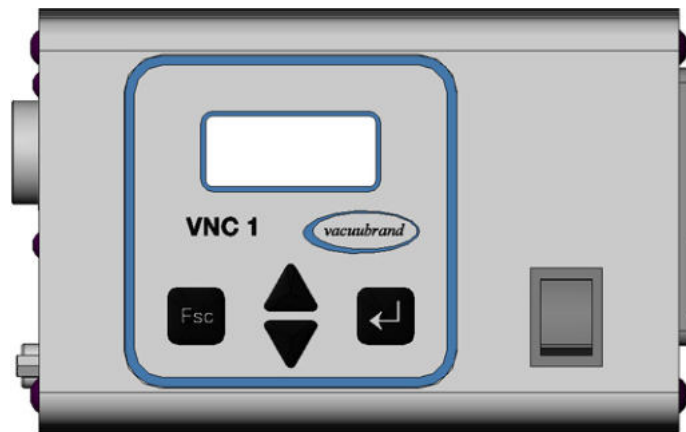




Technology for Vacuum Systems

Instructions for use



VNC 1

Vacuum Controller



LAB Online Exhibition



Dear customer,

Your VACUUBRAND vacuum controller shall support you at your work for a long time without any trouble and with full load output. Thanks to our large practical experience we attained much information how you could add to an efficient application and to personal safety. Please read these instructions for use prior to the initial start-up of your controller.

VACUUBRAND vacuum controllers are the result of many years of experience in construction and practical operation of these vacuum controllers combined with the latest results in material and manufacturing technology.

Our quality maxim is the "zero fault principle":

Every delivered vacuum controller is tested extensively including an endurance run. Due to this endurance run, also faults, which occur rarely, are reported and can be corrected. Every single vacuum controller is tested on achievement of the specification after the endurance run.

Every VACUUBRAND controller leaving our factory achieves the specification. We feel obliged to this high quality standard.

We are aware that the controller should not draw a part of the real work and we hope to contribute with our products to an effective and troublefree realisation of your work.

Yours

VACUUBRAND GMBH + CO KG

After sales service: Contact your local dealer or call (++49) 9342/808-193.

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Attention! Important notes!



Not permitted! Misuse may cause damage.



Isolate equipment from mains.



Note.



Safety information!



Remove all packing material, remove the protective covers and keep, inspect the equipment.

If the equipment is damaged, notify the supplier and the carrier in writing within three days; state the item number of the product together with the order number and the supplier's invoice number. Retain all packing material for inspection.

Do not use the equipment if it is damaged.

If the equipment is not used immediately, replace the protective covers. Store the equipment in suitable conditions.

☞ **Read and obey this manual before installing or operating the equipment.**

☞ **For operation valves and/or vacuum pumps are necessary.**

Use the equipment **for the intended use only** (for generation and measurement of vacuum).

☞ Obey notes on correct vacuum and electrical connections.

☞ Make sure that the individual components are only connected, combined and operated according to their design and as indicated in the instructions for use.



Obey **national safety regulations and safety requirements** concerning the use of vacuum and electrical equipment.

☞ Equipment must be connected only to a **suitable fused and protected electrical supply** and a suitable earth point. Failure to connect the pumping unit to ground may result in deadly electrical shock.

☞ Check that mains voltage and current conform with the equipment (see rating plate).

☞ Make sure ventilation is adequate if the controller is installed in a housing or if the ambient temperature is elevated.



To the best of our knowledge the equipment is in compliance with the requirements of the applicable **EC-directives** and harmonized standards (see "Declaration of conformity") with regard to design, type and model, especially directive IEC 1010. This directive gives in detail conditions, under which the equipment can be operated safely (see also IP degree of protection).

☞ Adopt suitable measures in case of differences, e. g. using the equipment outdoors, installation in altitudes of more than 1000 m above mean sea level, conductive pollution or dewiness.



The devices are **not suitable** for applications which involve **dangerous or explosive gases or explosive or flammable mixtures**. Ensure that the materials of the wetted parts are compatible with the pumped substances, see section "Technical data".

☞ Adopt suitable measures to prevent the release of dangerous, explosive, corrosive or polluting fluids.

☞ In case of residues, aggressive or condensable media install a gas washing bottle, if necessary.

☞ Position the device and the vacuum line in a way that condensate can not reach the pressure transducer.

☞ If necessary connect inert gas for venting.



Max. permitted pressure: 2 bar (absolute).

☞ At pressures higher than 1060 mbar the **display flashes. Error** message "p Er-ror" appears, four beeps.

➔ Immediate pressure relief necessary! **Risk of bursting!**

Attention: At pressures above 1100 mbar the device does no longer display the correct pressure values (pressure transducer saturated).

The controller is equipped with a **short circuit proof wide-range power supply** with integrated overload protection.

☞ Failure of the device (e. g. by power failure) or of connected components must not lead to a critical dangerous situation under any circumstances.

Electronic equipment is never 100% fail-safe. This may lead to an ill-defined status of the equipment or of other connected devices. Provide protective measures against malfunction and failure. Ensure that in case of failure the controller and the vacuum system always will turn into a safe status.



Attention: If **Auto-Start** (Auto-St.) is preselected, the process starts immediately after switching on the controller without pressing any further key. It is the user's responsibility to ensure that no dangerous status of the system due to the automatic startup of the pump, e.g. after a power failure, can occur and to provide appropriate safety measures. If necessary, the user has to check **prior to using the equipment** if the option "Auto-Start" is enabled.

Use only **genuine spare parts and accessories**.

☞ Otherwise safety and performance of the equipment as well as the electromagnetic compatibility of the equipment might be reduced.

Ensure that maintenance is done only by suitably trained and supervised technicians. Ensure that the maintenance technician is familiar with the safety procedures which relate to the product processed by the vacuum system and that the equipment, if necessary, is appropriately decontaminated before starting maintenance. Obey local and national safety regulations.



Before starting **maintenance** vent the system, isolate the vacuum controller from the vacuum system and the electrical supply.

Wait two minutes after isolating the equipment from mains to allow the capacitors to discharge.

Attention: Due to the operation the device might be contaminated by harmful or dangerous substances.

Interior components of the controller can only be repaired at the factory.

In order to comply with law (occupational, health and safety regulations, safety at work law and regulations for environmental protection) vacuum pumps, components and measuring instruments returned to the manufacturer can be repaired only when certain procedures (see section "**Notes on return to the factory**") are followed.

Technical data

Controller	VNC 1
Pressure transducer	capacitive absolute pressure transducer made of aluminium oxide ceramic
Display	alphanumerical LCD display, 2 x 8 characters
Electronic scale conversion (to be switched between)	mbar, Torr or hPa
Measurement range (absolute)	1100 mbar - 1 mbar (825 Torr - 1 Torr)
Max. range of pressure control (absolute)*	1060 mbar - 1 mbar (795 Torr - 1 Torr)
Uncertainty (with transducer carefully calibrated and at constant temperature)	<+/-1 mbar (0,75 Torr) +/-1 digit
Temperature coefficient	<+/- 0,07 mbar/K (0,05 Torr/K)
Permitted ambient temperature at operation	10°C to +40°C
Permitted ambient temperature at storage	-10°C to +70°C
Permitted relative atmospheric moisture during operation (no condensation)	30% to 85%
Max. permitted range of voltage supply	100 V~ (-10%) to 230 V~ (+10%) 50/60 Hz
Fuse	5x20 mm, T 8 A / 250 V
Power draw (no-load operation)	3 VA
Power draw with VACUUBRAND VV 6C - isolation valve and cooling water valve	max. 10 VA (without switch output)
Breaking capacity of diode socket: voltage supply 110-230 V 50/60 Hz voltage supply 100-110 V 50/60 Hz designed for the simultaneous operation (parallel connection) with the following original accessories	24 V, max. 400 mA 24 V, max. 340 mA - isolation valve VV 6C - cooling water valve 24 V=
Breaking capacity of IEC socket** ambient temperature 30°C ambient temperature 40°C	7,2(4) A 250 V~, 7,2(7,2) A 125 V~ 6(4) A 250 V~, 6(6) A 125 V~
Degree of protection according to IEC 529 front side of built-in version	IP 20 IP 54
Vacuum connection housing version	hose nozzle for vacuum hoses with 6 - 10 mm I.D.
built-in version	screwed hose connection NW 10/8 for PTFE tubing
Max. permitted pressure at pressure transducer (absolute)	2 bar (1500 Torr)
Max. permitted temperature of gaseous media at pressure transducer	for short periods up to 80°C
External error input (via diode socket)	5-24 V
Serial interface	RS 232 C

* The actual available range of the vacuum control can be limited due to the ultimate vacuum of the pump, the developed amount of gas, etc.

** ohm resistive (inductive) load

We reserve the right for technical modifications without prior notice!

Controller	VNC 1
Length of cable (built-in version)	approx. 1 m
Weight (housing version / built-in version)	0,8 / 1 kg
Dimensions (without vacuum connections) housing version LxWxH built-in version (without cable) LxWxH	144 mm x 90 mm x 72 mm 144 mm x 90 mm x 67 mm
Installation depth (behind rear of front panel)	60 mm
Stand rod (only table top unit)	thread M8
Mains supply housing version built-in version	integrated IEC combination IEC plug / socket at cable
Solenoid operated valve	
Operating cycles per minute	max. 50
Power draw	6 W
Power supply	24 V= +/- 10%
Current draw	ca. 0,22 A
Degree of protection IEC 529	IP 65
Max. permitted difference pressure, pressure gradient in direction of flow-through	1,5 bar

Components	Wetted parts
Vacuum connection / hose nozzle	stainless steel / PPS
Vacuum connection / screwed hose connection	stainless steel / PVDF
Screwed hose connection (vacuum connection)	PVDF
Elbow fitting (vacuum connection)	ETFE / ECTFE
Adapter / O-ring (vacuum connection)	PP / FPM
Pressure transducer housing	stainless steel
Seals	chemically resistant fluoroelastomer
Pressure transducer	aluminium oxide ceramic
Solenoid operated valve	PVDF / PTFE / fluoroelastomer
Valve block	PE
Valve	FFKM
Hollow screw	stainless steel
Blind plug	PP

We reserve the right for technical modifications without prior notice!

Accessoires:

Isolation valve VV 6C 24 V=	67 40 91
Isolation valve VV 15C, 24 V=, DN 16	67 41 10
Isolation valve VV 15C 24 V=, DN 25	67 41 15
Isolation valve VV 25, 230 V, DN 25	67 41 05
Cooling water valve 24 V=	67 60 13
VARIO adapter cable	63 71 76
Cable RS 232C nine-pole Sub-D	63 78 37

Description



After the connection of components the controller can be operated in different basic modes, see "**Basic modes and menu structure**".

When switching on the controller, the current basic mode and the **number of version** are displayed for 2s.

