pump temperature monitoring and thermoregulation
- automatic power regulation for different pump configuration
- diagnostic features (open/short connection, broken thermocouple, broken heating filament, overheating control, ...)
- pump temperature limiter: for pumps equipped with a thermocouple, a limit on the maximum temperature can be set by limiting the maximum power.
- stand-by mode: if the instrument is not operated for long time, it switches to stand-by mode. In this state, the power consumption of the instrument is reduced. The stand-by mode can be ended by a touch on the display of the NEG POWER.

2.3. Electronic circuit features

NEG POWER is a switching power supply, with an adjustable voltage output from 0 to 110 V. The instrument receives mains voltage (110÷240 VAC, 50÷60 Hz), converts it to DC voltage and supplies the getter pump by means of a microprocessor-based electronic control card.

The unit has a ON/OFF button to turn on/off the instrument, a touch screen display that allows a user to interact with it, and a LAN connector for remote control by standard network interface.

The unit has, on the back, four OUTPUT pump connectors, two fans, RS485 serial interface connector, IN/OUT interface connector and the instrument input for mains power supply (MAININPUT) IEC 16 A plug.

External interlock alarms (alarm condition generated by the user's vacuum system) are present, one for each current output (on IN/OUT interface connector).

If the getter pump is equipped with a thermocouple, **NEG POWER** shows its temperature on the display.

2.4. Output power modules

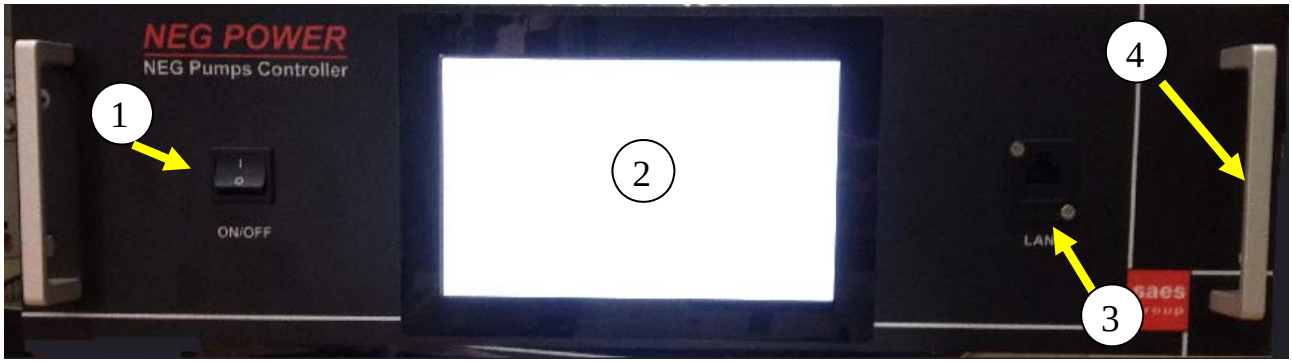
NEG POWER can be equipped with two types of modules: standard and low power modules.

Standard power modules of 700 W are can be used to control SAES NEG pumps requiring higher power during the activation.

Low power modules of 150 W can be also installed in the NEG POWER to work in the low range of power with the smallest SAES NEG pumps requiring low values of power / voltage / current with a precision around ± 0.1 V.

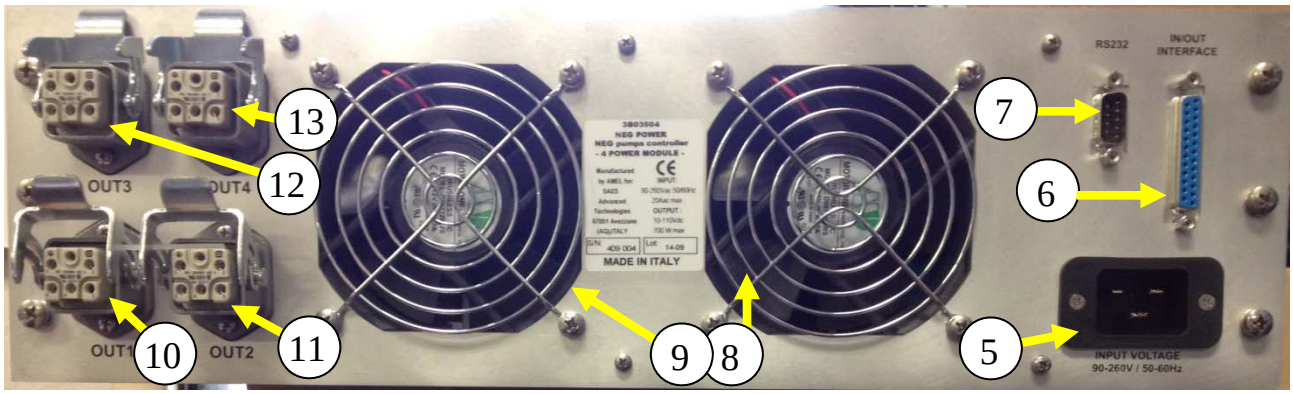
The two types of module can be mixed up in different slots in the same instrument.

2.5. NEG POWER: the front panel of the unit



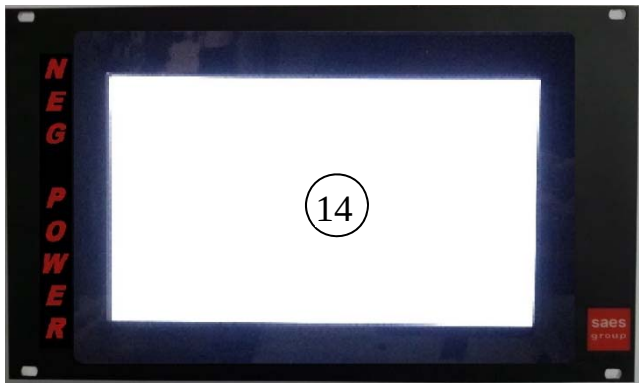
1. **ON/OFF** instrument power switch
2. touch screen display
3. **LAN** connector: RJ45 connector for Ethernet
4. handles for transport

2.6. NEG POWER: the rear panel of the unit



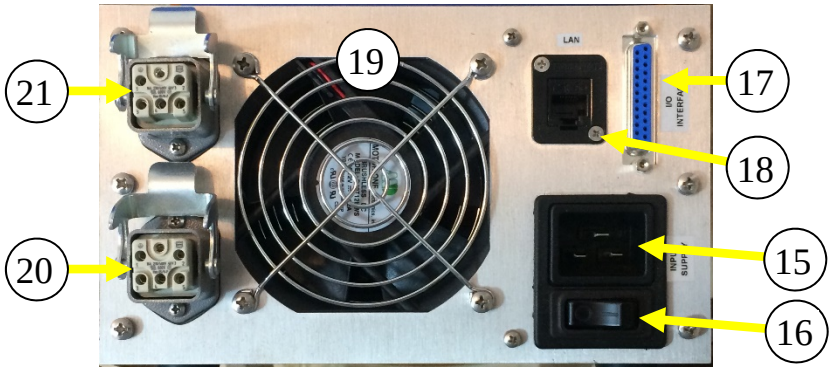
5. instrument **MAININPUT** IEC 16 A: plug for mains power supply
6. IN/OUT interface connector with **INTERLOCKS**
7. **RS485** serial interface
8. Fan for power modules 1 and 2
9. Fan for power modules 3 and 4
10. **OUTPUT 1** pump connector
11. **OUTPUT 2** pump connector
12. **OUTPUT 3** pump connector
13. **OUTPUT 4** pump connector

2.7. NEG POWER SMALL: the front panel of the unit



14. touch screen display

2.8. NEG POWER SMALL: the rear panel of the unit



15. instrument **MAIN INPUT** IEC 16 A: plug for mains power supply
16. **ON/OFF** instrument power switch
17. IN/OUT interface connector with **INTERLOCKS**
18. **LAN** connector: RJ45 connector for Ethernet
19. Fan for power modules 1 and 2
20. **OUTPUT 1** pump connector
21. **OUTPUT 2** pump connector

2.9. NEG POWER Dimensions and Weight

- NEG POWER dimensions 19” rack, 3U, depth 460 mm
- NEG POWER weight (with 1 power module) 10 kg
- NEG POWER weight (with 2 power modules) 12 kg
- NEG POWER weight (with 3 power modules) 13.5 kg
- NEG POWER weight (with 4 power modules) 15 kg

2.10. NEG POWER SMALL Dimensions and Weight

- NEG POWER SMALL dimensions ½ 19” rack, 3U , depth 445 mm
- NEG POWER weight (with 1 power module) 10 kg
- NEG POWER weight (with 2 power modules) 12 kg

3. INSTALLATION

NEG POWER is designed to be mounted in a 19” standard rack.

Place the instrument away from heat sources. A gap of at least 5 cm must be left between the sides of the unit and adjacent walls to ensure sufficient air flow to the cooling fan. When the NEG POWER is installed inside a cabinet, the latter must be provided with vents capable of ensuring adequate air exchange between the inside and the outside.

NEG POWER SMALL can be used mounted in a rack or also on a desk on its rubber feet.

For use on a desk the socket-outlet shall be installed near the equipment and shall be easily accessible.

NEG POWER (standard size) can be installed exclusively in a rack and it can be connected to the main line through the rack (it is not intended for direct connection to AC Mains Supply) and the rack must be equipped with a disconnecting means (bipolar) from the power supply

3.1. Rack mounting

Insert the instrument in the appropriate space (19” rack 3U according to DIN 41494 standard).

Fix the NEG POWER front panel on the rack columns with four M6 screws.

