



VACUUM SOLUTIONS

Part of the **BUSCH** GROUP

Digital Transmitter

Vacuum Measurement Equipment

VACTEST CTR 002 / CTR 004

Instruction Manual



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1 Safety

- Read and follow the instructions of this manual.
- Inform yourself regarding hazards, which can be caused by the product or arise in your system.
- Comply with all safety instructions and regulations for accident prevention.
- Check regularly that all safety requirements are being complied with.
- Take account of the ambient conditions when installing your device. The protection class is IP 20 (the unit is protected against penetration of foreign bodies).
- Adhere to the applicable regulations and take the necessary precautions for the process media used.
- Consider possible reactions between materials and process media.
- Consider possible reactions of the process media due to the heat generated by the product.
- Before you start working, find out whether any of the vacuum components are contaminated.
- Do not carry out any unauthorized conversions or modifications on the unit.
- Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.
- When returning the unit to us, please enclose a declaration of contamination.
- Communicate the safety instructions to other users.

This instruction manual highlights potential hazards where appropriate. Safety notes and warning messages are tagged with one of the keywords DANGER, WARNING, CAUTION, NOTICE and NOTE as follows:



DANGER

... indicates an imminent dangerous situation that will result in death or serious injuries if not prevented.



WARNING

... indicates a potentially dangerous situation that could result in death or serious injuries.



CAUTION

... indicates a potentially dangerous situation that could result in minor injuries.



NOTICE

... indicates a potentially dangerous situation that could result in damage to property.



NOTE

... indicates helpful tips and recommendations, as well as information for efficient and trouble-free operation.

2 VACTEST CTR 002-004

2.1 For Orientation

These operating instructions describe installation and operation of the CTR 002 / CTR 004.

The article number can be found on the product's type label. Technical modifications are reserved without prior notification.

2.2 Delivery Content

Included in the delivery consignment are:

- Active Sensor Controller CTR 002 / CTR 004
- Mains cable (CEE 7/7 plug)
- Counter plug for relay outputs
- Fasteners for panel installation (19" system)
- Instruction manual

2.3 Product Description

The devices are designed to display and control absolute pressure. The Active Sensor Controller CTR 002 works with both Busch Digital Transmitters and 0–10 V Analog Transmitters, while the CTR 004 only works with Digital Transmitters.

Up to two (CTR 002) or respectively four (CTR 004) measuring channels can be displayed and controlled simultaneously.

The device can be controlled via USB or RS232 and evaluated by a PC.

For more pictorial information of device, refer to *Transmitter Handling* [→ 13].

2.4 Proper Use



NOTE

The device is not designed for use in a corrosive atmosphere!

Dust, oil or condensing vapours will affect sensor performance and may cause malfunctions!

Aggressive media such as halogenides, carbon or oxygen plasma can reduce the devices life-time!

The device serves exclusively to display and control absolute pressure in combination with Busch Vacuum Transmitters. It may only be connected to components specifically provided for such purpose.

2.5 Improper Use

The use for purposes not mentioned above is regarded as improper, in particular:

- Connection to units which are not suitable for this purpose according to their operating instructions.
- Connection to components containing touchable, voltage carrying parts.

No liability or warranty will be accepted for claims arising from improper use.

The user bears the responsibility with respect to the used process media.

3 Installation



NOTE

Unauthorized modifications.

Risk of injury!

- Unauthorized modifications of the device are not allowed!
 - The device shall be installed by trained personnel only.
-

3.1 Notes for Installation

Installation location: Indoor

For not fully air conditioned open buildings and operation rooms:

Temperature: +5 °C ... +50 °C

Rel. humidity: 5 - 85%, non-condensing

Ambient pressure: 860 - 1060 hPa (mbar)

3.2 Electrical Connection



DANGER

Live wires.

Risk of electrical shock!

- Electrical installation work must only be executed by qualified personnel.



NOTICE

Connect transmitters when the controller is powered.

Risk of damage to the device!

- The controller must be switched off before any transmitters are connected.



NOTICE

Incorrect supply voltage.

Risk of damage to the device!

- Make sure to supply a correct and admissible voltage.

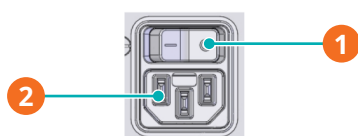
3.2.1 Mains Connection



CAUTION

When you start the electrical connection of the device, the mains connector must be plugged into a mains socket with protective earth conductor. For grounding, use only three-pole mains cables with properly wired earth conductor.

Mains connection socket of the controller:



Description

1	Mains switch	2	Mains connection socket
---	--------------	---	-------------------------

3.2.2 Connecting to Digital Transmitters (RS485)



NOTE

Before you start the transmitter's connection, refer to the chapter *I/O and Communication Port Schematic* [→ 10] for information about connector types and their connections.