Display and keys

Display

In menu

line 1: caption

line 2: menu item

In submenus (only setting of RS 232C)

line 1: menu item (RS 232)

line 2: submenu

After selection of menu item

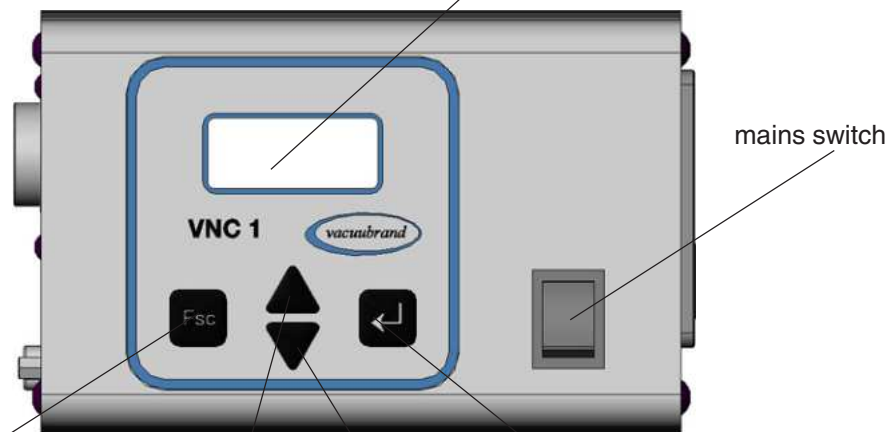
line 1: menu item (or submenu)

line 2: value to be set

In program

line 1: pressure

line 2: status message



key "Esc":

- go to previous level of program (operation menu)
- interruption of operation (reset to previous settings)
- stop of control

key "Enter"

- start of control
- next step in menu setting
- adopt set value and quit menu

key "up"

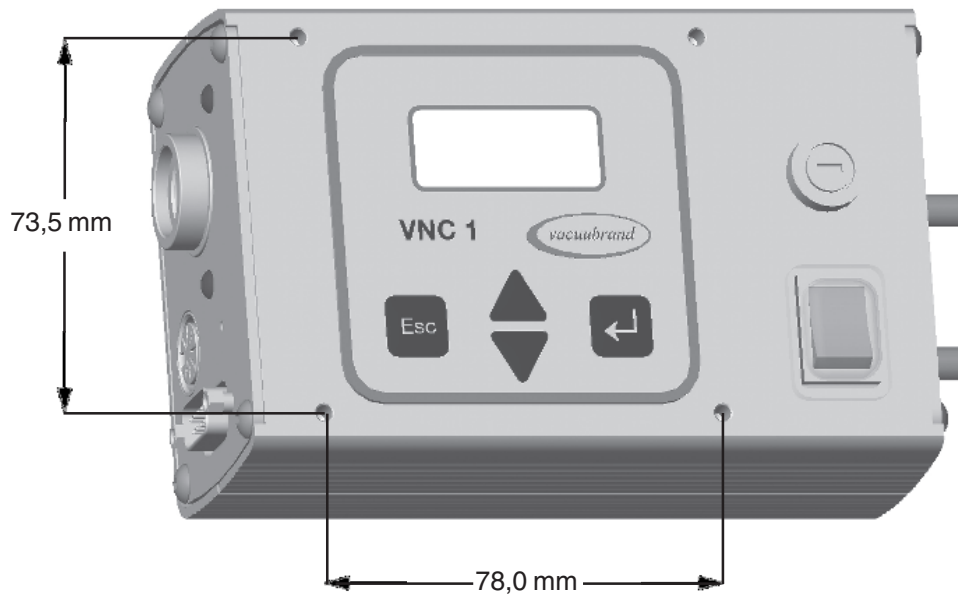
- select menu
- previous menu item
- increase value

key "down"

- select menu
- next menu item
- decrease value

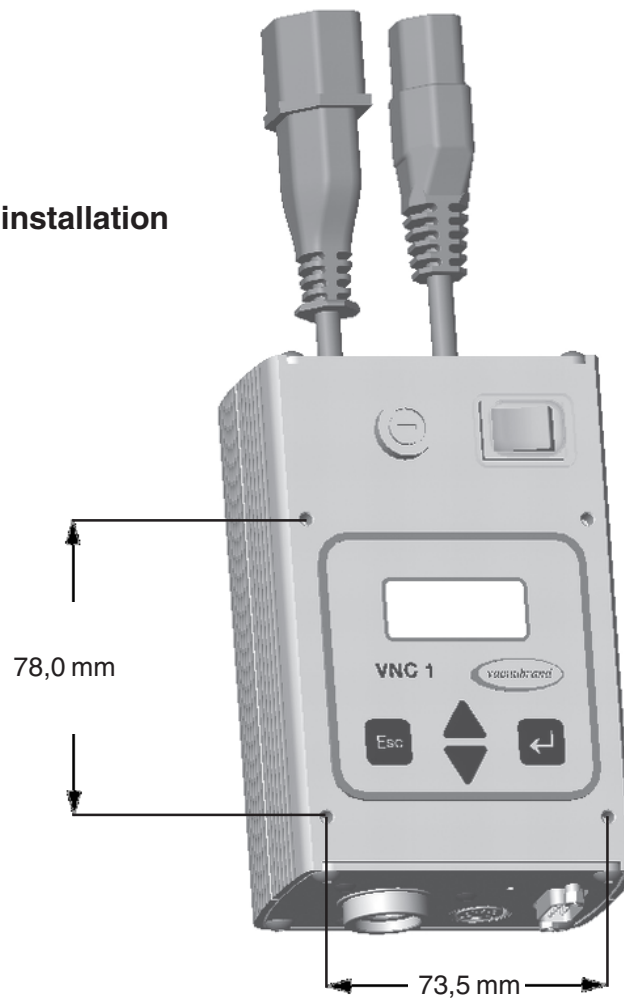
Controller VNC 1, built-in version

bores for screws M4



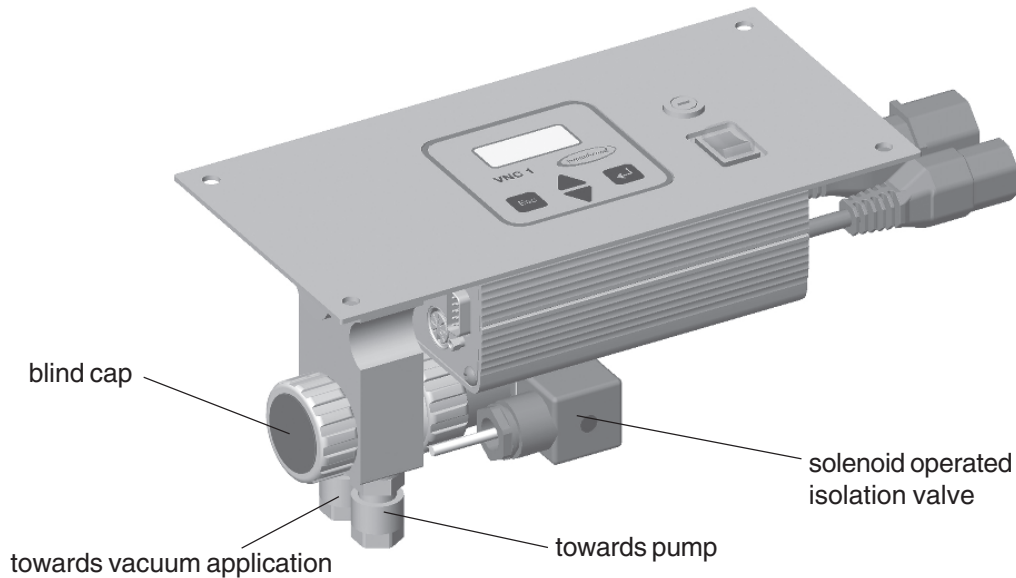
Built-in version for vertical installation

bores for screws M4



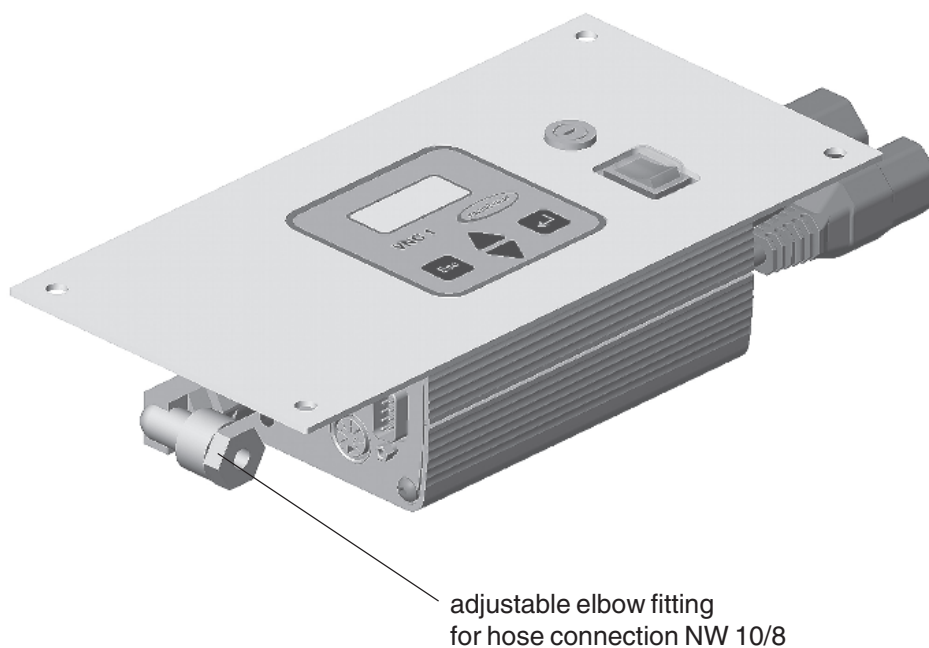
Built-in version with front panel (120 x 240 mm) and solenoid operated isolation valve

The controller VNC 1 is equipped with a non return valve underneath the blind cap. If the connection to the pump is vented, the non return valve prevents interference with the system and the pressure transducer. Check the non return valve regularly and clean or replace if necessary (Cat.-no. 63 88 36).