NEG POWER SMALL is half 19” rack large. It is prepared with lateral holes to fix it on rack with two brackets.

⚠ **ATTENTION:** the instrument cannot be used in potentially flammable or explosive areas.

⚠ **ATTENTION:** to avoid damages of the electronic circuit use the instrument within the environment specified conditions.

⚠ **ATTENTION:** do not place the equipment so that it is difficult to operate the disconnecting device

⚠ **ATTENTION:** no type of fuse or internal component can be replaced or modified by the user.

⚠ **ATTENTION:** do not use accessories which are not supplied or recommended by the manufacturer.

3.2. Electrical connections

The connections for the pump, the input mains line, the interlock and the external interface are on the rear panel of the instrument.

Before connecting the unit to the mains supply, make sure that supply voltage is within the range specified in the section Electrical Specifications.

⚠ **ATTENTION:** protective earthing is required!

Plug the equipment into a supply outlet which has an earth connection.

⚠ **ATTENTION:** use only adequate rated cords to connect instrument to the mains supply

3.3. Cleaning

ATTENTION: before starting any cleaning turn the units off and remove all mains.

The units should be cleaned with a damp cloth when necessary.
The use of solvents an aggressive or scouring cleaning agent is not permitted.
Avoid spraying or spilling any type of liquid directly onto the unit.
Before putting the units into operation mode to check them that are thoroughly dry.

4. MODE OF OPERATION

NEG POWER has a touch screen display to control all the pumps together and in a very friendly way; it is also possible to control the NEG POWER by the SAES remote control software.
The most popular SAES NEG pumps are preset in the software (like the GP SORB AC, the CapaciTorr, CapaciTorr HV and NEXTorr families).

⚠ **ATTENTION:** Before starting to heat the getter pump, check it is under high vacuum level.

If heated in air, the getter pump could burn.

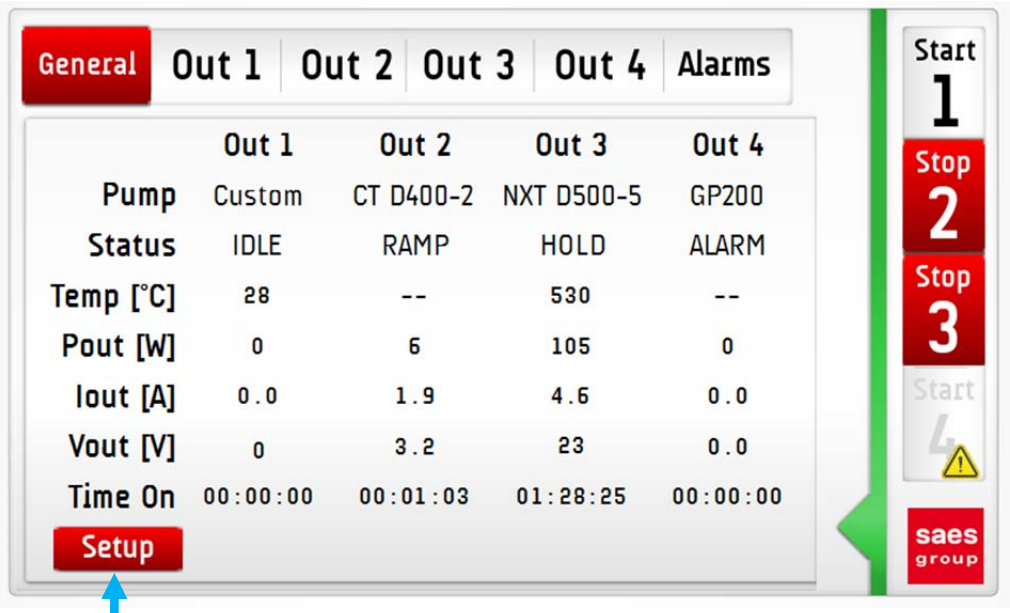
4.1. Power on

Turn on the NEG POWER pushing the ON/OFF power button.

Wait some seconds for the display to switch on and the instrument to initialize.

4.2. The General Menu

When the instrument is switched on, the general menu is shown. This same screen is meant to be used during normal operation as a summary of the overall status.
This menu presents an overview of main operational parameters, pump status, model, electrical and temperature values and on time.
This menu is read only and does not allow any changes to the configuration.
On the right side of the screen, 4 start/stop buttons allow switching on/off the outputs one by one and they are visible in most pages (see paragraph 4.7).



The General Setup button

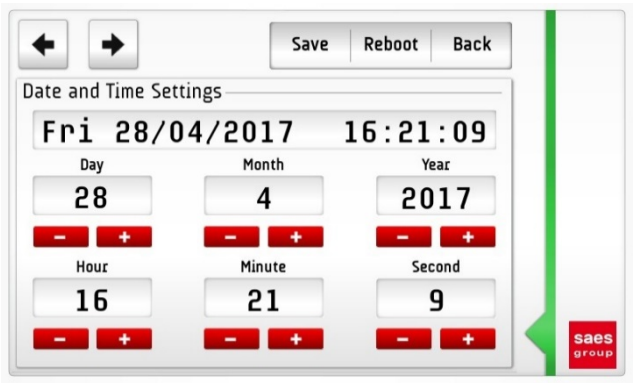
4.3. The General Setup button

A Setup button is present in the General menu. It allows to access menus of instrument settings: Date and time settings, Network settings, Modbus Server Settings, Output Channel Settings, Brightness and Standby time.

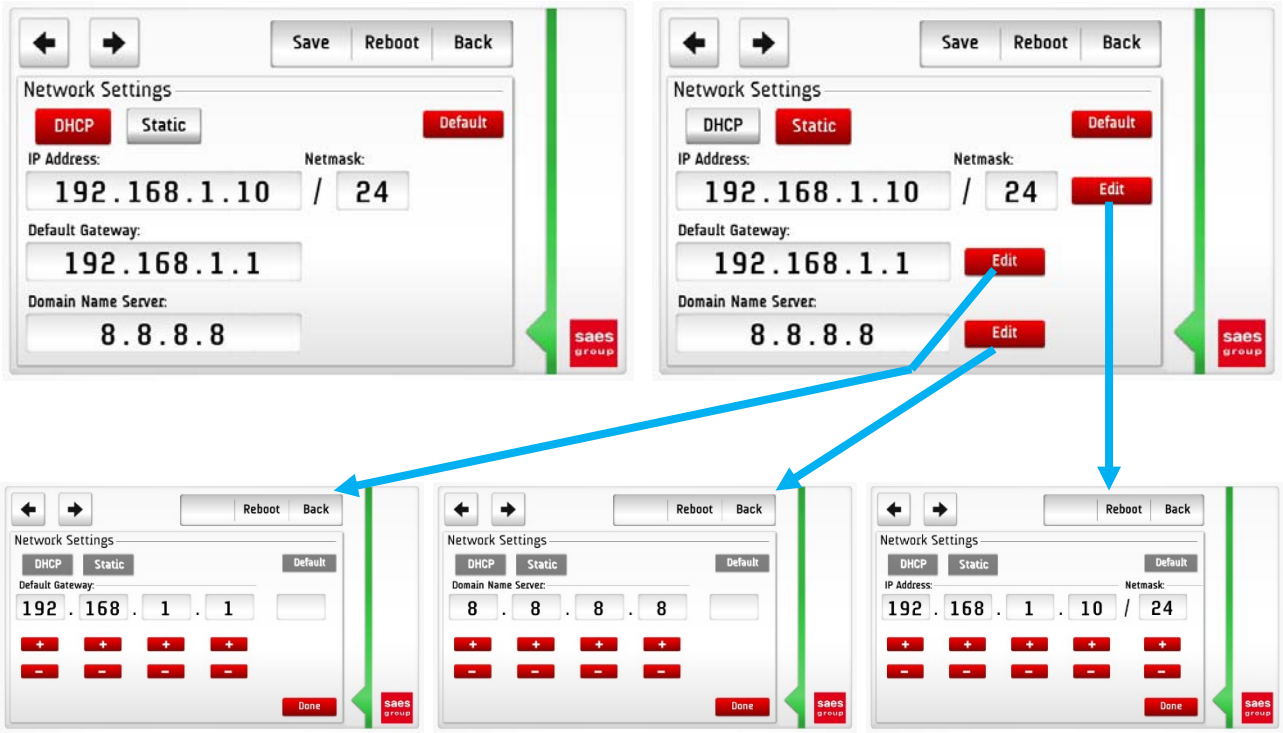
SAVE button saves the changes. BACK button leaves the menu.
REBOOT button restarts the firmware.