NOTE

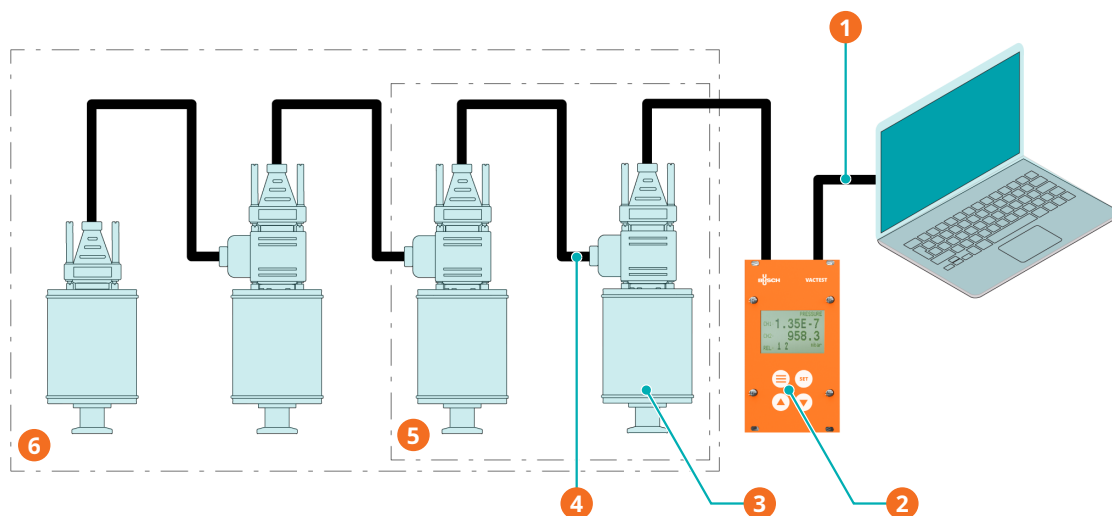
Before you connect the transmitter, make sure that the controller CTR 002 / CTR 004 are switched off.

For the digital transmitter connection, it is recommended to use original accessory cables. If you do not obey this instruction damage to equipment can occur!

You can connect up to two or four Digital transmitters to the RS485 digital signal output port of CTR 002 / CTR 004. The device provides voltage supply to the transmitters.

Transmitters connected to the digital RS485 interface can be allocated to channel 1 and 2 (CTR 002) or 1 to 4 (CTR 004) as needed. For this purpose, the transmitters are equipped with an address switch.

If analog transmitter ports are used with the CTR 002, the fixed channel numbers assigned to those analog ports cannot be applied as an address for digital transmitters. In this case, refer to *I/O and Communication Port Schematic* [→ 10] for connector details.



Description			
1	USB	2	Active sensor controller
3	Transmitter	4	D-sub measuring cable
5	With the controller CTR 002: up to 2 gauges can be connected.	6	With the controller CTR 004: up to 4 gauges can be connected.

Connect the Digital Transmitter to RS485 interface as follows:

- Set the relevant address at the address selector switch, see Setting RS485 Address (on the gauge instruction manual)
- Connect the D-Sub connector to the gauge and secure it with the screws.
- Connect the controller and secure the D-Sub connector with the screws.

3.2.3 Connecting to Analog Transmitters



NOTE

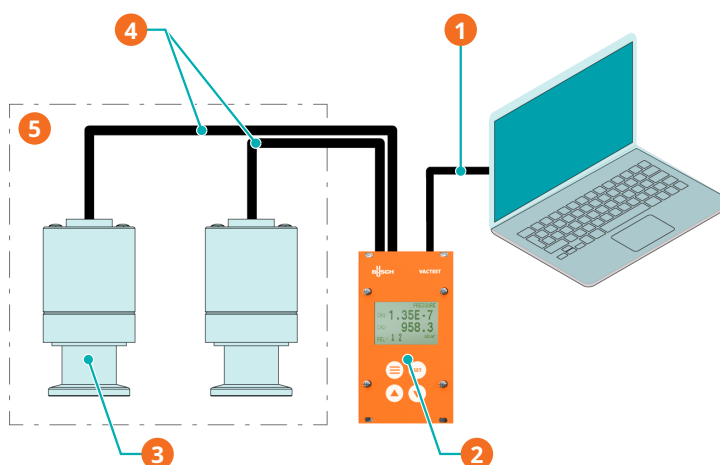
Before you start the transmitter's connection, refer to the chapter *I/O and Communication Port Schematic* [→ 10] for information about connector types and their connections.



NOTE

When an analog transmitter connection is used, the corresponding channel(s) cannot be applied as an address for digital transmitters at the RS485 port!

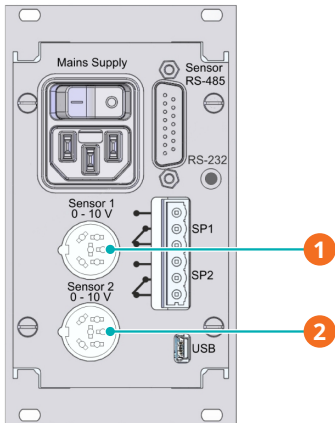
You can connect Analog Transmitters for absolute pressure with 0 - 10 V signal output. The controller CTR 002 automatically detects the transmitter type and provides voltage supply to the transmitters.



Description

1	USB	2	Active sensor controller
3	Transmitter	4	Measuring cables
5	With the controller CTR 002: up to 2 gauges can be connected.		

The controller has two dedicated ports, Channel 1 and Channel 2, specifically for the connection of two analog transmitters.



Description			
1	Channel 1	2	Channel 2

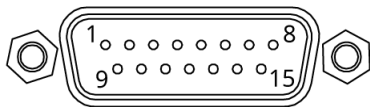
Examples of possible channel allocation:

Channel state	Digital connection allocation (RS485)
Channel 1: Analog	Channel 2 can be allocated to digital connector (RS485)
Channel 2: Analog	Channel 1 can be allocated to digital connector (RS485)
Channel 1 & 2: Analog	No channels available for RS485

3.2.4 I/O and Communication Port Schematic

Digital transmitter connector details

Connector Type: D-sub, 15-pin, male, bolted type



Pin No.	Description	Pin No.	Description
Pin 1	Do not connect	Pin 2	N/A
Pin 3	N/A	Pin4	Voltage Supply 24 VDC
Pin 5	Voltage Supply GND	Pin 6	N/A
Pin 7	N/A	Pin 8	N/A
Pin 9	N/A	Pin 10	RS485, D+
Pin 11	RS485, D-	Pin 12	Ground
Pin 13	N/A	Pin 14	N/A
Pin 15	N/A		

 **NOTE**

We recommend to have "Ground" (Pin 12) and supply common (Pin 5) grounded.