Bores in front panel: Ø 6,5 mm;
distance between bores: 100 mm and 220 mm (long side)

Built-in version with front panel (120 x 240 mm) and adjustable elbow fitting for hose connection NW 10/8

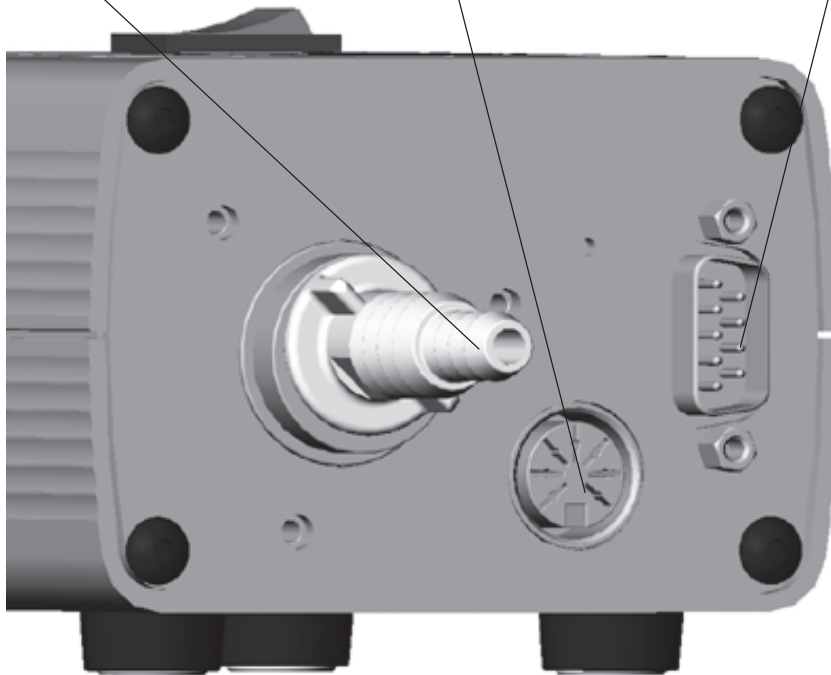


Connections

vacuum connection
hose nozzle NW 10/6

8-pin socket for connection of
cooling water valve or isolation valve
or speed control signal (PWM)

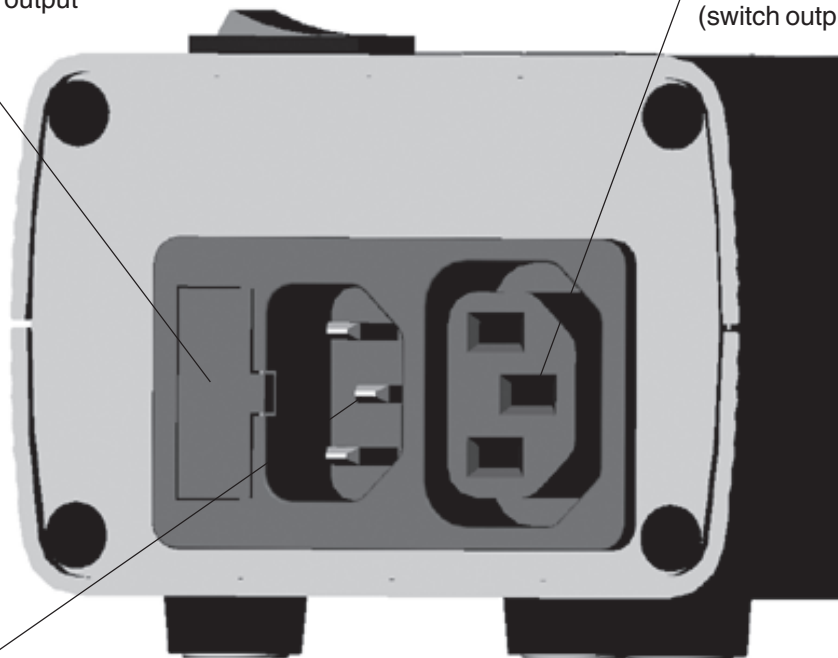
serial interface
RS 232 C



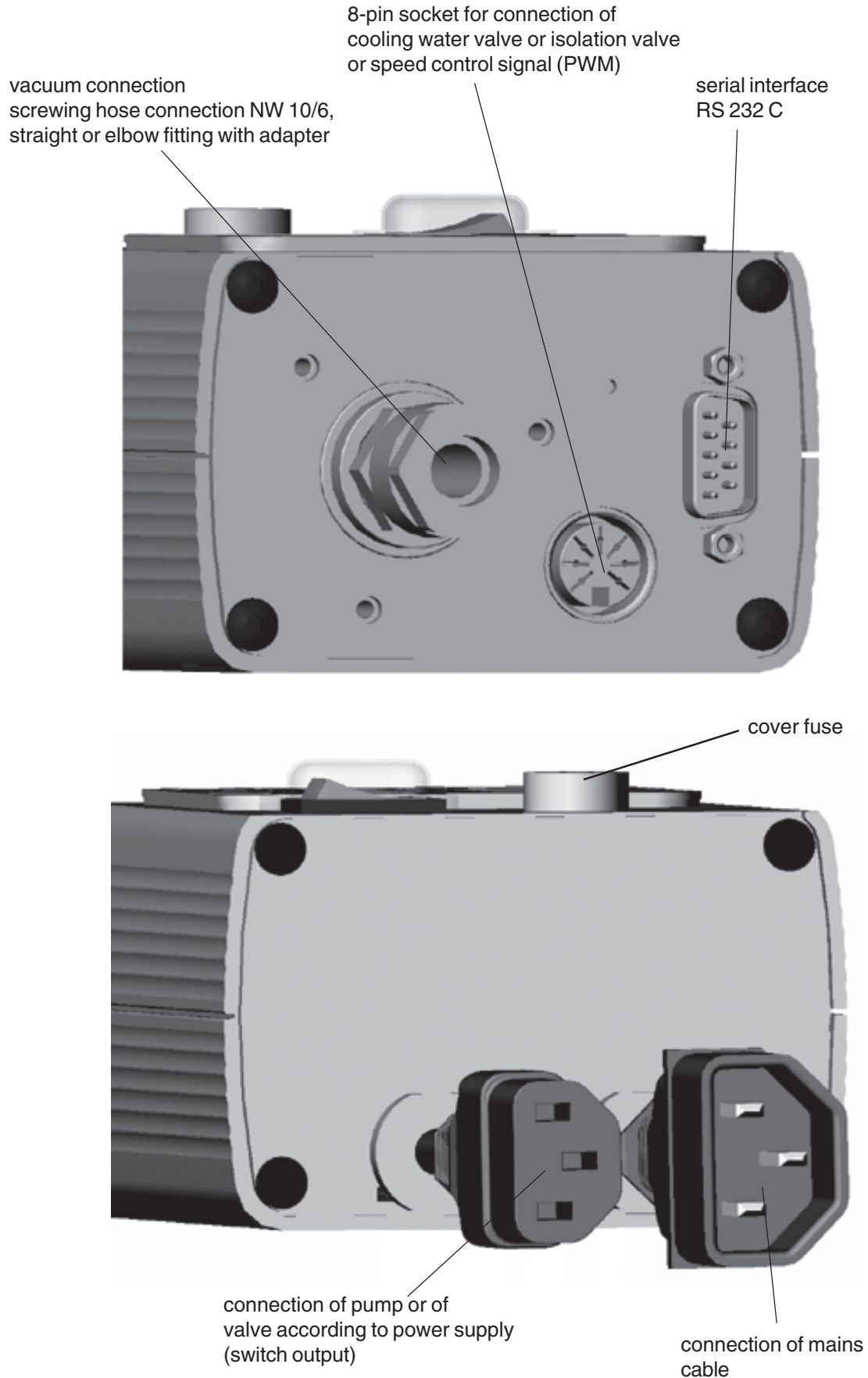
cover
fuse switch output

socket for connection of
pump or valve according to
voltage supply
(switch output)

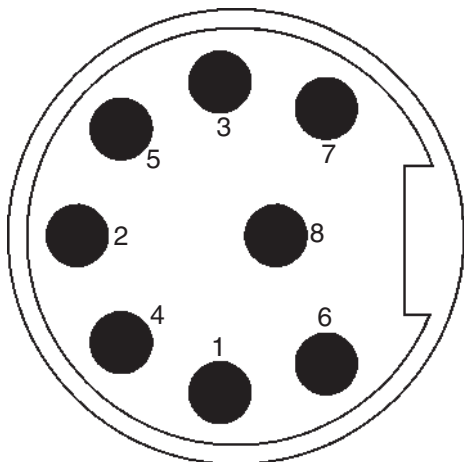
connection mains cable



Connections built-in version



Assignment of pins

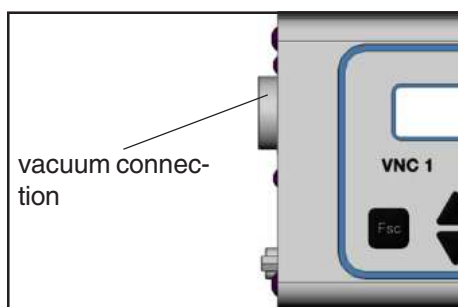


- | | |
|---|--|
| 1 | cooling water valve |
| 2 | + 24V |
| 3 | isolation valve |
| 4 | external error - |
| 5 | external error + |
| 6 | mass (PWM -) |
| 7 | PWM + (speed control signal for VARIO pumps) |
| 8 | +12 V |

Notes on operation

For operation it is necessary to install valves and/or vacuum pumps.

Note: Texts written in Courier font mirror the display of the LCD of the controller.