Five different pages are shown by pressing the arrow navigation keys:

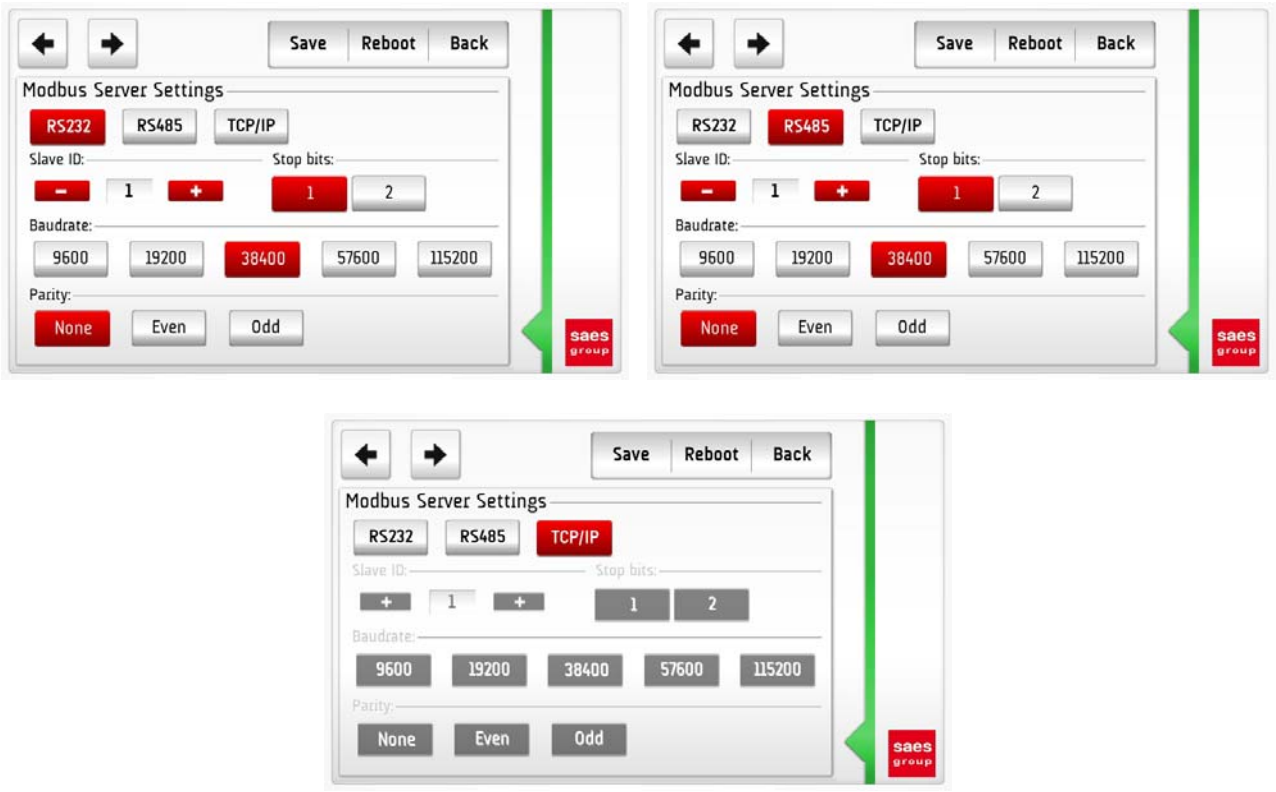
Date and Time Settings: set current date and time



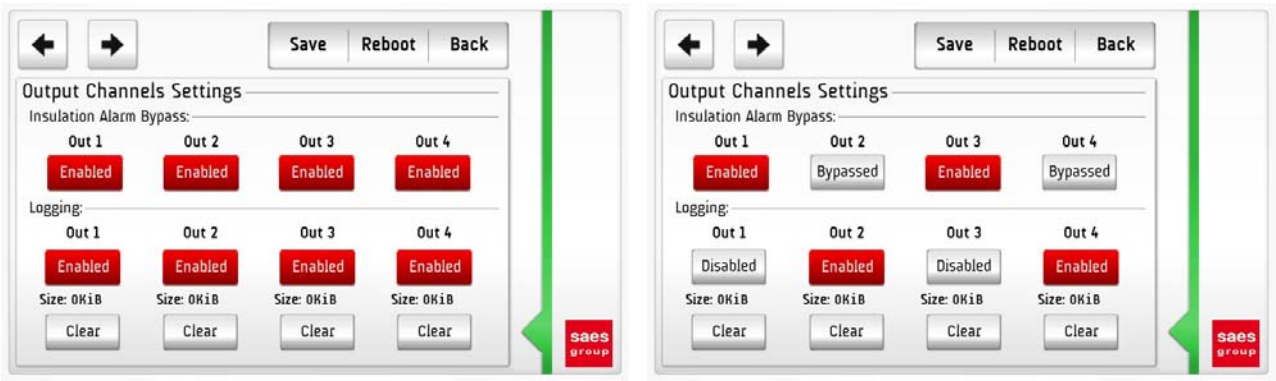
Network Settings: if your network is equipped with DHCP server, you can use DHCP for automatic IP address assignment, otherwise select Static and press edit to change IP Address and network mask, Default Gateway and DNS.
The default setting is static IP address 192.168.1.10 / 24. "/24" is the same as network mask equal to 255.255.255.0.



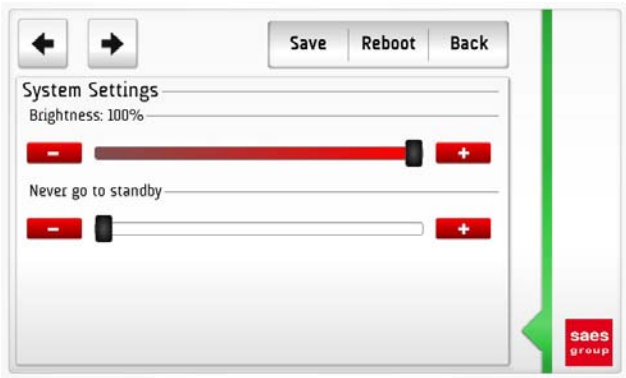
Modbus Server Settings: Modbus can be configured to operate over serial RS232 or RS485 and in this case Serial port physical parameters and Slave ID (1...256) can be configured. Modbus can also be configured to work over TCP/IP and in this case the network setting parameters apply.



Output Channel Settings: for each output the Insulation Alarm can be masked (bypassed). Logging can be disabled or log data cleared for each output.
The log files (one per each output and per each Start command) can be downloaded connecting with to a network share (replace IP address with the correct one):
192.168.1.10\negpower
Log files are stored in RAM so they are lost after power off cycle.
NEG POWER is able to detect the Output Insulation Losses making a check between positive/negative power wire and ground wire or between thermocouple wires and ground wire.
In some system it is possible that the negative power wire and ground wire are shorted. NEG POWER detects this particular condition as an Insulation Loss and shows an alarm. In order to avoid this situation, it is possible enable/disable this check.

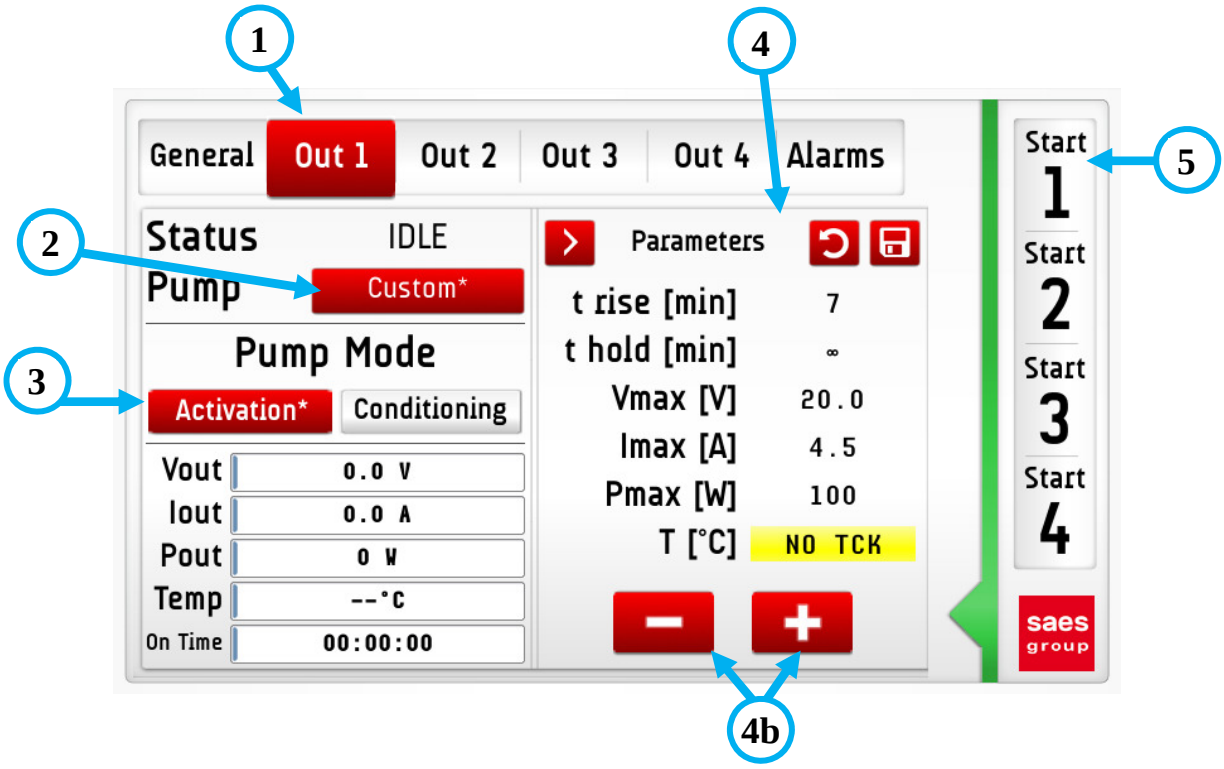


System settings: choose the screen brightness and standby delay (from 0 = never to 4 hours of inactivity).



4.4. The Setup Menu

A setup page is present for each output (1...4).



1 Touch the output to be set.

Status indicates the status of the output. It can assume 5 different values:

IDLE: the power supply is ready to give power to this output.

CHECK OPEN: first check made before starting the power supply in order to ensure that the pump is connected.