Analog transmitter connector details

Connector Type: C91E, 6-pin, female, bolted type



Pin No.	Description	Pin No.	Description
Pin 1	Identification	Pin 2	N/A
Pin 3	Signal input 0 ... 10 V	Pin 4	Ground
Pin 5	24 VDC, max. 8 W	Pin 6	AGND

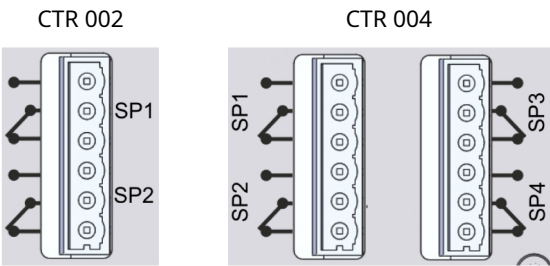
3.2.5 Setpoint Relays

 **NOTE**

Use enclosed counter plug for electrical connection. Connect only when power is OFF.
Maximum load for the relays is 2 A / 45 VDC or 4 A / 250 VAC.

Connector Type: Phoenix Combicon, 6pin

The contacts are shown in state-of-rest position, i.e. switching function "OFF"

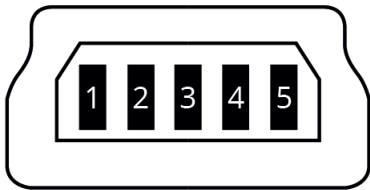


For process control this device output provides switching functions by means of 2 or respectively 4 relay switches (switch-over type) SP1 to SP4. The switching outputs can be assigned to one of the measuring channels or set ON and OFF manually (refer to *Menu "Relay" - Switching Outputs [→ 21]*).

3.2.6 Serial Interfaces

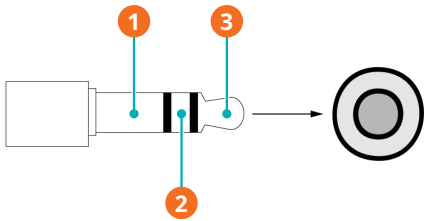
The USB port or RS232 interface can be connected to a PC via VACTEST Explorer to read out stored measurement data, transmit measurement values or configure the gauge.

Connector Type: USB Mini Jack, Type B



Pin No.		Description	
Pin 1		VCC, +5V	
Pin 2		Data -	
Pin 3		Data +	
Pin 4		GND	
Pin 5		GND	

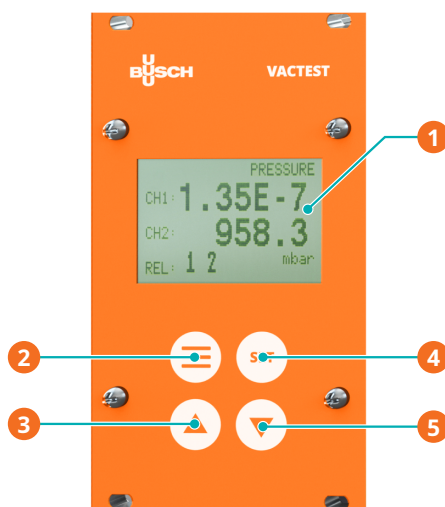
Connector Type: RS232, Stereo Jack 3.5 mm



Description			
1	GND	2	RXD (Ring)
3	TXD (Tip)		

4 Operation

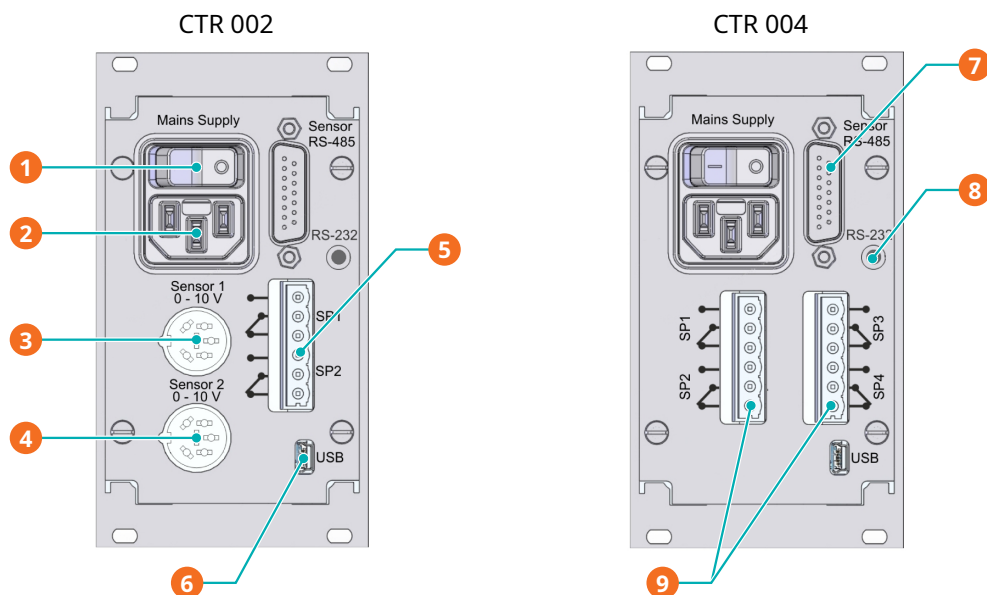
4.1 Transmitter Handling



Description

1	LCD graphic display	2	Menu key
3	UP key	4	Set key
5	Down key		

Connector Interface of CTR 002 and CTR 004



Description

1	Main switch	2	Mains connector 95 - 265 VAC, 50/60 Hz
3	Channel 1 (0 ... 10 V for Analog Transmitters CTR 002)	4	Channel 2 (0 ... 10 V for Analog Transmitters CTR 002)
5	Relay contacts (2x for CTR 002)	6	USB interface
7	RS485 connector for Digital Transmitter	8	RS232 PC interface
9	Relay contacts (4x for CTR 004)		

4.2 Startup

This chapter describes how to connect and operate the controller.

