MESSER
Cutting Systems

OPERATING INSTRUCTIONS

for

Tapping points

Type: TORNADO BI

PRODUCT

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1. Introduction

These operating instructions are the original operating instructions for the TORNADO BI extraction points from Messer Cutting Systems GmbH. The German version is the original.
The operating instructions are intended to enable the operator to operate the device safely and as intended and to warn against foreseeable misuse. It is intended for specialist personnel and the operator of the system.

All information marked with ⚠ are considered special safety instructions

2. Use

2.1. Intended use

The intended use of the TORNADO BI tapping point is to extract a gas from a system. The outlet pressure or the flow rate can be adjusted.

The permitted gas types and pressure ranges are specified on the type plate (see "Identification / type plate").

As the tapping points described here do not have their own ignition source (ignition hazard assessment in accordance with DIN EN ISO 80079-36), they may also be used in an area defined as an Ex zone.

The operating instructions must always be made available to every user in order to ensure that the device is used as intended.

2.2. Non-intended use

Any non-intended use misuse. Tapping points may only be used for the specified gases, in accordance with the type plate and within the specified pressure range.

Furthermore, the following operating conditions are considered improper use:

- ⚠ use for gases in the liquid phase
- ⚠ failure to carry out inspection and maintenance work
- ⚠ backward pressurization (against the direction of flow)
- ⚠ operation with gases that are not specified on the rating plate
- ⚠ operation outside the permissible technical limits
- ⚠ failure to observe and comply with the locally applicable statutory regulations and other provisions
- ⚠ non-observance of the operating instructions
- ⚠ failure to observe the information on the rating plate and the product data sheet

2.3. Technical data

Oxygen inlet pressure(P_v) [bar]	Flow rate (V_n) [m^3/h] at a back pressure (P_2) in [bar]				
	1	2,5	4	10	20
40	6,5	12,5	17,5	41	54
20	6,5	12,5	17,5	40	-
10	6,5	12	17	-	-
5	6,5	-	-	-	-

For other gases, this flow rate is multiplied by the following factors:

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

Acetylene Upstream pressure(P_v) [bar]	Flow rate (V_n) [m^3/h] at an outlet pressure (P_2) in [bar]	
	0,5	1
1,5	3,3	5

3. Security

- The tapping point corresponds to the current state of the art and the recognized rules of technology as well as the requirements of the existing standards and regulations.
- No changes or modifications may be made to the tapping point without the manufacturer's approval.
- No adapters may be used between the gas pipe and the tapping point
- Improper handling and improper use may result in danger to the user and other persons as well as damage to the appliance.
- All parts that come into contact with oxygen must be kept **free of oil and grease**

Fire and explosion hazard

- Smoking or naked flames (e.g. candles) in the vicinity of your gas supply is strictly prohibited!

Fire and explosion hazard

- The tapping point valve must always be opened slowly!

3.1. Accident prevention regulations to be observed:

- DGUV Regulation 1 "Principles of prevention"
- DGVR-500 Chapter 2.26 "Welding, cutting and allied processes" up to 20 bar
- DGUV 100-500 "Operation of work equipment"

3.2. Temperatures

When operating the system, normal temperatures to be expected in a production area are assumed: -20°C to +60°C.