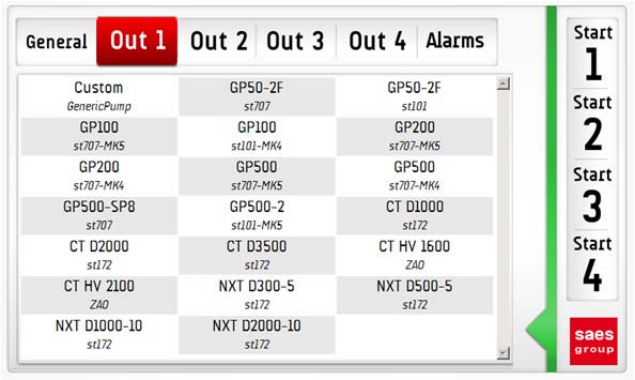
RAMP: output is powered and the power is rising (t_rise time).

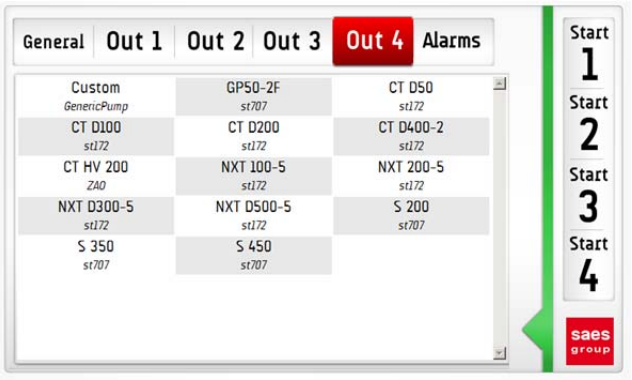
HOLD: ramp is finished and the power is maintained.

ALARM: there is some problem with the settings or with the output.

2 Touch the pump name to select the pump model to be controlled. A new window appears on the screen: touch the pump model to be selected (for example CapaciTorr D1000 in the example below).

The system shows automatically the list of SAES pumps that can be controlled with that output. In the left example picture below a list of pumps for standard 700 W module is shown, whereas the right picture shows the list that will appear when the low power module (150 W module) is installed.





Selecting the pump model, the recommended settings are preloaded (instructions to change these values are reported at point 4).

⚠ please note that these settings are for pumps without jackets.

CABLE is an automatic recognition of the cable length (if the cable supports the feature). It can not be changed by the user. In case of very long cables this value is used for automatic loss compensation (see Vcable at point 4).

3 Select the preferred heating mode.
The heating mode can be chosen between **ACTIVATION** mode and **CONDITIONING** mode.
The **ACTIVATION** mode provides the power required to heat the getter material in order to activate it.
The **CONDITIONING** mode provides the power required only to recondition the getter material. The conditioning mode might be helpful to pre-condition the pump during the baking process.
The selected mode is highlighted by turning the button to red background. If some working parameters are changed, the red highlighting disappears (see point 4).

4 On the right half of the screen, the working parameters are shown.
The default values can be modified: touch the parameter value (its background turns to yellow) and use the + and - buttons (4b) to increase or decrease the value.
When Vmax, Imax, Pmax and/or T are changed, an asterisk is marked beside the pump name and the Activation and Conditioning buttons are no longer highlighted.
t_rise and t_hold can be changed for each output; however they do not belong to the pump specific working parameters.

The parameters are explained in the following:

- **t_rise** is the time in minutes to ramp up the power from 0 to Pmax; 15 to 30 minutes are usually recommended if starting from room temperature, default is 15 minutes.
- **t_hold** is the time in minutes (starting after t_rise) during which power is held at the maximum value; after t_hold the output is turned off automatically. Setting t_hold = 0 (that is ∞), which is also the default value, the output is not turned off automatically but only with the stop button; 60 minutes or more are recommended. 60 minutes are enough for activation if working at the maximum recommended temperature Tmax, more time is better and is necessary if the system must stay at a lower temperature.

- **Vmax Imax Pmax** and **Tmax** are the target and the maximum values. These values can be chosen independently from each other. NEG POWER output will increase the voltage until the first of these limits is reached and will keep that working point for t_hold time. In other words if one of these parameters (i.e., V, I, P and T) reaches the max set value, the other parameters will be reduced accordingly.

For example: set

Vmax = 10V Imax = 6A Pmax = 70W and Tmax = 450°C

Let's assume that the working point of the NEG POWER is

V = 10V I = 5A so P = 50W and T = 400°C

NEG POWER stays in this working point because the output has reached Vmax and cannot exceed it.

- **Tmax** is the temperature target to be set if the pump is equipped with a thermocouple. If the pump has a thermocouple it is recommended to use it. The pump temperature is very much related to the system configuration. If your pump isn't equipped with a thermocouple this value can be decreased until **NO TCK** appears, which means that NEG POWER is configured to work without a thermocouple (an alarm is raised if Tmax is set in a pump without a thermocouple).

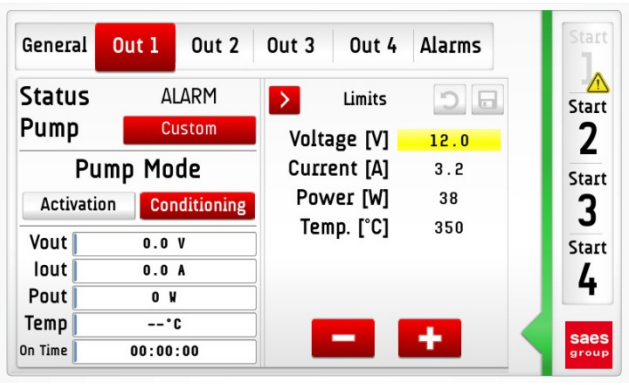
5 The start button can now be pressed.

On the left half of the screen, Vout, Iout, Temp and Time On current values are shown.

A Limit Setup button is present in this menu.

4.5. The Limit Setup button

By pressing **Limits Setup** button  a subpage is accessed that allows to configure a security limit on V, I, P and T. If any parameter reaches its limit, the output is switched off.



4.6. The SAVE and CANCEL buttons

For each channel there are two independent presets: one for activation and one for conditioning. Presets can be saved to permanent memory or changes can be cancelled restoring previous settings.

 SAVE

 CANCEL

4.7. The START/STOP buttons

START / STOP buttons are the first indicator of the status of the output.

If the output cable is well connected, **START** button is enabled to start supplying the power.

During the supply, **STOP** button is enabled to stop supplying the power.

If there are or there have been some problems that the user has not acknowledged yet, the button is disabled.

4.8. The recommended settings

When a pump model is selected in the Setup Menu a collection of recommended settings for the selected pump have been preloaded.

In Activation Mode parameters for the pump activation are preloaded, and in Conditioning Mode parameters for the pump conditioning are preloaded instead.
All parameters are adjustable in the setup menu, but every change of selected pump model or of operating mode (Activation/Conditioning) restore the default settings.
When you turn off and turn on NEG POWER, the last settings and used parameters are presented and you can use again pressing start button without any other change. This happens because NEG POWER stores permanently the current parameters when you press start button.
So it is easy to choose the settings one time and use repeatedly on the same system; if you change system or usage conditions you can restore default settings and make changes from there.

The default values of Voltage Current Power and Temperature are the maximum recommended settings for the selected pump.
They are recommended / necessary for pumps without jackets and without heat source nearby. If the system includes a partial or a full jacket around pump, a lower power is required to reach the correct Temperature. For more details refer to the pump manual.
It is always possible to regulate Voltage Current and Power values in the setup menu.

NEG POWER operates with a Temperature Control if Tmax parameter is set.
If the pump is equipped with a thermocouple and the Tmax parameter is set to any value apart from NO TCK, NEG POWER operates with a Temperature Control.
It is recommended to use a Temperature Control whenever it is possible.

In case the thermocouple is not available for the selected pump model, set Tmax parameter to NO TCK: in this case NEG POWER operates with a Power Control, always limited by Voltage and Current set values.

Especially when NEG POWER operates with Power Control, in order to reach the correct Temperature without exceeding it, it is very important to set the appropriate set of Voltage Current Power values for the specific system configuration.
An example of possible ranges of parameter values are listed in the following table for Activation Mode with and without jacket; for more details, please, refer to the pump manual.

Activation Mode			**without jacket**			**with jacket**		
		°C	**V**	**A**	**W**	**V**	**A**	**W**
NAME	**DESCRIPTION**	**Tmax**	**Vmax**	**Imax**	**Pmax**	**Vmax**	**Imax**	**Pmax**
GP 200	st 707	450 °C	52 V	3.8 A	200 W	42 V	3.2 A	134 W
CT D400-2	st 172	(450 °C) NO TCK	16 V	5 A	90 W	12 V	4.5 A	54 W
CT D1000	st 172	550 °C	43 V	4.3 A	190 W	35 V	3.4 A	119 W
CT D2000	st 172	450 °C	110 V	4.6 A	500 W	82 V	3.5 A	287 W

⚠ ATTENTION: SAES Getters is not responsible for damages due to improper use of the power supply

4.9. Heating (Activation/Conditioning) without stop

Some applications require special getter pumps (HV) that work when the getter material is hot. NEG POWER can be used to keep these pumps hot giving them the necessary power continuously. To do this, t_hold = ∞ is used (to set t_hold = ∞ reduce t_hold down to 100 and press down again). When t_hold = ∞ the power supply is only stopped by pressing the stop button.

4.10. Custom: a Generic Pump for Customer Settings

NEG POWER software is preset to know the activation/conditioning parameter settings of the most popular SAES getter pumps, like the GP SORB AC, the CapaciTorr, CapaciTorr HV and the NEXTorr families (see the Summary Table of the NEG pumps controlled by the NEG POWER).
In the software there is also a Generic Pump named **Custom**.
If the used pump model isn't included in the list, Custom pump can be selected and settings of suitable voltage, current, power and temperature must be set for the specific pump model.