To connect and start the controller, follow the steps below:

- Connect the vacuum transmitters with the appropriate signal inputs RS 485 or 0-10 V
- Wired the control lines of the relay outputs (as per standard)
- Connect the mains with measuring cable
- Switched ON the controller.

After switching ON the mains switch, the controller first performs a self-test and shows the device type and the software version number on the display.

When this process is finished, the controller detects the connected transmitters, and the 'Scan' display appears.



NOTE

Connected transmitters are only detected when the device is switched on!

By default, the controller is operating in Display mode / Menu "Pressure".

If the controller is configured to start mode "run" (start-active "on") as described in *Start Mode of Relay Control "start active"* [→ 24], the controller actuates the relay switches simultaneously with the display of actual pressure.

Description of keys:

Key Icon	Description
	Menu-selection (switch to next Menu)
	Confirmation of adjusted values and change to the next input position (flashing inversely)
	Use this key to increment input value
	Use this key to decrement input value

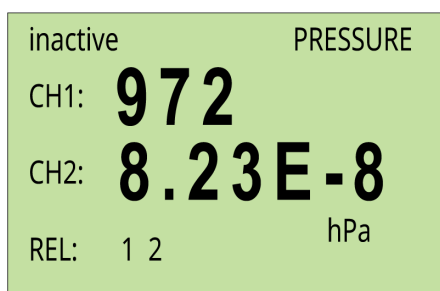
4.3 Menu "Pressure" - Pressure Reading

In display mode the controller shows the actual absolute pressure for two or respectively four channels. Reading is numerical above 1 mbar (Torr, ...) and exponential below.

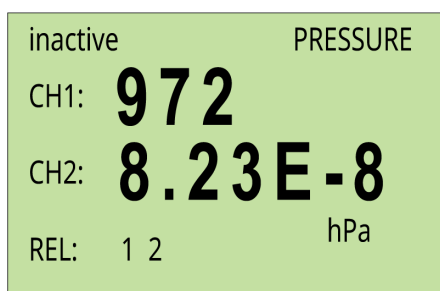
Further the display indicates the relay control status (active/inactive) and states of each individual relay (ON/OFF). The state of the switching outputs is indicated by figures 1 and 2 (CTR 002) or 1 to 4 (CTR 004), the figures being enlarged as soon as the corresponding relay is switched on.

Few examples of Pressure reading screen:

2-channel displays CTR 002, control inactive, relay 1 and 2 are OFF:



4-channel displays CTR 004, control active, relay 2, 3 and 4 are ON:

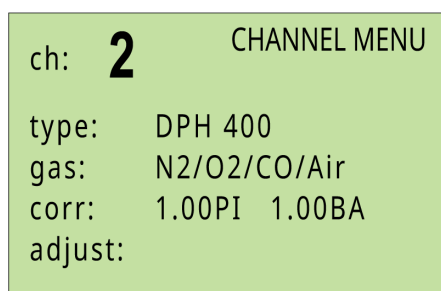


Description of keys:

Key Icon	Description
	Menu-selection (switch to next Menu)
	Press the "SET" key to activate or deactivate the relay control.
	CTR 004 with selected 2 channels display: Toggle between channel numbers CH1/2 or CH3/4, see <i>Channel Display Selection "display mode"</i> [→ 24].

4.4 Menu "Channel" - Parameters and Functions

The menu "Channel" shows channel number, transmitter type and the associated parameters and functions which directly affects pressure reading.



This screen has the following options:

Options	Details
ch:	Channel
type:	Transmitter type (cannot be edited) This detail is fetched automatically when device is connected to the transmitters.
gas:	Gas type
corr:	Gas type correction factor
adjust:	Transmitter readjustment

4.4.1 Channel Selection "ch"

Use below buttons to set the channel "ch" value:

Key Icon	Description
	Press the "SET" key to enter in the channel selection (flashing inversely).
	Select the channel using the up/down keys.
	
	Confirm changes and switch to the next parameter (flashing inversely).

4.4.2 Transmitter Type "type"

This value is fetched automatically when the device connects to the transmitters and is not changeable.

4.4.3 Set Gas Type Correction Factor "gas" and "corr"

For transmitters whose measurement depends on the type of gas, you can enter a correction factor for compensation below 0.1 mbar. Appropriate correction factors are found in the instruction manual of the transmitter or suitable technical literature. The range of the gas type correction factor is 0.20 to 8.00.

For transmitters with combination sensors separate factors for both sensors can be entered. The connected sensor type is displayed in uppercase letters after the numeric value of the factor; eg. "Corr: 1.00**PI** 1.00**BA**"

Refer to the table below for information on the sensor type acronym:

Acronym	Sensor type
PI	Pirani
CC	Magnetron (Cold cathode)
BA	Bayard-Alpert (Hot cathode)

Alternatively, you can select **pre-defined gas selection "gas"** from a list with using the steps given in table below:

	Press the "set" key several times until the cursor is flashing line "gas".
 	Use the appropriate key to select the desired gas type from the list.
	Confirm with "set".

You can also set the value of **user-defined correction factor "corr"** with using steps given in table below:

	Press the "set" key several times until the cursor is flashing in the line "corr".
	Use the appropriate key to adjust the required values.
	
	Confirm with "set".

