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**mbar**

VACOM

# SUBLI-CON 51

TSP Power Supply

Manual  
04/2002

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## 1. Safety notes



The device operates with high currents that may cause electrical fire if handled improperly.

Before switching on the device, make sure all connections are firmly and reliably mounted.



Make sure live conductors do not contact any casings or the vacuum chamber which the TSP is mounted to.



Do not disconnect the heater during operation (risk of arcing)!



Do not apply any voltage to the output as this may cause irreversible damage to the device.



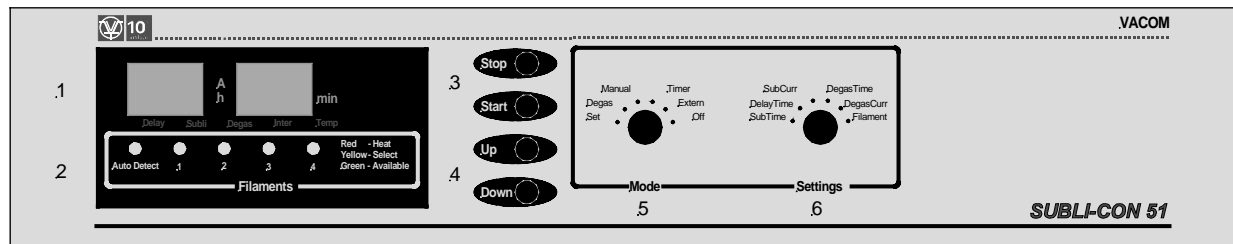
Do not cover the fan on the rear wall of the device to avoid heat accumulation.



Do not squeeze or notch the used silicone cable.

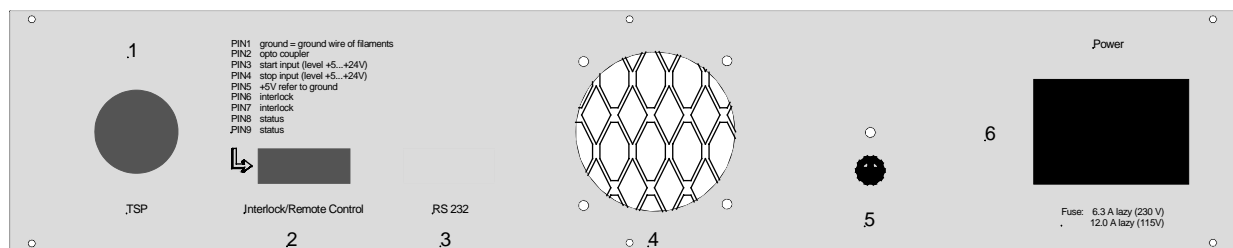
## 2. General / Overview

The *SUBLI-CON 51* is used for the operation of titanium sublimation pumps with up to four filaments at a maximum heating current of 50 A. The current rises to the preset maximum value within about 30 s. In this way, the degassing process of the filaments is improved. The selection of filaments can be done automatically or manually. The device provides various operating modes: manual, timer, and remote control mode. The *SUBLI-CON 51* is available as a 19" rack mounted unit (3.5" height), (☞ **Figures 1, 2**).



- 1 – Multi function display
- 2 – Display of the filaments
- 3 – START/STOP keys
- 4 – UP/DOWN keys
- 5 – Selector switch MODE
- 6 – Selector switch SETTINGS

**Fig. 1 - Front view of *SUBLI-CON 51***



- 1 - TSP connecting cable
- 2 - Connector for interlock and remote control
- 3 - Connector for serial interface RS232 (optionally)
- 4 - Fan grid
- 5 - Ground
- 6 - Connector for power cable and mains input filter, power switch

**Fig. 2 - Rear view of *SUBLI-CON 51***

### 3. Connection and installation

After unpacking the device, check it for exterior transport damage. If necessary, contact your forwarding agent or supplier.

#### 3.1 Connecting the pump

To install the device, connect the electric power cable to the sublimation pump. The cable with number 5 is the common ground wire. Connect the neutral conductor (green/yellow) at the pump with the ground contact of the system. The other four cables (number 1 to 4) serve to connect the filaments 1 ... 4. Make sure that all screws are screwed down tightly to avoid the risk of fire by increased contact resistance. The output is ungrounded to avoid equalising currents through the protective conductor. The cable is bakeable up to 200 °C. Install the cable in such a way that mechanical damages are precluded.

#### 3.2 Mains connection

The device is designed for line voltages of 115 V or 230 V. Make sure that the line voltage setting on the mains input filter corresponds to your local mains. If necessary, correct the setting. The device must be protected by slow-blow fuses of 4 A for 230 V lines or 6.3 A for 115 V lines.

#### 3.3 Rack mounting

For mounting the device in a rack remove the soft plastic strips at the bottom.

### 4. Operation

There are two selection switches (**Mode**, **Settings**) and four keys (**Stop**, **Start**, **Up**, **Down**) for the operation of the unit (☞ *Fig. 1*). First you have to take the settings of the process parameters. Switch on the power switch on the rear side (☞ *Fig. 2*) and set the selection switch **Mode** to the position **Set**. The following parameters are available by operating the selection switch **Settings**:

- **SubTime**           \* sublimation time (1...10 min)
- **DelayTime**       \* delay time (1...48 h)
- **SubCurrent**      \* sublimation current (10...50 A)
- **DegasTime**       \* degas time (1...20 min)
- **DegasCurrent**   \* degas current (10...30 A)
- **Filament**         \* selection of the filament (automatically or filament 1...4)

During the setting the selected parameters are flashing in the multi function display unit. The parameters can be set by pushing the keys **Up/Down**. The selected values are illuminated by a red light at the multi function display. The corresponding LED of the selected filament lights yellow.