The default settings for Custom pump are the following. These values can and shall be changed.

In case of standard 700 W module:

	Activation Mode				Conditioning Mode			
NAME	**Tmax**	**Vmax**	**Imax**	**Pmax**	**Tmax**	**Vmax**	**Imax**	**Pmax**
Custom	500 °C	50 V	4.5 A	500 W	250 °C	25 V	2.5 A	250 W

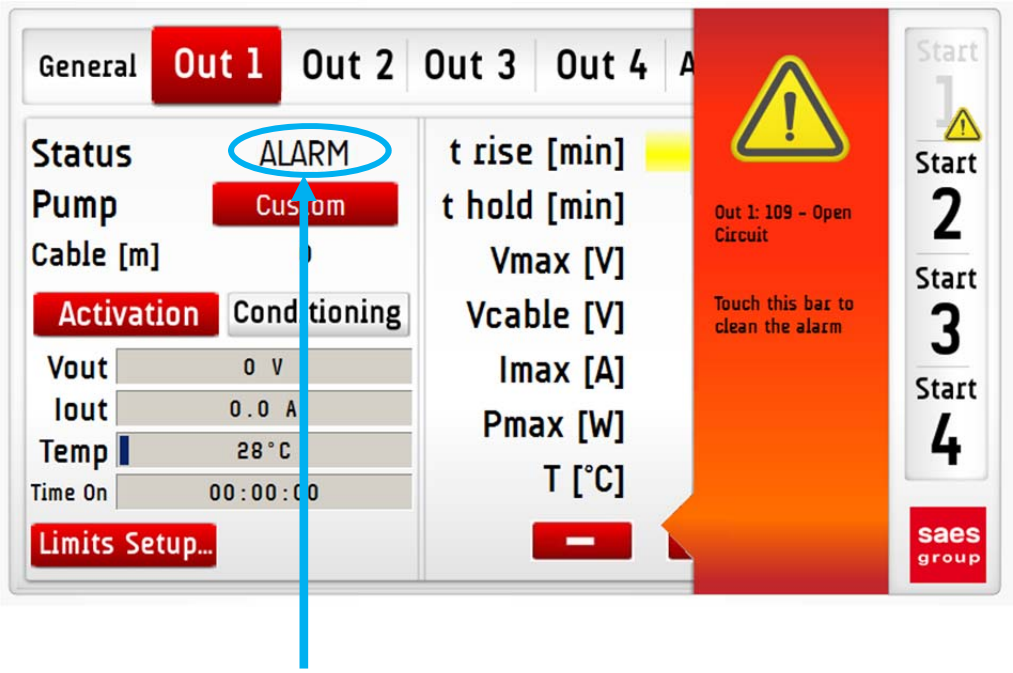
In case of low power 150 W module:

	Activation Mode				Conditioning Mode			
NAME	**Tmax**	**Vmax**	**Imax**	**Pmax**	**Tmax**	**Vmax**	**Imax**	**Pmax**
Custom	500 °C	20.0 V	4.5 A	100 W	200 °C	5.0 V	2.5 A	15 W

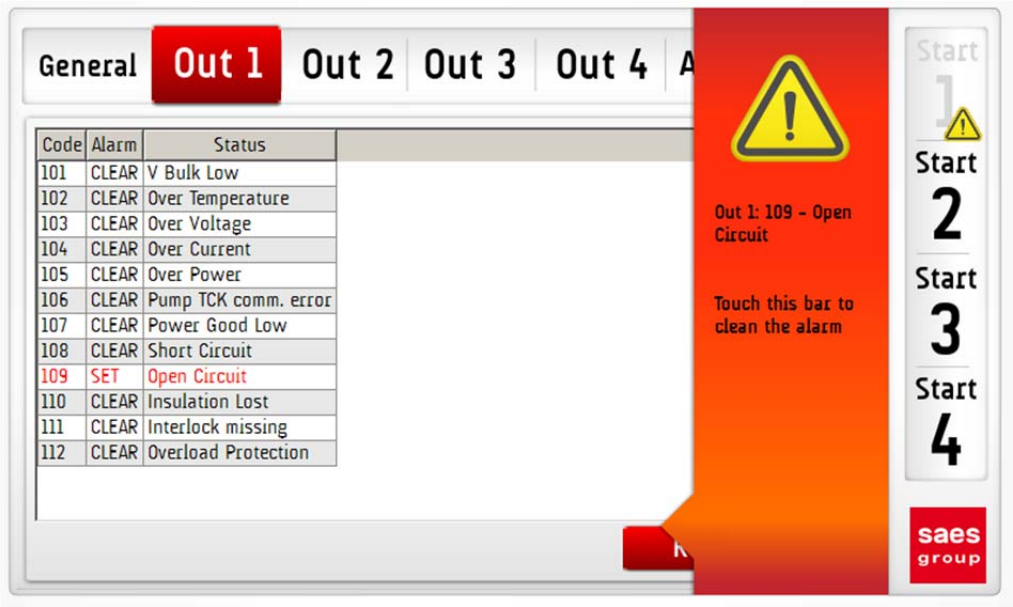
 ATTENTION: SAES Getters is not responsible for damages due to improper use of the power supply

4.11. Alarms

If there are problems during the control of NEG pumps, the output status is ALARM and the output start / stop button is disabled. The status is ALARM until the problem is solved.
When an alarm occurs, a red bar appears on the screen with detailed information of the problem. Touch the red bar to acknowledge the alarm.
The bar stays even if the problem has been solved until it is acknowledged by touch.

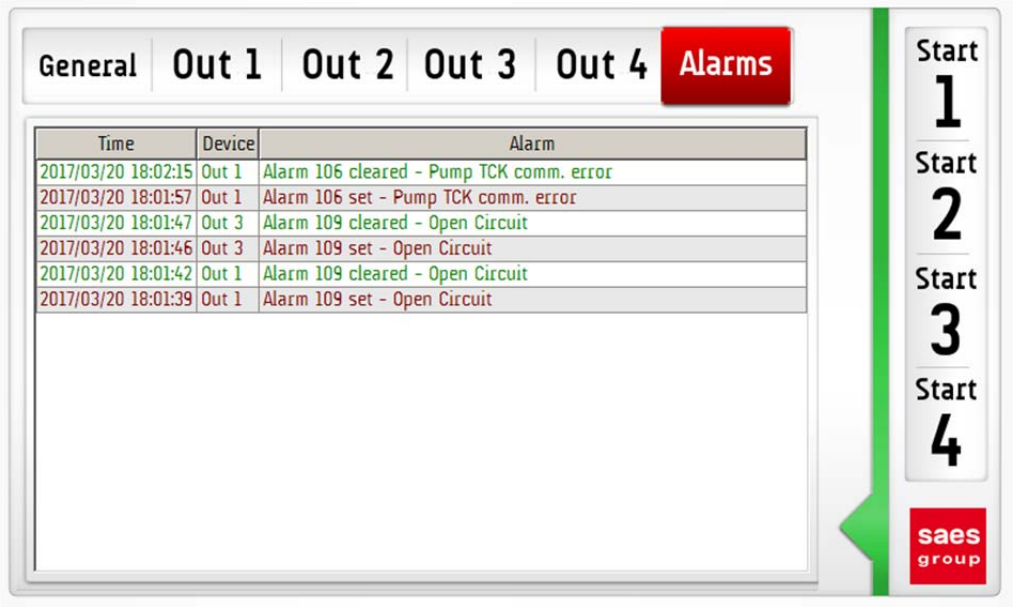


In this page by pressing the Status value (highlighted with blue circle in the previous picture) a list of all alarms and their current status is shown: the active alarms are highlighted in red.



4.12. Alarm history

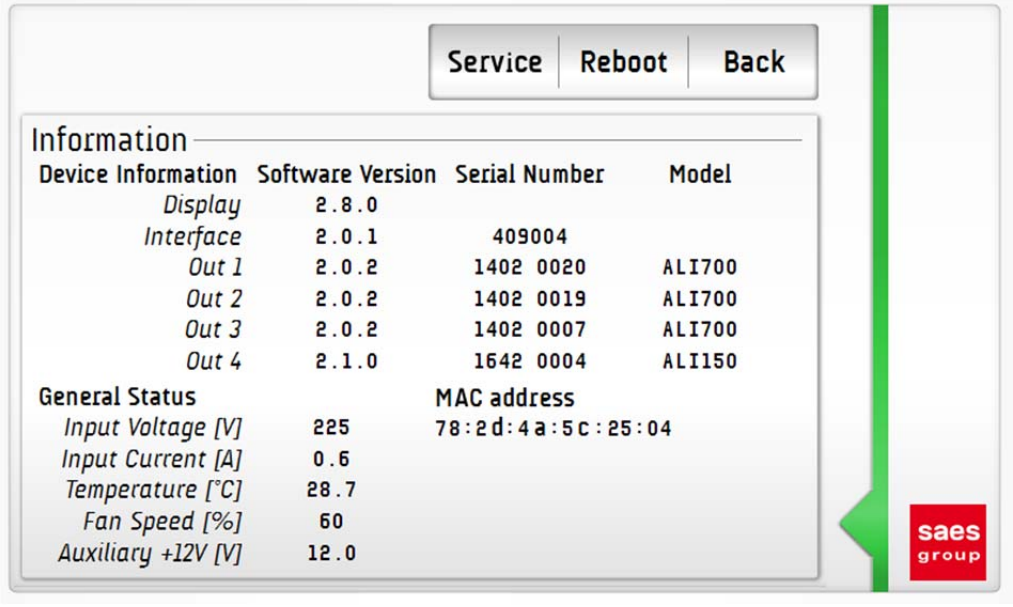
By selecting the Alarm page in the top row a history of all occurred alarms for system and all outputs is reported.
The cleared alarms (solved problem) are reported in green color, the currently active ones are reported in red color.



