TechNote TN-5

Connection of an Ozone Analyser:

VENT and PRESS Mode - In Line and Full Flow

Rev. 02/2008

In the majority of applications ozone analysers are connected in the **VENT mode**: After measurement in the instrument the sample gas is vented (via an ozone destruct) to the atmosphere **at no intentional overpressure** (no intentional counter pressure and no intentional flow resistance). The pressure range of the analyser thus needs to be not higher than the highest atmospheric pressure to be expected, plus the pressure drop in the ozone destruct. We are supplying this type of VENT mode analyser with the pressure range of 1.15 bars absolute (standard pressure range). This range fits any application in the VENT mode. Even in Siberia in deep winter atmospheric pressure never rises above 1.09 bars absolute.

All other ways of connecting an ozone analyser are characterized by a **systemic pressure** different from the ambient atmospheric pressure. The ozone analyser now is operated in the **PRESS mode**. For this type of applications we are offering six different pressure ranges higher than 1.15 barabs (from 1.5 to 4.0 barabs) to optimally adapt the pressure range of the analyser to the systemic overpressure present in a specific application.

For operation below the ambient atmospheric pressure (down to about 0.4 barabs) the pressure range of 1.15 barabs (standard pressure range) is recommended.

Full flow connection of an ozone analyser means that all of the ozone gas flowing in the ozone system is flowing through the analyser.

In line connection only means that the analyser is not connected in the VENT mode. When the ozone gas is flowing on different ways, *in line* means that only part of the ozone gas is flowing through the analyser.

In the PRESS mode an analyser can be connected *in line* and *full flow* at the same time. This is the connection we are recommending for the OZONE GENERATOR BMT 802 (see figure 1) because the flow rate usually will be less than 1 l/min which we recommend as the upper flow limit for the OZONE ANALYZER BMT 964.

If in an *in line* connection the flow rate through the analyser would be higher than 1 l/min we recommend to divide the ozone gas flow in two parts: one part flowing through a bypass, and one part (less than 1 l/min) flowing through the analyser (see figure 2: recommended connection of an ozone analyser with the OZONE GENERATOR BMT 803).

The connection of a BMT OZONE ANALYZER has to be allied to one of three ranges of the ozone gas flow rate in an ozone system:

1) flow rate much higher than 1 l/min
2) flow rate equal or less than 1 l/min
3) flow rate only slightly higher than 1 l/min

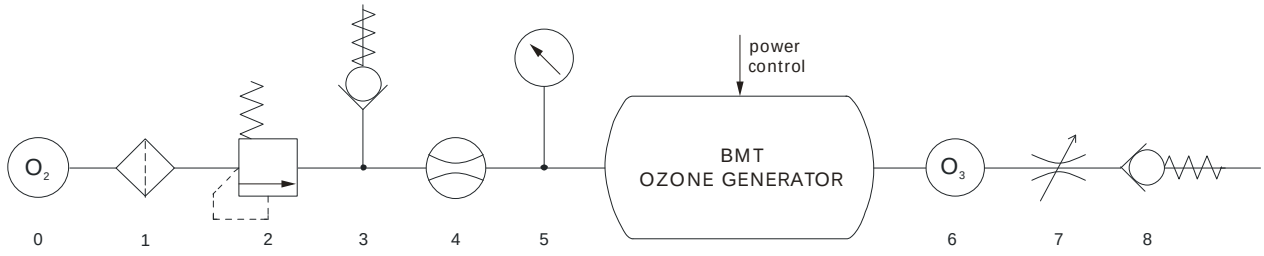
Range 1) is the typical situation for the VENT mode. It covers more than 95% of all ozone analyser applications.

Range 2) does not allow any other solution than *full flow* connection in the PRESS mode.

Range 3) is the only critical one. If the system flow rate is only slightly higher than one l/min the pressure becomes important now. One needs to know here that the pressure drop of a gas depends on its volume flow rate, not on the mass flow rate. If the flow rate would e.g. be 2 Nl/min, and the pressure would be 2 barabs, the BMT 964 readily can be connected *full flow*. Of course the analyser now has to have a pressure range of 2 barabs or higher.

In case the system flow rate is a few l/min, or higher, the user has to decide if he wants to make the connection of the analyser simple, but waste some of his ozone gas by an analyser in the VENT mode, or if he rather wants to install some more parts and spend some more money for the bypass connection (bypass throttle valve, flow meter, analyser with higher pressure range) to completely save his precious ozone gas.

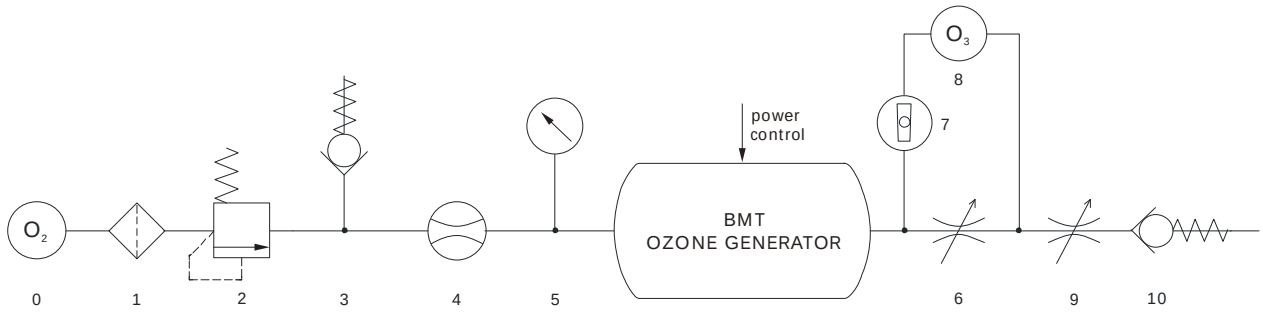
Concerning zeroing of the ozone analyser refer to our TechNote TN-6 (www.bmt-berlin.de).



Attention: Tubing should be PTFE, even between 0 and 5 !

0 oxygen source (5 bar max.)
1 filter (optional)
2 pressure regulator
3 pressure relief valve (safety valve)
4 flow meter (oxygen mass flow)
5 pressure gauge
6 ozone analyzer (flow < 1 l/min)
7 throttle valve
8 check valve

fig. 1: *Installation of an ozone analyser at low system flow (≤ 1 l/min)*



Attention: Tubing should be PTFE, even between 0 and 5 !

0 oxygen source (5 bar max.)
1 filter (optional)
2 pressure regulator
3 pressure relief valve (safety valve)
4 flow meter (oxygen mass flow)
5 pressure gauge
6 throttle valve (bypass)
7 rotameter
8 ozone analyzer (flow < 1 l/min)
9 main throttle valve
10 check valve

fig. 2: *Installation of an ozone analyser at high system flow (>> 1 l/min)*