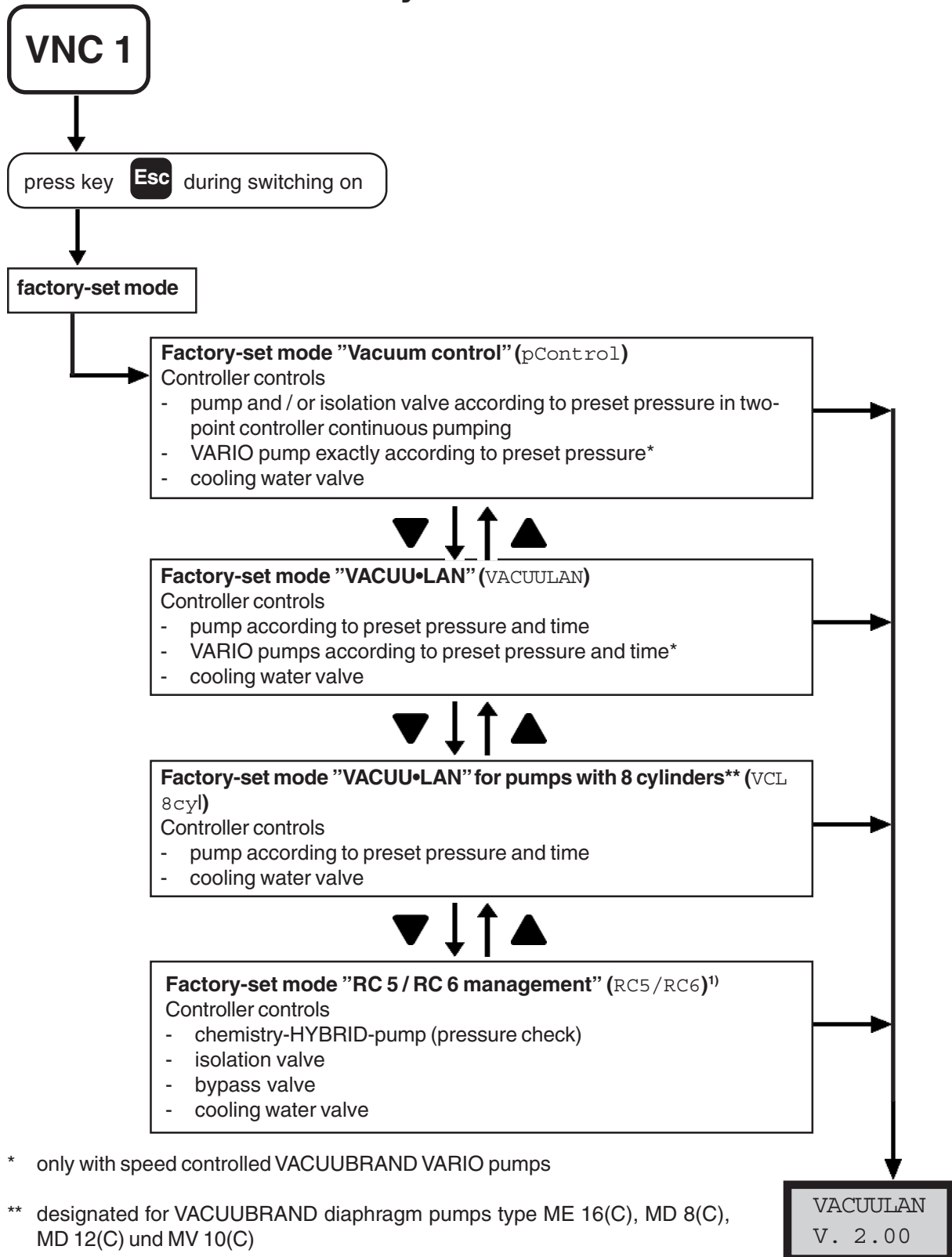


Max. permitted pressure at pressure transducer: 2 bar (absolute).

- ☞ The display flashes at a pressure higher than 1060 mbar.
- ☞ Inside a vacuum system where evaporation occurs, the vacuum is not uniform. This effects the value of the measured pressure and such the controlling. Therefore carefully choose the position where to connect the pressure transducer.
- ☞ Condensate and deposits at the pressure transducer falsify the measurement result.
- ☞ If residues occur or when working with aggressive or condensable substances, install a gas washing bottle in front of the pressure transducer.
- ☞ **Position controller in such a way, that condensate can not flow into the pressure transducer.**
- ☞ If necessary, clean pressure transducer, see section "Cleaning the pressure transducer".

- ☞ Setting of interface parameters, see "**Interface parameters**".
- ☞ Presettings at controller, see "**Factory-set modes and menu structure**".
- ☞ Operating the controller, see "**Working with the controller**".

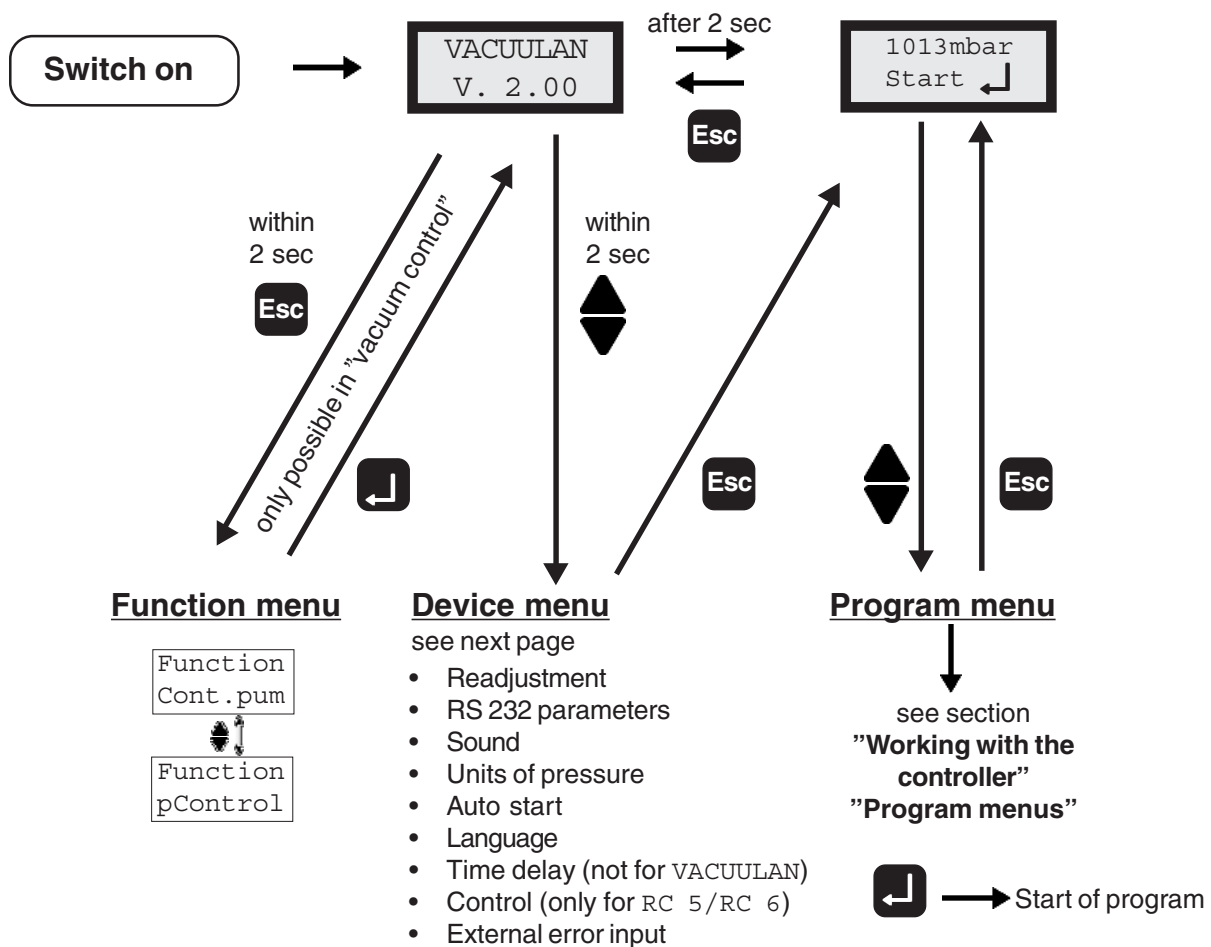
General view of factory-set modes



Attention: When connecting pumps pay attention to the breaking capacity of the IEC socket (see "Technical Data")!

1) Attention: For factory-set mode "RC 5 / RC 6 management" please order separate instructions for use!

Menu structure of controller



Notes on menu structure of the controller

Function menu:

- Setting of the basic function of the controller (only in "vacuum control" (pControl)).

Device menu:

- Setting of the device specific features and the periphery of the controller.
- Readjustment: Adjusting the pressure transducer at atmospheric pressure and under vacuum, see section "Readjustment".
- RS 232 parameters: Setting of the interface parameters, see section "Interface parameters".
- Sound: Switching on/off the function "acoustic warning signal".
- Pressure unit: Selection of the pressure unit mbar, Torr or hPa.
- Auto start: Process starts immediately after switching on the controller.
- Language: Selection of the language in the menus (English, German, French).
- Time delay: Delayed switching off of the cooling water and the pump (not for VACUULAN)
- Control: Control of a valve or a pump via the IEC control line (only for RC5/RC6).
- External error input: In case of failure of the signal the control sends an error message and switches off the pump, if preset.



Attention: When operating a VARIO pump the external error input is used to indicate a failure of the frequency converter and can not be wired externally.

Program menu:

- Setting of the function specific parameters (e. g. preset pressure).

Attention: Depending on factory-set configurations some menu options are not active!

Notes on configuring the controller

External error input (Ext. Err)

Via this input external error messages are processed.

- When set to `Off`, the external error input is ignored.
- When set to `Cont.`, an error message is displayed, the current program is continued.
- When set to `Stop`, an error message is displayed, the current program is stopped.

Note: To indicate a VARIO pump it is necessary to set the external error input to "Off".

Time delay

- At the end of the process the cooling water continues to flow according to the preset time delay. If an isolation valve is connected, the time delay applies to both the pump and the cooling water valve.

Notes on selecting the factory-set configuration



The controller VNC 1 can be adapted optimal to the specific application by choosing the appropriate set-in-factory mode depending on the components, the application and the process.

Automatic valve detection:

When switching on, the controller checks the actual valve configuration. If a valve is connected it is supervised and operated automatically until the controller is switched off. Isolation valves and cooling water valves are supervised equally.

Automatic VARIO detection:

If the not configured external error input is switched after switching on the pump (without isolation valve), the controller changes automatically to configuration "VARIO" and stores this configuration. After a restart the configuration "VARIO" is active directly. If an isolation valve is connected to the controller instead of a VARIO adapter, the controller switches automatically to valve operation after restart.

The preselected values from last operation (e. g. for pressure, pumping speed or switch-off time) are stored. In case of similar operation conditions it is possible to start immediately, if the preselections are chosen appropriately.

If selecting another factory-set mode (press key "Esc" during switching on), the configuration for this mode is taken over, the actual configuration gets lost.