4.13. Information page

Touching SAES logo an information page appears.
The software versions, serial numbers and general system information are here listed.

Please, note that Service page is a sub menu for service use only.



5. THE OUTPUT CONNECTOR FUNCTION

The output connectors can be used for a possible connection of a device designed for monitoring or controlling the supply activity.

IN/OUT INTERFACE is intended for connection to protective hardware systems;

LAN connector can be used for communication purposes via ETHERNET interface in MODBUS TCP protocol.

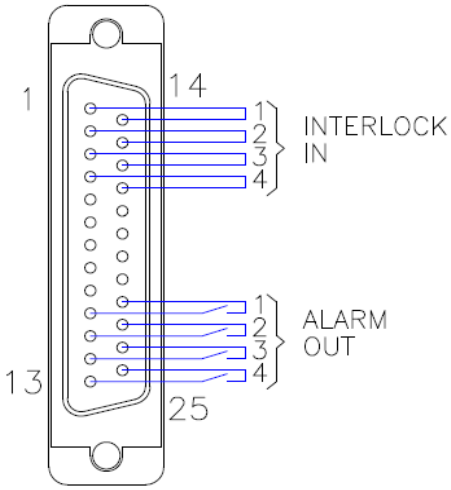
RS232 / **RS485** connector can be used for communication purposes via RS232 / RS485 interface in MODBUS RTU protocol.

(Modbus Application Protocol V1.1b3)

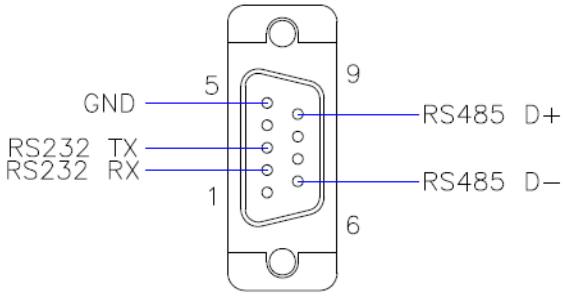
5.1. Pin layout of IN/OUT Interface connector

Interlock couple wires are open / short inputs. Short shall sustain at least 10 mA, open will present a 5V voltage difference.

Alarm couple wires are open / short outputs. They can be read with a maximum voltage of 24 Vdc and a maximum current of 500 mA.



5.2. RS232 / RS485 Interface



6. Electrical Specifications

Input:

Maximum Power	3.5 kW
Supply voltage	100-240 V~, +/-10%
Frequency	50/60 Hz +/- 10%
Input Current	20 A max
Mains cord connector	IEC Type 16A 250V
Over-Voltage category	II
Pollution degree	2
Isolation type	class I
Altitude max	up to 2000 m
Operating Temperature	0°C to 40°C
Relative Humidity	80%
Noise at 1 mt	< 40 dBA

Standard modules

Output1-4 at 110 V:

Output power	700 W + overload
Output Voltage	10-110 V ⎓
Overload	110% for one minute
Supply Current	10 A (at 70 V ⎓)

Low power modules

Output1-4 at 30 V:

Output power	150 W + overload
Output Voltage	0-30 V ⎓
Overload	110% for one minute
Supply Current	5 A

NEG POWER models	**Maximum Rated Current**
3B0501-3B0502-3B0503-3B0504	20 A
3B0521-3B0522-3B0523-3B0524	10 A
3B0525-3B0526-3B0527	20 A
3B0528-3B0529-3B0530	20 A
3B0531-3B0532	10 A
3B0533-3B0534-3B0535	16 A

7. Summary Table of the NEG Pumps controlled by the NEG POWER

GP PUMPS

Model Pump	Notes	Activation Voltage (nude) [V]	Activation Current (nude) [A]	Activation Power (nude) [W]	Temperature [°C]
GP 50-2F	st 707	25	2.8	75	(450°C) NO TCK
GP 50-2F	st 101	49	4.6	225	(700°C) NO TCK
GP 100	st 707 - MK5	41	3.4	138	450
GP 100	st 101 - MK4	81	5.2	420	700
GP 200	st 707 - MK5	52	3.8	200	450
GP 200	st 707 - MK4	25	7.0	175	450
GP 500	st 707 - MK5	61	9.4	580	450
GP 500	st 707 - MK4	46	9.9	455	450
GP 500 - SP8	st 707	110	4.5	500	500
GP 500-2X	st 101 - MK5	70	10	700	700

CAPACITORR PUMPS

Model Pump	Notes	Activation Voltage (nude) [V]	Activation Current (nude) [A]	Activation Power (nude) [W]	Temperature [°C]
CT D400-2	st 172	16	5.0	90	(450°C) NO TCK
CT D1000	st 172	43	4.3	190	550
CT D2000	st 172	110	4.6	500	450
CT D3500	st 172	92	3.9	360	550

NEXTORR PUMPS

Model Pump	Notes	Activation Voltage (nude) [V]	Activation Current (nude) [A]	Activation Power (nude) [W]	Temperature [°C]
NXT 100-5	st 172	9	5.0	45	(450°C) NO TCK
NXT 200-5	st 172	12.5	4.8	60	(450°C) NO TCK
NXT 300-5	st 172	20	4.6	92	550
NXT 500-5	st 172	24	4.8	120	550
NXT 1000-10	st 172	58	4.5	260	550
NXT 2000-10	st 172	66	4.2	280	550

8. PRODUCT CONFIGURATIONS AND ACCESSORIES

Configurations and accessories are given in the following section:

8.1. NEG POWER configurations and accessories:

Product description	Code	Note
NEG POWER C1	3B0501	Controller for NEG Pumps (1 output)
NEG POWER C2	3B0502	Controller for NEG Pumps (2 outputs)
NEG POWER C3	3B0503	Controller for NEG Pumps (3 outputs)
NEG POWER C4	3B0504	Controller for NEG Pumps (4 outputs)
Additional power module		Power module to upgrade NEG POWER
Cable Mains input 2mt	3B0336	Main cable with IEC 16 A plug length 2 m
Cable Mains input 10mt	3B0352	Main cable with IEC 16 A plug length 10 m
Interlock connector		DB25 connector with interlock connections
NEG POWER LP C1	3B0521	Controller for NEG Pumps (1 output low power)
NEG POWER LP C2	3B0522	Controller for NEG Pumps (2 outputs low power)
NEG POWER LP C3	3B0523	Controller for NEG Pumps (3 outputs low power)
NEG POWER LP C4	3B0524	Controller for NEG Pumps (4 outputs low power)
Additional low power module		Power module to upgrade NEG POWER LP
NEG POWER hybrid S1L1 C2	3B0525	(1 output standard power and 1 output low power)
NEG POWER hybrid S1L2 C3	3B0526	(1 output standard power and 2 outputs low power)
NEG POWER hybrid S1L3 C4	3B0527	(1 output standard power and 3 outputs low power)
NEG POWER hybrid S2L1 C3	3B0528	(2 outputs standard power and 1 output low power)
NEG POWER hybrid S3L1 C4	3B0529	(3 outputs standard power and 1 output low power)
NEG POWER hybrid S2L2 C4	3B0530	(2 outputs standard power and 2 outputs low power)
NEG POWER SMALL LP C1	3B0531	Controller ½ rack (1 output low power)
NEG POWER SMALL LP C2	3B0532	Controller ½ rack (2 outputs low power)
NEG POWER SMALL S1L1 C2	3B0533	Controller ½ rack (1 low power 1 standard power)
NEG POWER SMALL C1	3B0534	Controller ½ rack (1 output standard power)
NEG POWER SMALL C2	3B0535	Controller ½ rack (2 outputs standard power)

8.2. Pump cables and accessories:

Product description	Codes:	length 3m	length 5m	length 10m
Cable supply output for MK4 type pumps		3B0345	3B0356	3B0353
Cable supply output for MK5 type pumps and for CapaciTorr D2000 and D3500 pumps		3B0337	3B0361	3B0364
Cable supply output HT for MK5 type pumps and for CapaciTorr D2000 and D3500 pumps		3B0393	3B0394	3B0395
Cable supply output for CapaciTorr D1000 pump and for NexTorr D300-5, D500-5, D1000-10, D2000-10 pumps		3B0420		3B0422
Cable supply output for CapaciTorr D400-2 pump		3B0347		3B0348
Cable supply output for GP50 2F pump		3B0370		

Long cable supply output for MK5 type pumps and for CapaciTorr D2000 and D3500 pumps:

3B0354 length 20 m 3B0363 length 34 m

NOTE:

Special cables are available on request.

ATTENTION: do not use accessories which are not supplied or recommended by the manufacturer.

9. DECLARATION OF CE CONFORMITY

SAES Getters S.p.A.

