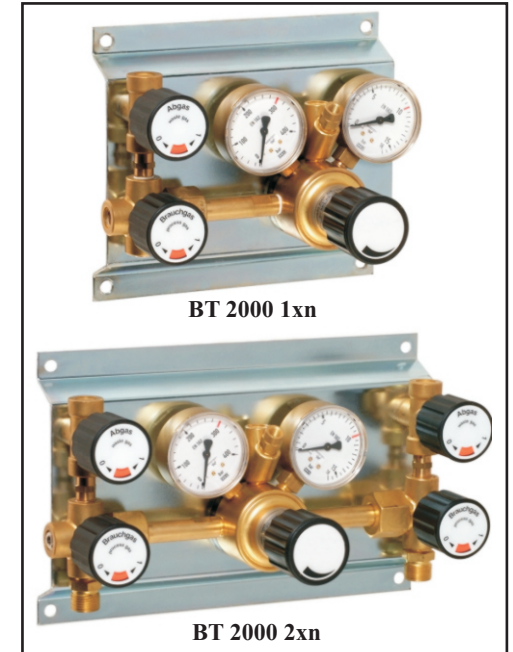


8. Repair

- 8.1 Repairs may only be carried out in authorized repair workshops by expert persons.
- 8.2 Only original spare parts must be used. The materials have been adapted to the gas type in each instance. So always specify the gas type.
- 8.3 In case of independent repairs, the use of non-original spare parts or changes on the side of the user or a third party without the approval of the manufacturer, any form of liability for resulting damages will expire as well as the manufacturer's warranty.
- 8.4 After being repaired, the pressure regulator must be checked with respect to proper function, leak-tightness and cleanliness of the gas-wetted surfaces. When the system is used again, a sufficient purging operation must be carried out first.

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1. Application

1.1 Designated use

- ▲ Use the pressure control panel for compressed gases or liquefied gases. The pressure control panel reduces an inlet pressure to an as constant as possible outlet pressure.
- ▲ This equipment can be used in explosion endangered areas because they don't have an own potential source of ignition (ignition risk assessment according to DIN EN 13463-1).

1.2 Non-designated use

- ▲ Do not use the pressure regulator for gases in the liquid phase.
- ▲ Do not use unsuitable gas types or corrosive gases.
- ▲ Do not use the pressure control panel at temperatures below -30°C or above +60°C!

The system has to be used according to these instructions of use and especially the safety instructions!

1.3 Technical data

SPECTROTEC	BT 2000
Inlet pressure P_v:	max. 300 bar
Outlet pressure P_u:	
adjustable depending on type up to	10 / 20 / 50 / 100 bar
Materials:	
Body:	Brass
Diaphragm:	EPDM
Seat valve:	PA 11
Mounting plate:	Steel, zinc plated
Weight:	
BT 2000-1:	3,7 kg
BT 2000-2:	5,5 kg
Extension:	1,1 kg
Connections panel:	Inlet: G ½"
	Outlet: ¼"-18 NPT
Connections extension:	Inlet: G ½"
	Outlet: M 24 x 1,5

Oxygen Inlet pressure [bar]	Flow rate (Vn) [m ³ /h] at outlet pressure (P) [bar]				
	1	2,5	4	10	20
40	15	30	40	50	60
20	15	20	25	30	--
10	15	15	15	--	--
5	10	10	10	--	--

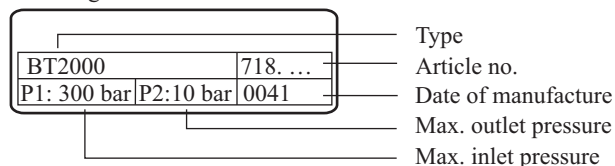
This control panel complies with the latest standards DIN/EN/ISO 7291
For special configurations these standards are observed accordingly.