4.4.4 Transmitter Readjustment "adjust"



NOTE

For transmitters DPC and DPH with combination sensors the adjustment does only affect the Pirani sensor. Hot and cold cathode sensors are not readjusted.

For more information on transmitter's readjustment, refer to the corresponding gauge manual.

For readjusting the transmitters, use below keys and steps:

	For adjustment: Press the "set" key several times until the cursor is flashing line "adjust".
	For adjustment at atmosphere pressure: - Press the "up" key, afterwards the display will show "Hi" or an editable reference pressure depending on sensor type. For adjustment of zero pressure: - Press the "down" key, the display will show "Lo".
	
	Confirm with "set".

4.5 Menu "Sensor" - Parameters and Functions

The menu "Sensor" shows channel number, transmitter type and the associated parameters and functions which control sensor operation of each transmitter.

ch:	2	SENSOR MENU
type:	DPH 400	
HCSens:	On	
trMode:	trans_hi	
degas:	Off	

This screen has the following options:

ch:	Channel
type:	Transmitter type
HCSens/ CCSens:	Ionization sensor On/Off
trMode:	Transition mode
degas:	Degas-function

Use below keys to set the "Sensor" parameters:

	Confirm changes and switch to the next parameter (flashing inversely).
 	Adjust input value with using the up/down keys.

4.5.1 Enable/Disable Ionization Sensor "HCSens" or "CCSens"

These functions are applicable for high vacuum transmitters with combination sensors operating an ionization sensor (hot or cold cathode).

For certain vacuum processes it may be necessary to disable the ionization sensor, which is automatically controlled by the transmitter electronics.

- "off" ► ionization sensor disabled.
- "on" ► automatic control of the ionization sensor.

With disabled ionization sensor transmitters DPC and DPH behave like a Pirani transmitter with range 1000 ... 1×10^{-4} mbar. In this case, the output "ur" means that actual pressure is below 1×10^{-4} mbar.



NOTE

Settings made under HCSens/CCSens are only temporarily saved in the transmitter memory. After mains supply is switched off or disconnected, the transmitter will always be start in mode "ionization sensor enabled" !

4.5.2 Select Transition Mode "trMode"

For transmitters with combination sensors you can select whether a hard switch-over ("switch") or a continuous transition ("trans" or "trans_hi"/"trans_lo") between the two sensors should be performed in the overlap range.

Detailed information about each mode can be found in the instruction manual of the transmitter.

4.5.3 Degas-function for Hot Cathode Sensor "degas"



NOTE

The degas function cannot be started if the hot cathode is disabled (fil "off").

Deposition or adsorbed gas molecules on the electrodes of a hot cathode sensor (DPH) may lead to increased degassing in ultrahigh vacuum or even cause instabilities of the measurement signal. In such cases it is appropriate to clean the anode of the sensor by degassing. This is done at pressures below 2×10^{-6} mbar by ohmic heating of the anode to temperatures around 800°C.

For degassing the sensor set the degas parameter to "on" and confirm with the set-key. The degas procedure will stop automatically after approx. 3 minutes, but can be cancelled any time by setting the parameter to "off" again.

4.6 Menu "Relay" - Switching Outputs

In the menu "Relay" you can assign the switching outputs and set relay parameters.

rel: 1	RELAY MENU
ch/mode: ch1	press
on: 10	mbar
off: 13	mbar
rel: 1 2	

This screen has the following options:

rel:	Relay number
ch/mode:	Transmitter type
on/off:	Ionization sensor On/Off
Setpoint (rel:)	Relay output status

Use below keys to set the "Relay" parameters:

	Confirm changes and switch to the next parameter (flashing inversely).
 	Adjust input value with using the up/down keys.

4.6.1 Relay Selection "rel"

- Select the relay number.

4.6.2 Set Relay Assignment "ch/mode"



NOTE

If setting "rel" is selected even though relative pressure is not available for this channel, error message "Err_DS" (data source error) will be displayed.

In this case settings are not saved and the assigned relay will not be triggered!

Each relay can be assigned to a measuring channel "ch1" to "ch4" and to various switching modes. Further each relay can be activated or deactivated permanently. This on/off setting is independent of sensors or pressure and becomes effective when controlling is started.

Switching modes:

- **abs:** Relay switches according to absolute switch-on and switch-off pressure
- **rel:** Relay switches according to relative switch-on and switch-off pressure
- **err / !err:** Relay switches in case of a sensor failure
- **ur / !ur:** Relay switches in case of pressure under-range
- **or / !or:** Relay switches in case of pressure over-range

Setting "on" becomes effective as soon as controlling is started.

4.6.3 Adjust Switching-points "on/off"

The switching points are adjustable over the whole measuring range.

For setpoint parameters and behavior, refer to chapter *Setpoint Parameters* [→ 27]

4.6.4 Setpoint "rel"

Displays the status of relay outputs: 1 - 2 (CTR 002), 1 - 4 (CTR 004)

For more information on relay setpoint, refer to chapter *Setpoint Parameters* [→ 27].

When the controller is active, the relays are switched according to the configuration.

The status of the relay switching outputs is displayed on the screen using the numbers 1 to 4, where the numbers are shown in large size when the corresponding relay is switched ON.

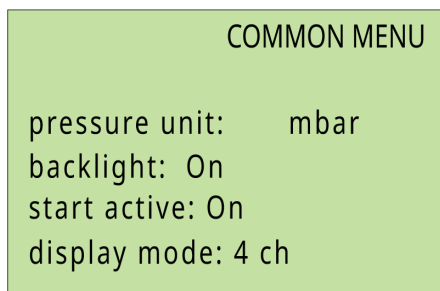


NOTE

If both relays are assigned to one measuring channel a three-state-control can be achieved by appropriate adjustment of the setpoints.

4.7 Menu "Common" - Display Settings

In the menu "Common" the display options and start mode of the control system are configured.