Dichiarazione di conformità CE
Declaration of CE conformity

Denominazione della macchina : NEG POWER - NEG Pumps Controller
Type of machine: model C1, C2, C3 and C4

Il sottoscritto dichiara che l'impianto in oggetto è conforme a quanto prescritto dalle seguenti Direttive e Norme:
The undersigned hereby declares that the above-referenced product, to which this declaration relates, is in conformity with the following Directive(s) and Norm(s):

Direttiva 2006/95/CE "Bassa Tensione" LVD
Directive 2006/95/CE "Low Voltage Directive"

Direttiva 2004/108/CE "Compatibilità elettromagnetica" EMC
Directive 2004/108/CE "Electromagnetic Compatibili"

Direttiva 2011/65/CE "RoHS 2 – Restrizione dell'uso di determinate sostanze pericolose nelle apparecchiature elettriche ed elettroniche"
Directive 2011/65/CE "RoHS 2 - Restriction of Hazardous Substances"

In conformità con gli standard:
In conformity with the standard:

EN 61010-1:2010 – "Prescrizioni di sicurezza per apparecchi elettrici di misura, controllo e per utilizzo in laboratorio - Parte 1: Prescrizioni generali"
EN 61010-1:2010 – "Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements"

EN 61204-7:2006 – "Alimentatori in bassa tensione con uscita in corrente continua - Parte 7: Prescrizioni relative alla sicurezza"
EN 61204-7:2006 – "Low-voltage power supplies, d.c. output. Safety requirements"

EN 61000-6-2: 2005 + EC: 2005 + IS1: 2005 - "Compatibilità elettromagnetica (EMC)"
EN 61000-6-2: 2005 + EC: 2005 + IS1: 2005 - "Electromagnetic compatibility (EMC). Generic standards. Immunity for industrial environments"

EN 61000-6-4: 2007 + A1: 2011 - "Compatibilità elettromagnetica (EMC)"
EN 61000-6-4: 2007 + A1: 2011 - "Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments"

EN 61000-3-3: 2008 - "Compatibilità elettromagnetica (EMC)"
EN 61000-3-3: 2008 - "Electromagnetic compatibility (EMC). Limits. Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection"

EN 61000-3-2: 2006 + A1: 2009 + A2: 2009 - "Compatibilità elettromagnetica (EMC)"
EN 61000-3-2: 2006 + A1: 2009 + A2: 2009 - "Electromagnetic compatibility (EMC). Limits. Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)"

EN 61326-1: 2013 - "Apparecchi elettrici di misura, controllo e laboratorio - Prescrizioni di compatibilità elettromagnetica - Parte 1: Prescrizioni generali"
EN 61326-1:2006 - " Electrical equipment for measurement; control and laboratory use EMC - Part 1: General requirements

Lainate 05/07/2016

Il Legale Rappresentante
Legal Representative
SAES Getters S.p.A.
Presidente
Dr. Ing. Massimo della Porta

Corporate Headquarters – Sede Legale, Direzione e Amministrazione
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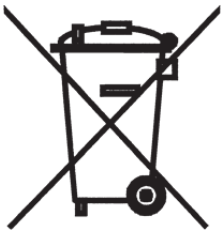
Numero Meccanografico MI 002143 – Capitale Sociale Euro 12.220.000 interamente versato
www.saesgroup.com

10. INSTRUCTION FOR INSTRUMENT DISPOSAL

The instrument disposal has to be carried out in compliance with the user's country applicable regulations.
The information below is issued in compliance with the regulations as set out by the 2012/19/EU directive (Waste Electrical and Electronic Equipment).



The instrument contains materials which may endanger the environment and it's not allowed to dispose it with unsorted urban waste.
The equipment shall also be disassembled by material for disposal.
The different materials shall be collected separately in accordance with local waste disposal legislations.
Neither the collection nor the transport of thus collected and separated materials is subject to any special requirements.

11. WARRANTY CONDITIONS

SAES guarantees that the Products delivered shall be free from operational and material defects and shall comply with the construction and functional data and specifications indicated in the Contractual Documents.
This warranty shall have a term of TWELVE (12) MONTHS. For Products which require installation at BUYER's facility by SAES personnel, the warranty shall have a term of TWELVE (12) MONTHS from the date of installation or FOURTEEN (14) MONTHS from the date of delivery, whichever term is shorter. Subject to the remainder of this Article 14, any action by BUYER for any alleged breach of this warranty shall be brought in writing by BUYER within thirty (30) days of BUYER's discovery of the breach. This warranty shall only apply to the BUYER and may not be assigned.
During the term of the warranty set forth above, SAES will promptly repair the Products which for their features can be repaired and which do not conform to the specifications and which BUYER returns to SAES at the address provided. Unless otherwise agreed and specified, BUYER shall be responsible for all transportation charges incurred in returning Products to SAES for repair; BUYER shall have obtained a Returned Material Authorization ("RMA") number and specific shipping instructions from SAES prior to its shipping of the Products to SAES. SAES shall not unreasonably deny BUYER authorization to ship Products to SAES. SAES shall return repaired Products to BUYER, with transportation charges prepaid by SAES, unless otherwise agreed. Additional information is available on the General conditions of sales.

12. SERVICE

For a request of return of the component contact a SAES Customer Service and will receive a **Return Merchandise Authorization** (RMA) number.

SAES S.p.A. can not accept any instrument which contains radioactivity or contamination of hazards: biological, toxic, reactive, corrosive, explosive or flammable. If this requirement present a problem call SAES Customer Service to discuss alternatives solutions.

12.1. Sales & Service Locations:

Europe, Middle East and Africa:

SAES Getters S.p.A.
Viale Italia 77
20020 Lainate (Milan) - Italy
Ph. +39 02 93178 1 - Fax +39 02 93178 320

European Customer Relations:
Ph. +39 02 9317 8402 - Fax +39 02 93178320
E-mail: CRM_SALES@saes-group.com

Asia and Oceania:

SAES Getters S.p.A. - Japan Technical Service - Branch Office
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23-1 Higashi Gotanda 5-Chome
Tokyo 141, Japan
Ph. +81 3 542 00431 - Fax +81 3 542 00438

SAES Getters (Nanjing) Co.,Ltd.
56 Xingangdadao, Xinshengwei
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Nanjing 210038, Jangsu Province, P.R. of China
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SAES Getters Korea Corporation
7th FI. Dongwon Bldg. 143-28
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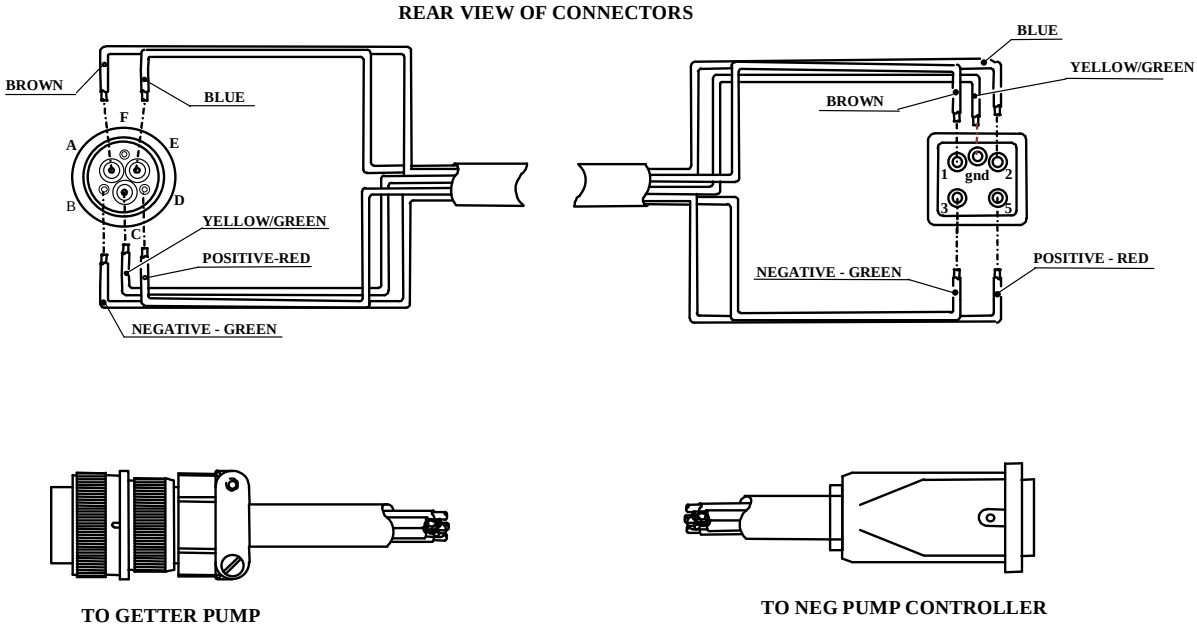
SAES Getters USA, Inc.
1122 East Cheyenne Mountain Blvd.
Colorado Springs, CO 80906 - USA
Ph. +1 719 576 3200 - Fax +1 719 576 5025

APPENDIX A: Supply cables

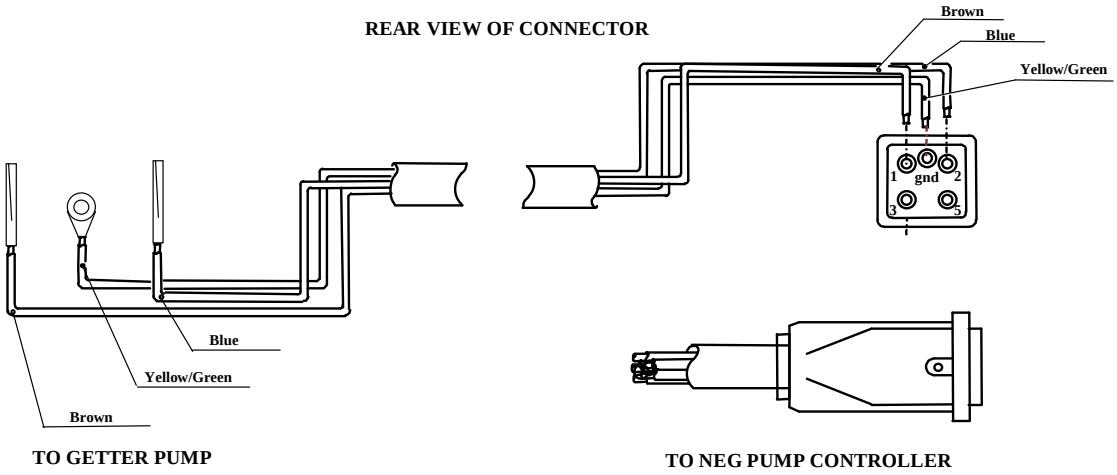
GP100 MK4, GP200 MK4, GP500 MK4.