For other gases this flow rate will be multiplied with the following factors:

Nitrogen	1,05
Hydrogen	4,00
Argon	0,90
Carbon dioxide	0,85

1.4 Labelling

On the mounting plate of the pressure control panel a type plate (pos.2) is attached with the following data:



Test label

All pressure control panels are subject to a functional and leak test. After the test procedure a test label is attached to the back of the mounting plate (pos.3) of each pressure control panel.

RK 11
geprüft / tested / testé

6. Shut-down

- 6.1 Close all cylinder valves. Close all other valves.
- 6.2 Depressurise the pressure regulator completely by turning the pressure regulator handwheel anti-clockwise. (inlet and outlet pressure gauges show 0 bar).
- 6.3 Close low pressure (line) shut-off valve (where applicable).
- 6.4 Open the waste gas valve(s) and close again (depressurise system).
- 6.5 For starting up the pressure control panel again refer to chapter 4.

7. Operation, maintenance and storage

- 7.1 Always protect the pressure control panel against damage (check in regular intervals).
- 7.2 Adjustment of the relief valve on the pressure regulator must not be altered!
- 7.3 Ensure perfect condition of seals, sealing surfaces and pressure gauges.
- 7.4 In case of malfunctions - such as a rise in the outlet pressure while the flow rate is zero, leakage to the ambient air, defective pressure gauges or an opening of the relief valve - immediately shut down the system and close the gas cylinder valves.
- 7.5 Before disconnecting the pressure regulator from the pressure control panel ensure that all pressure gauges show zero.
- 7.6 General operating conditions, transport and storage

Transport and storage:	-30°C up to 60°C
Atmospheric conditions:	rel. humidity: 50 % at 40°C 90 % at 20°C

Environment: Environment free from unusual amounts of dust, acids, caustic gases or substances like smoke, vapour, oil vapour, etc.
Note: The operation of pressure control panels in extreme weather conditions, especially at the coast, or on board of ships as well as vibrations or shocks impair the functional safety and are to be avoided.

Conditions differing from those described above may be agreed upon between manufacturer and user.

4. Start-up

- 4.1 Before starting work read this manual thoroughly and observe it accordingly.
- 4.2 Check if the pressure control panel is labeled for the relevant gas type.
- 4.3 Release the pressure regulator by turning the handwheel all the way anti-clockwise. Then turn the pressure regulator handwheel clockwise approximately half way.
- 4.4 Gradually open high pressure valves (only the fraction of one revolution), so that the inlet pressure at the pressure regulator slowly rises to the full value and the outlet pressure rises approximately to half of the maximum value.
After this filling process, fully open all high pressure valves.
- 4.5 Turn the pressure regulator handwheel clockwise until the desired outlet pressure value is achieved.
Check all connections for leak-tightness.
Gradually open the down-stream line shut-off valve and slowly pressurise the following pipework avoiding vibration. If necessary adjust the outlet (line) pressure by turning the pressure regulator handwheel.
- 4.6 For the use with flammable gases the complete system (including the pipework) must be purged with dry inert gas and all connections have to be checked for leak-tightness before start-up.

5. Changing cylinders

5.1 Changing all cylinders (e. g. 3 cylinders):







1. Close cylinder valves $V_{12} - V_{14}$.
2. Close block valve V_1 (pos.1)
3. Open and close waste gas valve V_5 (pos.5) (depressurise system)
4. Change gas cylinders.
5. Gradually open cylinder valves $V_{12} - V_{14}$
6. Gradually open block valve V_1 (pos.1)

5.2 Changing 2 cylinders (one cylinder reserve):

1. Close cylinder valves $V_{12} - V_{14}$
2. Close block valve V_1 (pos.1)
3. Open and close waste gas valve V_5 (pos.5) (depressurise system).
4. Close shut-off valve (of the cylinders to be exchanged) V_2 and V_3 (pos.6)
5. Gradually open cylinder valve of the spare cylinder V_4
6. Gradually open block valve V_1 (pos.1)
7. Change cylinders
8. Gradually open cylinder valves V_{12} and V_{13}

If desired a cylinder may be used as a spare cylinder. Therefore close the relevant shut-off valve and cylinder valve.