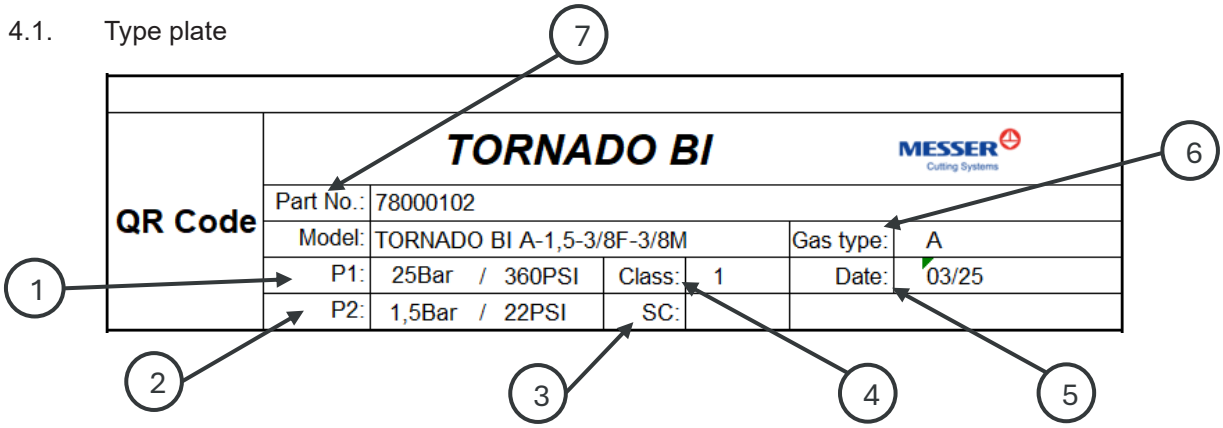
The air humidity must be below 60 % relative humidity to prevent condensation. The operating temperature depends on the gas used.

3.3. Degree of cleanliness

⚠ Access to the system and to escape and rescue routes must not blocked. The product should be kept clean (dust-free).
A suitable purge gas must be used, taking into account the quality and properties of the process gas.

4. Labeling

4.1. Type plate



Position	Designation	Explanation
1	P1	Maximum permissible inlet pressure
2	P2/Qn	Maximum permissible outlet pressure/outlet flow rate
3	SC	Manufacturer code
4	Class	Pressure classification according to ISO 2503
5	Date	Date of manufacture (quarter/year)
6	Gas type	Gas type according to ISO 2503
7	Part No.	Article number see point 4.2

4.2. Item number Nomenclature

Example 780 0 0 1 02

Pos. 1-3	Type	Pos. 4	Gas type	Pos.5	Outlet display	Pos.6	Inlet connection	Pos7-8	Outlet connection
780	Tornado BI	0	Acetylene	0	1,5Bar	1	G3/8 LH IG	01	G3/8 RH AG
		1	Hydrogen/Propane	1	2,5Bar	2	G3/8 RH IG	02	G3/8 LH AG
		2	Hydrogen	2	10Bar	3	G3/8 LH AG	03	G1/4 RH AG
		3	FG	3	20Bar	4	G3/8 RH AG	04	G3/8 RH AG + choke
		4	NFG	4	16l/min			05	G3/8 LH AG + choke
		5	O2	5	32l/min			06	G1/4 RH AG + choke
		6	Arogon/Co2						
		7	Forming gas						

The table is exemplary and is for illustrative purposes only, as it is subject to permanent additions in the event of future extensions of the variants.

4.3. Model code

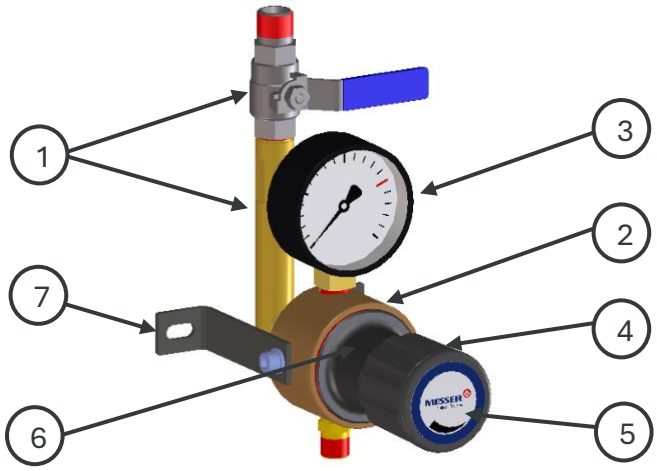
Example: TORNADO BI NFG-16-3/8M-3/8

Gas type	Outlet pressure / flow rate	Input screw connection	Output screw connection
H/P	1,5Bar	3/8M	3/8M
A	2,5Bar	3/8F	1/4M
FG	10Bar		
Ar_Co2	20Bar		
O2	16l/min		
NFG	32l/min		
H			
Ar_He			

The table is exemplary and is for illustrative purposes only, as it is subject to permanent additions in the event of future extensions of the variants.