For these pumps which are equipped with a dedicated electrical connector, use output supply shown in figure:



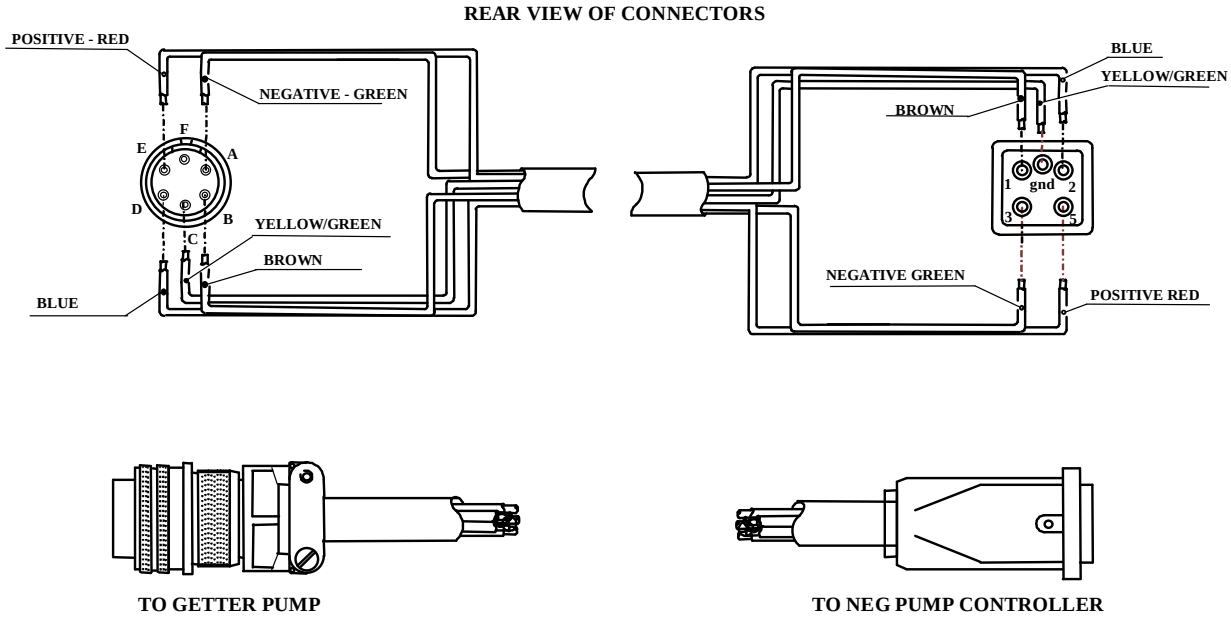
GP 50

For the GP 50 pump and pumps not equipped with an electrical connector use the output supply cable supply shown in figure:



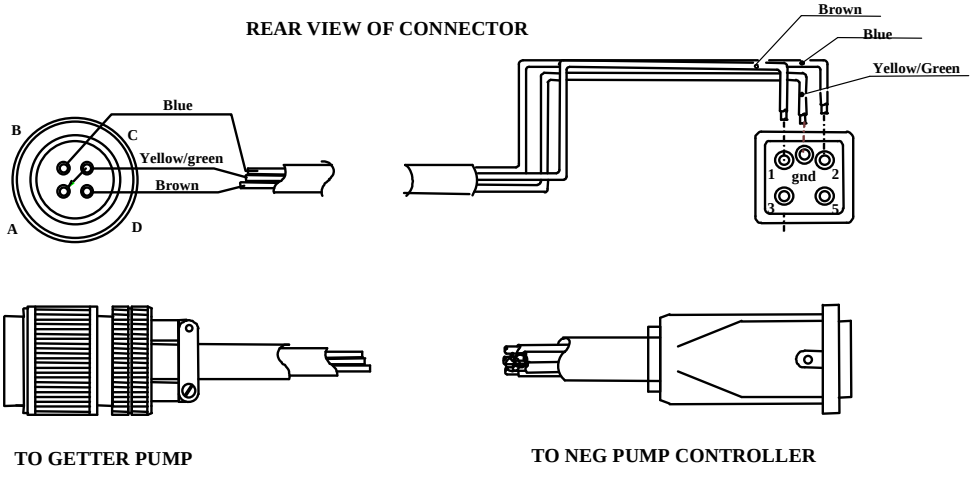
GP100 MK5, GP200 MK5, GP500 MK5,
CapaciTorr D2000, CapaciTorr D3500

For these pumps which are equipped with a dedicated electrical connector, use the output supply cable shown in figure:



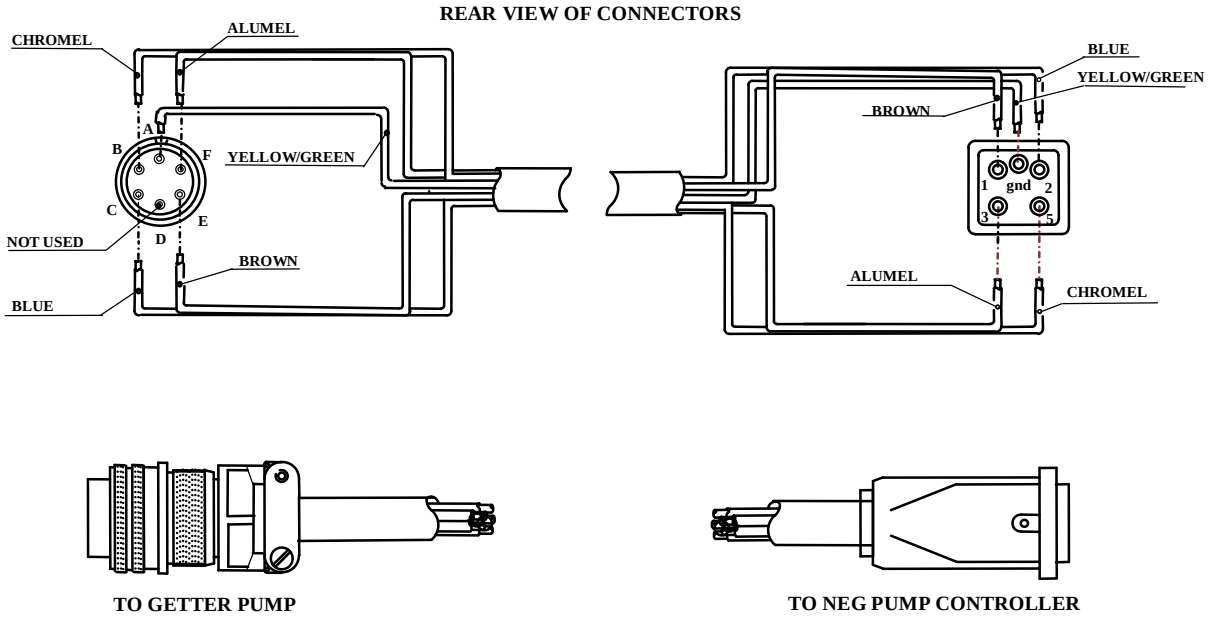
CapaciTorr D400-2

For these pumps which are equipped with a dedicated electrical connector, use the output supply cable shown in figure:



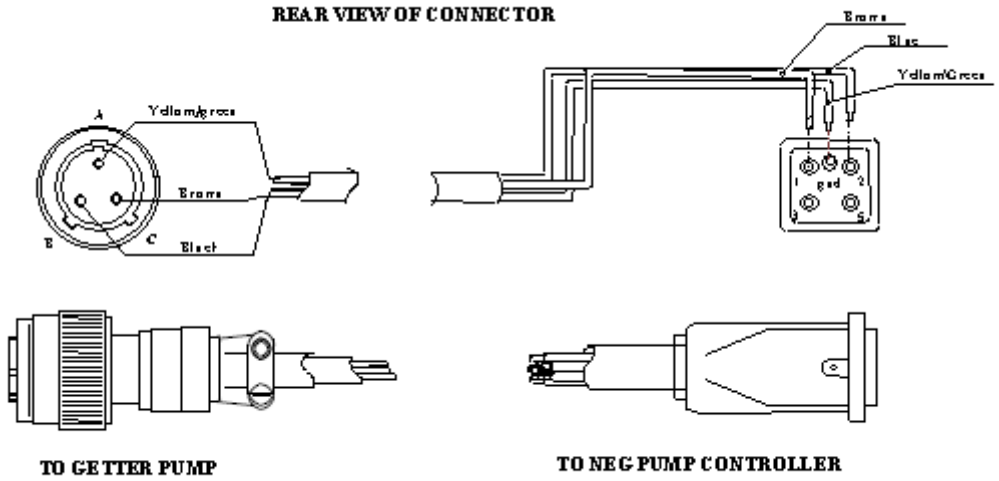
CapaciTorr D1000,
NexTorr D300-5, NexTorr D500-5, NexTorr D1000-10, NexTorr D2000-10

For this pump which are equipped with a dedicated electrical connector, use the output supply cable shown in figure:



NexTorr D100-5, NexTorr D200-5

For this pump which are equipped with a dedicated electrical connector, use the output supply cable shown in figure:



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