

## 5. Operation and maintenance

- 5.1 Make shure that seals, sealing surfaces and pressure gauges are in good status.  
5.2 Pressure regulators are always to be protect against damage (visual inspection in regular intervals).
- ▲ 5.3 In case of malfunctions, e. g. an increase of the outlet pressure during the supply, or in case of leakage versus atmosphere or a defective pressure gauge, shut down the upstream gas supply and take the pressure regulator out of operation.

## 6. Shut-down

- 6.1 For short-term interruption of work, it is sufficient to close the shut-off valve at the consumer unit.  
6.2 For longer interruptions or to end the work, close shut-off valve (1) first. After the pressure regulator has been depressurised, release the hand knob (4). Close shut-off valve at the consumer unit.
- ▲ 6.3 Before disassembling the pressure regulator, make sure that all pressure gauges display zero.

## 7. Gas saving mechanism

Saving of inert gas with certain operation conditions  
During frequent burner circuits a substantial gas saving can be obtained by connection of a gas saving device at the outlet side.

## 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 manufacturers 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.

# Instructions for use TORNADO 2000

Pressure regulator for tapping points  
Flow rate indication by pressure gauge

spectrotec

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## 1. Application

- 1.1 Designated use  
Use the pressure regulator for tapping points TORNADO 2000 with an suitable shut-off valve for gases dissolved under pressure, compressed or liquified gases. The pressure regulator TORNADO 2000 reduces an inlet pressure to an as constant as possible outlet pressure.
- ▲ 1.2 Non-designated use  
Do not use the pressure regulator for gases in the liquid phase.  
Do not use for unsuitable types of gas or corrosive gases.  
Do not use at temperatures below -30°C or above +60°C.

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

### 1.3 Technical data

Inlet pressure:	max. 40 bar	} s. name plate
Indicating range:	16 l/min	
	30 l/min	
Materials:	- Body: Brass	
	- Diaphragms: EPDM	
	- Seat sealing: EPDM	
Weight:	1,6 kg	
Tightness:	inside and outside: 1 x 10 <sup>-3</sup> mbar l/sec	

The pressure regulator TORNADO 2000 conforms to the latest standard DIN/EN/ISO 2503  
For special versions, this standard is taken into account as appropriate.

### 2. Safety instructions

- 2.1 All items of informations marked with  are valid as special safety instructions.
- 2.2 These pressure regulators 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 regulator 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"

**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 regulator is labelled for (see item 3).
- 2.8 Do not use at temperatures below -30°C or above +60°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.

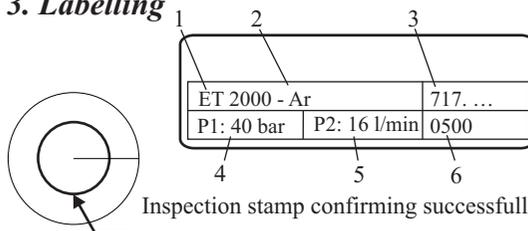
**Fire or explosion hazard!**

- 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 regulators for tapping points to a gas cylinder.
- 2.13 Protect gas cylinder against falling.

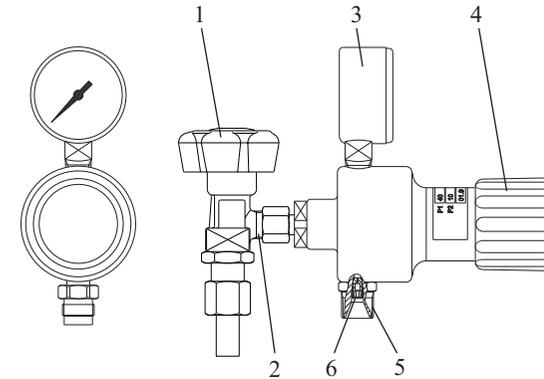
### 3. Labelling



- 1 Pressure regulator for tapping points TORNADO 2000
- 2 Gas type
- 3 Ordering-no.
- 4 Max. inlet pressure
- 5 Flow rate indication
- 6 Date of manufacture

### 4. Start-up

- 4.1 Before starting read the specifications of this instruction for use and observe it while working.
- 4.2 Check, that the cylinder valve thread, the pressure regulator connector and the connection seals are without any damage (blow through if necessary).  
Do not use the pressure regulator if damaged.



- 1 Shut-off valve
- 2 Shut-off valve connection
- 3 Pressure gauge conform to DIN/EN 562
- 4 Hand knob
- 5 Hose tail conform to DIN/EN 560
- 6 Throttle/ orifice plate

- 4.3 Connect the pressure regulator to the closed gas cylinder valve (1). Tighten it gas-tight with a suitable spanner.

- 4.4 Correspondence between flow rate and orifice-diameter:

Indication range [l/min]	Gas type	Orifice diameter [mm]
up to 16	Argon, CO <sub>2</sub>	0,55
up to 30	Argon, Co <sub>2</sub>	0,75
up to 50	Mitrogen-hydrogen 80/20	0,85

- 4.5 The pressure regulator for gas cylinder contains an inserted orifice plate (6). Check if an other orifice plate is installed in your system. In this case it has to be removed, because this orifice plate isn't adapted to the pressure regulator.

- 4.6 Adjustment of flow rate

Release the positioning spring with hand knob (4); first close shut-off valve at the consumer unit; open shut-off valve (1) slowly (High pressure gauge 3 indicate cylinder pressure); adjust required outlet pressure with hand knob (4). Open slightly shut-off valve at the consumer unit. Correct pressure setting in case of a decrease of pressure.