5. Assembly

5.1. Structure



POS	Designation	Explanation
1	Accessories 1	Ball valve + elbow for connection from above
2	Valve body	Basic controller
3	Pressure gauge	Display of the process pressure (back pressure display)
4	Adjustment valve	Setting the back pressure
5	Label gas type	Color coding of the approved gas type
6	Type plate	
7	Accessories 2	Wall bracket

5.2. General information

⚠ **Injury or damage due to improper assembly or disassembly**

Special steps are required for assembly and disassembly work on the product. Personal injury and damage to the product are possible.

- Assembly and disassembly work may only be carried out by the installer or appropriately qualified specialist companies and persons.

5.3. Commissioning

The tapping point can be attached to the room wall using the mounting plates, which can be purchased separately as an accessory. This is always necessary if the existing stability of the pipe on site is not sufficient.

All lines must be connected in accordance with the applicable standards and specifications and tested with purge gas (pressure test and leak test). The information on dimensioning the connections is described in the "Installation" chapter.

Connections at the inlet of the TORNADO BI tapping points may be tightened to a maximum of 40 Nm.

Commissioning procedure

The entire pipe network up to the consumer must be flushed in via a flue gas valve on the consumer. Refer to the consumer's system documentation.

1. Close all valves and fully depressurize the tapping point by turning the handwheel counterclockwise as far as it will go.
2. Open the valve of the process gas source and any downstream valves. Ensure that the tapping point does not experience a pressure surge.
3. Slowly and gradually adjust the tapping point to the required outlet pressure. The process source pressure and the gas type properties must be taken into account.

During regular operation, the system is supplied with power.

To interrupt the supply or shut down, close all valves and fully depressurize the tapping point by turning the handwheel counterclockwise as far as it will go.

5.4. Decommissioning

Close all valves and fully depressurize the tapping point by turning the handwheel counterclockwise as far as it will go.

6. Accessories

Accessory set 1

The accessory set consists of the following items and is used to connect your tapping point with piping from above.

- Ball valve + elbow pipe
- Wall bracket

All connections must be screwed gas-tight during installation and checked for leaks. See point 5.3 Commissioning.

Accessory set 2:

The accessory set consists of the following items and is used to attach your TORNADO BI tapping point to the wall if required:

- Wall bracket

7. Maintenance/repair/troubleshooting

7.1. Maintenance

Components	Investigation	Interval
All	Visual inspection for corrosion, damage and Fastening	at least annually and before Commissioning
	Function test	
	Leak test	

7.2. Repair

- Repairs may only be carried out by competent persons in repair workshops authorized by Messer Cutting Systems.
- Faultless operation and safety are only guaranteed if original spare parts are used.
- In the event of unauthorized repairs or modifications by the user or third parties without the manufacturer's approval, liability for the resulting consequences is excluded.
- After the repair, the tapping point must be completely checked. For type-approved pressure regulators (oxygen and acetylene), the requirements of the type approval or type recognition must be observed.

7.3. Troubleshooting/fault rectification

Malfunction	Possible cause	Remedy
Back pressure too low	• Process source	• Check the inlet pressure at the process gas source and change the process gas source if necessary
Vibration noises in the pressure regulator	• Pressure regulator defective	• Replace pressure regulator
Pressure regulator iced up	• Flow rate too high	• Reduce the flow rate or use a gas preheater if possible
System pressure cannot be set to the desired value	• Pressure regulator defective • System pressure outside the intended range	• Replace pressure regulator • Only operate the system at the specified operating pressure
Insufficient or fluctuating flow rate	• Inlet pressure of the process gas too low • Valve defective	• Increase inlet pressure • Replace defective valve
Leakage	• Leaky connections	• Perform pressure test and leak test

8. Waste disposal

Dismantling and disposal must be carried out in accordance with the official and legal requirements at the location of the system. The operator must prepare a risk assessment and work instructions prior to dismantling work.