This screen has the following options:

pressure unit:	Display unit selection
backlight:	Background illumination
start active:	Pressure control mode
display mode:	Channel display (CTR 004 only)

Use below keys to set the "Common" parameters of display setting:

	Confirm changes and switch to the next parameter (flashing inversely).
 	Adjust input value with using the up/down keys.

4.7.1 Unit Selection "pressure unit"

From this option, you can select the pressure unit that you want to display.

Available units: mbar (default), bar, mTorr, Torr, Pa or hPa

4.7.2 Set Background Illumination "backlight"

You can choose any one of the following options to set display's backlight illumination:

- "ON" ► backlight is activated.
- "OFF" ► backlight is deactivate.
- autoff ► backlight is switched "OFF" automatically after 20 seconds when no key is pressed

4.7.3 Start Mode of Relay Control "start active"

You can choose any one of the following options to set "start active" relay mode:

- "on" ► relay control is start-active, i.e. the relays are activated on as soon as the device has finished its self-test procedure.
- "off" ► after the device is switched on, the relay control has to be activated and deactivated manually.



NOTE

Independently from these settings relay control can be activated and deactivated by software command via serial interface.

4.7.4 Channel Display Selection "display mode"



NOTE

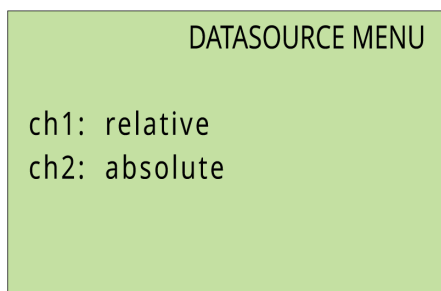
The channel "display mode" option is only available for CTR 004.

You can choose any one of the following option to set the channel display mode:

- "2 ch" ► 2 channels display
- "4 ch" ► 4 channels display

4.8 Menu "Datasource" - Data Source

In the menu "Datasource" a source of pressure data can be selected for each channel, which will be used for pressure display. Depending on the type of the attached transmitters this can be readings of absolute or relative pressure.



This screen has the following option:

ch1 ... ch4:	Display pressure datasource
---------------------	-----------------------------

Use below keys to set the "Datasource" parameters:

	• Confirm changes and switch to the next parameter (flashing inversely).
 	• Adjust input value with using the up/down keys.

Pressure Datasource Selection

You can choose any one of the following options to set the channel datasource:

- "absolute" ► absolute pressure.
- "relative" ► relative pressure.



NOTE

If setting "relative" is made even though relative pressure readings are not supported by the transmitter attached to this channel, an error message "Err_DS" (data source error) will be displayed instead of the pressure reading in the "PRESSURE" menu.



NOTE

The selection of data sources for pressure display in this menu is completely independent of settings made in the "RELAY" menu. For example, absolute pressure can be displayed whereas the relay assigned to this channel is triggered by relative pressure.

5 Communication



NOTE

The Busch communication protocol is available separately on request.

Ask your Busch representative to get the document.

5.1 Device Serial Interface

The controller is equipped with serial interfaces RS232 and USB.

The settings of the CTR 002 / CTR 004 can be changed via the device address 100. Device addresses 1 to 4 enable direct access to the connected transmitters and their parameters.

Interface-Parameter:

9.6 kBd, 8 data bits, 1 Stopbit, no parity

5.2 Commands Information

Below table includes a list of main commands and its information.

Code	Command Information
TD	Displays the device type.
PN	Displays the product name.
VD	Displays the device's hardware version.
VF	Displays the device's firmware version.
VB	Displays the device's bootloader version.
DR	Make a device reset.
DU	Displays the pressure Unit Value range: mbar (default), bar, mTorr, Torr, Pa or hPa. Display and set the pressure unit used for the LCD display of the controller.
PS	Display and set the panel Status.
CS	Display and set control status for the controller relays.
R2	Relay 1 ... 4 Display and set the relay mode; see chapter <i>Setpoint Parameters</i> [→ 27] for more information.

5.3 Device Parameters and Information

This table includes device commands and information.

Code	Description	Information
TD	Type of Device	Displays the device type, e.g. CTR 002
PN	Product Name	Displays the product name (article number)
VD	Version Device	Displays the device's hardware version
VF	Version Firmware	Displays the device's firmware version
VB	Version Bootloader	Displays the device's bootloader version
DR	Device Restart	Make a device reset

5.4 Display Functions

The table below includes display commands information of the transmitter.

Code	Description	Information
DU	Display Unit	Display and set the pressure unit used for the LCD display of the transmitter. Value range: mbar (default), bar, Pa, hPa, Torr, mTorr

5.5 Keylock

Code	Description	Information
PS	Panel Status	The parameter is used to activate or lock the keyboard. "0" : Keyboard active (Default) "1" : Keyboard locked

5.6 Relay Control

Code	Description	Information
CS	Control Status	The parameter is used to activate or deactivate the control function. "0" : Control function off (Default) "1" : Control function active

5.7 Setpoint Parameters



CAUTION

Setting T[p1] = F[p2] is forbidden!

Risk of flickering or damage to the relay!

- A gap between the thresholds being too small may result in flickering of the relay and can even cause damage to the relay.

The CTR002 is equipped with two and CTR004 with four independent, potential-free relay switches. These are available as change-over switches at the connector according to the pin assignment. Refer to chapter *I/O and Communication Port Schematic* [→ 10] for Digital and Analog Transmitter's connector details.