Four factory-set mode are stored in the controller (see section "General view of factory-set modes"). The single factory-set modes contain the following function specific settings in the program menu:

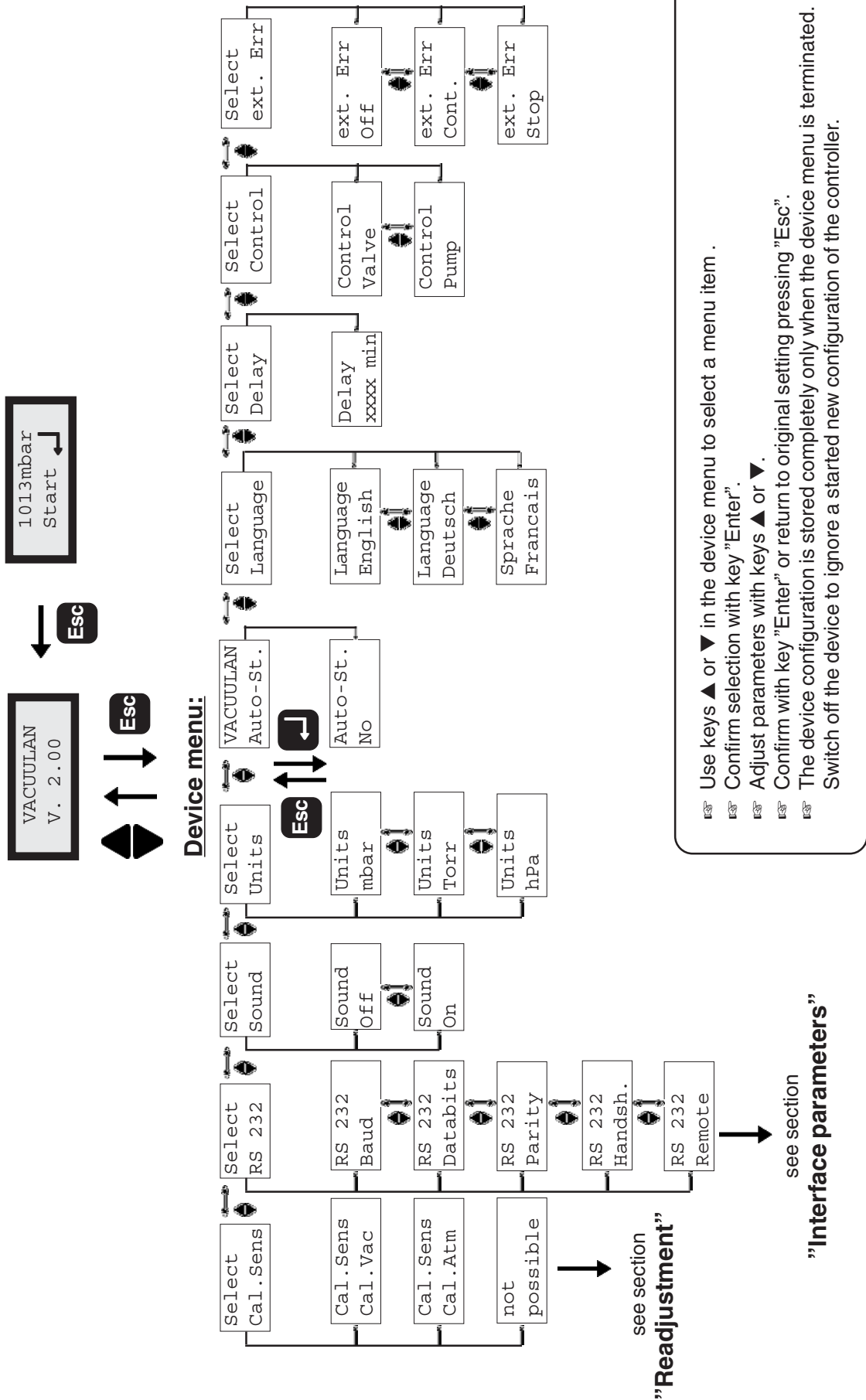
Vacuum control (`pControl`): Two point control with 5 minutes time delay.
`p set`: 25 mbar, `Δp`: Auto, `t Off`: off, `limit`: 1060 mbar.

VACUU•LAN (`VACUULAN`):
`p set`: 25 mbar, `p On`: 150 mbar, `t Off`: 15 min, `tProcess`: 99 h.

VACUU•LAN for diaphragm pumps with 8 cylinders with start-up control (3 minutes start-up delay) (`VCL 8cyl`):
`p set`: 25 mbar, `p On`: 150 mbar, `t Off`: 15 min, `tProcess`: 99 h.

RC 5 / RC 6 management:

Attention: For factory-set mode "RC 5 / RC 6 management" please order separate instructions for use!



Working with the controller

Factory-set mode "Vacuum control" (pControl)

Control without isolation valve:

- Control of a vacuum pump by direct switching of the pump. Preset time delay is only valid for an optional cooling water valve.

Control with isolation valve:

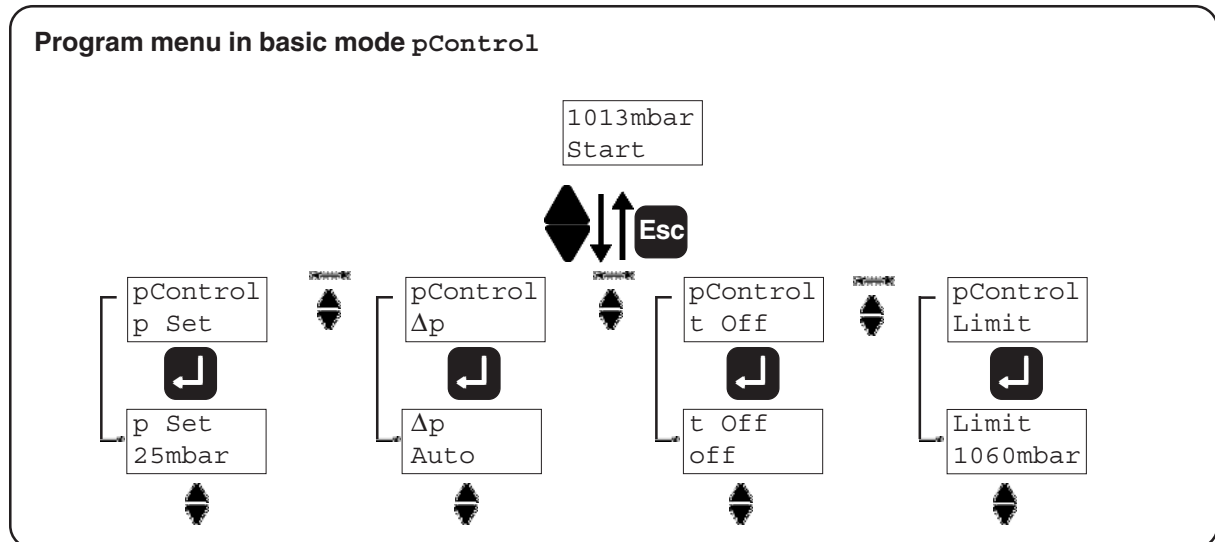
- Control of a vacuum pump via an isolation valve. Preset time delay is valid for the pump to reduce condensation inside the pump considerably. The cooling water valve is open during vacuum control and during time delay.
- For synchronous switching of the pump and the isolation valve:
Configure the time delay in the device menu: `t Off: off`.

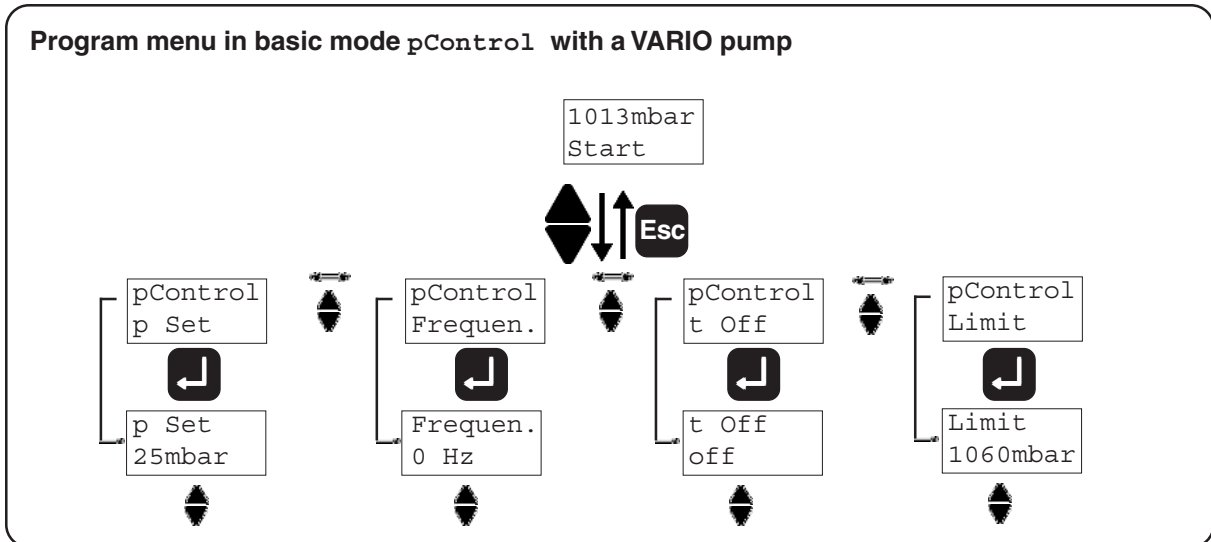
Operation of a speed controlled (VARIO) vacuum pump:

- Connect the pump using a Y-type adapter cable (see accessories) to the controller. The external error input must not be configured (factory-set: `ext.Errr: off`). Switch on the controller and start regulation. After approx. 1 second the VARIO pump is identified automatically.

- Use keys ▲ or ▼ in the program menu to select an item.
- Confirm selection with key "Enter".
- Adjust parameters with keys ▲ or ▼.
- Confirm with key "Enter" or return to original setting pressing "Esc".

Program menu in basic mode pControl





- **Vacuum control of a vacuum pump (with isolation valve if on hand)**

Settings in the program menu:

- ☞ **Preset pressure** (p Set): Lower pressure value for two-point control (displayed by a short tip on key ▲).
- ☞ **Hysteresis** (Dp): Control range of the two-point control.
- ☞ **Switch-off time** (t Off): The duration of the process (vacuum control) can be preset. If the pump is switched off due to surpassing of a pressure limit (Limit), the switch-off time is without function.
- ☞ **Maximal pressure** (Limit): Shut down of the pump when the "Limit" value is exceeded, e.g. at the end of filtrations or extractions (active only **after** the pressure did fall below the preset pressure for the first time).

Suggested values for the hysteresis Δp are stored in the controller (setting: "Auto") and are adapted automatically to the preset pressure values. It is possible to adjust the parameters manually.

p in mbar	5	10	50	80	100	200	500	700	900	1000
Δp in mbar (suggested values)	2	2	5	8	9	17	40	55	71	78

- **Vacuum control with a speed controlled pump**

- ☞ **Preset pressure** (p Set): Exact vacuum control according to a preset pressure value.
- ☞ **Frequency** (Frequen.): Sets the pumping speed when the preset pressure is decreased manually. **Only valid for pumps with frequency control (VARIO).**
- ☞ **Switch-off time** (t Off): The duration of the process (vacuum control) can be preset. If the pump is switched off due to surpassing of a pressure limit (Limit), the switch-off time is without function.
- ☞ **Maximal pressure** (Limit): Shut down of the pump when the "Limit" value is exceeded, e.g. at the end of filtrations or extractions (active only **after** the pressure did fall below the preset pressure for the first time).

Adapting parameters during the regulation:

- **Interruption:** Press key "Enter", the control stops, after releasing the key, the control is continued. During the interruption the preset pressure can be set to the actual pressure by pressing the key ▼ and by pressing the key ▲ the hysteresis is set. Performing both tasks in a row results in hysteresis 0 = Auto, because the preset pressure as well as the hysteresis are set to the same pressure value.
- **Decrease of preset pressure:** Keep key ▼ pressed for more than 2s.
- **Increase of preset pressure:** Keep key ▲ pressed for more than 2s.