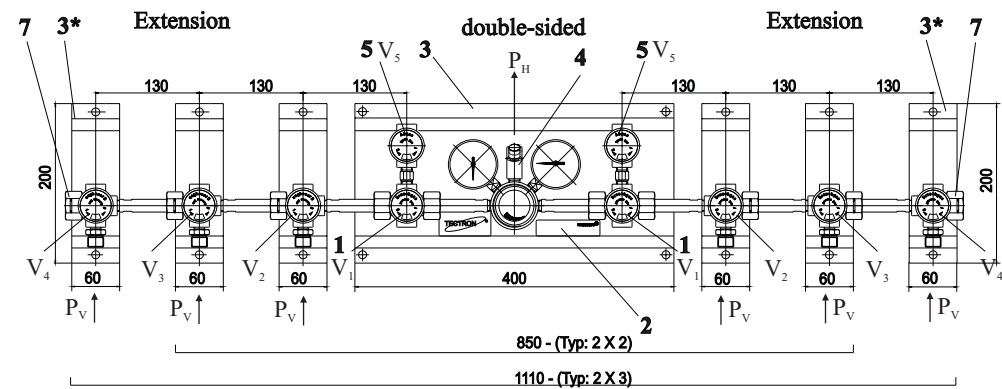
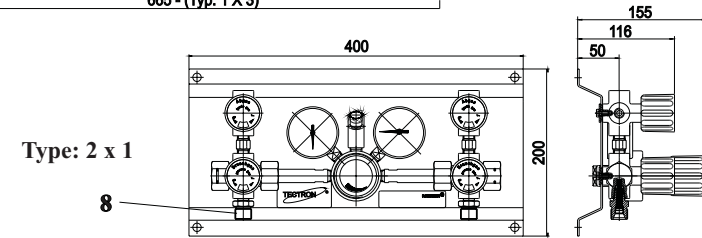
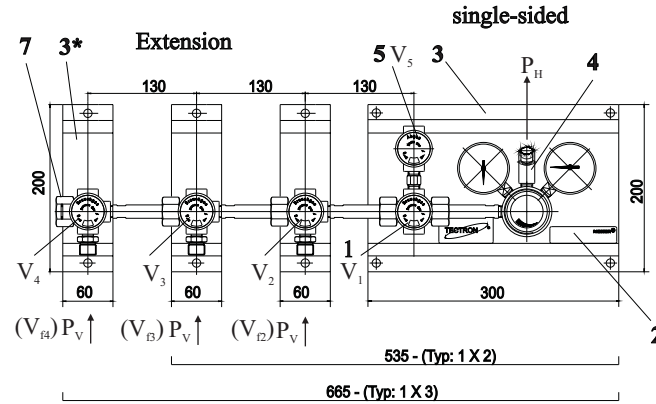
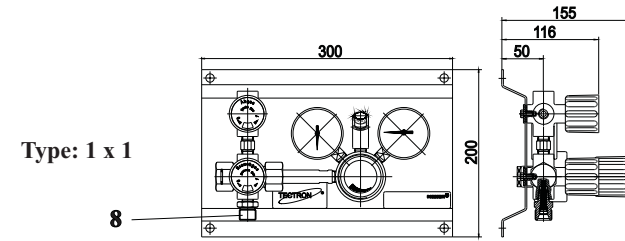
2. Safety instructions