After finishing the setting the evaporation process can be started. Three modes are at your disposal which can be selected by the switch **Mode**:

- **Manual**           \* manual operation by **Start/Stop** keys
- **Timer**            \* automatized process by an internal timer
- **Ext/Clock**       \* run of the process by remote control (☞ **Section 4.1.**)

There are three ways to start the evaporation process:

- Manual start by pressing the **Start** key (green) for settings **Manual** or **Timer**
- External start by using optocouplers (☞ **Section 4.1.**)

During the stand by mode the LED of the corresponding filament lights green, during the heating process the LED lights red. When all filaments are used up a warning signal can be heard during the next start.

When the currently used filament burns out during an evaporation cycle the current supply will be interrupted and after finishing the cycle a new filament will be selected automatically. When the manual operation mode is selected the key **Start** has to be pushed again for starting the evaporation process with a new filament.

The evaporation process is stopped:

- at any time by pressing the red key **Stop**
- at any time by an external stop signal
- at the latest when the time set on the internal timer has gone by.

For using the degas function the selection switch **Mode** has to be set to **Degas**. Start the process by pushing the key **Start**. The degassing process stops automatically when the selected time has gone by or when the key **Stop** is pushed.

#### **4.1. Interlock and remote control mode**

For activating the remote control and interlock mode the selection switch **Mode** has to be set to **Ext/Clock**. Connect the remote control system to the 9 pin Sub D connector on the rear panel of the device (☞ **Figure 2**).

PIN assignment of the connector:

- PIN 1   Device ground = neutral conductor of filaments
- PIN 2   Optocouplers
- PIN 3   Start input, level +5 ... +24 V
- PIN 4   Stop input, level +5 ... +24 V
- PIN 5   + 5 V relative to device ground
- PIN 6   Interlock
- PIN 7   Interlock
- PIN 8   Status
- PIN 9   Status

If the interlock is not used the plug that comes with the unit needs to be connected. This plug contains a bridge shorting PIN 6 and PIN 7. The evaporation mode is switched off automatically if the interlock circuit is interrupted.

The remote control is performed by internal optocouplers. If a potential isolation is required a positive control voltage fed to PIN 3 or PIN 4 related to PIN 5 starts or stops the device. If relays shall be used, bridge PIN 1 and PIN 2 in the plug and reconnect the relays from PIN 5 to PIN 3 or PIN 4.

## 5. Operating principle

The *SUBLI-CON 51* supplies an ungrounded heating current of 10 ... 50 A with 12 V max. which is switched to a filament. On the pump, the neutral conductor of the filaments must be connected with the ground contact of the system. The ungrounded design of the power supply prevents current from flowing through the neutral conductor particularly in case of any interruption of the neutral conductor to the pump.

The device operates with pulsating direct current of double line frequency and regulates to a constant effective value. The current control by means of phase shift regulation keeps the power loss in the device below 100 W so that it may be used without any problems in switch cabinets. The steepness of the signal edge when switching off the power FET's has been reduced with regard to electromagnetic compatibility (EMC).

If the temperature at the heat sink increases to 40 °C the fan will be turned on. At temperatures above approximately 100 °C, the heater switches off and the over-temperature LED starts shining.

The transformer for the heater is switched on only when the heating process is started. Thus, in the stand by mode the current consumption of the device is low and you may keep it always switched on.

## 6. Technical data

Line voltage:	230 or 115 V (switchable by voltage selector on mains input)
Power consumption:	600 VA max.
Fuses:	Slow-blow fuses of 4 A (230 V) / 6.3 A (115 V)
Output:	12 V, 50 A max.
Filaments :	cable 5 as the neutral conductor; green/yellow conductor to be connected to ground, cable 1 to 4 correspond to the filaments 1 to 4
External:	Interlock to be bridged or connected to relay contacts; remote control potential-free through internal optocouplers or with the 5 V supply voltage provided through external switches
Timer:	Five switching times per day (on request)
Weight:	10.5 kg (with cable of standard length)
Dimensions (mm):	448 x 320 x 88 (L x W x H)

## 7. Notes for the use of titanium sublimation pumps

On titanium sublimation pumps, the adsorption of chemically active gases on the surface of a thin getter film is utilised for pumping. The absorption rate is particularly high when the getter film has just been applied and is kept at a low temperature by cooling. As the absorption rate decreases considerably with growing coverage, the getter film must be regenerated after half a monolayer of adsorbed gas particles has built up. (☞ **Table 1**)

The length of the period between the phases of regenerating the getter films depends on the pressure range. Towards high pressures, the getter film must be regenerated at very short intervals as in this case the number of adsorbed gas particles is very high. Towards low pressures, the intervals between the phases of regeneration of the titanium layer are extended. In this case, the number of adsorbed gas particles is continuously decreasing.

Pressure range	Time Off settings
$1 \cdot 10^{-7}$ Torr ... $5 \cdot 10^{-8}$ Torr	1 hour
$5 \cdot 10^{-8}$ Torr ... $1 \cdot 10^{-8}$ Torr	1 ... 12 hours
$1 \cdot 10^{-8}$ Torr ... $1 \cdot 10^{-9}$ Torr	12 ... 24 hours
$1 \cdot 10^{-9}$ Torr ... $1 \cdot 10^{-10}$ Torr	more than one day
$1 \cdot 10^{-10}$ Torr ... $1 \cdot 10^{-11}$ Torr	more than one week

[Table 1] Time settings for different pressure ranges

## 8. Warranty

VACOM warrants to you that the device will be free from defects in material and/or workmanship for a period of six months from the date of delivery. VACOM basically does not warrant or cover damage caused by misuse and any consequential damages.



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