Relay R1, R2, R3, R4:

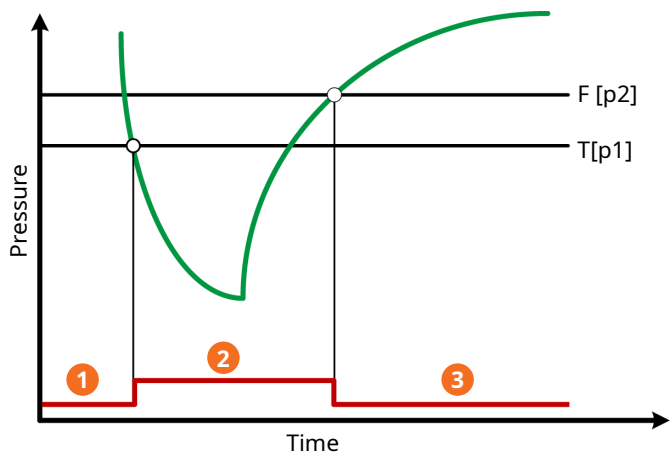
The relays can be configured independently for various switching modes. The parameter is used to request (query) and configure (set) these switching modes.

Setting T[p1] F[p2] C[ch]:

In this case two pressure thresholds T[p1] (true) and F[p2] (false) are transmitted. The relay is assigned to measurement channel ch1 to ch4 with the third parameter C[ch].

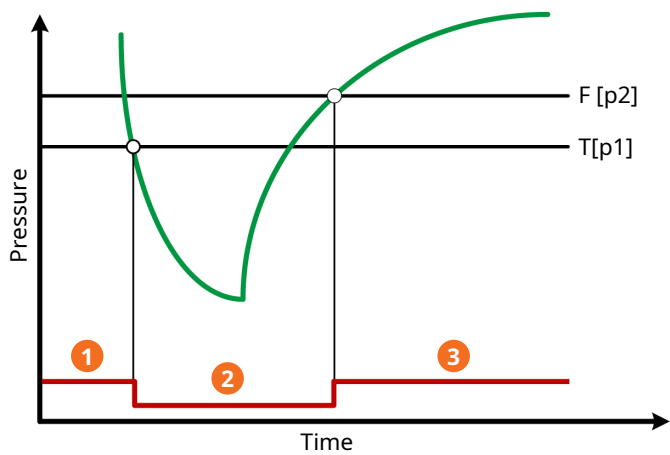
Setpoint Behavior

T[p1] < F[p2]: The relay closes when actual pressure falls below threshold T[p1] and opens again as soon as actual pressure exceeds threshold F[p2].



Description			
1	Relay "OFF"	2	Relay "ON"
3	Switching function "OFF"		

T[p1] > F[p2]: The relay opens when actual pressure falls below threshold F[p2] and closes again as soon as actual pressure exceeds threshold T[p1].



Description			
1	Relay "ON"	2	Relay "OFF"
3	Switching function "ON"		

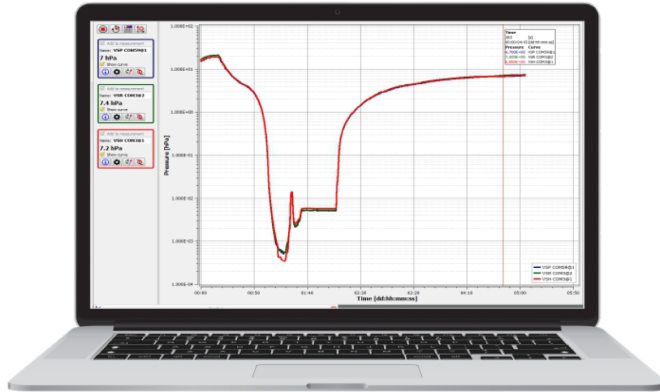
Relay Settings and Results:

Settings	Result
E	Relay closes in case of a device error.
E!	Relay opens in case of a device error.
U	Relay closes in case of pressure under range.
U!	Relay opens in case of pressure under range.
T0	Open relay by software command (off).
T1	Close relay by software command (on).
O	Relay closes in case of pressure overrange.
O!	Relay opens in case of pressure overrange.

6 VACTEST Explorer Software

Active Sensor Controller Explorer software has been especially developed for use with VACTEST gauges from **Busch Vacuum Solutions** and is compatible with operating system Windows.

Active Sensor Controller Explorer features plotting and saving of measurement data as well as comfortable configuration of all device parameters.



Download: www.buschvacuum.com

- Plot, analyze and save measurement curves
- Compare multiple plots
- Export measurement data for MS Excel
- Transfer of recorded measurements from the data logger to a PC
- Automatic calculation of leak rates from rate-of-rise measurements
- Easy configuration of all device parameters

7 Maintenance and Service



DANGER

Danger of possibly contaminated parts!

Contaminated parts can cause personal injuries.

- Inform yourself regarding possible contamination before you start working.
- Be sure to follow the relevant instructions and take care of necessary protective measures.



CAUTION

The unit is not prepared for customer repair!



NOTE



Malfunction of the unit which is caused by contamination or wear and tear is not covered by warranty.

The unit requires no maintenance. External dirt and soiling can be removed by a damp cloth.

When returning the gauge for service please fill out a declaration of contamination form and include it in the shipment. This document is mandatory to protect our service staff.

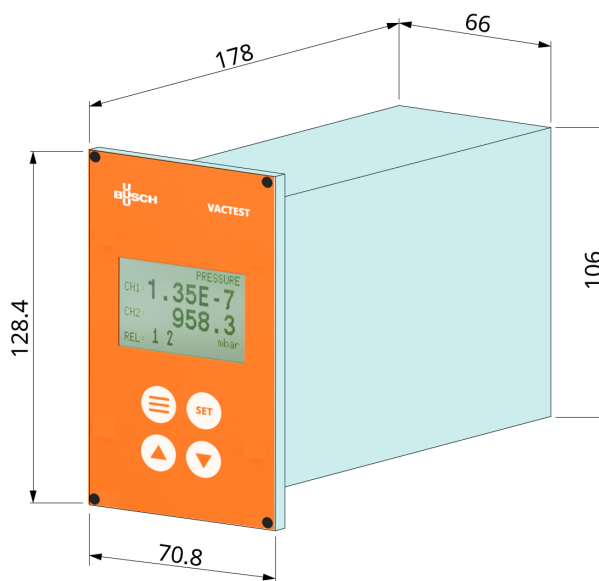
For downloading the declaration of contamination form, [click here](#).