Temporary switching from "vacuum control" to "continuous pumping":

- Keep key ▼ pressed for more than 2s (decrease of preset pressure) then press key "Enter" additionally, the controller switches to "continuous pumping". No change of the basic mode of the controller takes place. Once the pump down is stopped ("Esc"), the controller VNC 1 switches back to the mode "vacuum control".
- ☞ **Tip for distillation:** Temporary switching to continuous pumping enables an user friendly semiautomatic control of a distillation. Pumping down until the boiling point is reached, then press "Enter" and key ▼. The controller keeps the reached pressure value constant.

Temporary switching from "continuous pumping" to "vacuum control"

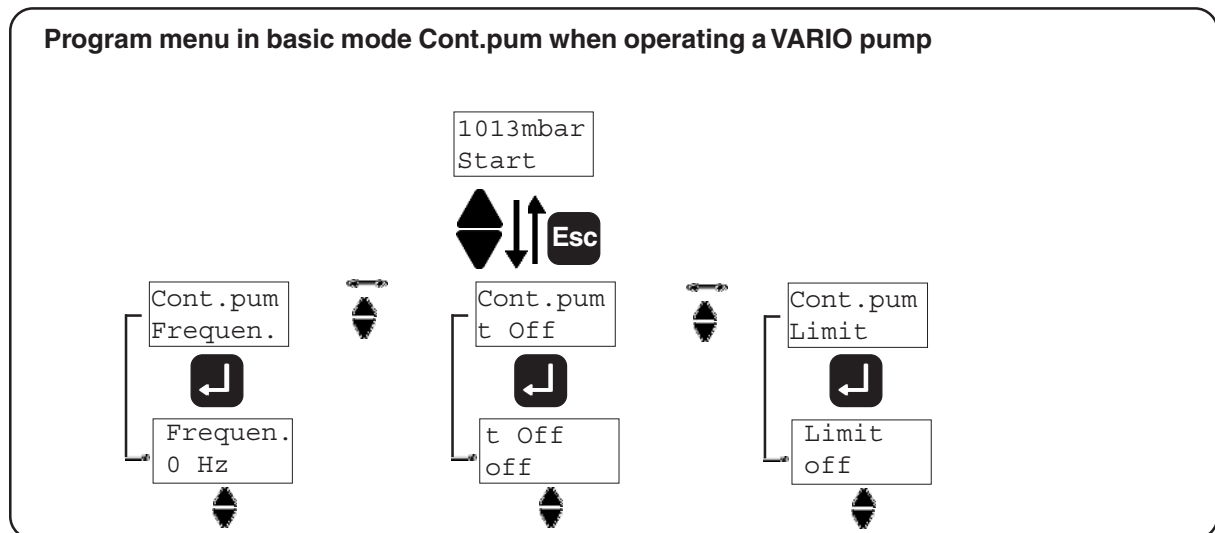
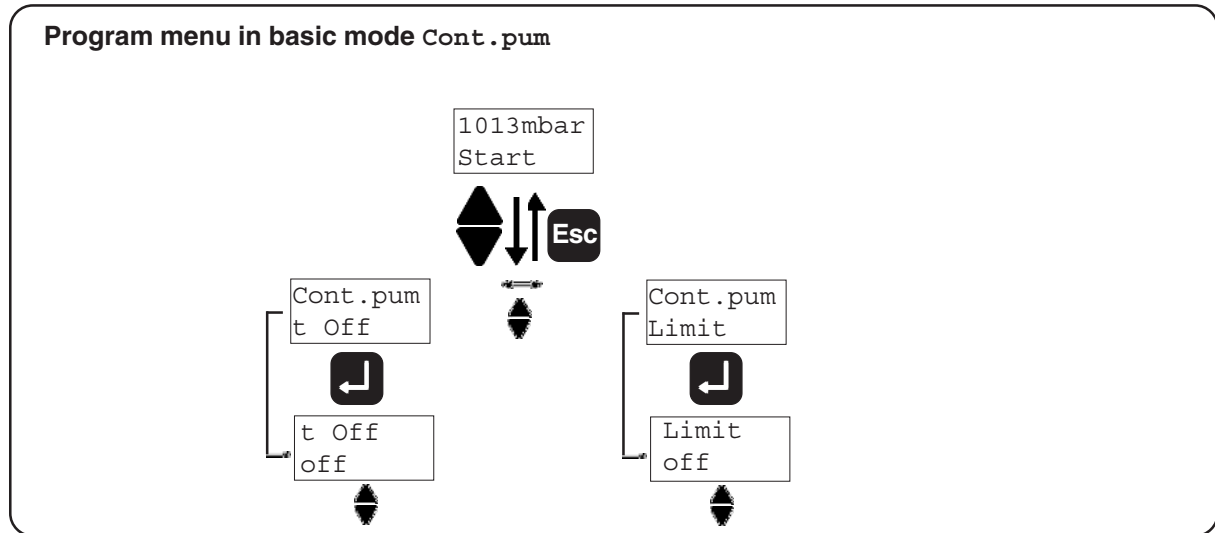
- If the key "Enter" is pressed while pumping down, the pumping down is interrupted. Pressing additionally the key ▼ results in switching to the mode "vacuum control". The actual pressure is stored as preset pressure. No change of the basic mode takes place. Once the regulation is stopped, the controller switches back to the mode "Continuous pumping".
- ☞ **Tip for distillation:** Temporary switching to continuous pumping enables an user friendly semiautomatic control of a distillation. Pumping down until the boiling point is reached, then press "Enter" and key ▼. The controller keeps the reached pressure value constant.
- ☞ **Tip for filtration:** Adjust preset pressure to a value well above the boiling pressure of the solvent (e.g. water: $p_{Set} > 100$ mbar). Set Limit to e.g. 500 mbar. Once the filtration has finished, the pressure increases and the pump is switched off.

Switching to "continuous pumping" (Cont . pum) using the function menu (see section " Menu structure of controller")

➔ Operation of a vacuum pump using an isolation valve, direct switching of a pump or operation of a VARIO pump

Settings in the program menu:

- ☞ **Switch-off time** (t Off): The duration of the process (vacuum control) can be preset.
- ☞ **Maximal pressure** (Limit): Shut down of the pump if the actual pressure falls below a preset pressure limit "Limit", e.g. for drying chamber application.



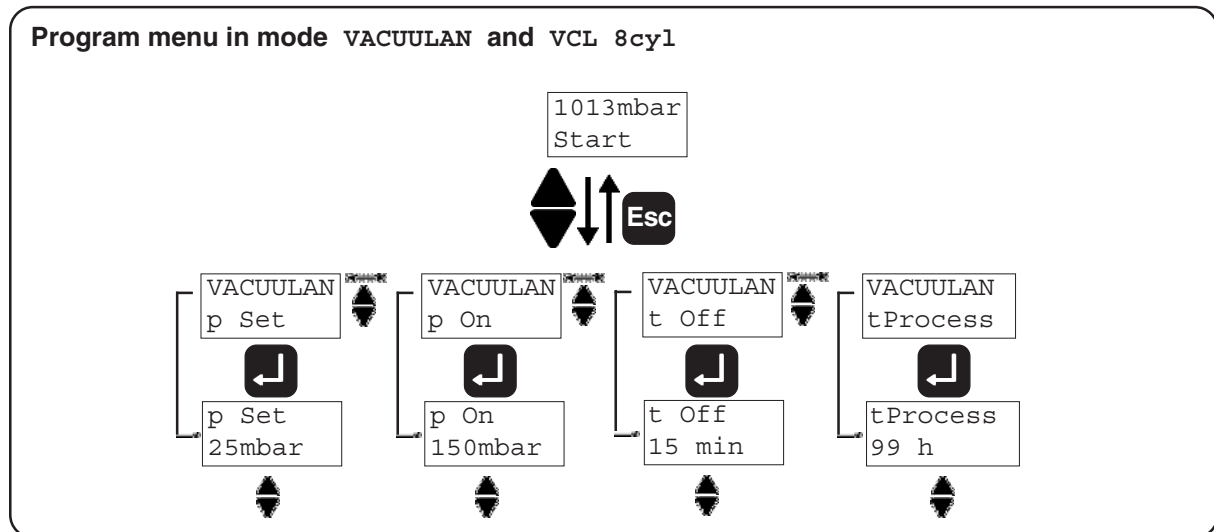
Factory-set mode "VACUU•LAN" and "VACUU•LAN for pumps with 8 cylinders (VACUULAN and VCL 8cyl)

- operation of a vacuum pump using an isolation valve
- operation without isolation valve: operation of a pump according to user requirements
- control of a speed controlled pump (VARIO) according to requirements
- VCL 8cyl: VACUU•LAN mode for diaphragm pumps with start-up control (delay of 3 minutes for start-up) for VACUUBRAND pumps type ME 16(C), MD 8(C), MD 12(C) and MV 10(C), see also "Technical data".

Settings in the program menu:

- ☞ **Lower pressure value** (p_{Set}) and **switch-off time** (t_{Off}): If the pressure is below the lower set point (p_{Set}), the time meter for automatic shut down is started; additionally the pumping speed is reduced (VARIO pumps only). If the pressure is higher than p_{Set} then the time meter for automatic shut down is reset. The process control stops when the switch-off time has passed. The vacuum pump is switched off if the pressure falls below p_{Set} longer than t_{Off} . The pump starts again in case of great pressure increase.
- ☞ **Upper pressure value** (p_{On}): If the pressure is higher than p_{On} , the pump starts again. Only for pumps with 8 cylinders: The pumping down does not restart before 3 minutes have elapsed since the shut down to enable a reliable restart of pumps equipped with start-up control.
- ☞ **Time of process** ($t_{Process}$): Check if time delay is reached. If time delay is not reached during $t_{Process}$ an error message appears. Check parameters and / or installation.

Program menu in mode VACUULAN and VCL 8cyl



Status messages displayed during operation of a program

The messages are always displayed in the second line, the first line always displays the pressure value.