- 2.1 All items of informations marked with  are valid as special safety instructions.
- 2.2 This pressure control panel adhere to state-of-the-art technology and to the demands of the existing standards and regulations.
- 2.3 Changes or modifications are not allowed to be made to the pressure control panel without the prior consent of the manufacturer.
- 2.4 The equipment must be operated by suitable trained personnel only.
- 2.5 The result of improper handling and improper use as intended can involve risks for the user and other persons as well as damage to the device.
- 2.6 Regulations to be adhered to:
 - BGV A1 (VBG 1), "General Specifications"
 - BGV D1 (VBG 15), "Welding, Cutting and Related Procedures"
 - BGV D34 (VBG 21), "Application of liquefied gases"
 - BGV B6 (VBG B6), "Gases"
 - BGV B7 (VBG B7), "Oxygen"
-  **Special attention has to be paid to the country specific laws, regulations and procedures concerning the use of this type of equipment.**
- 2.7 Use only for gas types the pressure control panel is labelled for (see item 3).
- 2.8 Do not use at temperatures below -30°C or above $+60^{\circ}\text{C}$.
- 2.9 The valve has always to be opened slowly!
- 2.10 All parts coming into contact with oxygen must be kept in oil-free and grease-free condition.
Fire or explosion hazard!
-     2.11 Smoking or open fire (e.g. candles) in the vicinity of the gas supply system is strictly prohibited.
Fire and explosion hazard!
- 2.12 Do not connect the pressure control panel for tapping points to a gas cylinder.
- 2.13 Protect gas cylinder against falling.

3. Installation

3.1 Pressure control panel

- 3.1.1 The installation must only be carried out by expert people who had suitable training especially regarding the safety instructions. This safety training has to be repeated in appropriate time intervals.
- 3.1.2 All parts of the pressure control panel have been subject to a functional and a leak test. All openings are covered. The required seals and labels are part of the scope of supplies. The components are shipped pre-assembled as far as possible.
- 3.1.3 Secure mounting plate (3), extension(s) and cylinder bracket(s) to the wall with the screws provided.
- 3.1.4 Position the gas cylinders in front of the cylinder brackets and secure them with a safety chain or belt.
- 3.1.5 Check the cylinder valve connections, the high pressure hose connectors and especially if the connection threads and seals are in perfect condition (where required briefly clean connectors using compressed air). Should any thread, seal or sealing surface of the connectors be damaged, **do not** connect and pressurise the system.
- 3.1.6 If there is no valve arrangement providing the possibility to shut off the entire low pressure pipe system or if the tapping point(s) are located far from the pressure control panel, a shut-off valve is required between pressure regulator and tapping point. The minimum distance between pressure regulator and the shut-off valve should be $20 \times D_n$ (internal diameter of pipe).
- 3.1.7 Connect the pressure regulator outlet and the down-stream line shut-off valve (not part of scope of supplies) of the pipe system.
- 3.1.8 For toxic or flammable gases connect waste gas valve outlets (5) and relief valve outlet (4) to a waste gas line. Ensure that the waste gas can be safely disposed of.



3.2 Installation extension (if not pre-assembled)

- 3.2.1 Unscrew the connector (8) from the inlet of the block valve (1) and close inlet of the block valve with sealing plug: Apply 5-10 clock-wise windings of PTFE-tape (Teflon-tape, article no. 0321422) to the thread (keep the first thread free from teflon-tape and fix the end of the tape tightly). Then seal the block-valve inlet gas-tight.
- 3.2.2 Unscrew sealing plug (7).
- 3.2.3 Secure mounting plate (3), extensions (3*) and cylinder brackets with screws provided to the wall.
- 3.2.4 Position the cylinders in front of the cylinder brackets and secure them with a safety chain or belt.
- 3.2.5 Check the cylinder valve connections, the high pressure hose connectors and especially if the connection threads and seals are in perfect condition (where required briefly clean connectors using compressed air). Should any thread, seal or sealing surface of the connectors be damaged, **do not** connect and pressurise the system.

- | | | | |
|---|----------------|---|-----------------|
| 1 | Block valve | 5 | Waste gas valve |
| 2 | Type plate | 6 | Shut-off valve |
| 3 | Mounting plate | 7 | Sealing plug |
| 4 | Relief valve | 8 | Connector |