7.1 Errors and Malfunctions

The device will show error messages as plain text on the display. Additionally, the following typical issues can appear:

Problem	Possible Cause	Correction
Error message "Err1"	Defective pressure transmitter.	Send transmitter for repair.
Error message "Err DS"	Data source error	The selected source of pressure readings is not supported by the transmitter. Check settings for absolute or relative pressure for this channel / relay.
Error message "notr".	Connection to transmitter interrupted.	Check transmitter, connectors and cables.
Error message "ur".	Measurement under range.	Check pressure range of the transmitter.
Error message "or".	Measurement over range.	Check pressure range of the transmitter.
Error message "off".	Channel not in use, no transmitter connected.	If appropriate check transmitter, connectors and cables.
"d" is displayed behind the pressure reading.	VSH is in degas mode	Wait until the end of the degas procedure.

8 Technical Data



	VATEST CTR 002	VATEST CTR 004
Measurement channels	2	4
Compatibility	All Digital Transmitters and 0–10 V Analog Transmitters	All Digital Transmitters
Display	LCD graphic display, background illumination, resolution 128 x 64	
Display refresh rate	2 Hz	
Measurement unit	mbar, bar, mTorr, Torr, Pa, hPa	
Measuring inputs	0–10 V, RS485	RS485
Sample rate	RS485: 12.5 Hz, 0–10 V: 50 Hz	RS485: 12.5 Hz
Scanning rate	RS485: 40 ms per connected transmitter 0–10V: 20 ms (50 Hz)	
Serial Interface	USB type B, RS232 (3.5 mm jack)	
Power supply	95–265 VAC, 50/60 Hz	
Electrical Connection	IEC-320 C14	
Max. power consumption	25 W (including transmitters)	45 W (including transmitters)
Setpoint relay	2 dry contacts, Phoenix strip terminal 6 poles, lifetime > 300,000 cycles	4 dry contacts, Phoenix strip terminal 6 poles, lifetime > 300,000 cycles
Relay contact rating	4 A, 250 VAC / 2 A, 45 VDC	
Operating Temperature	+5 ... +50 °C	
Storage temperature	-20 ... +60 °C	
Protection Class	IP20	
Approximate weight	750 g	800 g

9 EU Declaration of Conformity

This Declaration of Conformity and the CE-markings affixed to the name plate are valid for the gauge within the Busch scope of delivery. This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

The manufacturer **Busch Produktions GmbH**
Schauinslandstr. 1
DE-79689 Maulburg

declares that the gauge: VACTEST CTR 002; VACTEST CTR 004

fulfill(s) all the relevant provisions from EU directives:

- 'Electromagnetic Compatibility' (EMC) 2014/30/EU
- 'RoHS' 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (incl. all related applicable amendments)
- 'Low Voltage Directive (LVD)' 2014/35/EU

and comply(-ies) with the following harmonized standards that have been used to fulfill those provisions:

Standard	Title of the Standard
EN 61326-1 : 2013 Group 1 / Class B	Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements
EN 50581 : 2012	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.
EN 61010-1 : 2010	Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements

Legal person authorized to compile the technical file and authorized representative in the EU (if the manufacturer is not located in the EU):
Busch Dienste GmbH, Schauinslandstr. 1, DE-79689 Maulburg

Maulburg, 2025.01.02



Dr. Martin Gutmann, General Manager
Busch Produktions GmbH

10 UK Declaration of Conformity

This Declaration of Conformity and the UKCA-markings affixed to the name plate are valid for the gauge within the Busch scope of delivery. This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

The manufacturer

Busch Produktions GmbH
Schauinslandstr. 1
DE-79689 Maulburg

declares that the gauge: VACTEST CTR 002; VACTEST CTR 004

fulfill(s) all the relevant provisions from UK legislations:

- Electromagnetic Compatibility Regulations 2016
- Restriction of the use of certain hazardous substances in Electrical and Electronic Equipment Regulations 2012
- Electrical Equipment (Safety) Regulations 2016

and comply(-ies) with the following designated standards that have been used to fulfill those provisions:

Standard	Title of the Standard
EN 61326-1 : 2013 Group 1 / Class B	Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements
EN 50581 : 2012	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.
EN 61010-1 : 2010	Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements

Legal person authorized to compile the technical file and importer in the UK (if the manufacturer is not located in the UK):

Busch (UK) Ltd, 30 Hortonwood, Telford – UK

Maulburg, 2025.01.02



Dr. Martin Gutmann, General Manager

Busch Produktions GmbH

Notes

Grid area for notes.

BUSCH GROUP

The Busch Group is one of the world's largest manufacturers of vacuum pumps, vacuum systems, blowers, compressors and gas abatement systems. Under its umbrella, the group houses two well-known brands: Busch Vacuum Solutions and Pfeiffer Vacuum+Fab Solutions. Together, they offer solutions to a wide range of industries. A global network of highly competent local teams in 44 countries ensures that expert, tailor-made support is always available near you. Wherever you are. Whatever your business.



● Busch Group companies

▲ Busch Group production sites

● Busch Group service centers

■ Busch Group local representatives

www.buschvacuum.com

www.pfeiffer-vacuum.com