Displays in factory-set mode "Vacuum control"

Pressure > upper value of hysteresis: With VARIO pumps:	Pump down HI
Pressure within preset limits: With VARIO pumps:	-> p <- xx.x Hz (pumping speed in Hz)
After exceeding of upper pressure value:	Stopped
After expiry of time of process:	Timeout
Key "ENTER" pressed:	Pause (valve closed, frequency 0 Hz)
Key "ENTER" and key ▼ pressed:	p Set (actual pressure value is stored as preset value)
Key "ENTER" and key ▲ pressed:	Δp (actual pressure is stored as upper pressure value)
Key ▼ pressed for less than 2s:	xxxxmbar (preset pressure is displayed)
Key ▼ pressed for longer than 2s:	Adapt p (Pump / valve starts, preset pressure is adjusted)
Key ▼ pressed for longer than 2s and key "ENTER" pressed additionally:	Pumpdown (switching to mode "Continuous pumping")
Key ▲ pressed for less than 2s:	xxxxmbar (pumping down interrupted, pause)
Key ▲ pressed for more than 2s:	Adapt p (preset pressure is adjusted)

Displays in basic mode "Continuous pumping"

Operating with valve:	Pumpdown
Operating with VARIO pump:	xx.x Hz
Key "ENTER" pressed:	Pause (valve closed, frequency 0 Hz)
Key "ENTER" and key ▼ pressed:	p Set (actual pressure value is stored as preset value, switching to vacuum control)

Displays in basic mode "VACUU•LAN"

Process running, pressure above lower pressure value	Process
Time delay, pressure below lower pressure value:	xxx min
Key "ENTER" pressed:	xx.x Hz (only with VARIO pumps during process)
After process, check of pressure:	Monitor
Key "ENTER" pressed after process:	xxx/min (increase of pressure)
VCL 8cyl:	
After restart or switching off:	xxx min (start-up delay)

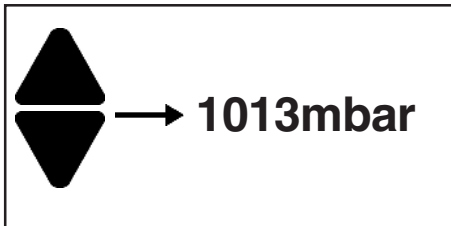
In remote mode: **P** is displayed in the second line.

Readjustment



The vacuum gauge was adjusted using factory standards, which are traceable through regular calibration in an accredited laboratory (German Calibration service) to the national standard. Depending on the process and/or accuracy requirements, check the adjustment from time to time and readjust if necessary. For readjustment, the device has to be adjusted both at atmospheric pressure as well as under vacuum.

Adjustment at atmospheric pressure

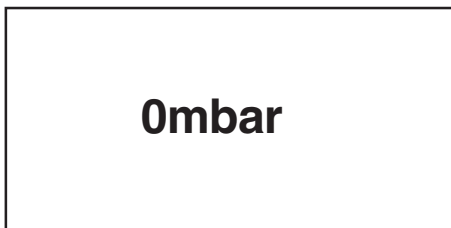


Ventilate the controller and/or the vacuum system. Make sure that the vacuum connection at the controller is at atmospheric pressure.

- Select program "Cal . Sens" at controller.
- Use keys ▲ and ▼ to adjust the display to the actual local atmospheric pressure.
- Confirm value with key "Enter".

Note: To determine the actual atmospheric pressure, use an accurate barometer or get accurate reading from the weather service, the next airport.....(take into account the difference in altitude between e. g. airport and laboratory).

Adjustment under vacuum

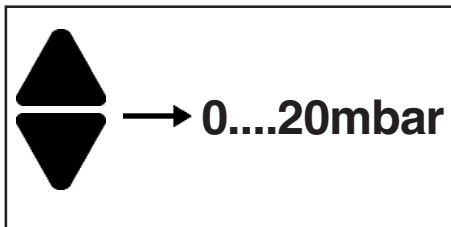


Evacuate the controller via the vacuum connection to a pressure < 0.5 mbar (e. g. by applying a good rotary vane pump).

- Select program "Cal . Sens" at controller.
- ☞ The display is set to zero automatically.
- Confirm value with key "Enter".

Note: Adjustment under vacuum with an actual pressure higher than 0.5 mbar reduces the accuracy of the measurement. If the pressure is significantly higher than 0.5 mbar, adjustment to a reference pressure (0....20 mbar) is recommended.

Adjustment at a reference pressure



Instead of adjustment under vacuum to a pressure < 0.5 mbar, adjustment to a reference pressure within the range of 0 20 mbar is possible.

Evacuate the controller via the vacuum connection to a reference pressure within the range 0 20 mbar.

- Select program "Cal . Sens" at controller.
- ☞ The display is set to zero automatically.
- Use keys ▲ and ▼ to adjust the display to the actual reference pressure at the vacuum connection within the range of 0 20 mbar.
- Confirm value with key "Enter"

Note: The accuracy of the value of the reference pressure will directly affect the accuracy of the adjustment. If the nominal ultimate vacuum of a diaphragm pump is used as reference vacuum, the accuracy of the controller might be doubtful. The diaphragm pump may not achieve the specified value (due to condensate, poor state, failure of valves or the diaphragm).

Calibration in the factory

Control of measuring equipment

The **VACUUBRAND DKD calibration laboratory** is accredited by the Physikalisch-Technische Bundesanstalt (PTB; German national institute for science and technology and the highest technical authority of the Federal Republic of Germany for the field of meteorology and certain sectors of safety engineering) for the measurable variable **pressure in the pressure range from 10^{-3} mbar to 1000 mbar** in accordance with the general criteria for the operation of testing laboratories defined in DIN EN/ISO/IEC 17025:2000.

Calibration in the VACUUBRAND calibration laboratory:

- To meet the requirements of the DIN ISO 9000ff and 10012 series of standards regarding the calibration of inspection, measuring and test equipment at specified intervals.
- To document that the vacuum gauges calibrated are traceable to national standards of the PTB.

DKD Calibration Controller VNC 1 90 02 17

Interface parameters

The controller VNC 1 is equipped with a serial interface (RS 232C, nine-pole Sub-D-plug).

- ☞ Respectively plug-into or remove the cable (cable RS 232C) from the interface only if the equipment is switched off.
- ☞ The interface is **not** electrically isolated from the measuring circuit.
- ☞ For optimal electromagnetic compatibility assemble an interface filter (cat. no.: 63 82 35).

The controller can be operated via serial interface. Measuring results, preselections and the status of the controller can be read at any time.

Setting of the interface

Setting of the interface parameters directly at the controller is described below. Enter the device menu "Select RS 232". The factory set values are underlined.

- ➔ Baud 9600, 2400, 4800 or 19200
- ➔ 7 data bits odd (Databits 7, Parity Odd); 7 data bits even (Databits 7, Parity Even); 7 data bits none (Databits 8, Parity None); 8 data bits none (Databits 8, Parity None)
- ➔ no Handshake (Handsh. None), XON/XOFF Handshake (Handsh. Xon-Xoff)
- ➔ Remote on, Remote off
- ➔ Startbit = 1, Stopbit = 1 (Stopbit = 2 at 7 data bits none)

In remote mode (Remote on, "P" is displayed) all keys at the controller are without function. To return to the manual operation of the controller set the controller to the mode "Remote off" via the interface or switch off controller and enter the device menu within the first 2s after having switched on the controller again.

Read commands can be sent always. The sending of write commands is only possible, if the remote mode (Remote on) is selected.

Read commands

Function	Command	Response	Description
Actual pressure	IN_PV_1	XXXX mbar or XXXX Torr or XXXX hPa	Unit according to preselection
Actual pumping speed	IN_PV_2	XX.X Hz	
Time	IN_PV_3	XX:XX h:m	Time for shut down or time of warmup (only RC 5 / RC 6)
Increase of pressure	IN_PV_4	xxx/min	Only VACUU•LAN
Time of process	IN_PV_5	XX:XX h:m	Only VACUU•LAN
Preselected at controller	IN_CFG	XXXXXX	<ul style="list-style-type: none"> 0: Remote mode off 1: Remote mode on 0: not used 0: not used 0: not used 0: not used 0: No cooling water valve 1: Cooling water valve 0: VACUU•LAN 1: Continuous pumping 2: Vacuum control 4: RC 5 / RC 6 management
Preselected at controller	IN_CFG_1	XXXXXXXXXX	<ul style="list-style-type: none"> 0: Remote mode off 1: Remote mode on 0: mbar 1: Torr 2: hPa 0: External error off 1: External error on (evaluation) 2: Stop (control is stopped) 0: Acoustic signal off 1: Acoustic signal on 0: Isolation valve off 1: Isolation valve on 0: Cooling water valve off 1: Cooling water valve on Control with 0: Valve 1: Pump 2: VARIO 0: VACUU•LAN 1: Continuous pumping 2: Vacuum control 4: RC 5 / RC 6 management

Read commands

Function	Command	Response	Description
Error status	IN_ERR	XXXX	<ul style="list-style-type: none"> 1: Last command to interface incorrect 1: Failure at pressure transducer 1: Overpressure 1: See ERR_1
Error status	IN_ERR_1	XXXX	<ul style="list-style-type: none"> 1: Temperature error 1: Error isolation valve 1: Error cooling water valve 1: External errorr (e.g. at VARIO)
Preset pressure	IN_SP_1	XXXX mbar or XXXX Torr or XXXX hPa	Unit according to preselection
Status of process control	IN_STAT	XXXX	<ul style="list-style-type: none"> VACUU•LAN <ul style="list-style-type: none"> 0: Off 1: Process 2: Pressure<preset pressure 3: Pressure check Continuous pumping <ul style="list-style-type: none"> 0: Off 1: On Vacuum control <ul style="list-style-type: none"> 0: Off 1: Pressure>upper pressure value 2: Preset pressure<pressure< upper pressure value 3: Pressure<Preset pressure 4: End RC 5 / RC 6 <ul style="list-style-type: none"> 0: Off 1: Warmup 2: Pressrue>preset pressure 3: Pressure<preset pressure Mode <ul style="list-style-type: none"> 0: VACUU•LAN 1: Continuous pumping 2: Vacuum control 4: RC 5 / RC 6 management Cooling water valve <ul style="list-style-type: none"> 0: not used 0: Closed 1: Open

Read command

Function	Command	Response	Description
Status of process control	IN_STAT_1	XXXXX	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>Mode</p> <p>Status of operation</p> <p>Isolation valve</p> <p>Cooling water valve</p> <p>Relay</p> </div> <div style="margin-left: 10px;"> <p>: see IN_STAT</p> <p>: see IN_STAT</p> <p>0: closed 1: opened</p> <p>0: closed 1: opened</p> <p>0: not operated 1: operated</p> </div> </div>

Write commands

Function	Command	Parameter	Description
Preset pressure	OUT_SP_1	XXXX	In unit according to selection at controller (0001 to 1060 mbar (hPa) or 0001 to 0795 Torr)
Pumping speed	OUT_SP_2	XX.X	In Hz (01.0 to 60.0, 99.9 corresponds HI)
Start-up pressure/ upper pressure value	OUT_SP_3	XXXX	In unit according to selection at controller (see OUT_SP_1) VACUU•LAN: start-up pressure "p On" Vacuum control: "p set" + "Δp"
Switch-off time	OUT_SP_4	hh:mm	Hours:minutes
Lower pressure value	OUT_SP_5	XXXX	In unit according to selection at controller (see OUT_SP_1) Vacuum control: upper pressure Continuous pumping: lower pressure
Time delay (only VACUU•LAN; otherwise process time)	OUT_SP_6	hh:mm	Hours:minutes
Mode of operation	OUT_MODE	X	0: VACUU•LAN 0S: VACUU•LAN blocked 1: Continuous pumping 2: Vacuum control 4: RC 5 / RC 6 management

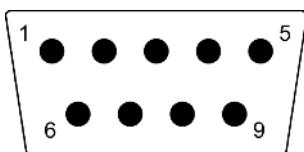
Write commands

Function	Command	Parameter	Description
Configuration	OUT_CFG	XXXXXXXX	<ul style="list-style-type: none"> 0: Remote off 1: Remote on 0: Unit of pressure mbar 1: Unit of pressure Torr 2: Unit of pressure hPa 0: External error off 1: External error on (evaluation) 2: Stop (control is stopped) 0: Acoustic signal not configured 1: Acoustic signal configured 0: Isolation valve not existing 1: Isolation valve existing 0: Cooling water valve not existing 1: Cooling water valve existing Control <ul style="list-style-type: none"> 0: Valve 1: Pump 2: VARIO
Start process control	START		
End process control	STOP	X	<ul style="list-style-type: none"> 1: End process control 2: End process control and store actual pressure value as preset pressure
Remote operation*	REMOTE	X	<ul style="list-style-type: none"> 0: Set controller to local operation 1: Set controller to remote operation
Store all parameters to EEPROM	STORE		

* If remote operation is selected or deselected, the user has to ensure that no dangerous status of the system due to the change of the mode of operation can occur and to provide appropriate safety measures, especially if selecting remote operation interferes with a locally operated active process.


The single abbreviations of a command are separated by underscores (ASCII 5FH).
 Command and parameter are separated by ignore characters (ASCII 20H).
 The string is terminated with <CR><LF> (ASCII 0DH, ASCII 0AH).

Connector assignment



- 2: RxD
- 3: TxD
- 4: DTR (12 V)
- 5: Mass

Troubleshooting

Fault	Possible cause	Remedy
<input type="checkbox"/> No display.	<ul style="list-style-type: none"> → Mains cable not plugged in? → Fuse defective? → Other cause (device defective)? 	<ul style="list-style-type: none"> ☞ Plug in mains cable. Switch on device. Check fuse in building. ☞ Check fuse in building and fuse at switch output of VNC 1, replace if necessary. ☞ Return controller to the factory for repair.
<input type="checkbox"/> Display disappears, internal overload protection activated.	<ul style="list-style-type: none"> → Thermal overload at controller, ambient temperature too high? → Thermal overload at controller, overload? → Short circuit at connected valves? → Other cause (device defective)? 	<ul style="list-style-type: none"> ☞ Ensure adequate ventilation. ☞ Check current draw of connected devices (pumps, valves). ☞ Replace valves. ☞ Return controller to the factory for repair.
<input type="checkbox"/> Pressure reading incorrect.	<ul style="list-style-type: none"> → Device not adjusted correctly? → Humidity in pressure transducer? → Pressure transducer contaminated? 	<ul style="list-style-type: none"> ☞ Readjust controller. ☞ Let dry pressure transducer, e.g. by pumping down, readjust if necessary, detect end eliminate cause. ☞ See "Cleaning the pressure transducer".
<input type="checkbox"/> VARIO pump not identified.	<ul style="list-style-type: none"> → Incorrect menu settings? 	<ul style="list-style-type: none"> ☞ Set ext Err in the device menu to off or set factory-set parameters.
<input type="checkbox"/> Error message "CheckSys", five beeps.	<ul style="list-style-type: none"> → Time of process in basic mode VACUU•LAN exceeded? 	<ul style="list-style-type: none"> ☞ Check system for leaks, select suitable pressure value. Check time of process.
<input type="checkbox"/> Error message "p Error", four beeps.	<ul style="list-style-type: none"> → Overpressure at pressure transducer, pressure >1060 mbar? 	<ul style="list-style-type: none"> ☞ Immediate pressure relief necessary (Risk of bursting)! 
<input type="checkbox"/> Error message "ErrSens.", three beeps.	<ul style="list-style-type: none"> → Pressure transducer or connecting cable to board defective? 	<ul style="list-style-type: none"> ☞ Return controller to the factory for repair.
<input type="checkbox"/> Error message "ErrValve", two beeps.	<ul style="list-style-type: none"> → Error at isolation valve or at cooling water valve? 	<ul style="list-style-type: none"> ☞ Check valve, connect correctly.
<input type="checkbox"/> Error message "ext. Err", one beep.	<ul style="list-style-type: none"> → No signal at external error pin of 8-pin socket? → Failure of a VARIO pump? 	<ul style="list-style-type: none"> ☞ Eliminate external error or deactivate external error input (controller menu). ☞ Connect pump, check line.
<input type="checkbox"/> Error message "ErrTemp.", six beeps.	<ul style="list-style-type: none"> → Excess temperature at relay due to frequent switching? → Relay circuit defective? 	<ul style="list-style-type: none"> ☞ Check configuration and process parameters. ☞ Return controller to the factory for repair.

Fault	Possible cause	Remedy
☐ All keys without function.	➔ Controller set to remote mode, "P" is displayed?	☞ Control controller via interface or switch off remote mode (see 'Interface parameters').
☐ Controller does not react when operating keys. No change after switch off/on.		☞ Return controller to the factory for repair.

Cleaning the pressure transducer

The controller itself is maintenance-free.

If the vacuum system is contaminated (oil, particles, etc.), contamination of the pressure transducer will influence the accuracy of measurement.



Attention: Never use hard objects to clean the pressure transducer!

- ➔ Fill the chamber of the pressure transducer with a solvent (e. g. benzene) and allow sufficient cleaning time. Observe all regulations concerning usage and disposal of solvents!
- ➔ Drain the solvent and dispose of in accordance with regulations, repeat cleaning if necessary.
- ➔ Rinse the chamber of the pressure transducer several times with alcohol in order to remove all solvent residues.
- ☞ Never use a spiky or sharp-edged tool to clean the pressure transducer.
- ➔ Allow the pressure transducer to dry.
- ➔ Readjust the pressure transducer if necessary.

Notes on return to the factory

Repair - return - DKD calibration



Safety and health of our staff, laws and regulations regarding the handling of dangerous goods, occupational health and safety regulations and regulations regarding safe disposal of waste require that for all pumps and other products the “**Health and safety clearance form**“ must be send to our office duly completed and signed before any equipment is dispatched to our premises.

Fax or post a completed copy of the health and safety clearance form to us in advance. The declaration must arrive before the equipment. Enclose a second completed copy with the product. If the equipment is contaminated you must notify the carrier.

No repair / DKD calibration is possible unless the correctly completed form is returned. Inevitably, there will be a delay in processing the equipment if information is missing or if this procedure is not obeyed.



If the product has come in contact with chemicals, radioactive substances or other substances dangerous to health or environment, the product must be decontaminated prior to **sending it back to the factory.**

☞ Return the product to us **disassembled and cleaned** and accompanied by a certificate verifying decontamination or

☞ Contact an industrial cleaning and **decontamination service** directly or

☞ Authorize us to send the product to an industrial cleaning facility **at your expense.**

To expedite repair and to reduce costs, please enclose a detailed description of the problem and the product’s operating conditions with every product returned for repair.

We submit **quotations** only on request and always at the customer’s expense. If an order is given, the costs incurred are offset from the costs for repair or from the purchase price, if the customer prefers to buy a new product instead of repairing the defective one.



☞ **If you do not wish a repair on the basis of our quotation, the equipment might be returned to you disassembled and at your charge!**

In many cases, the **components must be cleaned in the factory** prior to repair.

For cleaning we use an environmentally responsible water based process. Unfortunately the combined attack of elevated temperature, cleaning agent, ultrasonic treatment and mechanical stress (from pressurised water) may result in damage to the paint. Please mark in the health and safety clearance form if you wish a **repaint at your expense** just in case such a damage should occur.

We also replace parts due to optical aspects upon your request.

Before returning the equipment ensure that (if applicable):

☞ Oil has been drained and an adequate quantity of fresh oil has been filled in to protect against corrosion.

☞ Equipment has been cleaned and/or decontaminated.

☞ All inlet and outlet ports have been sealed.

☞ Equipment has been properly packed, if necessary, please order an original packaging (costs will be charged), marked as appropriate and the carrier has been notified.

☞ Ensure that the completed health and safety declaration is enclosed.



We hope for your understanding for these measures, which are beyond our control.

Scrapping and waste disposal:

Dispose of the equipment and any components removed from it safely in accordance with all local and national safety and environmental requirements. Particular care must be taken with components and waste oil which have been contaminated with dangerous substances from the process. Do not incinerate fluoroelastomer seals and “O” rings.

☞ You may authorize us to dispose of the equipment **at your expense.**





**Konformitätserklärung
Declaration of conformity
Déclaration de conformité**

Vakuu-Controller / Vacuum controller / Régulateur de vide

VNC 1 (68 29 70, 68 29 75) 100-230V

Hiermit erklären wir, daß das oben bezeichnete Gerät in Konzeption und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Anforderungen der zutreffenden, aufgeführten EU-Richtlinien entspricht. Bei einer mit uns nicht abgestimmten Änderung an dem Gerät verliert diese Erklärung ihre Gültigkeit.

We herewith declare that the product designated above is in compliance with the basic requirements of the applicable EC-directives stated below with regard to design, type and model sold by us. This certificate ceases to be valid if the product is modified without the agreement of the manufacturer.

Par la présente, nous déclarons que le dispositif désigné ci-dessus est conforme aux prescriptions de base des directives EU applicables et indiqués en ci que concerne conception, dessin et modèle vendu par nous-mêmes. Cette déclaration cesse d'être valable si des modifications sont apportées au dispositif sans notre autorisation préalable.

Niederspannungsrichtlinie / Low-Voltage Directive / Directive Basse Tension (nicht anwendbar auf / not applicable to / pas applicable à MD 1C VARIO-SP (69 61 10) 24V)

73/23/EWG, 93/68/EWG

Richtlinie Elektromagnetische Verträglichkeit / Electromagnetic Compatibility Directive / Directive Compatibilité Electromagnétique

89/336/EWG, 92/31/EWG, 93/68/EWG

Angewandte Harmonisierte Normen / Harmonized Standards applied / Normes Harmonisées utilisées
EN 61010-1, EN 61326

Managementsysteme / Management systems / Systèmes de Management
EN ISO 9001, EN ISO 14001

Wertheim, 17.03.2003

.....
Ort, Datum / place, date / lieu, date

.....
(Dr. R. Lachenmann)

Geschäftsführer / Managing director / Gérant

VACUUBRAND GMBH + CO KG
-Vakuu-technik im System-
-Technology for Vacuum Systems-
-Technologie pour système à vide-

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Dr. Bu

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VACUUBRAND GMBH + CO KG
-Technology for Vacuum Systems-

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